Management Competence and Incompetence Training: Theory and Practice

Developing Contextual Intelligence through Decision-Competency Training

in Nurturing the Opposable Mind

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ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work. To the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning (University Postgraduate Centre, 2013 .p.107).

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ABSTRACT

Several highly regarded scholars in management claim that educational methodologies using different management paradigms serve to increase incompetency in thinking and deciding by executives. Evidence-based testing of these claims is rare; however, and examinations of such claims have telling weaknesses (e.g., lacking in comparable control and treatment groups).This study examines andragogical methods (i.e., learning strategies focused on adults) and their effectiveness (or lack thereof) in improving sense-making and decision-making competencies in graduate managers in master of business administration (MBA) programmes.

The thesis tests several hypotheses using an experimental design, involving 150 MBA students and executive learners. The study includes a series of four in-basket simulations and role-plays simulating decision-making scenarios versus traditional lecture trainer-learner formats. Three decision categories (Human Resources, Marketing, and General Management) are tested in the four in-basket simulations and simulated interactions as well as independent thought. The study examines, through the application of fuzzy set qualitative comparative analysis (fsQCA) procedures, the effect of goal-based scenarios; devil's advocate dissent; group versus individual decision-making using different processing tools; accessing implicit knowledge; and "drop your tools" training on decision competency and incompetency outcomes as well as decision confidence. Laboratory experiments, involving 150 MBA graduates and Alumni from four universities across New Zealand, test 13 propositions. The findings provide evidence supporting the viability of testing training theory and tools that increase competency as well as incompetency in business-related decisions.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

An unfortunate proposition, confirmed by many research studies, is that human decision-making in general and management decision- and sense-making in specific is imperfect (Kerr, MacCoun & Kramer, 1996; Marewski, Gaissmaier & Gigerenzer, 2010; Simon, 1960). At the same time, however, several highly regarded scholars in management claim that educational methodologies using different management paradigms serve to increase incompetency in thinking and decision-making by executives (Armstrong & Brodie, 1994; Armstrong & Collopy, 1996; Armstrong & Green, 2007a). Businesses cannot afford to employ highly educated, highly paid graduate managers who lack the competence to manage and lead their enterprises. Woodside (2012) underlines this problem, stating that "training that results in inconsequential outcomes can represent substantial opportunity costs" (p. 280).

For business schools to remain relevant and survive in the competitive education marketplace, they will have to deliver on employer demands to produce graduates with the ability to use relevant management knowledge to make competent decisions. The complexity of the marketplace and the resulting difficulty in finding optimal solutions for real-world problems are widely recognised, as are the demands from employers to deliver graduate managers who are able to deal with these complexities. As a result, educationalists continually re-engineer curricula, and this reality is the foundation for the key questions this study examines.

This chapter outlines decision competence and incompetence and the current state of knowledge before presenting the research questions and key concepts of this study. It then surveys the known complexities in executive decision- and sense-making and the problems business schools and other educational institutions experience in developing decision competencies in protégés. This is followed by a range of suggestions from

scholars on how to assist management students to develop cognitive and ecological rationality. The methodology used in this study is then outlined and the chapter concludes with the contributions this study makes to the body of knowledge.

1.1 THE COMPLEXITY OF COMPETENT DECISION-MAKING

Dyer, Fishburn, Steuer and Zionts (1992) state, "Many real-world problems are so complex that one cannot reasonably expect to find an exact optimal solution" (p. 11). This leads one to ask whether trainers can move learners to a level of high competency and reduce incompetence and ineffective decision-making through andragogical methods (i.e., learning strategies focused on adults). If this is possible, as Mintzberg (2004) and Boyatzis, Stubbs and Taylor (2002) claim, what are the most effective ways to provide such education? Or more precisely, which andragogical methods or combinations of methods are most effective in developing decision- and sense-making competencies? Are theories, models and concepts incorrect, or is it the way in which these theories and tools are taught that causes master of business administration (MBA) graduates and executives to apply these tools within inappropriate contexts? Finally, does some training to increase knowledge and decision competency actually result in incompetent decisions or actions? If so, are there other ways to prepare managers for their future roles? Is there training that will reduce this tendency for incompetency and improve the decision- and sense-making of future executives? Which andragogical methods are most effective in developing decision- and sense-making competencies and reducing decision incompetency?

Surprisingly, scientific testing of the efficacy of change strategies to improve the effectiveness of executives' decisions – using treatment and control groups and random assignment of subjects to groups – is relatively rare. Exceptions to this conclusion are available (Armstrong & Collopy, 1996; Spanier, 2011; Wilson, 2011)

In addition to the above questions, the study asks: How can MBA curricula be re-engineered for the fast-changing, global, and highly complex business environment of the 21st century in order to prepare future managers for the unknowable, unpredictable future?

The next section introduces the research problem, discusses the key concepts involved, and outlines the methods used to address the problem before presenting a rationale for the use of these particular methods.

1.2   THE PROBLEM AND ITS CURRENT STATUS

1.2.1   *Evidence from the Real World*

Educationalists and behavioural psychologists have been intensely interested in decision- and sense-making competencies for several decades (Schank, 1994; Todd & Gigerenzer, 2007; Weick, 1995). When one reviews the substantial number of studies, a disturbing theme emerges. Scholars doing rigorous research find that trainers (e.g. coaches, executive trainers, educationalists, and development officers) may be using tools or providing training – knowingly or unknowingly – that lead to incompetence in some contexts (Armstrong & Collopy, 1996; Armstrong & Green, 2007a; Capon, Farley, & Hulbert, 1987; Morrison & Wensley, 1991; Wilson, 2011; Woodside, 2012b). Several examples of interventions that are less than effective – in some cases inadvertently causing increased crime rates, increased teen pregnancies, psychological distress and hastened death – are provided in Wilson's (2011) book *Redirect*. A telling example is the ineffective use of Critical Incident Stress Debriefing (CISD) – a set of psychological debriefing techniques – to prevent post-traumatic stress disorder in emergency workers who have been exposed to traumatic events. In 2003, psychologist McNally (cited in Wilson, 2011, p.4) recommended "ceas[ing] compulsory debriefing of trauma-exposed people". This drastic suggestion follows research comparing CISD

with writing down thoughts and emotions (well after the event and in private), which found the latter more effective. Not only did the results indicate that CISD is ineffective, they show that CISD can cause psychological problems. The generally accepted solution of offering the services of a well-trained professional does more harm than good. The hundreds of fire and police departments that use CISD are wrong in assuming that "offering people the services of trained professionals is better than asking them to sit and write by themselves" (Wilson, 2011, p. 5).

Woodside (2012b, p. 280) defines this type of activity as "'Incompetency training' [that] includes formal and informal instruction that consciously (purposively by the trainer) or unconsciously (unknowingly by the trainer) imparts knowledge, attitudes, beliefs, and behaviour (including behavioural protocols) that are useless, inaccurate, misleading, and/or lower performance outcomes of the trainee versus no training or training using alternative training methods." This principal example and Woodside's definition naturally lead researchers to question the effectiveness of other formal training methods and tools.

1.2.2   *The Problem in Business Schools*

Armstrong and Collopy (1996) and Armstrong and Green (2007b) report that substantial numbers of executives make ineffective decisions based on frameworks, models, and concepts in textbooks and that these ill-selected strategies result in less profitable organisations and some companies' demise. Their findings show that incompetent decisions increase in frequency with increased levels of strategic planning education.

The findings of empirical studies, as well as the proliferation of examples in popular literature on incompetent business decisions, inform the primary concerns of this study, which are: Do business schools teach future managers to be incompetent decision-makers? Are the theories, models and concepts taught incorrect, or is it the way in

which these theories and tools are taught that cause MBAs and executives to often apply these tools within inappropriate contexts? If so, are there other ways to prepare managers for their future roles and training that will reduce this tendency for incompetency, and improve the decision- and sense-making of future executives?

There is clear evidence in the business environment that executives are frequently less than competent and often make ineffective decisions. The popular business literature describes numerous examples of less than competent decisions. The evidence includes low impact cases such as the thousands of start-up small business enterprises failing annually (Campbell, 2005) as well as high impact examples such as Air New Zealand's Ansett purchase and the resulting collapse of Ansett (Gottliebsen, 2003) and the Enron disaster which catalysed the resulting global financial crisis (Dickerson & Duffy, 2002).

Boyatzis et al. (2002) investigate the question, "Can MBA and participants in executive education develop competencies related to outstanding managerial and leader performance?" (p. 151). Their literature review supports the findings of Pfeffer and Fong (2002a) and reports on business schools' effectiveness in improving some competencies (goal-setting, self-confidence, information analysis, theory-building and pattern recognition), whilst other skills remain unaffected or even decrease (persuasiveness, developing others, planning self-control, initiative and systems-thinking). Their empirical study concludes, "An MBA education can help people develop cognitive and emotional intelligence competencies needed to be outstanding managers and leaders. But we cannot use the typical lecture-discussion methods with their focus on knowledge acquisition" (Boyatzis et al., 2002, p. 160).

One of the self-confessed design short-comings of Boyatzis et al. (2002) is the lack of clarity regarding which components of the MBA programme is attributable to improving the three components of self-management, relationship management and

cognitive development. In line with the authors' final suggestion, this study investigates the impact of different pedagogical approaches to determine which educational methods are associated with improving the cognitive development of MBA and executive students, as well as the other competencies needed to make effective decisions within complex business environments.

Despite the criticisms and the evidence from the real world that highly educated managers and executives still frequently make incompetent decisions following their graduations from top business schools, more MBAs enrol worldwide every year and employers continue to recruit MBAs for high-level positions (Simpson, 1987). Accordingly, the impact of business schools' influence on the decisions middle and senior managers make is unlikely to diminish.

1.2.3 *Central Philosophy*

MBA schools are continually challenged to integrate and balance the need for technical competencies (such as auditing procedures, analysing financial reports, designing recruitment procedures, streamlining the supply chain and segmenting the market to launch a new product) with the ever-growing demand for general soft skills (such as oral communication skills, networking, teamwork and problem solving skills, dealing with diverse cultures and skill levels, negotiating contracts and managing motivational levels). A delicate and skilled balancing act is required to deliver the requisite competencies to graduates through management development and learning. The intention of this study is not to add additional criticism to the body of literature on MBA programmes, but rather to investigate the effectiveness of some instructional methods in delivering decision competencies – and to aid educationalists in their pursuit of delivering managers with high competencies.

Regarding the concepts of teaching and learning, although this research suggests only a small shift in the focus of teaching and learning, this slight shift is a key element in the philosophy of this study. In pursuit of business schools' mission to deliver the essential competencies required to manage and lead in the complex global business environment, this study will seek to answer the question: What and how do students need to learn?, rather than investigate and develop answers to the question: What do business schools need to teach? Not only does the central philosophy of the study focus on the outcome for MBA students, but it also circumvents the controversial issues related to whose responsibility learning is, the teacher's or the learner's? These philosophical issues are well beyond the scope of this study. This research therefore subscribes to the student-centred experientialist orientation, and supports the notion that learning is a process of co-creation of knowledge, skills and attributes, where the student participates fully in the process and is not merely a recipient of pre-designed development programmes. Effective learning takes place when participants' skills, knowledge and beliefs are challenged (Keys & Wolfe, 1988).

This study does not attempt to investigate how important these cognitive skills are in relation to other soft skills. Nor does it attempt to examine whether a consensus exists among diverse business schools and their various MBA programmes about the need to deliver decision- and sense-making skills. Further, no attempt is made to find support for claims that certain models or theories are incorrect or unacceptable. This study is based on the twin hypotheses that decision- and sense-making competency is important for future business leaders; and that not all theories, concepts and models are valid, correct or useful, theorists will keep on refining those that are not and research-based teaching will encourage relevance and rigor in curricula.

1.2.4   Masters in Business Administration (MBA)

Simon (1947) writes, "Administration is the art of getting things done" and, although he purports that all practical activities involve both deciding and doing, "It has not commonly been recognized that a theory of administration should be concerned with the processes of decision as well as with the processes of action" (p. 1). He continues by highlighting the need for administration theory to "include principles of the organization that will insure correct decision-making just as it must include principles that will insure effective action" (p. 1). According to Simon (1947), all social or professional actions involve intentional or unintentional decisions concerning what to act upon and what to relinquish.

In some cases this selection process is instinctive or habitual (as when driving a car or touch-typing a letter) (Schank, 1995). For other selections the process consists of a complex web of inter-linked choices and decisions, often based on extensive analysis, planning, design and implementation decisions (e.g. when marketing managers design a new marketing campaign to reactivate dormant clients; when managers select a venue to hold a sales conference; or when managers have to reprimand project teams for non-conformance. The list is endless.) Simon lists two common characteristics of the chain of decisions people make, firstly that at any moment there is a multitude of alternative possible actions and secondly people narrow down the possible alternatives to the one which is acted out by some process of elimination or choice (Simon, 1976, p. 4). Simon hastens to add that the words "choice" and "decision" can be used interchangeably, but when these words are used to describe the selection process they do not necessarily include the common connotations of deliberate, rational or self-conscious thought.

1.3   MAKING THE CUT

This thesis tests theoretical propositions by Gigerenzer and Brighton (2004, 2008, 2009a) and Weick (1995, 2007) for increasing decision- and sense-making competencies of managers within the contexts most relevant to the firm.

1.3.1   Contextual or Ecological Rationality

Simon (1976) states that all decisions have three key limitations in common: they are grounded in incomplete information (bounded rationality); human decision-makers have limited alternative generation abilities; and human decision-makers have limited insight into the future consequences of the alternatives that are under consideration. Simon (1956, 1990) argues that decisions and cognitive strategies can only be judged as rational or irrational and optimal within the confines of their context. According to Simon (1990), the internal cognitive capacities and the external environment that surrounds our rationality are closely linked. "Human rational behavior … is shaped by a scissors whose two blades are the structure of the task environments and the computational capabilities of the actor" (Simon, 1990, p. 7). This analogy is an important representation of what it might take for management graduates to "make the cut". Whilst external environmental factors may be immutable for the decision-maker, the internal cognitive capacity of the actor – here graduate managers – may be shaped by educational development or evolution (Todd, 2001; Todd & Gigerenzer, 2003). Educationalists expect, as part of the outcome when developing effective decision-makers, the development of students' ecological rationality (Todd & Gigerenzer, 2000, 2003, 2007). This entails students with the ability to make "good decisions with mental mechanisms whose internal structure can exploit the external information structures available in the environment" (Todd & Gigerenzer, 2003, p. 144).

1.3.2   Fast and Frugal Heuristics

Gigerenzer and Murray (1987) propose "fast and frugal" alternatives to the complicated, time-consuming, and often defective probabilistic view of human decision-making. Early probability models of human thinking – in which humans attempt to find optimal solutions – were popularised by George Boole (1854-1958) (quoted in Gigerenzer, 2008). In contrast, heuristics are fast and frugal cognition models. Heuristic cognition models focus on situations in which people need to act fast (rarely not of concern for logical models of the mind), the probabilities or utilities are unknown, and multiple goals and ill-defined problems prevent logic or probability theory from finding the optimal solution. In the real world, decision-makers must arrive at their choice using realistic amounts of time, information and computational resources (Gigerenzer & Todd, 1999). This study builds on the propositions of Gigerenzer and colleagues that "human reasoning and decision making can be modelled by fast and frugal heuristics that make inferences with limited time and knowledge. Heuristics that are matched to particular environments allow agents to be ecologically rational, making adaptive decisions that combine accuracy with speed and frugality" (Todd & Gigerenzer, 2003, p. 148).

Hasford (2013) builds on the work of Dijksterhuis (2004) and colleague Nordgen (Dijksterhuis & Nordgen, 2006) to investigate how customers' product decisions should be optimized. Evidence from his empirical study on when customers should make either fast or slow decisions, leads Hasford (2013, p. 70) to conclude that "consumers should think more about their everyday decisions, use intuition for occasional choices, and 'sleep on it' before making major purchase decisions", to achieve optimal outcomes.

1.3.3   When Less Is More

Experimental evidence shows that experts use surprisingly little information in forming

their judgements (Shanteau, 1992). In laboratory situations, people have been shown to

use a single piece of information to make a choice, despite the availability of other

pieces of information (Goldstein & Gigerenzer, 1999; Goldstein & Gigerenzer, 2002).

In real life (as in MBA assessments and the experimental laboratory of this research)

managers must select alternative courses of action despite the absence of the necessary

information to complete rational decisions.

Even more surprisingly, some studies report on the effectiveness of simple decision

algorithms (heuristics) that rely on a total lack of knowledge to make appropriate

decisions (Todd & Gigerenzer, 2003). Gigerenzer (2008) explores the misconception

that more information and more extensive computation are always better and

paradoxically states that "good decisions in an uncertain world require ignoring part of

the available information" (p. 22). Past information that is used to assist in prediction

might be drowned by irrelevant information, and the more complex the issue, the more

likely it is that noise will need to be ignored to determine the relevant and robust

information. Having insight into which data are relevant and which should be ignored is

part of the decision-making problem, and the more complex the issue and the context,

the more enabling forgetting and ignoring information may be (Gigerenzer & Brighton,

2009b; Marewski et al., 2010; Schooler & Hertwig, 2005).

Klein, Moon and Hoffman (2006) refute the myth that more information makes for

better decisions. Their study provides empirical support for the hypothesis that more

information does not necessarily lead to better decisions; it does affect confidence

however. But an increase in people's confidence is not balanced by increased

correctness or improved performance. People tend to be overconfident, despite their empirically evident incompetence (Omodei, 2005; Oscamp, 1965).

Very often organisational crises cause managers to stumble, and these crises often threaten their personal mental and cognitive stability as well as the stability – or possibly the survival – of the business. People are reluctant to adapt and the more intense the threat or risk, the less willing decision-makers are to drop what they know. "Dropping one's tools is a proxy for unlearning, for adapting, for flexibility" (Weick, 1996, p. 301). Weick (1988) elsewhere states, "it is our contention that actions devoted to sense making play a central role in the genesis of crises and therefore need to be understood if we are to manage and prevent crises" (p. 308).

1.3.4   Intuitive Thinking: Blink before you decide

Many studies report on the role of intuition, common sense, life experience, gut feelings, snap judgements and smart guesses in qualifying decisions (Gigerenzer, 2007, 2008; Gladwell, 2005; Goleman, 1998; Goleman, Boyatzis & McKee, 2002; Simon, 1987; Wilson, 2002, 2011). These non-factual decision drivers do not absolve managers of the need to carefully research relevant information and knowledge, but practised managers readily admit that knowledge and evidence are often used merely as additional weapons to support decisions and already-made conclusions to people in authority and subordinates. It is important, though, not to credit the intuitional faculties of managers with more legitimacy than seems merited. Gigerenzer (2007) defines intuition as "a judgment that is fast in consciousness, whose underlying mechanisms is unconscious, yet is nevertheless strong enough to act upon" (p. 23). Goldstein and Gigerenzer (2002) highlight the need for careful research when they conclude that "intuition alone sometimes can lead people to make bad decisions. Intuition works best, it seems, when a gut sense can be used to build on other kinds of data" (p. 43).

In an empirical study of 60 successful business entrepreneurs in California, the vast majority of respondents attested to weighing available information by referring to their intuitive feelings (Schooler & Hertwig, 2005). They report that even if the data seem to indicate one response and their "gut feel" indicated another, they would proceed with great caution or resist proceeding at all. Goldstein and co-authors (2002) cite a simulation where volunteers attempt to predict the weather based on meteorological data and the role of experience and intuition in decision outcomes. According to their study, the data and mathematical probabilistic functions were so complex that analytical reasoning was useless. But despite this complexity, volunteers improved their predictions after 50 trials and were making correct guesses about 70% of the time, demonstrating the cumulative learning humans acquire through on-going experience and trial and error. "The brain constantly registers decision rules about what works and what doesn't" (Goldstein & Gigerenzer, 2002, p. 43). "Every day that a leader spends in a given business or career, his brain automatically extracts the decision rules that underlie one turn of events or another, or the operating cause-effect sequences. This wisdom increases throughout a leader's career, even as the abilities to pick up new technical skills may wane … Gut feeling, in fact, has gained new scientific respect because of recent discoveries about implicit learning – that is, the lessons we pick up without being aware that we're learning them (Goldstein & Gigerenzer, 2002, pp. 43-44). Goleman et al. (2002) showed that it is important for managers to develop the emotional intelligence skills and attunement needed to correctly interpret the messages from their intuition.

Simon's bounded rationality theory stresses that human rationality is constrained by both internal (cognitive) and external (environmental) limitations (cited in Todd & Gigerenzer, 2003). It is clear that – in addition to the organisation's objectives and the internally available information and knowledge – the manager's own decisional

premises play an important role in the synthesis of a completed decision. The organisation can influence the internal premise of the manager through organisational values and culture, loyalty, and the employees' identifications with these, but only to a certain degree. This is because internal decision drivers may be independent of or only minimally affected by outside influence, also labelled in the literature as internal locus of control (Rotter, 1966). Research studies highlight significant individual differences in decision-making behaviour. These differences are influenced by emotions, internal-vs.-external locus of control (LC), cognitive moral development (CMD), principled moral reasoning capacity, economic value orientations, political value orientations, and Machiavellianism (Gigerenzer, 2007; Hegarthy & Simms, 1978; Penn & Collier, 1985; Trevino & Youngblood, 1990). This study will not make any attempt to assess the impact of internal identifications on decision-making process or effectiveness.

1.3.5   *The Effects of Other People on Decision Competence*

Conventional wisdom holds that groups make better decisions than individuals because of their ability to accumulate information and build a large reservoir of relevant knowledge (Baron & Kerr, 2003; Forsyth, 2006). Scholars attribute improved outcomes to decision-makers' ability to deal with more information and the increased opportunities to deliberate correct and incorrect reasoning and factual statements, as well as the ability to point out other group members' errors and reduce other limitations such as bias and personal preferences (Hilmer & Dennis, 2000; Schulz-Hardt, Frey, Luthgens, & Moscovici, 2000; Shaw, 1981; Stasser & Titus, 1985; Zimbardo, Butler, & Wolfe, 2003). Other scholars, considering real-world settings, point out that pooling of individual perceptions and knowledge may only explain improved group decision competency in part (Michaelsen, Watson, Schwartzkopf, & Black, 1992). Empirical studies have uncovered other factors which may explain improved decision quality related to inter-personal feedback, diagnostic review, and the concomitant improved

meta-knowledge due to other people's critiques (Chalos & Pickard, 1985; Einhorn, Hogarth, & Klempner, 1977; Heath & Gonzalez, 1995; Kerr et al., 1996). Not all scholars agree that group decision-making improves the quality of the decisions, however.

The literature on group decision-making suggests that individual and collective decisions not only differ, but can also be more or less effective based on a number of cognitive, social, and contextual influences. An empirical study by Chalos and Pickard (1985) revealed significant differences in decision performance results between committee or group decisions and individual ones. Explanatory factors highlighted by their study were: "quality of information selection, cue weighting and judgment consistency" (p. 635). Scholars in the areas of social cognition and social psychology have provided evidence that groups do not always outperform individuals. Although interaction is likely to improve decision confidence, it does not necessarily improve decision quality (Heath & Gonzalez, 1995). The reasons proffered are groupthink (a dysfunctional pattern of thought and interaction during group decision making which is characterised by an overestimation of the group), closed-mindedness, pressures towards uniformity, and biased information search (where "group homogeneity" for a preferred alternative result in a predominantly biased search for information supporting the group view), and underestimation of risk (Janis, 1982; Kerr et al., 1996; Schulz-Hardt et al., 2000). In some cases group decision-making procedures not only affect the (in)accuracy of decision-making, they can also result in lower participant satisfaction, especially when dissenting minority groups or individuals feel groups fail to consider their opinions or group processes debilitate their capacity to raise alternatives for consideration (Ilgen, Hollenbeck, Johnson, & Jundt, 2005; Park & DeShon, 2010; Parker, 1993).

1.3.6   ***The Impact of Overconfidence and Blocking Dissent***

Decision confidence is defined as the feeling of having made the correct or incorrect decision (Insabato, Pannunzi, Rolls, & Deco, 2010; Jonsson, Olsson, & Olsson, 2005). Dunning and Kruger (1999, 2003) demonstrate that subjects in the lowest scoring quartile are not capable of judging their own level of incompetence and consistently over-estimate their capabilities in a wide range of tasks, including logical reasoning. Research by Hodges, Regehr and Martin (2001) confirms these results and also illustrates that, despite exposure to the performance of others, lower tertile and quartile performers' assessment of their competency remained unchanged. In contrast to the under-achievers, research subjects with the highest scores under-estimated their abilities, but were able to adjust their assessments after exposure to the performance of co-performers. The phrase "overconfidence in incompetence" is used to describe this phenomenon (Dunning et al., 2003; Dunning & Kruger, 1999). There are obvious dangers to this inability to recognise one's own incompetence. Those identified in the literature include inflated ideas of self-importance, mindless action, limited deliberation before deciding, infrequent updating of both mental models and current hunches, limited research into alternatives, and poor risk analysis resulting in poor quality assumptions and irrational recommendations (Brafman & Brafman, 2008; Dunning & Kruger, 1999; Nemeth, Brown, & Rogers, 2001; Weick, 2010). Over-confidence may also result in under-performance due to an over-reliance on intuition, which may reduce managers' willingness to engage in consultation and information-gathering activities. Or when they do so engage, they consider their own opinion as superior and reject the cautionary input from others. An example of over-reliance on one person's decision-making competence that resulted in hundreds of untimely deaths, is the deadliest crash in airport history – the Tenerife airport disaster (Brafman & Brafman, 2008, p. 78). On 27 March 1977, Captain Van Zanten, a KLM pilot, started the take-off procedure and

rebuffed his co-pilot's safety concerns. Without the voice of the blocker – the devil's advocate providing cautionary input – a deadly sequence of events unfolded which led to the deaths of 583 people. There are numerous examples of highly experienced people and highly educated graduates in senior positions making incompetent and irrational decisions that lead to serious repercussions, such as billions of dollars in losses (e.g. Enron) or worse, mass loss of lives (Brafman & Brafman, 2008; Trevino & Youngblood, 1990; Weick, 1988, 1990, 2010).

Deliberate conflict or appropriate dissent can improve decision quality (Janis & Mann, 1977; Schwenk, 1988). In a series of articles, educationalist Schwenk (1984, 1988, 1990) suggests devil's advocacy to stimulate constructive conflict. Schwenk (1990) reports on the contradictory results of 16 different studies on the worth of devil's advocate dissent and recommends future research.

1.4   METHOD

This study conducted a series of laboratory experiments that examined alternative management training methods and tools, designed either to increase executives' competency or incompetency in decision-making. The research probes several propositions relating to the educational merit and impact of four teaching methods: goal-based learning; individual versus group interactive decision-making procedures; role-play or simulated interaction (SI); and appropriate assertiveness through devil's advocate dissent.

True laboratory experiments investigate decision competency, working with a total of 150 participants who receive four in-basket case-based problems to investigate, analyse, and solve. Participants complete decision exercises on four pre-tested business scenarios. The exercises range from low- to high-level cognitive decisions and cover a wide range of managerial topics. Implementing the theoretical framework of the thesis

involves testing the propositions (set out in Chapter 2, section 2.6 on pages 69-72) with

pre-test and post-test scenarios and control-group design. The research design requires a

total of 150 participants in order to achieve a reasonable number of units (statistical

power) through the application of fuzzy set quantitative content analysis (fsQCA).

This research design has four major benefits. First, it substantially extends the research

of Weick, Sutcliffe and Obstfeld (2005), Gigerenzer and Brighton (2009b), Green

(2002, 2005) and Green and Armstrong (2009) relating to training methodologies and

alternative management development pedagogies to affect managerial competency or

incompetency. Second, the study contributes to the body of knowledge and responds to

the demand made in the literature on simulations and gaming for rigorous, objective and

compelling research (Anderson & Lawton, 2009; Feinstein & Cannon, 2002; Feldman

& Lankau, 2005; Gosen & Washbush, 2004). Gosen and Washbush (2004) report that,

based on Bloom's (1956) taxonomy of learning (where objectives in learning range in

cognitive levels from the lowest level of knowledge, to comprehension, to the higher

levels of application, analysis, synthesis and finally the highest level namely evaluation)

and rigorous research design standards, "There have not been enough high quality

studies to allow us to conclude players learn by participation in simulations or

experiential exercises" (p. 286). Third, the high level of control over the experimental

environment and the treatment variables offered by experimental laboratory research is

of great value (Campbell & Stanley, 1963b). Fourth, managerial development is a

continual series of experiential learning interventions and this study mirrors the way

managers progress in real business life, thus ensuring high face validity (Hsu, 1989;

Schippmann, Prien & Katz, 1990). The ability to hold all other variables constant whilst

administering the treatment is of extreme value to this study, hence the choice of

laboratory experiments within the MBA context (Burns & Burns, 2008; Campbell &

Stanley, 1963b).

To the best of this researcher's knowledge, there is no empirical study investigating the combination of conditions (detailed in Chapter 2, Table 2-2), using this methodology within the specific context of MBA decision competencies and higher education.

1.5   IMPLICATIONS OF THE STUDY

This study will raise the level of consciousness about competency and incompetency training (whether deliberate or unintended). It will contribute to a lively debate and stimulate further research interest among scholars in andragogy and management development, as well as aid in finding remedies for ineffective or poor educational methods.

The findings extend the theories relating to management competency development and education in decision- and sense-making and endorse the value of combining teaching methodologies to achieve even greater impact. Study outcomes include advances in guidelines regarding new or improved tools to prevent graduate and practising managers from thinking and making incompetent choices or decisions, and reductions in their inability to drop their tools and previously acquired knowledge – should the circumstances favour doing so.

This study contributes to the body of knowledge regarding organisational knowledge, organisational learning, management development, and experiential learning. A further contribution, of particular use to management practitioners and human resource recruitment and development specialists, are the tested in-basket cases for use in management competency assessment and senior management selection.

In addition, this study hopes to increase the vigilance of education providers regarding competency and incompetency training methods, and to raise awareness about unintentional incompetency training and its effect on trainees. The study provides

faculty responsible for re-engineering the MBA curricula (or other management education and development interventions) with empirically supported knowledge regarding four teaching methodologies. The implications for pedagogical and andragogical application of the in-basket simulations are thoroughly analysed, resulting in detailed in-basket cases and checklists which can assist educators to design, implement and improve experiential learning tools such as SIs and written simulations in the form of goal-based scenarios for application in tertiary education.

This study extends the work of Armstrong (2003), Armstrong and Green (2005), Gigerenzer (2008), Gigerenzer & Brighton (2009b) and Schank, Berhman and Macpherson, (1999). The research illuminates, through fsQCA, the conceptual deductions in developing a theory of Decision-Competency Development Interventions (DCDI) through Decision Incompetency Training (DIT) and testing several theories in the same model. Finally, this study hopes to stimulate further research into decision competency development and executive training in sense-making and heuristics for MBA students, thereby increasing protégés' own vigilance about the training they receive.

1.6   OUTLINE OF THE THESIS

To investigate the key research question, namely "How can educators develop decision-making competencies in protégés?", and to develop a theory of Decision-Competency Development Interventions (DCDI) through Decision Incompetency Training (DIT), the subsequent chapters are organized as follows:

Chapter 2 presents a detailed analysis of the strengths and short-comings of current practice as they relate to DCDI and DIT. Chapter 3 introduces the research methodology. Qualitative comparative analysis (QCA), which combines elements of quantitative and qualitative method – thus offering a robust approach and middle-

ground approach between quantitative and qualitative methods – is outlined.

Justification for the use of case-studies and in-basket simulations is provided in this

chapter. Following on the general description of QCA as method and set of techniques,

Chapter 4 details the implementation of this study and outlines the numerous

methodological considerations for the application of fsQCA (a variant of QCA) in this

study. Chapter 5 presents the analysis of the data and configural models for overall

decision competence and decision confidence, aggregated over all four the in-basket

simulations. Chapter 6 presents the QCA procedures, data analysis and interpretation of

the findings for the four separate in-basket simulations. Chapter 7 investigates decision

incompetence and doubt, and Chapter 8 summarizes major contributions of this

research, and along a discussion of the limitations of this study, covers suggestions for

future research and implications for practitioners and scholars.

CHAPTER 2: LITERATURE REVIEW

2.1   INTRODUCTION

This thesis proposes and examines theoretical propositions concerning competency nurturing in entry-level managers and business executives (MBA students). The propositions relate to decision-making competencies and incompetencies within managers' operational context, that is, contexts important to firms and other organisations. The thesis extends prior work by Weick (1995, 2007), Boyatzis (1996, 2006), Armstrong and Green (2005), Gigerenzer (2000, 1999), Schank (1995, 1993) and Dunning and Kruger (1999, 2003) related to increasing decision- and sense-making competency in managers and executives.

Improving the thinking and doing abilities of executives to be critical thinkers for their roles as decision-makers in firms, non-governmental organisations (NGOs) and other organisations relates to a key learning goal of the Association to Advance Collegiate Schools of Business (AACSB, 2003). Similarly, employers demand future employees, graduate managers and business leaders who are able to act reasonably and make effective decisions (AACSB, 2003; Boyatzis, 1982). Consequently, a primary goal of formal management education (such as MBA programmes) and other development interventions is to prepare people to be outstanding managers and leaders (Boyatzis, 2002). It is our duty as educators to move learners from incompetency to effective, efficient, and profitable managers through technical and non-technical skills training to find innovative ways to ensure the key requisite skills in thinking and actions and to provide useful metrics for measuring the quality of both.

Unfortunately, clear evidence exists that well-educated managers (well-versed in literatures on strategic thinking and planning) impoverish their organisations frequently through poor decision-making. Annually, considerable numbers of executive decisions

result in the demise of well-established organisations worldwide, despite increasing numbers of highly educated management graduates and MBA-endowed executives. While not all firm failures are due to bad decision-making, incompetent decisions likely occur in many configurations of decision-contexts and result in the failure of firms. This raises the question of whether it is an achievable, realistic obligation to expect business schools to develop managerial decision competencies, and if it is, how do educators ensure this in the fast-changing global environment where change is inevitable and the future is unknown?

A mal-alignment occurs between academic and professional expectations for business graduates, and a large complement of researchers agree on the need to deliver an eclectic mix of soft, technical, and conceptual skills (Beard, 2007; Birell, 2008; Clinebell & Clinebell, 2008; Cornuel, 2007; Navarro, 2006; O'Reilly & Michels, 1994; Pfeffer & Fong, 2002; Rubin & Dierdorff, 2009; Schiewer & Surendran, 2007). Researchers confirm that soft skills not only distinguish outstanding leaders and managers; they can also associate positively to strong performance in all other levels of professionals. The degree to which the curricula should shift and how the expected shift differs for the different industries represented by MBA recruits and graduates is unspecified and open for debate.

Fortunately, training can develop the requisite competencies needed for effective and productive managers (Boyatzis, 1996). In addition to the educational benefit of decision competency training, people who receive formal training in decision-making may obtain better life outcomes (Bruine De Bruin, Parker, & Fischhoff, 2007; Larrick, Nisbett, & Morgan, 1993). Baron and Brown (1991) and Boyatzis, Leonard, Rhee, & Wheeler, 1996) find that decision-making is a teachable competency, but scholars need to better understand how this outcome occurs. Schank (1995) reports that by practising decision-

making implementation, learners can move from incompetence to competence, to the point where they have a real and measurable impact on the financial performance of their employing organisations. Boyatzis, Smith and Blaize (2006, p. 25) state that "Competency development in executives can be done, but not the way we thought." This view indicates that the key questions are how, where, when, and what educators and trainers should develop managerial competence.

In the next few sections I discuss what decision competency is within the context of the firm. I then examine the characteristics and measures of decision competency and incompetency in depth. Next a review of the relevant literature relating to decision competence and incompetence is carried out. In the last part of this chapter, I draw inferences and develop the research propositions of this thesis.

2.2   WHAT DOES DECISION COMPETENCY LOOK LIKE IN THE REAL WORLD?

Managers have to make business decisions for both complex and simple issues, often with limited time and insufficient information available to them (Gigerenzer & Goldstein, 1996; Simon & Kaplan, 1989). In contrast, they can also be confronted with multitude of complex, often irrelevant data and cues to consider when making decisions (Shah & Oppenheimer, 2009). Several other factors and limitations impact upon the rationality, effectiveness and reasonableness of human decisions such as dispositional factors; stress; experience levels; mode of thinking used; peer pressure; intuition, self-deception; reward responsiveness; self-efficacy; ineffective training; wrongful advice and environmental factors (Dijksterhuis, 2004; Dijksterhuis & Nordgen, 2006; Dismukes, 2010; Dunning et al., 2003; Iederan, Curseu, & Vermeulen, 2009; Ito, Pynadath, Sonenberg, & Marsella, 2010; Maureen, 1995; Newell, Wong, Cheung, & Rakow, 2009; Scheres & Sanfey, 2006; Simon, 1956).

Humans find decision-making difficult and unpredictable. Simon (1947 1955, 1956, 1960, 1977, 1982) highlights the cognitive limitations of the human mind and concludes that "bounded rationality," the inability to access and or process all available information to make an optimal choice, leads to "statisficing" – less than optimal decisions. He argues the classic expected utility theory of economists that explains decision-making as a simple problem of maximising utility (Sanfey, Loewenstein, McClure, & Cohen, 2006) is unrealistic, since real life never meets the criteria of perfect knowledge and perfect cognitive weighing of alternatives, as the theory requires. Simon concludes that linear mathematical models cannot predict human decision behaviour. Simon's (1947, 1957b, 1960) seminal works on bounded rationality in economic decision-making won the Noble Prize in Economics for 1978 and pioneered new directions in the study of human decision-making.

Since this early shift, a large body of primary research attests to human decision-making behaviour to be irrational and not as extensive as commonly believed (Curseu, 2006; Gigerenzer & Todd, 1999; Shafir & LeBoeuf, 2002). Shafir and LeBoeuf (2002, p. 491) report on the "systematic ways in which people violate basic requirements of the corresponding normative analyses" and conclude that a review of the decision and judgement literature highlights persistent and systematic short-comings in human's reasoning abilities (see Manktelow 1999; Johnson-Laird, 1999). As set out in Chapter 1, rational managers undeniably make poor, inconsistent, and often irrational decisions despite training, access to information, and high levels of experience.

A clear understanding of what constitutes effective decisions is essential if we are to develop an andragogical theory of decision competency. The next section of this chapter is thus develops a working definition for this study of the concept of effective decisions within the business context of managerial decision-making.

2.3   TOWARDS A WORKING DEFINITION OF EFFECTIVE DECISIONS IN MANAGERIAL DECISION-MAKING

An extensive literature review in the areas of management, psychology, social psychology, neuro-economics and neurology resulted in a dearth of workable definitions of effective decision-making. Most of the articles relevant to the issue depart from the assumption that the reader knows what effective decision-making is or makes passing statements about "effective," "optimal," or "best" decisions. Some literature focuses on the process or procedure, not the outcomes. Scholars skirt composing a formal definition, in part because of the obvious complexity of defining effective decisions over a wide range of disciplines and a large variety of problems and issues. Another factor that may be partly responsible for scholars' lack of confidence or inability to propose a catch-all definition maybe the huge number of influences, variables, contingencies and constructs comprising the "scissors of decision-making" (Simon, 1956) and the many cognitive operations involved in making an effective decision (Iederan et al., 2009; Shah & Oppenheimer, 2011). Still a further reason may be the number of influences on the final outcome of a decision, the number of variables affecting an outcome, and the huge delays often experienced between the initial decisions and the eventual outcome of the decision, making the causality between the decision and the outcome less than obvious.

How do people make difficult decisions and why do they use heuristics and decisions aids in specific contexts? Most papers and studies "judge the quality of a decision by its process rather than by its outcome, although it is assumed that a person who uses better decision processes will be more likely to experience good decision outcomes" (Bruine De Bruin et al., 2007, p. 940). Hence, evaluating the decision process for decision quality is more important than measuring the success or failure (outcome) of a single or one-off decision.

Very limited research is available on domain-general decision-making heuristics (Shah & Oppenheimer, 2009), and "only a small subset of researchers attempt to investigate the relationship between procedures and the expected efficacy of decisions and the whether the heuristics reduce demands for cognitive resources and or the effort associated with decision processes" (Shah & Oppenheimer, 2009, p. 209). Shah and Oppenheimer (2009, p. 232) begin their work on judgement and decision-making by stating "making optimal decisions can be thought of as a complex process that requires many cognitive operations to be performed."

In search of a definition of effective decision-making, scholars in the various fields seem to agree on two key dimensions of decisions, namely: (1) *choice* and (2) *judgement.* Neuro-economists Sanfey et al. (2006, p. 108) define choice as: "the evaluation of options and selection of actions" and judgement as "information processing and probability estimation". These definitions are patently different from those found in other disciplines, for example health care, where Bagnato, McKeating-Esterle, Fevola, Bortolamasi and Neisworth (2008, p. 335) define judgement as "inference or evaluation derived from intuition and/or personal experience, is the basis of many daily routine assessments by parents and professionals". Dictionary.com (2013), meanwhile, defines judgement as "the ability to judge, make a decision or form an opinion objectively, authoritatively and wisely; especially in matters affecting actions; good sense; discretion. The forming of an opinion, estimate, notion or conclusion as from circumstances presented to the mind. The act or process of judging: the formation of an opinion after consideration or deliberation."

In the area of entrepreneurial decisions, Langlois (2005, p. 15) states, "Judgment is the (largely tacit) ability to make, under conditions of structural uncertainty, decisions that turn out to be reasonable or successful ex post"…"In other words, entrepreneurial

decision-making applies to situations where there is no obviously correct model or decision rule that can be applied, or when the data isunreliable or incomplete." Judgment is Knight's term for the process of creating frameworks of interpretation and decision (Langlois, 2005, p. 14). According to Casson (2005, cited in Langois 2005), "judgment is a capacity for making a successful decision when no obviously correct model or decision rule is available or when relevant data is unreliable or incomplete."

For some decisions, alternatives are available and mere selection of the "best" choice is required, for example, to turn left or right or go straight through an intersection. In this case "best", in reference to the quality of the decision, may be determined by either (1) location of the destination; (2) ability for the vehicle to navigate the route (e.g. off-road capacity); (3) the restrictions/licence required to use certain roads; (4) the enjoyment by the passengers; (4) the criteria set by stakeholders: the goal is to get there fast (save time); or use the most direct route (save on maintenance); save petrol; have a scenic outting (most enjoyable); contextual circumstances (see Chapter 2 – Heuristics, for a more in-depth discussion of contextual influences). For other decisions there are many alternatives, combinations of alternatives, or equally agreeable substitutes which are known to the decision maker, e.g. when one is feeling cold one can get a blanket, dress in warmer clothes (many options to pick from), take a warm bath, switch on the air conditioning, use a small electric heater, drink a hot drink (multiple varieties available); or a number of these options combined.

For some decisions the alternatives are unclear, not yet developed, or simply unknown or unavailable to the decision-maker, as in the case of product innovations, design thinking, negotiating third alternatives, and brainstorming decision alternatives (Putman & Paulus, 2009). It seems that the complexity of the decision-making process and of assessing the "best" decision increases as (1) the number of alternatives; (2) the

familiarity of possible alternatives are to the decision-maker(s); (3) goal or outcome is stated, unstated, clear or unclear; and (4) the number of stakeholders who consider the decision have different perceptions of the ideal outcome. It seems that the terms "best" and "effective" are quite often subjectively rated by judges and will differ substantially from stakeholder to stakeholder. In the earlier car example, the "best" route as seen by the sight-seeing passengers may be quite different to the "best" route as seen by the frugal petrol-paying party or the "best" route through they eyes of the council officer who requires the driver to have a permit to take a certain route. In the literature on brainstorming, Putman and Paulus (2009, p. 25) directly link the selection of the "best ideas" from a pool of ideas to the main aim of brainstorming, namely generating and qaulifying novelty, originality and feasibility.

Putman and Paulus (2009) state that "Typically, originality is determined by the subjective ratings of judges", while Guerra-López (2011, p. 37) questions: "How do organizations go about making sound decisions? They use relevant, reliable, valid and complete data, gathered through a sound evaluation process that is aligned with desired, long-term outcomes". Another important dimension for decision quality is feasibility. Feasible ideas are those that have some reasonable potential for application, given worldly constraints. Again, feasibility is typically based on the subjective ratings of judges (Putman & Paulus, 2009). It seems that for new idea generation, the rating of results is unashamedly subjective. Why should we expect anything different from the new generation of business leaders when making decisions about real-world problems?

After a comprehensive literature review, only two workable definitions related to the outcome or efficacy of decisions were found. A comprehensive definition of effective strategic decision-making, as offered by Iederan et al. (2009, p. 293), reads: "an intentional and goal-directed cognitive process of selecting one of several available

alternatives when only incomplete information on the alternative and their possible outcomes is available and the facts, variables and contingencies involved in the decision situation are highly complex".

In his seminal work, Simon (1947, 1957a, 1976) aligns effectiveness with the goals of the organisation or strategic business unit (SBU): "The organization provides the individual with some of his principal premises of decision: it specifies his fundamental value-premises – the organization objectives – and it supplies him with relevant information of all sorts that is necessary if he is to implement these values" (Simon, 1976, p. 172). He continues: "The criterion of efficiency… largely guided by the profit objective … dictates the selection of that alternative, of all those available to the individual, which will yield the greatest net (money) return to the organization" (p. 172). Simon considers the criterion of efficiency of such importance in decision-making that he devotes a 25-page chapter to it, which offers this precise definition: "The criterion of efficiency demands that, of two alternatives having the same cost, that one be chosen which will lead to the greater attainment of the organization objectives; and that, of two alternatives leading to the same degree of attainment, that one be chosen which entails the lesser cost (p. 122). Simon lists four levels at which the analysis of the efficient use of the limited resources available to the decision-maker should be done. "At the highest level is the measurement of results, of the acomplishment of agency objectives. Contribution to these results are the elements of adminstrative performance. Subordinate to these, in turn, is input measured in terms of effort. Effort finally, may be analyzed in terms of money cost" (p. 188).

In addition to the feasiblity and quality of the decision, an emerging view in strategic management literature is that "confidence in decisions plays a critical role in a decision's success" (Adidam & Bingi, 2000, p. 35). Decision confidence is defined as

one's belief and trust in a decision (Scniezek, 1992), as opposed to the concept of self-efficacy (belief in the decision-makers' own ability) or belief in the decision aids or outcome expectancy. Top corporate managers spend a large proportion of their time making strategic decisions and pursuing decision confidence in others by convincing support teams and stakeholders of the decisions' merits in order to get strategic decisions implemented (Mintzberg & Waters, 1985).

Managers allocate more capital and human resoures, invest greater effort in implementing decisions, and are more willing to overcome obstacles for selected courses of action they have confidence in, thus improving the chances of success for predecided strategies (Adidam & Bingi, 2000; Barney, 1991; Bonoma, 1984). Although the importance of decision confidence in decision success may be a fairly recent consideration for strategic marketing and management strategy, its has been widely covered in a variety of disciplines such as psychology, medicine, economics, statistics and neuroscience.

Some researchers hold that decision-makers' concurrent assessment of the likelihood that the decision will result in favourable or unfavourable outcomes is an important part of the subjective decision experience. "Decision-making, and our confidence in the decisions we make, are important areas in neuroscience in the new field of neuroeconomics (Deco & Rolls, 2006; Heekeren et al., 2004; Kable & Glimcher, 2007; Kepecs et al., 2008; Kiani & Shadlen, 2009; Kim & Shadlen, 1999; Rolls, 2008; Romo et al., 2004; Shadlen & Newsome, 2001)" (Rolls, Grabenhorst, & Deco, 2010, p. 2359). In nursing, for example, a doctor's decision to follow a particular course of action and the confidence of nurses, patients and other stakeholders in the decision, will affect the success (or otherwise) of the implementation of the selected course of action .

Although decision confidence may, at first glance, seem desirable under all circumstances, high confidence in low quality or incompetent decisions may be undesirable. Similarly, "High confidence in a low quality strategy or low decision confidence in a high quality strategy may both be undesirable" (Adidam & Bingi, 2000, p. 36). The evidence shows that even managers who are incompetent can be overconfident in their own decision incompetencies (Dunning et al., 2003; Dunning & Kruger, 1999,2003). Adidam and Bingi (2000, p. 38) argue (in relation to marketing strategy) that although confidence is a subjective feeling. "the consequences are real". Marketing strategists provide evidence that decision confidence affects the willingness of business units to allocate material and human resources to the implementation of a strategy they have confidence in, thus directly affecting the performance of the business unit (Bonoma, 1984). Adidam and Bingi (2000) explain that confidence commensurate with the quality of the strategy is highly desirable, if not imperative, since high confidence in low qaulity decisions may lead to wasted resources and hence wasted opportunity costs. Low confidence in high quality strategies may lead to the abandonment of good strategies and a lack of appropriate resource allocation, whilst low confidence in low quality strategies may lead to abandonment of the suggested strategy and high confidence in high quality strategies is likely to result in the desired outcome and thus implementation success (see Figure 2-1).

STRATEGY QUALITY

	High	Low
High	Success	Overcommitment and Wasted Effort
Low	Missed Opportunity and/or Abandoning of Good Strategy	Failure and/or Abandoning of Bad Strategy

DECISION CONFIDENCE

Figure 2-1: Strategy quality and decision confidence
(Source: Adidam & Bingi, 2000, p.36)

2.3.1 Quality, Feasibility, Confidence as Measures of Decision Success

Based on the two workable definitions identified above, and the dimensions offered in the choice and judgement literature – it is clear that confidence in the decision plays a key role in the successful implementation of that decision. For the purposes of this thesis effective decision-making in business management is the (deliberate, unconscious or intuitive) goal-directed process of gathering, verifying and processing relevant (if limited) information and appraising likely outcomes in order to choose a final set of reasonable, coherent and feasible actions, ultimately in the interest of all or a selection of the key stakeholders. The term stakeholders refers to the personal interests of people amongst other the manager or decision-maker, and issues such as public interest, employee welfare and shareholder value (i.e., whether it can be regarded as reasonable; ex post successful; rational; sound; effective or competent).

2.4 TEACHING, LEARNING AND THE DECISION COMPETENCY TRIPARTITE

Educators and practising management developers need to make the decision-making process less difficult, less ambiguous and more predictable. This study investigates the

primary question: "How can educators develop decision-making competencies in protégés?

In their paper on the development of effective business managers and leaders and supportive teaching methodology, Boyatzis and Saatcioglu (2007, p. 93) state that developing human talent can be broken down into three categories: "helping people learn knowledge, helping them develop what to do with the knowledge, and to learn why they would use their knowledge". The authors add that to be effective, leaders and managers need "the ability to use knowledge and make things happen". Boyatzis (2008, p. 7) expands on the role of knowledge in the performance of outstanding leaders and managers by identifying three "clusters of 'threshold competencies': expertise and experience, knowledge and basic cognitive competencies such as memory and deductive reasoning." Given that knowledge is threshold competency for effective decision-making, and the lowest hierarchy of learning in Bloom's (1956) taxonomy of educational objectives, educationalists need a full understanding of the roles of knowledge and knowledge transfer, retention and application in order to understand competency development.

To understand how different training methodologies affect competency development, educationalists and trainers need to understand (a) the different ways of knowing (b), how the types of knowledge can be developed, (c) which teaching approach is best in which circumstances, (d) how they can be implemented in the current educational context for greatest success, and (e) how they can be assessed over time against predetermined teaching objectives.

As early as the 17th century, the scientist, mathematician and philosopher Descartes separated the mind and the body and placed the primacy of knowledge firmly in the realm of the mind (Descartes, 1628; Elm & Taylor, 2010, p. 128). Much later,

Baumgarten (as cited in Strati (1996) suggested two parts to knowledge: "on the one hand logic, which investigates intellectual knowledge; on the other hand aesthetics … which investigates sense knowledge". Over the last century, there has been increased acceptance by philosophers and academics of the notion that all forms of knowledge are founded in the aesthetic experience based in the senses or "gut" (Welsch, 1997).

Elm and Taylor (2010) mention that academia has often emphasised intellectual knowledge-based cognitive tools of logical arguments, scientific analysis and comprehension and has "left aesthetic embodied knowledge to the fine arts or the margins of academy". This cognitive emphasis sees knowledge acquisition as involving complex cognitive processes: perception, learning, communication, association and reasoning. However, to focus purely on cognitive processes and intellectual learning is to neglect a substantial and critical component to real-life learning, i.e. tacit, aesthetic, embodied learning. To exclude tacit and implicit knowledge from discussion about teaching and learning is to only address learning in part. Following modern educationalists, this author argues for wholeness of learning which incorporates both the mind and the senses/gut. This study highlights the importance of gathering knowledge through a variety of senses and teaching methods (Baruch, 2006; Beirne & Knight, 2007; Garventa, 1998; Heron & Reason, 2001; Kolb, 1984; Strati, 1996; Taylor, 2003; Taylor, Fisher, & Dufresne, 2002; Yang, 2003; Yanow, 2001). To achieve holistic learning, both the body and the senses/gut need to be engaged. Elm and Taylor (2010, p. 128) suggest that to "promote learning in a complete way means creating wholeness through both artistic and discursive forms of representation."

Compared to more conventional lecturer-centred teaching approaches (such as lectures, group-based research, reading and question-and-answer driven seminars), experience-based learning (such as video-recordings of student interactions with business

professionals, in-class dramas and role-plays, simulations and other forms of educational dramas) engage the whole person – intellect (logos), feelings, and senses (pathos). This idea can be traced back to Aristotle (384–322 BCE), the ancient Greek philosopher whose contributions to logic, metaphysics, mathematics, physics and biology are still revered today. Aristotle suggests that to fully persuade someone (especially one not as well educated as oneself), orators need to apply three modalities of reasoning: pathos, ethos and logos, where pathos is an appeal to the emotions, logos is an appeal to logic, and ethos persuades through appeal to the authority, credibility or honesty of the speaker. Further, in the words of Aristotle (n.d.), "Persuasion is clearly a sort of demonstration, since we are most fully persuaded when we consider a thing to have been demonstrated."

More recent theoretical underpinnings for the acquisition, creation and transformation of knowledge through educational drama are found in the work of Brunner (1966) on constructivism; Dewey (1963), Rogers (1983, 1969, 1994), Kolb (1984) and Boud (1996) on experiential learning; Rogers (1983) on humanism; and Senge (1990) on adaptive and generative learning. Heron and Reason (2001, p. 184) suggest four types of knowledge: (1) experiential knowing – knowing through the immediacy of perceiving, through empathy and resonance; (2) presentational knowing – results from experiential knowing and is the way of expressing meaning via forms of imagery through dance, movement, story-telling, drama, drawing, sound, sculpture and more; (3) propositional knowing – informative statements to express knowledge "about" something in the form of ideas, theories and informative statements; (4) practical knowing – "how to do" something as expressed in a skill, capability, knack or competency. Yang (2003, p. 111) categorises three knowledge types: (1) explicit (codified knowledge representing factual information); (2) implicit (personal habits, intuition and tacit understanding); and (3) emancipatory (emotional feelings, values, spirituality and vision). Yang also identifies

three learning processes: (1) knowledge acquisition; (2) knowledge creation; and (3) knowledge transformation.

This study focuses on experiential and presentational forms of knowledge acquisition, creation and transformation. For this reason much of the rest of this thesis will focus mainly on the potential of different andragogies such as educational drama (Brennan & Pearce, 2008; Elm & Taylor, 2010), also called simulated interaction (SI) (Armstrong & Green, 2005; Green, 2002, 2005); role play (Bosse et al., 2010; Druckman & Ebner, 2007; Sebenius, 2001), and case-based scenario enactment (Schank, 1994, 1995; Schank et al., 1999).

2.5   SCOPE AND FOCUS OF THE STUDY & THEORETICAL GROUNDING

Researchers report on the complexity of managerial judgement and decision-making. Making sound judgements and deciding on a course of action is a complicated and complex process, and one that is not yet fully understood by either practitioners or scholars. Literature in managerial development and managerial competency theory reports contradicting results concerning the effectiveness of certain theoretical models, constructs and frameworks in supporting effective decision-making (Abramson, Currim, & Sarin, 2005). In addition, sobering studies in educational methodologies report that increased levels of managerial education leads to increased levels of incompetent decision-making (Armstrong & Collopy, 1996). In a semester-long study at the University of Pennsylvania's Wharton Business School involving MBA students (categorised into 21 groups differentiated by educational level), Armstrong and Collopy (2005, p. 194) found that "less profitable decisions were made by 38% of low-education, 46% of the intermediate-education, and 55% of the higher-education groups", a shocking indication that additional managerial education may result in increased incompetence in decision-making. This brings the argument full circle, and

links in closely with Boyatzis et al.'s (1996) observation (cited above) that decision

competencies can be taught, but scholars still need to improve their understanding of

how.

2.5.1 *Managerial Development Interventions Resulting in Incompetence (Incompetence Training)*

Assiduous scholars provide evidence, supported by meticulous empirical research, to

show that the application of particular models, concepts, frameworks and theories may

lead to incompetent decision-making (Abramson et al., 2005; Armstrong & Brodie,

1994; Armstrong & Green, 2007a). These studies further conclude that use of some

widely publicised decision aids extensively espoused and promoted in management

training and MBA programmes nurtures heuristics that aid incompetence and ineffectual

decision-making. Woodside (2012b, p. 279) summarises "incompetency training" in the

following way: "Incompetency training includes formal and informal instruction that

consciously (purposively) or unconsciously imparts knowledge, attitudes, beliefs, and

behavior (including procedures) that are useless, inaccurate, misleading, and/or will

lower performance outcomes of the trainee versus no training or training using

alternative training methods."

From the definition it is clear that all types of deliberate and non-deliberate training

(including inter-personal, social interactions) that result in lower decision performance,

constitute incompetency training. As directed by Simon (1976, 1992) it is important to

consider the context when considering alternatives in decision and sense making. A

variety of factors such as culture (national as well as corporate culture); objectives and

goals; and other determinants, such as desired outcome(s) of a variety of stakeholders,

influence how ineffectual decision or lower decision performance is determined. To

illustrate this point, consider the following example from the socio-cultural domain. A

mother might think that to teach her daughters to satisfice on money and status when

selecting a future husband might deliver a more desirable outcome than to satisfice on trust, love and respect. The mother will thus consciously and continuously instruct her daughters to be demure and reserved, not to make "clever remarks" or contradict her suitor, and perhaps not to read too widely and study further. This "training" might include behavioural training, conscious coaching and role-modelling, such as lowering one's eyes in social gatherings, and never talking without being directly addressed. Although the mother is most likely to pursue this type of training, when she considers it to be conscious competency training; her daughters' peers or feminists are likely to regard this type of coaching as deliberate incompetency training, or at best, unconscious incompetence training – depending on the cultural influences. This illustrates the point of context and perception, as well as the relevance of the intended goal. A further example from economics is the incompetency training recently offered by Lehman and Enron (2004), that eventually resulted in the mortgage-related financial crisis.

There are numerous examples of incompetency training (both formal and informal) in the management literature (Armstrong & Green, 2007a; Armstrong & Collopy, 1997; Kahneman, 2013; Spanier, 2012; Woodside, 2012b). Since this study focuses on marketing and management decisions, and the size and scope of this study limit the number of incompetency tools considered during the laboratory experiment, the four incompetency training tools (also labeled decision aids in this study) to be investigated are: (i) a singular focus on market share instead of profit during strategic pricing decisions - such as advocated by the BCG; (ii) an exaggerated focus on key clients, at the cost of retaining or developing key staff; (iii) the use of weighted priority matrices (WPM) rather than finding knowledge-based, well researched facts to make decisions regarding limited resource allocation and (iv) not using fast and frugal heuristics to select a course of action. These tools and frameworks are not always incompetency

tools, but given the scenarios and goals set out in the in-baskets, using those tools is likely to result in lower decision performance.

Although educationalists might find it hard to believe that ethical trainers or leaders will consciously and deliberately impart faulty knowledge, skills or attributes (KSAs) or knowingly decrease knowledge or skills, Woodside (2012b) offers anecdotal (but well-documented) examples such purposive public level incompetency training. Woodside provides examples such as former American president George W. Bush's speeches, as well as empirically supported evidence of conscious and unconscious training behaviour displayed in racial bias in the job-applicant field experiment executed by Bertrand and Mullainathan (2002) and in the property appraisals and price listings studied by Northcraft and Neale (1987), to name but a few. Several well-publicised examples of firm level incompetency training in both the popular and academic literature leave no room for doubt that trainers knowingly and unknowingly provide inaccurate, misleading, and sometimes dangerously wrong information as illustrated by the summary (in matrix format) provided by Woodside (2012) (see Figure 2-2).

Trainer Conscious of Imparting
Incompetency Training

1

- Ponzi schemes by con artists, grifters
  (e.g. Investing literature and presentation
  by B Madoff
- Financial frauds (e.g. see movie Inside Job)
- Response category effects

2

- U.S. Securities & Exchange Commission training in
  investigation financial wrong-doing
- U.S. states' training in marketing management audits
  of state tourism marketing departments and agencies.
- "tort reform" speeches by G.W. Bush
- "Iraq WMD" speeches by G.W. Bush

Individual,
Organization &
Firm Levels

Groupthink 1

Groupthink 2

State, National &
Global Levels

4

- Portfolio Planning methods
  (e.g., BCG Matrix growth-share matrix
- Experience curve training
- Training for medical doctors in probability
  patient has cancer following positive
  test results
- "Key success factors"

3

- Deregulation financial industry speeches
  and advocating industry self-regulation by R. Reagan
- Preaching slavery as God's will.
- Separate but equal appeals laws
- Efficient market hypothesis
- "Gays service openly in military will "disrupt unit cohesion"
- Discrimination against Chinese and the Chinese
  Exclusionary Acts starting in 1882 an ending in 1943.

Trainer Unconscious of Imparting
Incompetency Training

Figure 2-2: Incompetency paradigm and examples
(Source: Woodside, 2012, p. 282)

Rodriquez and Ruiz-Navarro (2004) identify (by using a quantifiable measure, that is,

counting citations in the top-ranked *Strategic Management Journal*) 50 of the most

influential management aids in wide use in MBA programmes between 1980 and 2000.

This investigation into influential management tools cites Porter's *Competitor Strategy*

(1980) as most influential, to the surprise of scholars Armstrong and Green (2007a, p.

128), who find this "an extraordinary distinction for a book that contains no evidence on

this topic." Another surprising celebrity on this distinguished journal's citations list, and

the eighth most cited work, is *Market Share: A Key to Profitability* (1975), by Buzzell,

Gale and Sultan. The advocated advantage of focusing on market share to improve

profitability, as promoted through citations in this leading journal, prompted celebrated

academics such as Kotler (1997) and Carpenter and Nakamoto (1989) to preach

inaccurate marketing gospel such as: "19 out of 25 companies who were market leaders

in 1923 were still the market leaders in 1983, sixty years later" (Kotler, 1997, p. 352) and promote the Boston Consulting Group (BCG) matrix as an aid to develop sustainable competitive marketing strategies (Kotler, 1991). Kotler has omitted the BCG matrix from his latest texts (Kotler & Keller, 2006, 2008).

Empirical research by Golder (2000) provides substantial evidence that contradicts the claims of Buzzell et al. (1975) and Kotler (1997) that market share optimisation leads to sustainable competitive advantage and long-term brand leadership, with "leading brands outsell[ing] their rivals for years and sometimes decades" (Carpenter & Nakamoto, 1989, p. 285). Golder (2000) and Armstrong and Green (2007) concur that earlier studies' claims of firms' survival and profitability are inaccurate and "that it does not follow logically that seeking higher market share will improve profits. Rather the correlation between market share and profitability is more logically interpreted as showing that firms with better offerings tend to achieve higher market shares" (Armstrong & Green, 2007a, p. 116). Armstrong and Green (2007b, p. 116) lament, "Advocates of competitor-oriented objectives do not provide evidence relevant to their claims" and further bewail, "marketing professors and those who teach business strategy continue to advise students to strive for market share and they develop techniques to help businesses gain market share." Of particular concern, related to strategic business decisions, is the natural competitor-orientation of business managers, which is worsened by unsupported claims of decision tools cited in management textbooks and strategic marketing and management courses that "increasing market share will improve profitability" (Armstrong & Collopy, 1996, p. 130).

To surmount this incompetency training, Armstrong (2011) suggests that business schools should prescribe evidence-based books and advocate evidence-based models and advice. Unfortunately, the respective studies of Golder (2000) and Armstrong

(1994) do not propose or investigate alternative teaching methodologies to ensure effective and competent decision-making aids. Armstrong does point out, however, that learners should be made aware of the importance of conditions for or strategic landscape within which certain decision aids may or may not be ineffective. Weick (1996, 2007) proposes that decision-makers should learn when to "drop tools" (see below for Weick's insights regarding re-engineering management education).

Spanier (2011), using decision-experiments and extending the works of Armstrong and Brodie (1994) and Armstrong and Green (2007a), finds increased incompetence in managerial decisions when decisions are based on portfolio matrix planning tools such as the BCG matrix. Spanier's thesis supports and expands on the evidence provided by Capon, Farley, and Hulbert (1987) and Armstrong and Green (2007a) that firms that use the BCG matrix in portfolio planning on average report lower return on capital than those who do not. Spanier (2011) confirms the substantial laboratory experiment by Armstrong and Brodie (1994) that conclusively finds that greater shares of subjects make ineffective decisions – resulting in reduced profitability for their employer organisations – when using the BCG matrix as a decision aid as opposed to not using it.

It is clear that trainers and managerial trainees (used interchangeably with students and protégés) may be totally unaware of these instances where they themselves are exposed to or involved in incompetency training (Gigerenzer, 2007; Wilson, 2002; Woodside, 2012b). Thus vigilance to become aware of and recognise exposure to incompetency training is essential for the success of both parties, managers and their educators. As well as identifying what constitutes incompetency training or which methods, tools, concepts, models, frameworks may lead to ineffectual results within specific contexts, decision competency needs to include training about meta-thinking, i.e. thinking about one's thinking), meta-talk (thinking about what the unintended message or message

behind the message might mean) and cautionary, appropriate dissent (see p. 64 for more on devil's advocate dissent).

Woodside (2012b) makes several suggestions to educators on how to overcome incompetency training. Firstly he proposes increased awareness, secondly deepened understanding of the conditions under which the human mind behaves rationally or irrationally, and, lastly – linked closely to the work of Gigerenzer, Simon and colleagues – Woodside suggests developing deep knowledge about the many forms of incompetency training (see Figure 2-2 above) and its variance by context. Woodside (2012b, p. 280) suggests that "creating, learning, and applying a multiple set of tools is necessary to disrupt such training processes and to counter the outcomes of such training." Building on Armstrong's findings regarding incompetency enhancing models such as the BCM matrix and heeding Woodside's call for more scholars to investigate and empirically test the impact of active or passive incompetency training, this study proposes the use of four tools from a variety of educational methods to "disrupt the training processes and to counter the outcomes of such [deliberate or unconscious incompetency] training" (Woodside, 2012b, p. 290).
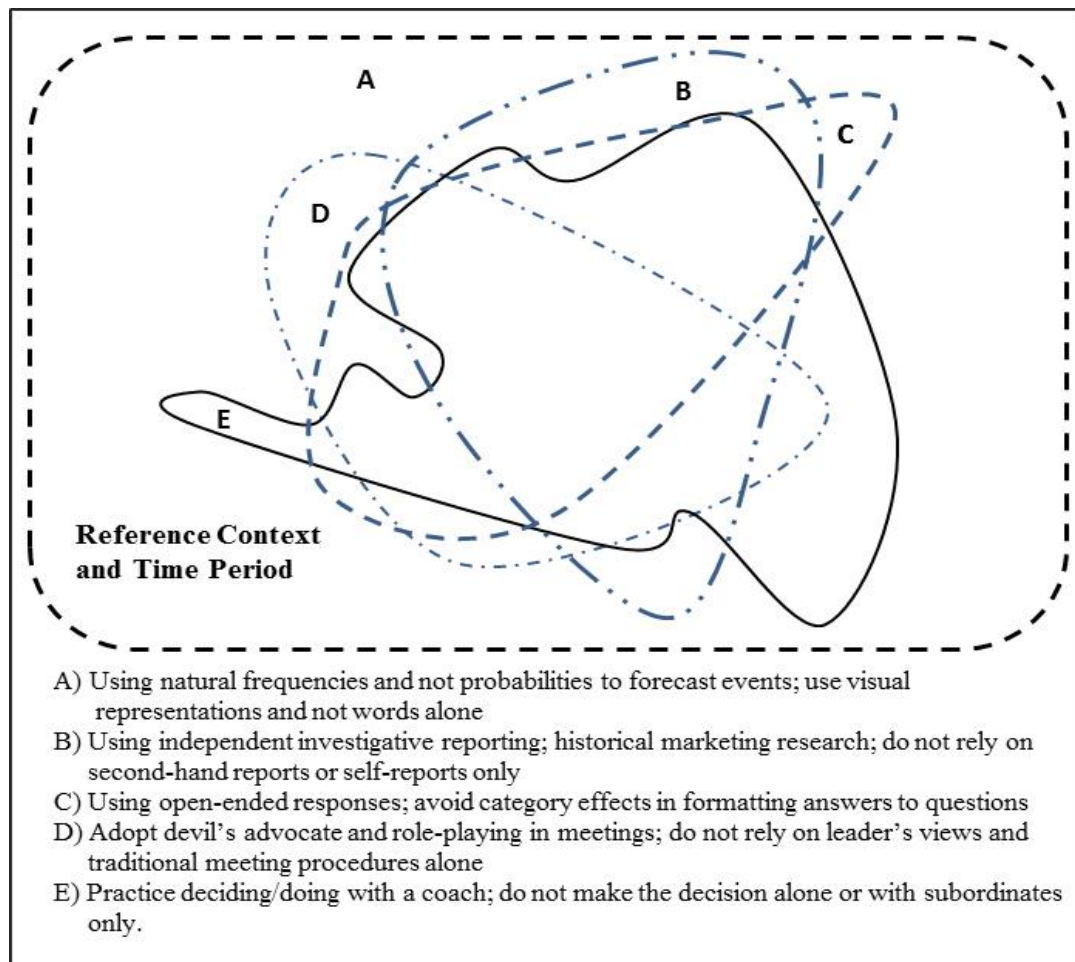
**Figure 2-3: Counter-incompetency training tools and conjunctive recipes for using
two to five tools in the same context**
(Woodside et al., 2012, p. 291)

This study applies conjunctive recipes as follows:

A) Using sense-making tools and other complexity-reducing heuristics such as "drop
your tools" and "take the best".

B) Using case-based reasoning (CBR) and goal-based scenarios (GBS) to predict
stakeholder behaviour.

C) Using independent investigative reporting/historical marketing research; do not rely
on second-hand reports or self-reports only.

D) Adopt devil's advocate and role playing in meetings; do not rely on leaders' views
and traditional meeting procedures alone.

E) Practice deciding/doing within a group of non-competing peers – interactive
decision-making.

A) Using sense-making tools and other complexity-reducing heuristics such as "drop your tools" and "take the best".

B) Case-based reasoning (CBR) and goal-based scenarios (GBS) to predict stakeholder behaviour

C) Using interdependent role-play and simulated inter-actions

D) Practice deciding/doing within a group of non-competing peers – inter-active decision making

E) Adopt devil's advocate and role-playing in meetings; do not rely on leader's views and traditional meeting procedures alone.

Figure 2-4: Counter-incompetency training tools and conjunctive recipes for using five tools in the same context and time period – this study

(See sub-sections 2.5.2 A–F for rationale for the selection of
this configuration of causal recipes.)

2.5.2 Competency Training & Andragogical Methodology to Develop Decision Competency and Expertise

According to Boyatzis, Stubbs and Taylor (2002, p. 150) competence is the ability to apply knowledge to make things happen, and competencies are defined as the underlying characteristics of a person that lead to or cause effective and outstanding performance (Boyatzis, 1982, p. 21). Schank et al. (1999, p. 167) argue that an expert is someone who can use knowledge and perform skills in a functional manner to achieve their goals. They define CBR as the "theory of how we remember and how we use our memories in order to solve new problems" (Schank et al., 1999, p. 166). The following

sub-sections consider six alternative andragogies are considered: (1) sense-making applied to prior knowledge, contextual information and frugal heuristics; (2) learning by doing: case-based reasoning (CBR) and goal-based scenarios (GBS); (3) group-interactive decision-making (GIDM); (4) educational drama, role-play and simulated interaction (SI); (5) individual and collective decision-making and (6) devil's advocate dissent (DA).

A. *Sense-making and Fast and Frugal Heuristics*

Making a decision is often risky. There are numerous examples of less than optimal decisions, ranging from low impact cases such as the thousands of start-up small business enterprises that fail annually to Air New Zealand's Ansett purchase and the resulting collapse of Ansett (Gottliebsen, 2003), to the Enron disaster and the resulting global financial crisis (Dickerson & Duffy, 2002). Regis McKenna (2004, p. 668) points out that "managerial effectiveness and competence is particularistic, situated, contextual and socially constructed". Hence, there is a clear need for educationalists and practising trainers to prepare managers to deal with contextual complexity and ambiguity (De Villiers, 2010).

Some scholars propose a probabilistic view of the way humans make decisions: individuals execute mental computations based on probabilities and utilities, wherein reasoning, judgement and decision-making is based on the laws of probability (Gigerenzer & Murray, 1987). Unfortunately, when the complexity and ambiguity of reality is brought into the resulting models and frameworks produced by probabilistic advocates, these models become too complicated for the limited cognitive capacities of human beings. Simon (1956, 1957a), Gigerenzer and Gaissmaier (1999) and Gigerenzer et al. (2011) propose that human reasoning and decision-making can be modelled by "fast and frugal heuristics" that make inferences with limited time and knowledge.

Contrary to probabilistic views of human decision-making, these heuristics do not involve much computation, and do not compute probabilities and utilities; they are models of "bounded rationality" (Gigerenzer & Todd, 1999, p. 6). Within bounded rationality there are two main types of decision strategies: "satisficing" (Simon, 1956), where a decision is based on searching for sequential alternatives and stopping as soon as any one alternative that meets the preset aspirational criterion is found; and fast and frugal heuristics that "use little information and computation to make a variety of kinds of decisions", also described as "a simple strategy that ignores information" (Marewski et al., 2010, p. 103). In a series of empirical studies Gigerenzer and colleagues present evidence that decision-making can be sound and accurate without requiring super-human cognitive capabilities, unlimited time and talent or unbounded knowledge (Gigerenzer & Brighton, 2009a; Gigerenzer & Todd, 1999; Marewski et al., 2010).

Simon (1976) states that all decisions have three key limitations in common: (1) they are grounded in incomplete information (bounded rationality); (2) human decision-makers have limited alternative generation abilities; and (3) human decision-makers have limited insight into the future consequences of the alternatives which are under consideration. The decision-making process is further complicated by the lack of readily available information – in reality information is not *given*; managers must *search* for relevant, current and impactful cues (Gigerenzer & Todd, 1999). This search for information is compromised by the speed at which it must take place, as well as the limited search resources (Gigerenzer & Todd, 1999), including the lack of cognitive and meta-cognitive abilities of the individuals involved in them (Chase, Hertwig, & Gigerenzer, 1998; Gigerenzer & Todd, 1999). A further complication is the rate of change in the environment.

Competency researchers stress the high value in developing deep knowledge about contexts within which decisions are made and availability of alternative choices as a necessary (but not sufficient) condition for understanding and nurturing explicit competence. Simon (1990) argues that decisions and cognitive strategies can only be judged as rational, irrational or optimal within the confines of the context. According to Simon, the internal cognitive capacities and the external environment that surrounds our rationality are closely linked.

Simon (1990) proposes the analogy of the mind and the world fitting together like the blades of scissors – the two must be well matched for effective behaviour to be produced, and just considering the cognitive blade will not explain how the scissors cut. "Human rational behavior … is shaped by a scissors whose two blades are the structure of the task environments and the computational capabilities of the actor" (Simon, 1990, p. 7). This analogy is an important representation of what it might take for management graduates to "make the cut".

Whilst external environmental factors may be immutable for the acting decision-maker, the internal cognitive capacity of the actor – in this study graduate managers – may be shaped by educational development or evolution (Todd, 2001; Todd & Gigerenzer, 2003). For educationalists, the expected outcome of producing effective decision-makers would entail developing students' ecological rationality (Todd & Gigerenzer, 2000, 2003, 2007) – i.e. students' ability to make "good decisions with mental mechanisms whose internal structure can exploit the external information structures available in the environment" (Todd & Gigerenzer, 2003, p. 144).

Gigerenzer (2004, 2008, 1999) suggests that a way decision-makers can achieve simplicity is by developing "adaptive tools" in the form of fast and frugal heuristics. Heuristics are efficient cognitive processes that ignore information. Heuristics can be

defined as "a method of solving a problem for which no formula exists, based on informal methods or experience, and employing a form of trial and error iteration" (Encarta Dictionary, 2004). In contrast to the generally held belief that more accuracy is attainable with higher levels of effort in thinking and information processing, Gigerenzer (2004) finds that when "profound simplicity" is achieved by dropping complex algorithms that do not fit the context accurately, higher levels of accuracy can be attained.

Gigerenzer and Brighton (2009a, p. 107) suggest, "*Homo heuristicus* has a biased mind and ignores part of the available information, yet a biased mind can handle uncertainty more efficiently and robustly than an unbiased mind relying on more resource-intensive and general-purpose processing strategies." These simple decision algorithms (heuristics) can work well or may be ineffective, depending on their appropriateness within a given context (Gigerenzer & Brighton, 2009).

This call to drop complex and ineffective tools when inappropriate to the context relates directly to the work of Weick (1988, 1993 1995, 2007). According to his seminal work on explicit competence and incompetence and his concept of "sense-making", managers select and employ simple heuristics in decision-making within specific management contexts with the objective of reducing incompetence and increasing competence. Managers and business executives use sense-making strategies to understand and make sense of ambiguous situations. According to Woodside (2001, p. 416), sense-making is "meaning creation based on current and prior interpretations of thoughts generated from three sources: external stimuli, focused retrieval from internal memory; and seemingly random foci in working memory; such sensemaking is constructed on cultural pilings held unconsciously in long-term memory."

Weick (2007, p. 15) states, "Knowledge involves acquiring. Wisdom involves dropping. Sensitivity to that difference is part of what I think it means to reconfigure management education." Weick continues:

> Learning to drop one's tools to gain lightness, agility, and wisdom tends to be forgotten in an era where leaders and followers alike are preoccupied with knowledge management, acquisitions, and acquisitiveness. Nevertheless, human potential is realized as much by what we drop, as what we acquire… students and professors hold onto concepts, checklists, and assumptions that similarly weigh them down, reduce their agility, and blind them to what is happening right here and now and how they can cope with it (p. 6).

In an appeal to educationalists to further the development of human potential and advance excellence in management education, Weick (2007) suggest six extensions of the "drop your tools" idea: (1) Drop your confused complexity: "profound simplicity is to cut through the confusion and 'drop' those perspectives that are redundant, useless, secondary, and contradictory" (p. 10). (2) Drop your fixation: "Students suffer from fixation error and find it very difficult to move beyond their initial diagnosis." The suggested solution: "First, voice aloud an expanded symptom review. Second, voice an expanded list of what diagnoses might fit those symptoms. Third, voice a plan to eliminate diagnoses one by one. The striking finding is that when people start to vocalize this review, they stop fixating on just one possibility" (Weick, 2007, p. 11). (3) Drop your undifferentiated categories: "Essentially, when people engage in sensemaking, they impose abstractions and categories that mean they move farther and farther away from their initial impressions. The cost is greater intellectual and emotional distance from the phenomena picked up by direct perception" (Weick, 2007, p. 12). (4) Drop your focus on decision-making: "Learning to hold one's tools lightly shifts the

focus from decision-making to sense-making. In the words of the late Paul Gleason (personal conversation, 1996), one of the most revered wildland fire-fighters in the world, 'If I make a decision it is a possession, I take pride in it, I tend to defend it and not listen to those who question it. If I make sense, then this is more dynamic and I listen, and I can change it. A decision is something you polish. Sensemaking is a direction for the next period'" (Weick, 2007, p. 12). (5) Drop your tactics that muddy learning about dropping: "To sensitize people to the consequences of dropping, compare performance with and without the tool. Learn how much of a difference it makes … audit of what tools you do have … date when tools were first acquired … spend time refining judgments of precisely which tools need to be dropped" (Weick, 2007, pp. 13, 14). (6) Drop your preoccupation with efficiency. High reliability organizations (HROs) have a different set of priorities (Weick & Sutcliffe, 2001). They drop the traditional ways of acting and pay more attention to failures than success, avoid simplicity rather than cultivate it, are just as sensitive to operations as they are to strategy, organize for resilience rather than anticipation, and allow decisions to migrate to experts wherever they are located (Weick & Putman, 2006).

Thus, an important contribution of competency training should be the development of skills to identify poor and ineffective training and incompetent or ineffective sense-making tools. This thesis also includes the role of training in identifying tools, knowledge skills, and attributes that are ineffective and need to be dropped or unlearned.

B. Learning by Doing: Case-based Reasoning (CBR) and Goal-based Scenarios (GBS)
According to Simon (1947, p. 1), "Administration is the art of getting things done." Although he purports that all practical activities involve both deciding and doing, "It has not commonly been recognized that a theory of administration should be concerned with

the processes of decision as well as with the processes of action" (p. 1). Schank (1995, p. 1) stresses the importance of learning by doing and its role in teaching decision-making; he advocates the creation of an educational environment where students "make many decisions that they would not ordinarily get to make".

Schank et al. (1999, p. 166) argue that traditional methods of instruction have several shortcomings, including the teaching of content without linking the content to the intrinsic motivators and prior knowledge of the learner. Also, if students do not know why the knowledge is useful, they will not retain the newly acquired knowledge for long. The authors propose case-based reasoning (CBR) as a method to "learn content and skills in order to achieve goals that [students] find interesting and important and that relate to the subject matter" (Schank et al., 1999, p. 166). The proposed teaching method provides meaningful context for new learning material by demonstrating how it would be used in real life. The traditional method of teaching that decontextualizes knowledge and skills, "makes it difficult for students to retrieve and use such knowledge" (Schank et al., 1999, p. 166).

Schank et al. (1995) and Schank et al. (1999) offer practical suggestions to educationalists on how to design educationally sound curricula and lessons, and identify four fundamental features. First, learning is *goal-directed* – people are willing to learn when the goal aligns with their own interest or needs. Second, learning is *failure driven*– mistakes prompt learners to improve their knowledge and correct misconceptions. Third, learning is *case-based* – learners will naturally reflect back to previous experiences (cases) to help them solve new problems. And fourth, learning takes place by doing – realistic environments and experiences will assist learners to apply and use the newly acquired knowledge, skills and attitudes.

Schank and colleagues propose CBR, a theory of memory and learning based on a teaching structure of goal-based scenarios (GBS) and argue that students learn best through actual decisions and behaviours and seeing examples from real life, rather than passive listening or being preached at. "We want students to know the exceptional cases from which they can learn and make judgments on their own about new situations" (Schank, 1995, p. 8). CBR allows students to acquire and practise skills closely related to what they will use in real life, which not only assists graduates in dealing with real-life problems of a similar nature, but provides motivating goals. "The way in which they practice the skills should closely relate to how they will use the skills outside the learning environment" (Schank, 1995, p.166). Schank et al. (1999) maintain that such a methodology will facilitate easier retrieval of learning memories when students need to deal with problems similar to those dealt with in development interventions, due to their similarity.

This learning methodology involves "based cases", defined as a memory of an incident or a memory of an event – something that happened. To become an expert, a learner will need a number of experiences or cases to retrieve in order to refer to them to find the relevant information, when it is needed. For a memory to be really useful "it must be retrieved at the right time" (Schank et al., 1999, p. 168). People "index" experiences (much like a library indexes books or one uses files and folders on a computer) in order to retrieve the memories from cues provided by the current experience. Experts have more experiences to rely on when faced with an unknown problem or incident. Sound teaching methodology will provide students with sound "indexing" systems to ensure learning memories that are easy to retrieve and linked to the right cue to be retrieved at the necessary time.

Schank et al. (1999) define GBS as "learning by doing" simulation where students pursue a goal by practising target skills and by using relevant content knowledge to help them achieve their goals. A GBS design creates a motivational and sensible context within which learners grapple with issues, acquire new knowledge, and target skills, framed against prior experiences and learning (Schank et al., 1999). During the simulation, students are provided with coaching just in time for them to use the information. Giving feedback in this manner allows learners to remember what they were taught (Schank et al., 1999, p. 165).

An important distinction between GBS and traditional teaching methods is that students learn how to address issues and solve problems, rather than learn pure or applied knowledge. Learning the content knowledge becomes a natural outflow of learning "how". Schank (1994, p. 165) report that if students learn "how to" rather than "know that", they know why they need to know something as well as how to use the knowledge. An additional proffered benefit of GBS learning is that students are intrinsically motivated to learn due to own interest, rather than extrinsically motivated in order to pass an assessment. This learning process further aids recall since the problems are contextualised, which aids memory and recall. According to Schank et al. (1999, p. 166), "The only way we remember what we learned is by having similar experiences that trigger out memories". When student attempt to diagnose a new problem, memories of other diagnoses will be triggered, more so than when knowledge is learned in a decontextualised fashion (Schank et al., 1999). When learners practise knowledge, skills and abilities in ways closely related to how they will be used outside of the classroom, relevance, motivation and recall are enhanced. Schank et al. (1999, p. 169) lament that traditional methods fail because "learners do not understand the relevance of what they learn and the lessons do not apply to an intrinsically motivating goal".

In particular, Schank (1995, p. 28) points out that "student managers need to be allowed to make contrastive decisions, that is to choose one thing one day and then make alternative choice the next, in order to learn the detailed level of nuance that is part of good decision-making". He adds that students will have to make a great many decisions in order to become good at it; which links well to the work of Gladwell (2008) who suggests that it takes much time, a suggested 10, 000 hours, to become an expert at anything.

Schank et al. (1999, p. 168) define experts as "people who can use knowledge and perform skills in a functional manner to achieve their goals" and add "In order to be an expert, a person "must have many experiences in their domains of expertise". These experiences will be filed in "well-indexed case libraries that are organized for appropriate retrieval" (p. 169). In *Outlier: The Story of Success*, Gladwell (2008, p. 40) reports that researchers agree on a figure of 10,000 hours of critical experience in a domain being required to become an expert. Gladwell states, "Achievement is talent plus preparation" (p. 38). Gladwell (in line with neurologist Levitin [2006] and psychologist Ericsson [1993]) also argues against the primacy of talent, and reports that a complex task can be mastered.

Schank et al. (1999) expand on the issue of expertise, by stating that experts must be able to organise memories of experiences in order to retrieve the relevant information when needed. CBR assists with this indexing task by providing similar problems in the learning environment to those learners are likely to encounter in the real business environment, making retrieval more likely (Schank et al., 1999). In traditional teaching methods, learners are more likely to learn in order to prepare for assessments, thus linking the new knowledge, skill or ability to a test or assessment, rather than the relevant competency domain.

Schank et al. (1999) provide an example to illustrate this phenomenon. When students in a Biology class are asked to learn about different types of blood cells, it can either be done via the traditional method of providing the knowledge and inducing students to learn it by rote for an upcoming assessment. The key aim of an instructional method based on GBS, by contrast, is to provide realistic, sensible and motivating contexts where students want to learn and practise target skills. For instance, in this Biology class example, learners are asked to play the role of a doctor and are presented with a patient displaying certain symptoms. The patient complains of exhaustion over a long period and manifesting a fever. When students are now asked to analyse blood samples in order to determine the cause of the patient's illness, their learning about how certain configurations of blood cells are associated with certain diseases is contextualised and indexed in relation to curing patients, as opposed to indexed as knowledge about biology. In this example students have, through a case-based scenario, learned relevant new knowledge which is well indexed for later retrieval in real-life problem solving and decision-making.

As practical guidance for designing case-based reasoning and learning, Schank et al. (1999) offer three key elements: (1) goals, plans and expectations; (2) expectation failure; and (3) explanations. With regard to the first key element, the authors state, "every endeavor begins with a goal and learning results from what happens on the way to achieving our goals" (p. 170). As people learn and grow, they will develop some expectation of the standard to which to perform. Plans created to solve previously attempted problems or to resolve issues, as well as knowledge and competencies indexed in past experiences will cue learners for this new development intervention. The second key element, expectation failure, refers to results that differ from the planned outcome. If learners care about the outcome and know that they will use the knowledge, skills or abilities again, they are not likely to forget erroneous outcomes and

what caused the failure. Learners are also more likely to demand an explanation for the ineffective or unacceptable standard of the outcome, resulting in a "prime condition for learning" (Schank et al., 1999, p. 171). When learners experience an expectation failure, explanations – the third key element – become important. While attempting to construct explanations of failure, mistakes or unacceptable outcomes, learners have to access past experiences, knowledge and competencies.

To transition from learning theory to instructional design theory, Schank et al. (1999) outline seven elements that comprise a GBS: the learning goals; the mission; the cover story; the role; the scenario operations; the resources; and the feedback, including coaches and experts (Schank et al., 1999; Schank, Fano, Jona, & Bell, 1993). In this study, the learning goals for the students are:

(1) To appraise the available information and determine which information to use and which to omit in making an effective business decision (Bloom's [1956] highest order learning objective = evaluation)

(2) To conclude by advising the client of the preferred course of action within the complex business environment. (Bloom's higher order learning objectives = analysis and synthesis).

(3) To analyse available information in order to assess the impact of the context on the business decision (Bloom's higher order learning objective).

(4) To justify or explain why the suggested course of action is the preferred or most effective option. (Bloom's highest order learning objective.)

C. Educational Drama, Role-play (RP) and Simulated Interactions (SI)

Elm and Taylor (2010) observe that academia has often emphasised the importance of intellectual knowledge-based cognitive tools such as logical arguments, scientific analysis and comprehension and left aesthetic embodied knowledge to the fine arts or

the margins of academy. This cognitive emphasis sees knowledge acquisition as involving complex cognitive processes: perception, learning, communication, association and reasoning. However, this focus on purely cognitive processes and intellectual learning neglects a substantial and critical component of real-life learning, i.e. tacit, implicit, aesthetic, embodied learning.

Modern educationalists argue for wholeness of learning which incorporates both the mind and the senses/gut (Baruch, 2006; Beirne & Knight, 2007; Garventa, 1998; Heron & Reason, 2001; Kolb, 1984; Strati, 1996; Taylor, 2003; Taylor et al., 2002; Yang, 2003; Yanow, 2001). These scholars assert that learners gather information and learn knowledge through a variety of senses and teaching methods. The theoretical underpinnings for the acquisition, creation and transformation of knowledge through educational drama (ED), which includes role-play and SI, can be found in the work of Brunner (1966) on constructivism; Dewey (1963), Rogers (1983, 1985), Kolb (1984) and Bound (1996) on experiential learning; Rogers (1983) on humanism; and Singe (1990) on adaptive and generative learning.

ED in management education dates back to the 1960s, with Lewin's teaching method for training group dynamics (Kolb & Kolb, 2008). Kolb and Kolb (2008) report a number of experiments relating to Lewin's laboratory training methods, resulting in their first management textbook about experiential learning, published in 1971. The literature indicates the popularity, acceptance, effectiveness and widespread use of experiential learning in education in general (Andrew, 2010; Bosse et al., 2010; Druckman & Ebner, 2007; Evans, McGuire, & Thanyi, 2010). This thesis is particularly interested in the presentational form of knowledge acquisition, creation and transformation espoused by Heron and Reason (2001, p. 184), consisting of SI (Armstrong & Green, 2005; Green, 2002, 2005), ED (Brennan & Pearce, 2008; Elm &

Taylor, 2010) or role-play (Bosse et al., 2010; Druckman & Ebner, 2007; Sebenius, 2001).

Although empirical studies in management education are relatively few, they all seem to concur that role-play and SI has andragogical merit (Beaver, 1999; Brennan & Pearce, 2008; Knowles, 1998; Moshavi, 2001; Pearce, 2004; Torbet, 1989). Of particular importance to this study are (1) the ability of a methodology to provide meaning through links to students' prior learning (as Schank, 2008, confirms and discusses via CBR through GBS; (2) their ability to make sense of content by creating links with real-life experiences; and (3) links to students' future career aspirations. These attributes are important since one of the key concerns raised about management education is the relevance and application to the real world (Pfeffer & Fong, 2002a), and because educationalists confirm that improved learning outcomes are achieved when links to prior learning can be made (Boud, 1996). ED and experiential learning delivers these outcomes (Boud, 1996).

A wide range of educational benefits have been shown to stem from ED and experiential learning, including the embodiment of knowledge through physical activity and movement (Beaver, 1999; Boud, 1996; Wright, 1998), and role-playing has been described as "powerful and effective" in improving team-based skills (Ferris, 2001). Beirne and Knight (2007, p. 602) report that students who participate in educational role-play recognise the "benefit of transferability of the acquired skills in the areas of collaborative problem solving, propensity to share responsibility and to negotiate roles and respective contributions", resulting in improved employability. According to the empirical work of Brennan and Pearce (2008, p. 8), students find role-play drama "an excellent method of acquiring knowledge and skills".

Beirne and Knight (2007, p. 602) further attest that ED also cultivates "the potential to empathize with contrasting positions" – a very important competency required in dealing with human interactions in managerial positions – and instils an appreciation for management as a "social and political rather than neutral process that sometimes involves unpalatable and difficult situations.

Schank et al. (1999) suggest that role-play or enactment should form an integral part of the design and implementation of CBR. Empirical support for this suggestion can be found in the work of Armstrong and Green (2005). They find that SI, a form of role-playing, increases the accuracy of decisions and forecasts substantially (correct in 61% of predictions) over unaided or even expert judgement (same as chance guesses correct in 28% of predictions). Armstrong and Green (2005) report that even experts, when their judgements are unaided, are no better than chance predictions by people in conflict situations.

Although the literature on role-play as a teaching approach and learning medium is extensive, comparatively little empirical research evidence is available on using this learning method for teaching business concepts to graduates and executive students in higher education contexts (Brennan & Pearce, 2008; Kolb, 1984). To investigate the validity of role-play as a teaching method and decision aid in management development, this study will extend the work of Armstrong and Green to management education and development, and include role-play(s) in the form of CBR and GBS in the selection of conjunctive recipes.

D. Individual, Collective, or Interactive Decision-making (IDM)

Distinguishing between group and committee decision-making is important (Hastie, 1986) where consensus or some form of agreement is required versus interactive decision-making (Heath & Gonzalez, 1995) and where people consult with others

before deciding among alternative options. According to Heath and Gonzalez, interactive decision-making (IDM) is a process whereby decision makers "collect information and opinions from others but make our final decision alone" (p. 305). In personal decisions such as which restaurant to visit, which car to buy, and in more life-altering long-term decisions such as who to marry, humans often seek council and gather information from experts, peers, friends and family – only to ultimately decide alone. In real-life business decisions, managers consult with subordinates, colleagues, coaches, experts and seniors but ultimately have to or need to make the final decision themselves. This study concerns itself with management decisions in general and with some specific marketing and management decisions as they are encountered in the four in-basket simulations included in the laboratory experiment. IDM is clearly of great importance in management and marketing decisions (how customers make decisions affected by peers and others), but many scholarly studies treat the two types of decisions (group and interactive decision-making) as interchangeable.

This study recognises the difference and concentrates on IDM since its laboratory experiment states emphatically that groups do not need to consensually agree to a single outcome. Thus, to clarify the difference the definition of IDM as conceptualised by Heath and Gonzalez (1995, p. 306) is adopted in this research: "A procedure where individuals consult with others to make their final decision alone".

Further, as explicitly stated by Heath and Gonzalez (1995, p. 307), this study assumes that "theories developed to explain 'group' polarization, [are] also assumed to apply to interactive decisions". All group decisions are interactive decisions, but not all IDM processes conclude with group consensus or group decision-making. Even though the need to agree on a single alternative was not expressed either verbally or in writing during this study's laboratory experiment, the norm in classrooms and the business

environment has been so entrenched in the participants that the majority of participants presumed that this was the required mode of operating or simply assumed that this was the intention despite instructions contradicting this nurtured perception. During the pre-experiment briefing and in the written step-by-step instructions, groups were instructed that "there is no need to achieve consensus". (The observer was asked to monitor this type of behaviour and although not quantifiably or explicitly recorded, behaviour enabling group consensus or attempting to sway the decision of members with alternative views was clearly and unmistakably observed in several of the groups.)

The literature includes a further distinction highlighting the difference between judgement, selection and decisions (respectively: choose between 2 options; choose between a few known alternatives; and open-ended decision where there is no clear or normatively known answer). This study combines all three types (judgement, selection and decisions) into a single category labelled IDM.

E.   Group Interactive-Decision-making (GIDM)

In business today collective decisions are common. Complex decisions involving many diverse actors, ambiguous cues and multiple contexts are made routinely and non-routinely. Consequently, educators responsible for training managers in decision-making and practitioners who rely on group decision-processes need to understand the influence of group information seeking, group decision processing and group judgement on business decision outcomes.

Pooling information in group discussions is one proposal to deal with increased complexity and bounded rationality. Conventional wisdom holds that groups make better decisions than individuals because of their ability to: accumulate information and knowledge (Sargis & Larson Jr, 2002); deal with more information; point out other group members' errors (Schulz-Hardt et al., 2000); encourage divergent and innovative

thinking (Janis & Mann, 1977; Rijnbout & McKimmie, 2012; Sargis & Larson Jr, 2002; Schulz-Hardt et al., 2000); and reduce limitations such as bias and personal preferences (Hilmer & Dennis, 2000; Shaw, 1981; Stasser & Titus, 1985) through cognitive conflict in group decision-making. Other scholars, considering real-world settings, point out that pooling of individual perceptions and knowledge only explains improved group decision competency in part (Michaelsen et al., 1992). Other factors which may explain improved decision quality, uncovered by empirical studies are inter-personal feedback and diagnostic review (Chalos & Pickard, 1985; Einhorn et al., 1977; Kerr et al., 1996) and improved meta-knowledge due to other people's critiques (Heath & Gonzalez, 1995).

In contrast to conventional wisdom, a number of scholars in the area of social cognition and social psychology have uncovered evidence that groups do not always outperform individuals. A study by Chalos and Pickard (1985) reveals significant differences in decision performance results between group decisions and individuals. Explanatory factors highlighted by their study are "quality of information selection, cue weighting and judgment consistency" (p. 635). Some literature on group decision-making suggests that individual and collective decisions not only differ, but can be more or less effective based on a number of cognitive, social and contextual influences (Hall & Williams, 1970).

Heath & Gonzalez (1995) report that, although group interaction is likely to improve decision confidence, it does not necessarily improve decision quality. Reasons put forward include: (1) "groupthink," a dysfunctional pattern of thought and interaction during group decision-making, which is characterised by an overestimation of the group, closed-mindedness, and pressures towards uniformity (Janis, 1982; Schulz-Hardt et al., 2000); (2) biased information search (Kerr et al., 1996), where "group

homogeneity" for a preferred alternative results in a predominantly biased search for information supporting the group view; and (3) underestimation of risk (Schulz-Hardt et al., 2000).

Janis (1982) highlights the limiting and debilitating effect of groupthink on the quality of decisions, using several real-world fiascos such as Pearl Harbour and Watergate as examples. The suppressed views may be the result of both self- or group censorship and a need to conform to the pervasive group view. This very factor – suppressed dissent – is also blamed for the Tenerife airport disaster during which 583 people died (Haerkens, Jenkins, & Van der Hoeven, 2012; Landefield & Cheung, 2004; Woodside, 2012b). In response to the disaster, the National Aviation Safety Administration of America developed training, including aeronautical decision and human interaction procedures, called Crew Resource Management (CRM), which promotes appropriate dissent and purposely introduces challenges to the views of captains by co-pilots and flight engineers to ensure censorship and acceptable double-check habits and reduces cultural and social debilitating factors such as social rank and status awe (Turney, 2004). Woodside (2012b, p. 284) notes that "CRM is distinctly designed to get away from 'the captain is the man' view. Pilots are trained to communicate effectively and accept feedback, and crew members are taught to speak up when they see that their superior officer is about to make a mistake. When pilots spot a departure from safety procedures, they are trained to challenge the captain".

Rijnbout and McKimmie (2012) expand on the disastrous consequences of stifling dissent and offer the Vietnam War and the *Challenger* shuttle disaster as evidentiary examples. These authors warn that groupthink disallows individuals to bring forward suppressed alternatives, resulting in the suppression of valuable alternatives and opposing views which may offer necessary caution or reconsideration by the decision-

maker. Woodside (2012b, p. 284) suggests that a "key to reduce groupthink processes is to train individual and working groups into how to effectively counter culture-based incompetency training (e.g., showing deference to superior authorities)". The effectiveness of using devil's advocates (DAs) and role-playing to counter incompetency training and groupthink receives substantial support in the literature (Armstrong, 1977; Cosier, 1978; Green, 2002; Schweiger, Sandberg, & Ragan, 1986; Schwenk, 1990). Therefore, in the pursuit of effective training methods to reduce the effect of inherent inability or the effect of decision incompetency training, this study investigates the impact of DA on group interactive decisions further.

F. Devil's Advocate (DA) & Purposely Introduced Decision Dissent (PIDD) or Deliberate Decision Dissent

Since Janis's thought-provoking book, an abundance of empirical research has provided suggestions on how to mitigate the effect of groupthink and counteract conformity (Greitemeyer, Shulz-Hardt, & Frey, 2009; Nemeth, Connell, Rogers, & Brown, 2001). This can be achieved authentic (genuine disagreement) and contrived (regardless of real preferences) dissent strategies such as DA (Schulz-Hardt et al., 2000); group-support systems (GSS) (Miranda & Saunders, 1995); and dialectic inquiry (DI) (Schwenk, 1984). "Group-support systems (GSS) are typically computer-based decision aids that help members anonymously express hidden doubts … Devil's advocacy and dialectical inquiry are different methods for purposely introducing dissent into group decision-making" (Freedman, 2011, p. 205). DI is a method where "Leaders assign at least two different teams to approach a problem using different assumptions, and then bring the teams together to present and debate their results" (Freedman, 2011, p. 3).

Advocates of the group decision procedure DA recommend a role-player who is consciously tasked to offer dissent; to caution and to question assumptions made during decision-making processes; and to identify potential problems with proposed decisions

(Cosier & Schwenk, 1990; De Bono, 1999; Janis, 1982; Nemeth et al., 2001; Schwenk, 1984, 1990). The role of the DA is defined as: "a procedure which involves the appointment of one or more persons to raise objections to favored alternatives, challenge assumptions underlying them, and possibly point out alternatives" (Schwenk, 1984, p. 158). Hence, the role of the devil's advocate is especially useful when (1) groups are likely to arrive at decisions prematurely – due to either a high level of cohesion or conforming; (2) when group members have diverse levels of power or status (MacDougall & Baum, 1997); (3) when time pressures cause decision angst over deadlines; or (4) when strong leadership oppose alternative views to the extent that authentic dissent is quashed (Nemeth et al., 2001; Schwenk, 1988).

In an attempt to emulate authentic dissent, the role of the DA is fundamentally that of formalised, purposely introduced decision dissent (PIDD) into group decision-making processes, in order to avoid false assumptions; stimulate open discussion; prevent inadequate research into possible alternatives; and increase the diversity of views, thus expanding the range of alternatives under consideration and ultimately improving the overall decision quality (Rijnbout & McKimmie, 2012; Schwenk, 1990). Although theorists fundamentally agree on the role of the DA, they disagree on how it is best performed. A large variety of alternatives on the practical implementation within organisations of DA is recorded in the literature (Brockman, Rawlston, Jones, & Halstead, 2010; De Bono, 1999; Freedman, 2011; Greitemeyer et al., 2009; Nemeth et al., 2001; Schulz-Hardt, Jochims, & Frey, 2002; Schwenk, 1990). The suggested strategies and tactics relate to the number of role-players; whether an internal expert or objective external consultant should be nominated for the role; or whether the DA should be prepared with perspectives from different assumptions or paradigms or just intuitively raise opposing viewpoints. Some scholars imply that the role should be taken by a group of people, whilst others feel a single role-player will suffice.

Not all scholars agree that dissent – especially contrived dissent – improves decision outcomes, however (Greitemeyer, Schulz-Hardt, Brodbeck, & Frey, 2006). The deviance and conflict accompanying dissent may distract individual members from the task, thus affecting group morale and cooperation (De Dreu, 2006; Nemeth et al., 2001). As discussed below, the higher levels of conflict associated with DA may be especially debilitating for group members who are amiable, peaceful social types or who are from ethnic backgrounds with low tolerance of ambiguity. This study aims to measure the effect of a deviant group member on the decision quality as well as the confidence of the individual members in the decisions they have made as a result of the group interactions. These two decision outcomes (quality and confidence) are discussed separately below.

The Effect of DA on Decision Quality

This research investigates configurations of conditions which might lead to successful decision outcomes. The specific focus is on MBA graduates who are, due to the nature of the selection process followed by New Zealand (and other) MBA schools, very diverse in experience, education level, age, and therefore level of power. In this study, participant groups were made up of four randomly selected members. The composition of MBA streams of cohorts in New Zealand is truly multi-cultural, with a large proportion of students from Asia (Korea and Japan) and India (see the demographics profile of the study participants in Chapter 4 and Appendix D). In order to emulate real-world executive decision groups, and as a result of the composition of the MBA cohort in New Zealand universities, the participant groups were comprised of members with different perceived power levels – connection, referent, expert, legitimate, coercive and reward power (Blanchard, Zigarmi, & Nelson, 1993; Hersey, Blanchard, & Natemeyer, 1979).

Following the cultural diversity studies of Hofstede (1980, 1983, 1986, 1993, 1994, 2001) and Hofstede, Hofstede and Minkov (2010), and heeding Hofstede's (1986, p. 301) warning that "Differences expected in teacher/student and student/student interaction … with reference to the four dimensions of Individualism versus Collectivism, large versus small Power Distance, strong versus weak Uncertainty Avoidance, and Masculinity versus Femininity" place a burden of adaptation and sensitivity on the teacher, the laboratory experiment in this research included a DA dissent condition. The study's proposition is that free and open discussion is more likely to be stimulated in any group, including the culturally diverse groups (where cultural diversity may lead to suppression of opposing views through dissent), resulting in better decision outcomes.

Several authors report criticisms of MBA graduates as displaying poor inter-personal and communication skills and being highly opinionated and arrogant (Boyatzis et al., 1996; Pfeffer & Fong, 2002a; Porter & McKibbin, 1988). Although not all authors agree on how impactful these behaviours are on the quality of MBAs' decisions (Dearing, 1997; Porter & McKibbin, 1988), this study investigates the possible impact of contrived dissent (DA) on decision quality. It examines the effect of pre-allocated, mandatory deviants on the less confident or less forceful members of the group and ultimately the decision quality and the individual's confidence in the decision.

The Effect of DA on Decision Confidence
Insabato et al. (2010, p. 539) define decision confidence as "the feeling of having done something correctly or incorrectly" and conclude that decision confidence "is an important aspect of the subjective experience during decision-making which increases for correct decisions and decreases for error decisions as the task become easier".

During the development of a working definition for this study, the issue of decision confidence was also covered from a strategy implementation and strategic business unit (SBU) performance perspective. A plethora of articles report on the importance of intellectual and emotional buy-in and confidence in team leaders and their decisions to ensure productivity and high performance organisations (Sadler, 1970; Thomson, 1999; Weick & Roberts, 1993; Wiley, 2010). Further, for groups to have confidence in their leaders, leaders must display high levels of self-confidence in their own capabilities and decisions (Boyatzis & McKee, 2005; Goleman et al., 2002). Both in the educational environment and in real-world organisations, people are often required to collaborate on the same or different projects; hence it is important to determine the effects of dissent/deviance on group decision outcomes. There is relatively little empirical research on the effect of dissent or deliberate deviance on the decision confidence of either the group or its individual members. This study therefore considers decision confidence – both of the decision maker and the group members – as part of a successful decision outcome and aims to measure the effect of a purposefully deviant group member on the decision confidence of the individual members of a group.

Rijnbout and McKimmie (2012, p. 2) warn against the potential impact of deviance on group morale and group member confidence in its leadership, but acknowledge that "the way that deviants affect the decision-making process is poorly understood". This study is not longitudinal and will thus not be able to provide insights into the long-term effect of dissent on group cohesion, morale and group health. Instead this study investigates the instantaneous effect of dissent (deviance) on decision confidence immediately after the group interactions and upon the recording of the decision.

2.6   DEVELOPMENT OF RESEARCH PROPOSITIONS

Table 2-1 summarises the propositions considered by this study and provides an at-a-glance, concise overview of all its key propositions. The table, based on the literature review conducted in this chapter, is divided into three main categories: (A) contextual conditions; (B) cognitive conditions/workings of the mind; and (C) a combination of contextual and cognitive conditions (A and B). These main sections are further divided into six sub-categories: (1) the main considerations regarding the impact of competency and incompetency training; (2) the impact of group interactive methodologies such as role-play, CBR, GBS and group discussions; (3) the role of dissent in decision-making; (4) the impact of experience, age, education, ethnicity; and (5) the impact of decision confidence on decision success; and (6) a combination of contextual and cognitive conditions. (These antecedent conditions are referred to as "paths" in qualitative comparative analysis [QCA], which is used in this study, as discussed in Chapter 3.)

Table 2-1: Three main categories and sub-categories of conditions

A CONTEXTUAL CONDITIONS	1.	**Competency & Incompetency Training (COMPT & INCMPT)**
	1.1	Boston Consulting Group matrix (BCG)
	1.2	Weighted Priority Matrix (WPM)
	1.3	Take the Best Heuristics (TTBH))
	1.4	Goal-based Scenario (GBS)
	1.5	Simulated Interaction (SI or Role-play)
	2.	Group Interactive Decision-making & Individual Decision-making (GROUP & INDV)
	3.	Purposely Introduced Dissent (DA, devil) When the participants are not exposed to DA, they are labelled with FREE)
B COGNITIVE CONDITIONS/ WORKINGS OF THE MIND	4.	Demographic impact factors: age and education level (EDUC)
	5.	Decision Confidence (conf), considered both as outcome condition and as a measured antecedent.
	6.	Judgement and Decision-making (JDM Experience), labelled management (or managerial) experience in this study.
C A COMBINATION OF CONTEXTUAL AND COGNITIVE CONDITIONS	6.	A combination of the contextual and cognitive conditions set out above (Causal paths combining antecedent conditions = conjunctive statements)

The first category further investigates effects noted by prominent scholars such as Weick, Armstrong, Gigerenzer, Schank and fellow researchers that introduce contextual information in the form of competency and incompetency training (the provision of corrective materials) and considers the effect upon quality and confidence of the decision and the impact on competent or incompetent decisions. The first category also contains the main theses: although certain incompetency training tools of the BCG matrix and the Experience Curve typically lead to poor decisions, these models' effect can be overcome by introducing a combination of andragogical methods. The second category contains propositions concerned with the impact (or absence of impact) of various cognitive conditions, while the final category of propositions deals with a few combination of Categories A and B. It is important to note here that the terms "configuration of conditions", "causal paths", "conjunctive statements" and "complex antecedent conditions" are used interchangeably in this study. The implementation specifics such as content and application are discussed in Chapter 4. The in-basket

cases, including the four scenarios and the competency and incompetency decision aids,

appear in the Appendices.

Table 2-2: Research propositions

Number	Contextual Propositions
P$_1$	Training via GBS results in more competent decision-making than inactive knowledge learning.
P$_2$	Competency increases by adding formal assignment of a DA role-player versu natural, unguided group interactive decision-making (a type of placebo condition) to group discussions in making decisions**.**
P$_3$	The introduction of incompetency training and decision aids such as BCG and Priority matrices result in less competent decision-making, but is associated with high decision confidence
P$_4$	Role-playing introduced through CBR/GBS increases decision competency versus group inter-active decision-making alone.
P$_{5a}$	Decision-making by an individual is more effective than group decision-making when the group uses no formal group-discussion protocols (e.g. form: role-playing as introduced through GBS).
P$_{5b}$	Group interactive decision-making is more effective than individual decision-making when the group uses formal group-discussion protocols (e.g. formal role-playing as introduced through GBS.**)**
P$_6$	Individuals trained in contextual influences on decision-making (e.g. drop-your-tools contexts) and the use of implicit thinking (e.g. "intuitive first choice/gut feeling") make more competent decisions, compared to groups using formal group-discussion protocols.
P$_{7A}$	The introduction of irrelevant information leads to cognitive overload and causes a greater proportion of incompetent decisions (for individual participants as well as group interactive decisions).
P$_{7b}$	The introduction of irrelevant information through complex decision aids leads to lesser confidence in the decision that (for individual participants as well as group interactive decisions).

Number	Cognitive Propositions
P$_8$	An individual with more experience in managerial JDM makes more competent decisions compared to decision-making by individuals with lower levels of managerial (JDM) experience.
P$_9$	Groups with a more diverse spread of JDM experience make more competent decision compared to decision-making groups with a lesser JDM experience.
P$_{10}$	Individual participating decision-makers with higher versus lower levels of experience in JDM make more competent decisions and are more confident in their decision competency than individual decision-makers with lower levels of experience in JDM.
P$_{11}$	Individuals with high versus low levels of education and JDM experience are more competent and more confident in their decision outcomes.

Number	Propositions with a Combination of Contextual and Cognitive Conditions
P_{12}	Training via GBS results in more competent decision-making than inactive knowledge learning.
P_{13}	Participants exposed to a combination of treatment conditions will outperform participants who receive only one of the treatments, resulting in higher levels of decision confidence and higher levels of decision competence.

2.7   SUMMARY

This chapter has outlined the decision tripartite in managerial decision-making and

highlighted the strengths and short-comings of current practice as it relates to decision

competency and decision incompetency development. The array of andragogical

methods reviewed provided a generous number of tools and strategies to consider in

relation to this research's investigation into education's impact on executive decision-

making capabilities and resulted in 13 propositions combining contextual and cognitive

conditions. A complication particular to this research into effectual teaching

methodologies is the configural nature of conditions that may affect high decision

competence or decision incompetence. The next chapter therefore details the research

methodology and techniques for investigating the propositions in order to advance

theory and testing in competence and incompetency training.

CHAPTER 3: METHODOLOGY: fsQCA AND CONFIGURATIONAL CAUSALITY

3.1 INTRODUCTION

The key objective of this thesis is to determine which developmental interventions or combination of causal conditions (used interchangeably with "teaching methods") result in managers' use of appropriate heuristics and other decision-making tools to ensure decision competency and decision confidence. This study investigates the impact of four different methodologies, namely: first role-play or simulated interactions in goal based scenarios; second using inter-active decision-making strategies; third employing a devil's advocate to cause dissent and in-depth discussion and, fourth knowledge-based decision aids in competency and incompetent decision-making. Furthermore, this research aims to improve our understanding of why managers make incompetent decisions and explores how they can be educated or supported to make competent decisions. It extends the work of Armstrong (2003), Armstrong and Green (2005), Gigerenzer (2008), Gigerenzer and Brighton (2009b) and Schank et al. (1999) and illuminates, through data gathering and critical analysis, the conceptual deductions in developing a new theory of Decision-Competency Development Interventions (DCDI) by testing several theories with the same model.

3.2 RESEARCH DESIGN & QCA PROCEDURES

3.2.1 General Overview of the Method and Operational Propositions

The study includes a series of laboratory experiments that examine alternative management training methodologies and tools designed either to increase executives' competency or incompetency in decision-making. The study probes several propositions relating to the educational merit and impact of four teaching methods: GBS; individual versus group interactive decision-making procedures; role-play or SI; appropriate

assertiveness through devil's advocate dissent; and competency and incompetency decision aids. The study tests the 13 propositions arrived at in Chapter 2, which are:

P_1: Training via GBS (a GBS represents a specific context-case) results in more competent decision-making than inactive teacher-centred knowledge learning. [Grounded in the theories related to GBS and case-based reasoning (CBR) in action learning (Schank, 1995, 1999) and traditional fact-based training versus educational drama.]

P_2: Competency increases by adding formal assignment of a DA role-player versus natural, unguided group interactive decision-making (a placebo condition) to group discussions in making decisions. [Grounded in the theories related to DA and SI (Armstrong & Green, 2005, 2007; De Bono, 1985, 1999; Spanier, 2011), experiential training and educational drama (Schank, 1993, 1994, 1999.)]

P_3: The introduction of incompetency training and decision aids such as the BCG and Priority matrices results in less competent decision-making, but associates with high decision confidence.

P_4: Role-playing introduced through CBR/GBS increases decision competency versus group inter-active decision-making alone.

P_{5a}: Decision-making by an individual is more effective than group decision-making when the group uses no formal group-discussion protocols (e.g. formal role-playing as introduced through GBS).

P_{5b}: Group interactive decision-making (GIDM) is more effective than individual decision-making when the group uses formal group-discussion protocols (e.g. formal role-playing as introduced through GBS).

P_6: Individuals trained in contextual influences on decision-making (e.g. drop-your-tools contexts) and the use of implicit thinking (e.g. "intuitive first choice/gut feeling") make more competent decisions, compared to groups using formal group-discussion protocols.

P_{7A}: The introduction of irrelevant information leads to cognitive overload and causes a greater proportion of incompetent decisions (for individual participants as well as in group interactive decisions).

P_{7B}: The introduction of irrelevant information through complex decision aids leads to lower confidence in the decision (for individual participants as well as group interactive decisions).

P_8: An individual with more experience in managerial judgement and decision-making (JDM) makes more competent decisions compared to decision-making by individuals with lower levels of management (JDM) experience.

P_9: Groups with higher levels of management experience make more competent decisions compared to decision-making groups with less management experience.

P_{10}: Individual decision-makers with higher versus lower levels of experience in JDM make more competent decisions and are more confident in their decision competency than individual decision-makers with lower levels of experience in JDM.

P_{11}: Individuals with high versus low levels of education and JDM experience are more competent and more confident in their decision outcomes.

P_{12}: Groups of participants with high levels of management experience and high levels of formal education are less competent than individual decision-makers with high

levels of management and education experience but the first condition does not associate with higher levels of confidence

P_{13}: Participants exposed to a combination of treatment conditions outperform participants who receive only one of the treatments, resulting in higher levels of decision confidence and higher levels of decision competence.

To ensure valid substantiation of propositions, a rigorous experimental research design is imperative (Anderson & Lawton, 2009), and the next section outlines the research design of this study. The validation procedures are discussed in Chapter 4.

3.2.2 Research Design

True laboratory experiments investigates decision competency, using a total of 150 participants who receive four in-basket problems to investigate, analyse, and complete four case-based scenarios. In surveying the effectiveness (or not) of a predetermined selection of andragogical methods, this study exposes participants to a series of a configuration conditions likely to affect decision-makers' competency and/or the decision outcome. To implement the andragogies, configurations of conditions are designed in the form of in-basket simulations, supported by printed decision aids that have been pre-tested in several studies or as a pre-test to this study, but to the best of my knowledge, there are no studies that are either investigating this particular combination of conditions, or studying the effect on this specific target audience of MBA and graduate management students.

Participants are given four in-basket simulations covering four managerial decision-making scenarios, with one decision required for each scenario. All participants receive the same limited selection of possible answers. It is hypothesised that different combinations of andragogical methods result in different levels of competence or

success in the decision outcomes. Contextual conditions are thus varied through the application of decision-aids in the form of type-written competency and incompetency training aids as well as extraneous information. Competent decisions are predefined by a panel of experts (described in detail in Chapter 4). Participants complete the four decision exercises in a single two-hour laboratory and the configuration of conditions each participant experiences remain unchanged throughout the 2 hours (e.g. if they are in a group, they do not change groups during this period; if they receive a competency training aids, they do not also receive incompetency training aids). The exercises range from low cognitive decisions to high level cognitive decisions and cover a wide range of managerial topics. Implementing the thesis involves testing the 13 propositions with 20 groups (a total of 150 participants) in pre-test and post-test scenarios with a control-group design. The proposal requires a total of 20 groups to achieve reasonable statistical power through the application of fuzzy set quantitative content analysis (fsQCA).

This research design has four major benefits. First, the design substantially extends the research of (Gigerenzer and Brighton 2009; Green 2002, 2005, 2010; Green and Armstrong 2009; Weick, et al. 2005) relating to training methodologies and alternative management development pedagogies that affect managerial competency or incompetency. Second, the study contributes to the body of knowledge and responds to the call for rigorous, objective and compelling research in of the field of simulations and gaming (Anderson and Lawton 2009; Feinstein and Cannon 2002; Feldman and Lankau 2005; Gosen and Washbush 2004). Gosen and Washbush (2004) report that, based on Bloom's (1956) taxonomy of learning and rigorous research design standards, "There have not been enough high quality studies to allow us to conclude players learn by participation in simulations or experiential exercises." Third, the high level of control over the experimental environment and the treatment variables (Campbell and Stanley, 1963) via experimental laboratory research. Fourth, managerial development is a

continual series of experiential learning interventions and this study mirrors the way managers progress in real business life, thus ensuring high face validity (Hsu 1989; Schippmann et al. 1990).

The ability to hold all other variables constant whilst administering the treatment is of extreme value to this study, hence the choice of laboratory experiments within the MBA context (Burns and Burns 2008; Campbell and Stanley 1963).

3.3 JUSTIFICATION OF THE PARADIGM AND METHODS

3.3.1 Selecting Appropriate Tools

Gigerenzer (1991, p. 19) states, "Scientists' tools are not neutral". His study shows how methods and instruments affect the way researchers analyse data, as well as how they develop theory. Woodside (2011, 2013) echoes this general thesis and comments on the limitations of traditional multiple regression analysis (MRA) and structural equation modelling (SEM) to investigate and theorise about cognitive processes. Unambiguous advice from McClelland (1998), Gigerenzer and Brighton (2009b), Armstrong (1991) and Woodside (2013) encourages researchers to move beyond the dominant logic of thinking of outcomes as net effects and using matrix algebra and traditional statistical methods to investigate outcome. Instead researchers in social sciences need to think in terms of which of several factors are crucial to an outcome using Boolean algebra, set theory and algorithms for asymmetrical data analysis. Thus this study will, in an attempt to identify and analyse possible conditions necessary to improve decision competence and decision confidence, consider a combination of causal factors.

McClelland (1998) highlights the non-linear relationships between dependent and independent variables. He stresses that studies on success and competencies show that relationships are not well described by correlation coefficients. Gladwell (2001), meanwhile, describes observation by social scientists as "tipping points". He offers

several examples from the social sciences (such as the decline of inner-city crime, pedagogy and TV watching behaviour) to support this tenet. He explains tipping points by referring to the impact of variances in societal factors (poverty, red tape, corruption, hours practised) make little difference in the outcome (such as epidemics; corruption; excellence in sport; executive success), until a certain critical level is achieved. McClelland (1998) executed 13 studies on causation and competency algorithms associated with managerial success. He concludes that a number of different competencies can substitute one another. This is labelled "multiple conjunctive paths" and indicates that many recipes or combinations of factors may lead to the same outcome. Outcomes are the desired results or dependent variable in traditional statistical methods. For McClelland's studies the outcome under investigation is executive success. For this study the outcomes are decision competence and decision confidence.

Mauro (1995, pp. 685-686) studied GDP growth per capita for different countries considered nine institutional factors (such as corruption, red tape, bureaucratic procedures) and concludes that "A number of mechanisms may contribute to explaining positive correlations among all categories of institutional efficiency… As a consequence, it may be desirable to combine groups of variables into composite indices". In commenting on Mauro's study, Woodside (2013) offers the following advice: "The difficulty is overcome if the researcher moves beyond thinking in terms of which of the several institutional factors are crucial; none are crucial but a few combinations of these variable are likely to associate with high levels of growth. Rather than developing theory and thinking in terms of relative impacts of independent variables, thinking in terms of alternative mechanisms (i.e. algorithms) indicates that several causal recipes relate to high economic growth". These studies add further support for the use of algorithms rather than linear relationships between variables. Some high scores in the outcome (for example GDP annual growth in Mauro's study), a

low score in one antecedent condition (in his study judicial inefficiency) in combination with another antecedent (of high or low score; treatment or measured antecedent, example low corruption) may result in a high score in the outcome condition. The next section considers the strengths and weaknesses of QCA as methodology.

3.3.2   *Justification of the Use of QCA at Epistemological and Methodological Levels*

According to several authors (Aarebrot & Bakka, 2003; Ragin and Rihoux, 2009; Swanson, 1971) comparison lies at the core of most empirical scientific research methods. Ragin and Rihoux state that comparative analysis as powerful mental operation "can be translated into a set of systematic comparative methods and techniques" and "is a key operation in all experimental and natural sciences" (2009, p.xvii). The foundation for this methodoly is laid in J.S. Mill's (1967) canons in which systematic matching of one phenomenon with another in order to establish causal relationships is of key concern to the research scientist. According to Mills (as cited in Ragin & Rihoux, p.2) one phenomenon under investigation can only be identified as of a particular nature of category, if it is systematically compared and recognized as different from another phenomenon. "If two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instance agrees is the cause (or effect) of the given phenomenon: (p. 390). It is rare in social sciences to find or identify such rigid positivist assumptions about causal relationships. In addition it is difficult to "*prove* any causal relationship, because it is most often impossible (in social science at least) to test a clear and complete (preconceived) model of such links and to sufficiently 'control' for other factors (Ragin & Rihoux, 2009, p.3). QCA offers the tools and techniques to identify and investigate the conditions of occurrence and to compare and contrast circumstances that my cause or effect a given phenomenon.

According to Wagemann and Schneider (2007, p. 380), "The general goal of a QCA is to support the researcher in the attempt to arrive at a meaningful interpretation of the (causal) patterns displayed by the cases under examination". QCA resembles qualitative case research in that it is inductive, considers case-based data and explanatory variables, and compares configurations of variables, called conditions or antecedents, and the outcome or lack of outcome to review, update or dictate theory. At the same time it is deductive in approach in that theory informs the criteria and calibration of both the conditions and the outcome(s), as discussed below.

QCA can be distinguished from the more frequently applied statistical methods (with a large number of cases and a small number of variables) in that it investigates the phenomenon represented by a small or medium number of cases with a large number of variables in a configurational way. "This means that each individual case is considered as a complex combination of properties, a specific 'whole' that should not be lost or obscured in the course of the analysis – this is a holistic perspective" (Ragin & Rihoux, 2009, p.6).

There are some difficulties though, in the use of qualitative comparative analysis (QCA) versus MRA. Ragin (2006a, pp. 7-8) captures these in the statement, "The search of patterns of multiple conjunctural causation[s], a common concern of case-orientated research, pose serious practical problems for variable-oriented research". He adds that sophisticated techniques such as QCA are "very rarely used by variable-oriented researchers. When they are, they require at least two essential ingredients: (1) a very large number of diverse cases and (2) an investigator willing to contend with a difficult mass of multi-collinearity. These [statistical] techniques are simply not feasible in investigations with small or even moderate Ns, the usual situation in comparative social science." (N = number of cases.)

Several key principles necessary to bridge the gap between management decision practice and research are listed in the literature. Woodside, Ko and Huan (2012, pp. 775-776) present six methodological pillars designed to bridge the gap between management decision practice and research, and these are (in no particular order): "(1) do case-based, not variable-based analysis, thus enable the maintenance of each individual case's integrity, while enabling generalization and prediction to multiple or 'new' cases; (2) consider multiple paths associated with high outcome(s) and that paths may lead to alternative outcomes; (3) report on key paths or configurational models, rather than one key success factor that is sufficient or necessary for success or failure to occur; (4) allow participants to revisit research reports to add missing data and correct mistakes; (5) do theory-driven sampling to study prolific and rare cases, thus recognizing that averages mislead; (6) 'get out' and do the research in real-life contexts where chance observations and real-life context provides the complexity and rare insights not always possible in self-completed surveys or quasi experiments." "In QCA a cause (such as a specific conjunctive path) is sufficient if the path associates invariably (or almost invariably) with a given outcome condition" (Woodside, 2012c, p. 279). In surveying the effectiveness (or not) of a predetermined selection of andragogical methods, this study exposes participants to a configuration of conditions likely to affect decision-makers' competency and/or the decision outcome. To implement the andragogies, configurations of conditions are designed in the form of in-baskets, supported by printed decision aids that have been pre-tested in several studies or as a pre-test to this study.

3.3.3   *Justification of Case-based Methods*

Several scholars (Byrne & Ragin, 2009; Cooper, 2005; Kent, 2009; Schrodt, 2006; Woodside, 2011) challenge traditional assumptions that case-centred methods are limited to small-N research and synonymous with qualitative research, and that

"frequentist" (Kent, 2009, p. 184) statistical methods (such as analysis of variance [ANOVA]; MRA and SEM) should be used to analyse causal relationships and offer alternative overlapping methods to replace the misconception that "linear frequentist orthodoxy [is the] sole legitimate form of social science". These dominant analytical methods "deconstruct individual case data into variables using matrix-algebra calculations" (Woodside, Ko, & Huan, 2012, p. 766). Other social researchers and scholars (Ragin, 2008c; Woodside et al., 2012) promote the use of case-centred approaches such as cluster analysis, ethnographic decision tree modelling (EDTM) and QCA and its variants (csQCA, mvQCA and fsQCA) when frequentist approaches are counterintuitive; seem inappropriate to the task of finding patterns; when many sets of possible solutions are likely; or when the researcher expects the asymmetric relationships between low scores in antecedent conditions might be associated with low or high scores in the outcome condition(s) (Woodside et al., 2012, p. 770).

Yin (2003, p. 1) states, "In general, case studies are the preferred strategy when 'how' and 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context". The researcher opted for a multiple case-study research design as this is aligned with the recent resurgence of interest in case-based research (Braumoeller & Goertz, 2000; Jordan, Gross, Javernick-Will, & Garvin, 2011; Miethe & Drass, 1999; Woodside, 2011) as well as the procedural requirements of QCA as method and set of techniques (Ragin, 1987, 2006). Ragin (1987, pp. 51-52) points out that the case study approach has a number of benefits: "First they are designed to uncover patterns of invariance and constant association [;] … second …the method is relatively insensitive to the frequency distribution of types of cases [;] …third, case orientated methods force investigators to consider their cases as whole entities … [and] fourth, case-oriented method stimulate rich dialogue between ideas and evidence". Thus, the main reason for

this choice of methodology is our need to look at a combination of causation factors in developing MBA graduates' decision competencies, rather than the net effect of a set of independent variables.

A key objective of this study is to examine how various teaching methods and competency and incompetency training aid or impede the development of decision competency and confidence. This research thus takes up the challenges highlighted in this section by considering several combinations of antecedents (variables) likely to associate with high levels of decision competence and high levels of decision confidence and by selecting a methodology that expects and supports asymmetric relationships between treatment conditions and the outcome(s).

3.3.4   QCA as Method and Set of Tools

QCA is a method based on the premise of configurational causation in that it combines qualitative and quantitative methods to study the relation between multiple factors and a specific outcome. According to Rihoux and Grimm (2006, p. 1), this research strategy is more likely to result in "in-depth insight in the complexity of the cases, while still attempting to produce some level of generalization". In contrast to net effect thinking, where each variable is considered to be able to affect the outcome or the level or probability of the outcome in isolation and regardless of the other variables, QCA considers how combinations of conditions and case aspects affect the specified outcome condition, in this study the decision competencies of the participants.

In addition, QCA techniques allow for different factors or causal paths to lead to the same outcome, termed "conjunctural causation" (Rihoux & Ragin, 2009). "Unlike more quantitative methods that are based on correlation, QCA seeks to establish logical connections between combinations of causal conditions and an outcome, the result being rules that summarize the sufficiency between subsets of all of the possible

combinations of the causal conditions (or their complements) and the outcome. Each rule is a possible path from the causal conditions to the outcome" (Lambert & Fairweather, 2010, p. 1). According to Grimm and Rihoux (2006, p. 18), "By studying combinations of conditions, it is possible to unravel the conditions or contexts that enable or disable specific connections (e.g. between education and the avoidance of poverty)".

QCA is both a research strategy and a set of research tools (Jordan et al., 2011; Rihoux, 2006b) and was developed by Ragin (1987) to bridge the divide between qualitative and quantitative approaches (Woodside & Zhang, 2011). Although originally designed for application in politics and historical sociology, QCA principles and the accompanying set of analytical techniques have been gaining acceptance and are now applied in a large variety of disciplines An increasing proportion of social scientists, for example, are selecting QCA for its ability to generalise findings over a relatively limited number of cases (Braumoeller & Goertz, 2000; Chan, Levitt, & Garvin, 2010; Jordan et al., 2011; Lambert & Fairweather, 2010; Miethe & Drass, 1999; Moses, Rihoux, & Kittel, 2005). Rihoux (2006a, p. 680) notes that this "increasing momentum … coincides with a renewed interest in case-oriented research".

As a research strategy, QCA's goal is to "integrate the best features of the case-orientated approach with the best features of the variable-orientated approach" (Ragin, 1987, p. 84). In essence the technique involves understanding the interplay between variables or conditions; configurations of variables and a specific outcome or absence of a specific outcome (Ragin, 1987, 2000).

QCA differs from traditional qualitative research in viewing the causal relationships as complex, asymmetric and equifinal (Wagemann & Schneider, 2007). The term equifinality refers to multiple routes to certain outcomes (Rihoux, 2006a); different

causal paths – distinct and relevant in a unique way – may lead to the same outcome (De Meur & Rihoux, 2002). In other words, it allows for the possibility that the phenomenon can be explained by or result from several causal recipes, with several combinations of antecedent conditions generating the same outcome. Rihoux (1987) refers to this as "multiple conjunctural causation". It differs from standard statistical analysis in that sets, subsets, unions and intersections of sets are not seen as correlated or co-variables to result into quantifiable net effects, but as sufficient conditions to develop causal claims (Ragin, 2000, 2008b). "This implies that (1) most often, it is a combination of conditions (independent variables) that eventually produces a phenomenon – the outcome (dependent variable); (2) several different combinations of conditions may produce the same outcome; and (3) depending on the context, on the con juncture, a given condition may very well have a different impact on the outcome" (Rihoux, 2006a, p. 682). QCA rejects permanent causality, but views causality as context- and conjuncture-sensitive (Ragin, 1987) and "allows different configurations of cases conceived as combinations of qualitative attributes" (Ragin, 2000, p. 181).

According to Jordan et al. (2011, p. 1160), QCA is an appropriate family of configurational comparative methods to use when "the underlying question is which combination of conditions trigger a given outcome". The phenomenon that is studied, in this case the decision competencies of managers and graduate students, is conceptualised as an observable change or discontinuity and the causal antecedent conditions are considered as sets. "While an MRA model might report the 'total effect' via summing the direct and indirect net effects on an outcome variable" QCA, using Boolean-algebraic calculations "recognize the necessity of maintaining the integrity of individual cases in analyzing management decision data" (Woodside et al., 2012, p. 767). QCA and its published benefits are therefore deemed as particularly relevant to this study.

QCA also has some of the key strengths of statistical quantitative research methods. In QCA both antecedents and outcomes involve explicit criteria and are calibrated and therefore "researchers should use external, substantive criteria to define the phenomenon of interest and to evaluate its degree of expression" (Ragin, 2004, p. 14). Using Boolean algebra, membership to either the antecedent sets or the outcome sets can be quantified and can vary from full membership (1.0) to cross-over point or indifference point (0.5), to full non-membership (0.0). There are three main variants of QCA, which are described in Table 3.1.

Table 3-1: Variants of QCA

Variant of QCA	Name	Variable Range	Useful
csQCA	Crisp-set	Dichotomous	When variables can be defined and approximated into binary categories of present (1) and absent (0)
mvQCA	Multi-value	Multi-chotomous	When attribute values under study can reasonably be summarised into a small number of discrete options
fsQCA	Fuzzy-set	Continuous	When finer graduations in the dataset are significant and each variable can be assigned a value along a continuous range.

(Adapted from Jordan et al., 2011, p. 1162)

As a later iteration of QCA, fsQCA uses fuzzy-set logic to allow variables between the two qualitative states (full and non-membership) at varying degrees of membership, forming a continuous "fuzzy set" (Seawright, 2005). Thus, information about antecedent conditions and outcomes are transformed into sets of variables by creating a calibrated set ranging between the two thresholds of (0.0) non-membership and full membership (1.0). QCA researchers use theoretical information and arguments to create the calibrated set of membership and use intensive theoretical and collected knowledge of the cases to determine which empirical evidence to consider (Wagemann & Schneider, 2010).

The advantage of using Boolean algebra for scholars of management science is its ability to turn cases (conditions and outcomes) into algebraic variables and expressions, without compromising the integrity of each case. "Each individual case is considered as a complex entity, as a whole that needs to be comprehended and which should not be forgotten in the course of the analysis" (Rihoux, 2006a, p. 682). Two key conditions for scientific research are (1) the ability to generalise and (2) the ability to replicate the study and its results (Campbell & Stanley, 1963a; Popper, 1963; Ragin, 1987; Rihoux, 2006b). Since QCA and fsQCA rely on Boolean algebra for its key operations (where aspects and cases are essentially reduced to a series of numbers – an analytic approach), prior research results can be easily replicated, collaborated or falsified (Rihoux, 2006a).

In addition, the use of Boolean minimisation algebra allows for generalisation to parsimonious causal regularities and prime implicants. "Boolean minimization; that is, reducing the long Boolean expression, which consists in the long description of the truth table, to the shortest possible expression (the minimal formula, which is the list of the prime implicants) that unveils the regularities in the data" (Rihoux & Lobe, 2008, p. 225). According to Kent (2009, p. 205), "A major advance accomplished by the configurational approach and in particular the work of Ragin is that the study of necessary and sufficient causation is moved away from temporal implication (if X then Y) to one of set theoretic inclusion (which, in set theoretic terms, can be seen as the Xs are a subset of the Ys). Only this approach can cope with situations where relationships between the variables are asymmetrical".

A key advantage of QCA is "its ability to corroborate or refute assumptions and theories. QCA is hence a particularly powerful tool for theory-testing … QCA slows one to elaborate new assumptions or theories: the minimal formula ultimately obtained can be interpreted … and lead the researcher to formulate new segments of theory"

(Rihoux, 2006a, p. 684). This is of particular importance to this study, whose main aim

is to extend the theoretical proposals of Schank (1994, 1993, 1999), Armstrong and

Green (2007a), Gigerenzer (2004), Gilovich (1991) and Gladwell (2005).
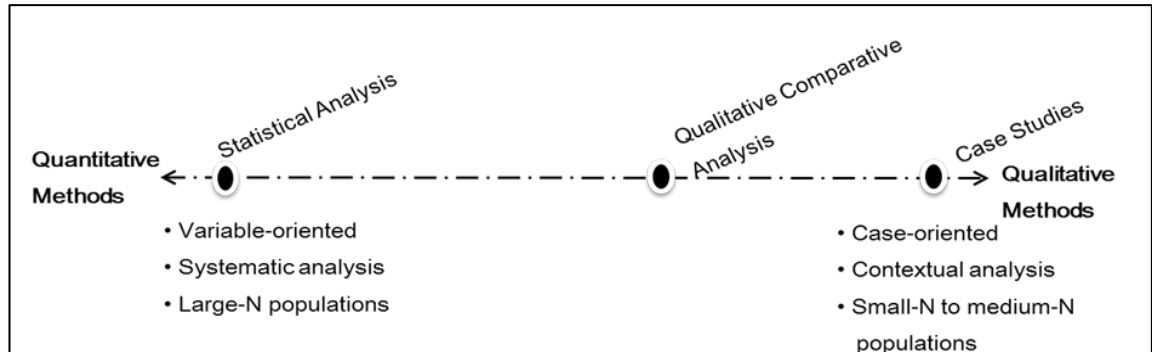
Figure 3-1: Spectrum of research methodology
(Adapted from Jordan et al., 2011, p.1161)

As a research strategy, QCA, more recently called *crisp-set* QCA (csQCA) and its

subsequent variants *fuzzy-set* QCA (fsQCA) and *multi-value* QCA (mvQCA), provides

a middle-ground method between statistical analysis methods based on large-N studies

(typically quantitative), which may lose the ability to examine causal links, and small-N

case-oriented (typically qualitative) methods (Gross, 2010; Jordan et al., 2011; Rihoux,

2006b), with their limited generalisability. Each of these approaches is best suited to a

particular situation, relative to the number of cases and need to preserve the richness of

the information in the data set under investigation, as illustrated in Figure 3-2 below.
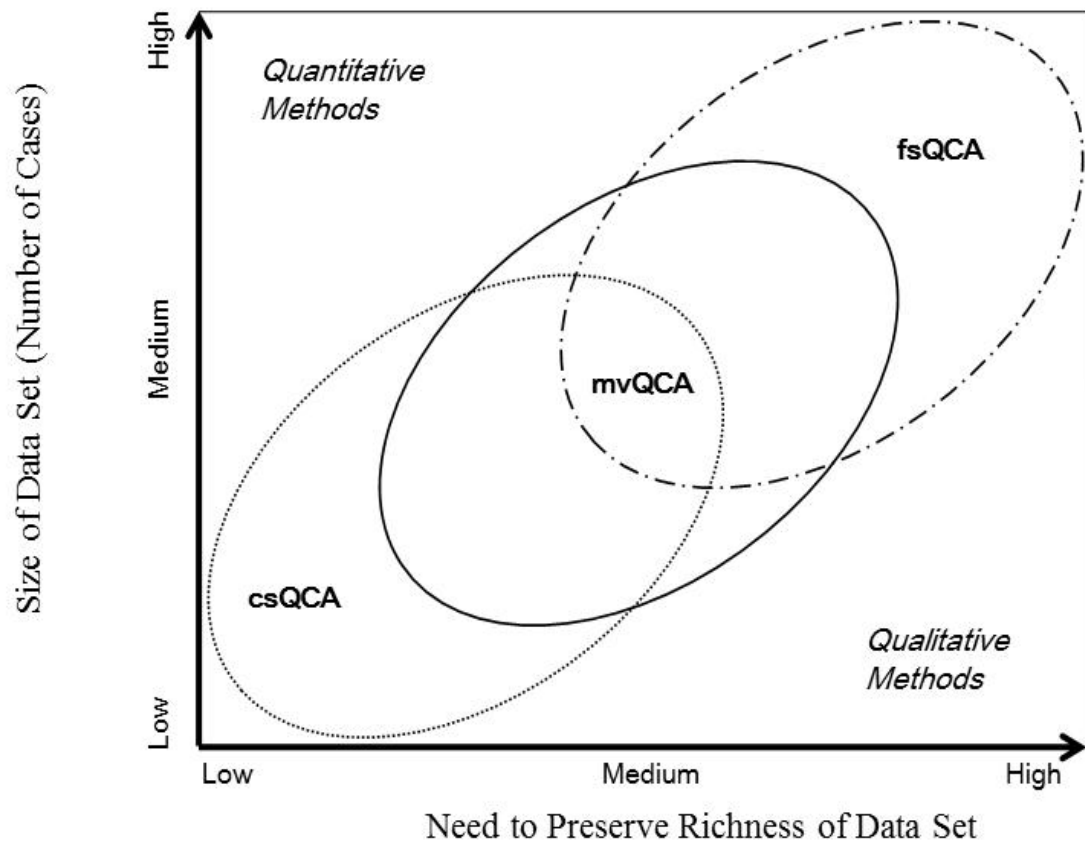
Figure 3-2: Best use of QCA, MVQCA and fsQCA
(Adapted from Rihoux, 2006)

In this experimental study, minimal loss of contextual information is likely to result

from using the binary structure (1=present; 0=absent) of crisp sets for several of the

proposed condition variables – such as group versus individual decision-making; the

presence of absence of DA dissent; and the introduction of competency or

incompetency training materials to the participants, making crisp-set QCA the preferred

option. Other variables such as educational level and age are more complex than mere

binary variables (crisp set values of 0 or 1) and need to be recorded as more finely

graduations. De Meur et al. (2008) argue that forcing all variables strictly to be binary

will cause biases and can result in a serious loss of case information. If the theory

indicates that great contours of data are necessary, then fsQCA or mvQCA should be

selected. In addition to the complex measured antecedents of education levels,

experience levels and self-reported decision confidence, the anticipated complexity of

the outcome antecedents - where full membership to the outcome antecedent success=1 (all answers 100% correct) or full membership to the outcome failure (full non-membership = 0; all answers incorrect) will not provide rich insight into neither the outcome – indicate fsQCA is the most suitable approach. FsQCA accommodates and deals effectively with less finely graduated crisp sets (Ragin & Rihoux, 2008). Thus, it is clear from the complexity of the treatment and measured antecedents, as well as the anticipated outcome antecedents (namely decision confidence, decision doubt, decision competence, and decision incompetence), that finer graduations of the datasets are expected and will be necessary to interpret the causal paths and thus fsQCA is the preferred method.

3.3.5   *Justification of the Use of Laboratory Experiments*

A series of laboratory experiments is conducted to compare the relative effectiveness of alternative pedagogies on participants' decision-making and managerial competencies.

This study assesses educational value – rather than attitudes – and for this purpose a large number of assessment tools, including case-based exams, multiple choice exams, computer-based games, role-plays, card and board games, short-answer questions, essay questions, oral exams, progress tests and free recall can be selected from (Anderson & Lawton, 2009). Scholars and academic examiners require postgraduate students to display higher order skills (Easterby-Smith et al., 1991), where lower order skills (levels 1-3) are knowledge, comprehension and application, and higher order skills (levels 4-6) are analysis, synthesis and evaluation. Since our study focuses on higher order learning outcomes in Bloom's (1956) taxonomy of learning (Bloom, Englehart, First, Hill, & Krathwohl, 1956), such as analysis, synthesis and evaluation, instruments better suited and sensitive enough to assessing higher levels of learning need to be used.

3.3.6   Justification of the Application of Simulated Interaction (SI)

Scores of articles and conference papers laud the benefits of business simulations and offer a wide range of diverse reasons why simulations should be used by educationalists and why they are used in universities and private enterprise (Anderson & Lawton, 2009; Faria, 2001; Gosen & Washbush, 2004; Keys & Wolfe, 1990; Wolfe, 1985). In-basket assessment exercises mimic the bounded rationality (Gigerenzer & Selten, 2001; Simon, 1976) and the required levels of productivity and efficiency in real-life business environments, which call for quick decisions with limited information.

Gooding (1980) points to the importance of the time aspect of simulations and although not directly tested on role-plays and in-basket simulations, experience has taught the researcher that this is an important factor to take into consideration when designing, implementing and assessing outcomes. Developing executives' decision-making and thinking competencies through role-plays and in-basket simulations allow pedagogues and HR practitioners to bring reality into the training in terms of content and time factors, whilst minimising the risk factors of expensive mistakes in business enterprises (Gooding and Zimmerer, 1980).

Armstrong and Green (2005) use experiments to investigate the accuracy and validity of SI to achieve and improve marketing graduates' competency in sales forecasting. They report on the usefulness of SI in predicting decisions in conflict situations such as negotiations. A quote from Green's (2010) website provides some insight into this method: "The group forecasting method of simulated interaction … allows realistic representations of group interactions and does provide accurate forecasts."

Although empirical studies in management education are few, studies concur that role-play and SIs have andragogical merit (Beaver, 1999; Brennan & Pearce, 2008; Knowles, 1998; Torbet, 1989). The early work of Meier et al. (1969, p.15) records the

self-instructional benefits of SIs, whose "valuable contribution to the development of decision-making skills … is not dependent upon practice in a realistic environment".

Moreover, there is an increase in the uptake and implementation of ED and role-play to enhance management education (Brennan & Pearce, 2008; Schibrowsky & Peltier, 1995), "Role play is most prevalent amongst the learning techniques" in active learning in higher education (Lean, Moizer, Towler, & Abbey, 2006, p. 234). Lean et al. conclude that teachers use role-play in their pedagogy across a diverse range of disciplines. Gosen and Washbush (2004, p. 286) report that "there is a mild preference for simulations over other experiential modes, and there are positive learning effects – and I cannot even say this for sure because there are too few studies that used comprehensive research designs. It is the intention of this study to expand the body of knowledge through rigorous research to allow for objective, verified and generalisable results.

ED in management education dates back to 1960s, with Lewin's well-known T-group teaching method for training group dynamics (Kolb & Kolb, 2008). The literature indicates the popularity, acceptance, effectiveness and widespread use of experiential learning in education in general (Andrew, 2010; Bosse et al., 2010; Druckman & Ebner, 2007; Evans et al., 2010). Compared to more conventional lecturer-centred teaching approaches (such as lectures, group-based research, reading and question-and-answer driven seminars), experience-based learning (such as video-recordings of student interactions with business professionals; in-class dramas and role-plays, simulations and other forms of educational dramas) engage the whole person – intellect (logos), feelings and senses (pathos) (see Chapter 2). The central theme which emerges from a thorough literature review as it relates to business education is that ED is not only diverse in its application across content fields and curricula, but is also, on the whole, popular with

students as a learning method (Bosse et al., 2010; Brennan & Pearce, 2008; Druckman & Ebner, 2007; Pearce & Jackson, 2006). Qualitative studies on the nature and benefits of ED (Pearce, 2004; Pearce & Jackson, 2006) and quantitative studies on comparative student attitudes reveal ED's value to teachers and the role it can play in achieving soft skills acquisition and transfer (Brennan & Pearce, 2008). As mentioned before, the key objective of role-play and SI is to achieve holistic learning outcomes. Additional advantages can be directly linked to the advantages of experience-based learning (Anderson et al., 2000; Bloom, 1956; Dewey, 1963; Kolb, 1984), specifically (a) whole person engagement – cognitive, affective and senses (Beirne & Knight, 2007; Elm & Taylor, 2010; Taylor, 2003; Yanow, 2001), (b) prior learning experiences and learners' personal meaning and the relevance to the learning, and (c) self-reflection and expert-assisted reflection to improve understanding and deepen learning (Pearce, 2004). The work of Gooding and Zimmerer (1980) stresses important secondary benefits such as enhancing the participant's self-confidence as a decision-maker.

According to the empirical work of Brennan and Pearce (2008, p. 8), students find role-play drama "an excellent method of acquiring knowledge and skills". Of the 11 teaching methods they surveyed (including assignment-based research; discussions with co-students; self-guided research; group and self-analysis of case studies; question-and-answer seminars; private reading of textbooks and articles; watching videos; lectures; and computer-based learning), students clearly scored ED the highest in terms of "how much they learn when each method is used" (Brennan & Pearce, 2008, p. 8). The authors conclude that "educational drama is a potentially valuable tool in marketing education, particularly where educational goals pertain to presentation skills, team-working skills, and confidence building" (p. 9).

3.3.7   In-baskets as an Andragogical Method

"An in-basket game presents the participant with a hypothetical work situation in which he must make decision on a series of letters, memos and other documents deposited as incoming mail in his in-basket" (Kesselman et al., 1982). In Keys and Wolfe's (1990) review of the litearture, a number of definitions for in-basket simulations are mentioned. The following abbreviated definition is most applicable to this study: "A simulation experiential environment is a simplified and contrived situation that contains enough verisimilitude, or illusion of reality, to induce real world-like response by those participating in the exercise… [stripping away extraneous details], thereby producing an accelerated from of action so that they can be more efficient than their real-world operating environments". In more informal terms, in-basket simulations consist of a set of materials upon which participants much make rapid decisions – condensing experiences normally encountered over a far longer period in the real workplace to an hour or so.

The uses of in-basket simulations include selection tests in recruitment drives (Kesselman et al., 1982; Lopez, 1966; Randall et al., 1985; Shimko, 1992); teaching and training methods – a military technique since 1930 (Schippmann et al., 1990); and in business and educational institutions and as research instruments (Fredericksen et al., 1957; Kibbee, 1961). In-basket simulations are widely used as teaching and assessment tools for a large variety of reality-based business competencies, including sales skills and sales management competencies, skills in business communication, managerial and personality assessment, and information systems management (Castleberry, 1990; Craik et al., 2002; Pearson et al., 2006; Stearns et al., 2003; Wagner, 2004). Hackney (1971) identifies a variety of decision and interpersonal skills that can be learned in simulations based on contracted time-frames including prioritising; inter-related nature of decisions; and team cooperation and coordination. Randall, Cook and Smith (1985) report on the

use of in-basket simulations to assess soft skills competencies such as self-reliance, time management, and the processing abilities of sales professionals in the life insurance industry.

In-basket simulations have been used specifically in studies of managerial decision-making and other management topics (MacCrimmon & Wehrung, 1984; Tse et al., 1988). A study by Kesselman, Lopez and Lopez (1982) reports on the use of simulations and games to predict managerial performance. The authors conclude that management games are promising tools to assist firms to assist organisations in their management and selection efforts (Kesselman, et al. 1982). In contrast to some management games - which largely focus on team and group situations - the authors place premium on the ability of in-basket cases to act as training method, selection test and research instrument for solitary management tasks and functions as opposed to other manager games which are aimed mainly at group situations and team interactions.

In the seminal work of Bloom (1956), six levels of cognitive teaching objectives are set out (see p. 15). It is often very difficult to achieve higher order learning outcomes with standard teaching practices such as lectures, questioning techniques and text reading (Pearson et al., 2006) and there is evidence in the literature that in-basket simulations assist teachers to achieve higher order learning objectives such as synthesis and evaluation (Day, 1995; Pearson et al., 2006).

Lopez (1966) identifies several advantages of the in-basket exercise and these are re-iterated by other authors: it measures insight rather than recall; the assessees (those assessed) use higher order thinking skills such as reasoning, critical thinking, problem-solving and higher order mental processes; participants can demonstrate creativity and originality; it allows participants to demonstrate social subtleties, judgement and

appreciation for complexities and ambiguities; and it measures the assessees' willingness to make decisions.

Although a rigorous attempt was made to uncover literature from as wide a range of sources as possible, very little empirical work substantiates the use of in-basket simulations as an assessment and teaching tool (Kesselman, et al. 1982). However, an empirical study using four hypothetical scenarios in in-basket format cited the main benefit of this method as "its realism and its rich context, [which] in comparison with conventional tools for studying executives' decisions … provides more relevant decision variables to the respondents" (Tse et al., 1988). Hence, in-basket assessments are well suited to this study.

Having established the validity of in-baskets as an assessment and development tool, I now turn to the advantages and disadvantages of using in-basket simulations to conduct research.

3.3.8   *In-baskets as Research Method*

According to McGrath (1982), the research method should ideally maximise three dimensions: (1) the ability to generalise from the sample to the population; (2) the control and precision with which to evaluate the behaviours; and (3) the realism of the setting in which the actors behave. This laboratory study uses in-basket simulations (simulated problem solving and decision-making) to allow greater control over the experimental arrangements and provide a rich contextual narrative (Tse et al., 1988). Since no single laboratory method maximises all three of the above dimensions, the experimental design was selected to ensure robustness and trustworthiness of the research findings (Campbell, 1957; Cook & Campbell, 1979); to allay doubts about validity; and because it places considerable emphasis on causality. Further, as highlighted a number of studies (Burns & Burns, 2008; Keys & Wolfe, 1990; Lant,

1989; McGrath, 1982; Schippmann et al., 1990), simulations and experiential methods allow precise measurement as the environment is a closed system and decision responses are made repeatedly over time by both the treatment and the control groups.

Darley (1999) reports two distinct advantages of using in-basket simulations that are relevant to our study: time compression and "to the degree to which a participant feels genuinely evaluated as an organizational member, it both creates involvement on the part of the participant and casts the respondent into an organizational milieu". For this study, the ability to condense a work week or perhaps even decisions normally made over an extended period of time into a two-hour time-frame will not only assist with the research process in terms of convenience and do-ability, it will also enable intensive learning opportunities with minimal impact on the normally over-full MBA programme. The second advantage relates to the verisimilitude and realism of the study and the usefulness of the research environment thus created. Unfortunately this is simultaneously a limitation of the study, since participants are aware that the simulation is merely a role-play and may therefore react differently within the social environments and informational structures of the ecological environment of real-world organisations.

A. Validity and Reliability of In-basket Simulations

In-basket simulations and tests are the result of more than 60 years of research and application. The first in-basket simulation was designed by Fredericksen et al. (1957) in response to a need for assessing managers' competencies when working in solitude. Over the years in-basket simulations have gained wide acceptance and the technique is seen as useful in a variety of research, assessment and training applications (Kesselman et al., 1982; Lopez, 1966; Schippmann et al., 1990). A number of studies report on the reliability and validity of situational methods which include in-basket methods, but with

mixed findings (Bray & Grant, 1966; Kesselman et al., 1982; Wollowick & McNamara, 1969).

"Evidence from several studies indicates that in-baskets could be reliably scored, although reliability values obtained were modest" (Spangenberg & Theron, 2003). Procedures for scoring the tests can be taken from the earliest work by Frederickson (1957) and Hemphill (1961) and the reviewed tests by Meyer (1970). Meyer (1970) suggests three approaches to score in-basket tests. Raters and scorers should consider: a) the content of the behaviour; (b) the style of the behaviour; and (c) the overall performance as rated by an expert. In line with Meyer (1970), split-half checks on reliability could be achieved by using two or (multiples of two) scores or raters. By dividing the completed test in half, with one half of the raters marking only odd-numbered in-basket items and the other half rating only even-numbered items, the half-tests could be correlated to obtain reliability estimates.

Inter-rater reliability was first studied in 1957 by the United States Air Force. Studies reporting on inter-rater reliability coefficients cover a wide range of values indicating a need to consider the causes of these variances. From the literature review compiled by Schippmann et al. (1990), covering 30 years of studies on in-basket performance measures, scorer/rater training and ensuring rater reliability emerges as a serious consideration for this (or any other in-basket simulation) study, hence the scoring, capturing and encoding in this study was done by a single scorer and double-checked by an independent research specialist for accuracy and any anticipated bias.

In terms of validity, most prior relevant studies provide superficial descriptions of assessment centre (AC) programmes and they are often based on perception and anecdotal evidence rather than empirical analysis and evaluative data. Jeanneret and Silzer (1998) define the method as "a process of measuring a person's knowledge,

skills, abilities, and personal style to evaluate characteristics and behavior that are relevant to (predictive of) successful job performance" (p. 3). ACs are relevant to this study, as methods used in ACs often include: measures of personality, values, interests, and motives, cognitive aptitude testing instruments, work simulations, such as case analyses, in-baskets, and role-play exercises, which simulate real world scenarios, situational judgment tests, which consist of questions about relevant on-the-job situations and group interaction exercises with assessment observers (Gaugler, B. B., Rosenthal, D. B., Thornton III, G. C., & Bentson,1987). Schippmann et al.'s (1990) review concludes that "evidence of validity is at best marginal and generally higher in settings where the in-basket was specifically constructed for a defined target job. Unfortunately it appears that specifically constructed in-baskets are not very common – shelf products being used with greater frequency". This study specifically constructed four in-basket simulations. In the label "in-basket "simulation", the word simulation can be used interchangeably with "assessments" for this study, since decisions are assessed in response to the in-basket case-based simulations.

Campbell (1957) and Cook and Campbell (1979) warn against the threats of rival explanations of causal findings resulting from testing sensitivity of respondents; historic changes and natural maturation of the respondents; selection differences between groups; and causal direction ambiguities. These threats can be easily eliminated by assigning control groups and using random assignment of activities. This study followed these procedures and confidence in the findings is thus greatly enhanced.

According to Burns and Burns (2008, p. 427), "Content validity reflects the degree to which the content of a measurement reflects the intended content to be measured" The content is a sample of the universe of the content. This is obviously of critical

importance to this study and steps taken to achieve content validity is discussed in detail in Chapter 4.

Burns and Burns (2008) define face validity as "how a measure or procedure appears … and reassures lay participants… of a test's validity simply on its design and on how professional it looks" (p.428). The high realism and face validity of in-basket simulations are important advantages of the method (Keys & Wolfe, 1990; Lopez 1966; Meyer, 1970; Schippmann et al., 1990). But face validity is insufficient for making inferences about job performance and competency development through this method. A review of 30 years of studies reporting on in-basket and assessment centre (AC) validity, claim content validity but in most cases the supporting data is lacking (Schippmann et al., 1990). Several authors (Schippmann, et al., 1987; Schippmann et al., 1990) advise that systematic procedures be used to unsure that content-orientated test development procedures, including a thorough job analysis, should be followed and care should be taken to ensure that the resulting information is built into the research study. For this study, as for most, it will be especially important to determine which aspects of the test correlate with which aspects of management competency or performance. Meyer (1970) observes that "Experience in construction tests of this kind in the past had shown that the use of real a life managerial job as the position to be simulated, and the use of actual materials that had appears in the in-baskets of managers of such a job, was advisable".

In terms of the external validity of in-basket simulations, Spangenberg and Theron (2003) note that "Criterion-related validity of assessment centres is well established" (p.29). According to Schippmann et al.'s (1990, p. 853) review, "The studies of criterion-related validity did reveal a large number of significant correlations between in-basket measures and various criteria. Thus the evidence of criterion-related validity

of certain in-baskets is sufficient to support the development and use of the procedure for various decision-making purposes". It is clear from the review that construct validity will need serious consideration for a study employing in-basket simulations in its design. The authors qualify their by conclusion by noting the "differences in in-basket content, performance measure schemes and criteria across situations". Chapter 4 treats this issue in greater detail.

Reports on the predictive validity of in-basket experiments are scarce. Only two research studies (Schippmann et al., 1990; Spangenberg & Theron, 2003) report on the correlation between job performance ratings and measures and in-basket measures using predictive designs. Satisfactory predictive construct validity is reported and Spangenberg and Theron (2003, p. 31) contend that "the earlier conclusions about the usefulness of in-basket measures of performance remain valid to some degree."

Poor generalisability is one of the main weaknesses of in-basket simulations (Keys & Wolfe, 1990; McGrath, 1982), resulting from the fact that business simulations often provide realistic group decision-making contexts but not realistic organisational context. The organisational context of this study however is the educational context and therefore this limitation is negated. Another weakness highlighted in the literature is poor generalisability due to poor sample selection. In management studies, convenient samples of business students are selected rather than using more demanding sampling from real managers or multi-level hierarchies (Cook & Campbell, 1979; Gooding & Zimmerer, 1980). In this study, however, a random sample of MBA students and executive course participants is highly matched to the overall population. To further enhance the selection, maturation and history validity, this experiment is repeated with four groups in four different tertiary education institutions.

3.4   THOUGHT EXPERIMENTS

In order to assist the researcher (and readers of this dissertation) to visualize the anticipated outcomes of this study and to develop new insights, in line with the advice of Tufte (2000 and Cohen (2005), a thought experiment is executed. Tufte (2000) declares in his book, *Visual Explanations: Images and quantities, evidence and narrative,* "clarity and excellence in thinking is very much like clarity and excellence in the display of data. When principles of design replicate principles of thought, the act of arranging information becomes an act of insight" (p. 9).

Figure 3-3 below shows a thought experiment on the expected hypothetical findings for this study. According to Woodside (2012a, p. 460), "A thought experiment includes a 'property space analysis' (Lazarsfeld, 1937) of possible influences in a given context and predicts likely outcomes of specific configurations (i.e., causal recipes) of antecedent conditions".
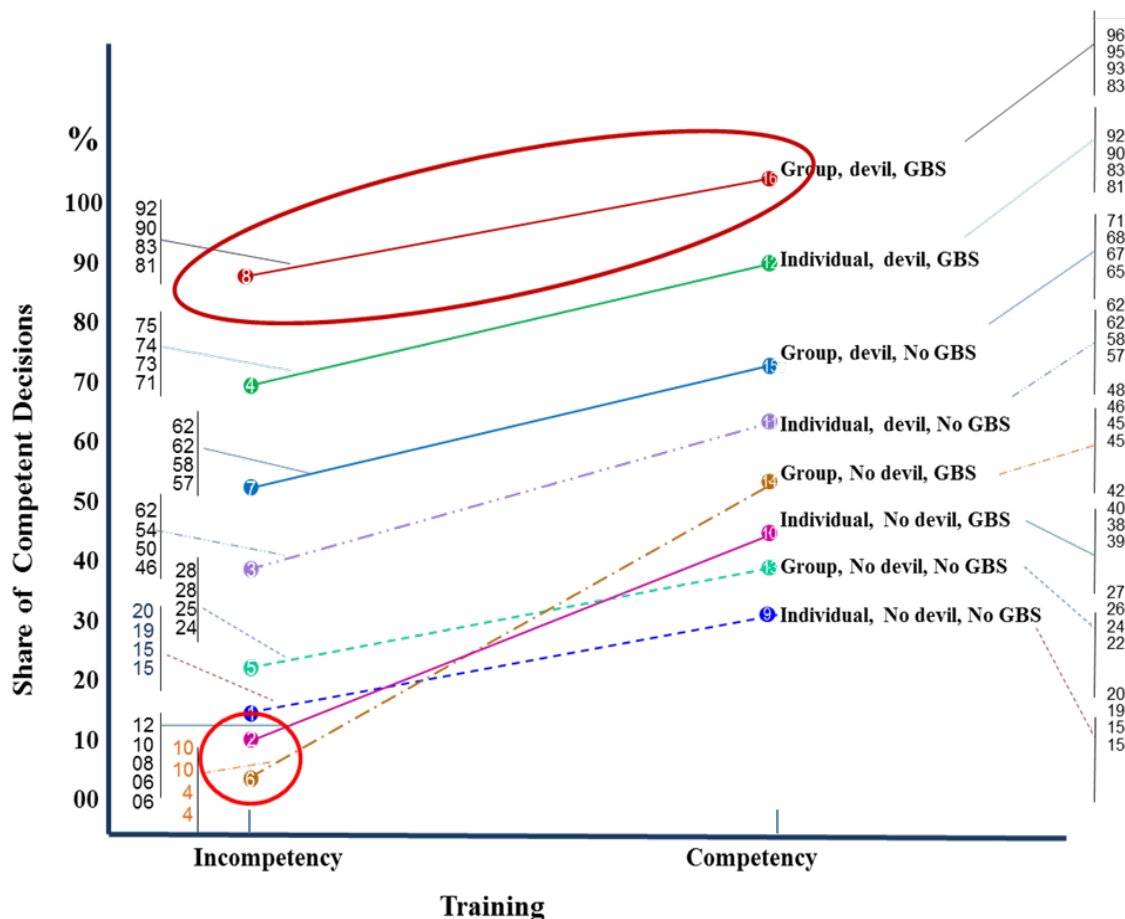
Figure 3-3: Thought experiment on findings of sense-making and decision-making training influences on decision competency

Figure 3-3 indicates that high membership of the configuration of all four treatment antecedents (combinations of the four treatments: group interaction; GBS simulations; DA dissent; and (in)competency training) associates with high membership of the outcome antecedent (decision success). The rationale is as follows: high exposure to all four treatment antecedents simultaneously will result in high decision success since participants (1) benefit from the insight and experience of their colleagues in the group interactions (**Group**); (2) are exposed to the alternative and contradicting views of the DA and will thus reconsider incorrect or faulty assumption (**devil**); (3) benefit from GBS simulations (**GBS**) to become aware of the impact of decisions on other strategic business units (SBUs) which are likely to affect their decisions in a positive way; and (4) competency training (**Competency**) will remind participants of important heuristics and will guide students to "drop their tools" when necessary in order to improve

decision outcomes. The thought experiment in Figure 3-3 also indicates that the absence of any one of the treatment antecedents will reduce the success rate of participants. For example, participants who make decisions as individuals (and who are not exposed to group interaction) are likely to be less successful in their decisions. Further, the presence of DA dissent will compensate for the absence of GBS, since some of the considerations that might have been raised by the different role-players are likely to be raised by either group members or by the DA. In addition, it is expected that participants exposed to group interaction will show a higher share of competent decision outcomes than those participants who work as individuals only. On the whole, the upward slant of all graphs indicates that this study accepts the rationale of Armstrong and Woodside that incompetency training will result in a lower share of decision competence compared to participants who receive competency training treatments such as heuristic training (e.g. "take the best" and "drop your tools"). The slant of the graphs upwards and to the right indicates that incompetency training is expected to reduce decision success, or conversely, that competency training will, in general, result in more competent decision outcomes.

3.5   SUMMARY

This chapter has provided a general overview of the methodology and justified the decision to use case studies and experiments involving in-basket simulations. Given the nature of this study, the complexity of the outcome under investigation, and the benefits espoused in the literature, QCA and its variant fsQCA, based on case-based analysis through a set of tools, is clearly indicated as the best research methodology for this study.

CHAPTER 4: IMPLEMENTATION OF LABORATORY EXPERIMENTS & APPLICATION OF fsQCA

This chapter provides an overview of the laboratory experiments in this study and outlines the numerous methodological considerations for the application of fsQCA, a modification the QCA method. A description of the in-basket simulations and decision aids used in the laboratory experiments is provided, followed by a, step-by-step description of the research procedure.

4.1 DESIGN & IMPLEMENTATION OF THE LABORATORY EXPERIMENTS

The study was originally designed as a laboratory experiment involving 96 participants in 12 sessions with (see numbers 1-12 in the columns labelled "Cell #" in Table 4-1.). This would have resulted in a total of 384 decisions, since each respondent would have completed decisions for each of the four in-basket simulations.

A total of 153 MBA students responded to the invitation and attended the decision-making laboratories, but due to incomplete responses three completed in-baskets simulation cases were rejected, resulting in 150 cases in the study (see Table 4-2).. The experiments consisted of either groups with four members per group making interactive decisions or groups comprising four individuals making individual decisions. The study was executed 10 times to allow the opportunity to test and retest, replicate and adjust. The number of participants in each group and the number of individual participants is shown in Table 4-1 below.

The study utilised a series of four in-basket simulations and role-plays simulating decision-making scenarios. Three decision categories (Human Resource Management, Marketing, and General Management) were tested in four in-basket simulations, combining simulated interactions (SIs) as well as independent thought. Each participant

received four in-basket problems to investigate, analyse and resolve. Participants were asked for decisions on business issues such as the selection of marketing media exposure, pricing, key account management, key talent development, and event venue selection. The problems ranged from low cognitive difficulty to high cognitive difficulty as per Bloom's (1956) taxonomy of learning objectives. All four simulations were pre-tested with two groups, involving six senior faculty in the marketing and management disciplines and three to four senior business executives in private enterprise. A post-test only design was used to confirm or contradict the asymmetrical relationships between the antecedents of competencies and incompetencies in executive decision-making.

Table 4-1: Initial research design: 12 configurations of conditions
(384 Units/96 Participants)

Competency/ Incompetency Decision Aids (1 ≡ Competency 2 ≡ Incompetency)	Indi- vidual (I) or Group (G)	Devil's Advocate (Yes ≡ D) (No ≡ F)	Cell. # No GBS Units/ Decisions (Code N)	Code to Indicate configu- ration of Conditions	Cell. # GBS Units/ Decisions (Code B)	Total Units / Decisions	Total Cases
Incompetency ≡ 2	I	No ≡ F	1. n =8/32	↵INF2 IBF2↳	2. n =8/32	16/ 64	16
Incompetency ≡ 2	G	No≡ F	3. n =8/32	↵GNF2 GBF2↳	4. n = 8/32	16/ 64	16
Incompetency ≡ 2	G	Yes ≡ D	5. n =8/32	↵ GND2 GBD2↳	6. n = 8/32	16/ 64	16
Competency ≡ 1	I	No ≡ F	7. n = 8/32	↵ INF1 IBF1↳	8. n = 8/32	16/ 64	16
Competency ≡ 1	G	No ≡ F	9. n =8/32	↵GNF1 GBF1↳	10. n = 8/32	16/ 64	16
Competency ≡ 1	G	Yes ≡ D	11. n = 8/32	↵GND1 GBD1↳	12. n =8/32	16/ 64	16
Units			n = 48/192		n =48/192	n = 96/384	n/a
Total Participants			48		48	n/a	96

Note: Although 2^4 = 16 combinations can logically be expected with four conditions; the four treatments (IND1, IND2, IBD1, IBD2) Individuals in role-plays employing devil's advocate dissent as decision aid were excluded from this study.
The ≡ symbol indicates the code that signifies a specific condition.

As displayed in Table 4-1, the original plan for the study was to test the impact of four conditions, resulting in $2^k = 2^4 = 16$ (k = number of conditions) configurations. Only 12 configurations could logically be considered, since treatments of individual participants

would not practically allow for the inclusion of a devil's advocate (DA) role-player in the decision-making process. Each of the 12 configurations of conditions investigates the impact on a minimum of 8 participating MBA students or units. The Boolean algorithms and numbers are displayed in Table 4-2 below.

Table 4-2: Research design: Configurations of conditions & number of units

Combination of Conditions	# of Units Number of Decisions	Cell CODE	Cell CODE	# of Units Number of Decisions	Combination of Conditions
~group • ~gbs • ~devil • comp	$\frac{22}{88}$	INF1	GNF1	$\frac{9}{36}$	group • ~gbs • ~devil • comp
~group • ~gbs • ~devil • ~comp	$\frac{25}{100}$	INF2	GNF2	$\frac{12}{48}$	group • ~gbs • ~devil • ~comp
~group • gbs • ~devil • comp	$\frac{21}{84}$	IBF1	GBF1	$\frac{12}{48}$	group • gbs • ~devil • comp
~group • gbs • ~devil • ~comp	$\frac{19}{76}$	IBF2	GBF2	$\frac{13}{32}$	group • gbs • ~devil • ~comp
group •~ gbs • devil • comp	$\frac{8}{32}$	GND1	GND2	$\frac{9}{36}$	group • ~gbs • devil • ~comp

Actual number of students = 95	*Actual number of students = 55*
Actual number of decisions = 380	*Actual number of decisions = 220*

comp ≡ Competency training	Code 1	~comp ≡ Incompetency training	Code 2
devil ≡ Devil's advocate	Code D	~ devil ≡ No devil's advocate dissent	Code F
group ≡ Group	Code G	~group ≡ Individuals;	Code I
gbs ≡ Goal-based scenarios	Code B	~gbs ≡ No goal-based scenarios	Code N

Note: Combinations are recorded as coded strings and as Boolean algebraic equations in this table. Interpreting Boolean algebraic equations is discussed later in this chapter

The implemented laboratory experiment involved 150 MBA alumni and current MBA students at four universities in New Zealand. Each participant completed the two-hour simulation in the laboratory. Each of the participants received and information sheets and was briefed about the procedures and prepared for the group or individual decision process. Every participant completed a post-test questionnaire to collect demographic and attitudinal data and was debriefed after completion. In alignment with ethics requirements, all participants are given the opportunity to opt out and attend a further debriefing meeting after all experiments were completed. Not a single participant took up the invitation to attend the second debriefing meeting, but all participants indicated the wish to receive the research results. The briefing sheet, information sheet and debriefing sheet can be found in Appendix B.

4.1.1   Administration of the Experimental Treatments

Students were invited to participate in different laboratories at the different campuses at different points in time, exposing between 8 and 64 participants to the treatments any one point in time. The laboratories were held at 10 different times between January 2012 and April 2012, starting at Auckland University of Technology in Auckland, and ending with Victoria University MBA students in Wellington, New Zealand. The researcher took meticulous care to ensure that the instructor, support material, instruments and physical context remain almost exactly the same during the course of the experiments. Conditions were meticulously recorded before, during and after each of the experimental laboratories.

As participants arrived for the experiment, they received a set of materials (in-basket simulations and decision aids and support materials, collated into pre-packaged sets) encoded by treatment code (see Table 4-2 above). Note that the cells in this study alternated between individual (~group/I) and group treatments, where a cell is a group of people who received exactly the same set of materials, with the same configuration of treatment conditions, and is represented by a treatment code, e.g. INF1. . The tilde ~ sign indicates "not" in Boolean algebra and is explained in more depth in paragraph 4.2.6 on page 131). In not-group (**~group**) cells, participants worked on their own, without assistance from or interaction with other participants.) All participants received printed (competency or incompetency) training matter and four in-basket simulations (and additional support material) for consideration (see Appendix C for examples of the decision aids and written training materials). All decision sheets and demographic sheets were coded with the treatment code, but participants were not made aware of the meaning or position of these codes (this code/terminology is not used in any of the instructions for the participants).

Every participant received a set of the same four in-basket simulations with the same four business scenarios and problems to solve. The problems under consideration ranged from low cognitive difficulty to high cognitive difficulty (Bloom, 1956). Decision-makers were provided with printed (competency or incompetency) training matter as decision aids for the four in-basket simulations (and additional support material) for consideration. During each 2-hour laboratory experiment, four training methods were probed: goal-based scenario (GBS) including simulated interaction (SI); group interactive decision-making (G) (Schank, 1999); devil's advocates (DA) black hat thinking (De Bono, 1976); decision-matrix training through the Boston Consulting Group matrix (BCG) and knowledge-based teaching aids. Each in-basket had one main cased-based decision to be made. Participants received a finite range of possible answers from which they could select their preferred choice – the one they would recommend to their prospective clients.

In the groups (indicated with the code "G" in Table 4-1s and Table 4-2 above), problem solving was done via group interaction (instructions provided in Appendix B). Where SI was part of the treatment, four role-players were identified and participants' roles were pre-allocated (for detailed descriptions of the roles, see Appendix C for instructions and descriptions of the roles of Vice President (VP): Marketing, VP: Sales & Advertising, VP Operations and VP: Talent & Development). The pre-allocated roles were initially hidden from all prospective participants when they entered the laboratory and only become known once they opened the packs and found the props (i.e. a sash and a button indicating their role). For those groups where DA dissent was indicated (coded "D" in Table 4-2), all participants were provided with an instruction sheet (see Appendix B) and one member of the group received a black hat, a coat button, and a red sash to wear as visible reminders of his/her role to provide caution and highlight potential issues and difficulties with group suggestions. Participants exposed to the GBS treatment condition

(indicated with B; those participants who were not exposed to GBS are coded with N) received instructions (see Appendix B) based on the work of Schank (1993). The research propositions were tested in SI, a form of role-playing (Armstrong, 2006) for all groups where GBS (coded B in Table 4-1 and 4-2) was indicated. Green (2002, 2005) reports 57% less forecast errors relative to expert judgement forecasts when participants use SI. According to Armstrong, "simulated interaction is particularly useful in conflicts such as … buyer/seller negotiations, union management relations [and] legal cases" (Armstrong, 2006, p. 9). Since the focus of this study is the development of soft skill competencies such as reasoning and other sense-making heuristics, this forecasting method will be a useful teaching method and decision aid from which it is reasonable to expect a high level of accuracy. (See the detailed discussion of internal and external validity section 4.3 below).

Since configurations of the conditions are investigated, not all participants were exposed to the same four training methods. Some learners/participants were only exposed to KBT materials. The KBT competency and incompetency training aids deserve special attention and are discussed in section 4.1.2 below.

Where simulated interaction is part of the treatment, four role-players (Vice President (VP): Marketing & Sales, VP: Accounting, VP: Talent & Development, and VP: Operations) are identified and participants were pre-allocated (at random) to the roles. In some cases the role of Operations Manager was replaced by an alternative fourth role, i.e. the DA. Clear briefs were provided to prepare participants for these roles (see Appendix B). Problem solving was done in isolation for cells with individual participants (~group). In this case, individual participants were be instructed to "wear different hats" when considering alternative decisions. Physical props (such as hats and buttons) were provided to identify the role-players. Groups resolved problems

employing SI or role-play, but where no GBS or SI was in the configuration of conditions, groups were left to their devices and natural instincts for interaction. All groups received brief instructions to facilitate group interaction, whether they were exposed to GBS and SI or not (see Appendix B).

4.1.2 Competency and Incompetency Teaching Aids

As explained in Chapter 2, decision-makers are often unconsciously incompetent and use ineffective heuristics. Of keen interest to this thesis are teaching tools or developmental aids that will aid in overcoming conscious and unconscious debilitating habits and tools. In a bid to overcome decision-makers' unconscious incompetence; unconscious childhood biases; implicit cultural training; "leaps to conclusion"; and other competency reducing or debilitating factors, KBT competency training aids were provided to some participants. The laboratory experiments include competency aids which highlighted the context and relevant information and advised against groupthink, consensus and unnecessary complexity (i.e., suggested "dropping tools") but did not provide additional facts or improved information to support the decision-makers' decision processes or procedures. (The competency and incompetency teaching aids can be found in Appendix C, and differ substantially for each of the in-basket simulations). Some participants (unbeknownst to them) received deliberate incompetency training and decision aids, to act as a placebo. Incompetency aids covered content traditionally taught in business school courses such as the BCG matrix, priority weighting matrices, market share, and customer and profit orientation. For further discussion of the use of incompetency training in organisations and in formal instruction see Woodside (2012b).

4.2 APPLICATION OF FUZZY SET QUALITATIVE COMPARATIVE ANALYSIS (fsQCA) AS METHOD

QCA identifies and studies a specific outcome, along with the combinations of causally relevant antecedents affecting that outcome (Ragin, 2008c; Rihoux, 2006b; Woodside & Zhang, 2012). Defining the outcome(s) of interest to a study is the most important aspect, more important than either selecting cases or configuring the conditions (variables) that distinguish one case from another (Jordan et al., 2011). The application of QCA as a research methodology involves numerous procedures which are addressed in this section. Figure 4-1 outlines the terms and abbreviations used in the following discussion.

Figure 4-1: QCA nomenclature
(Adapted from Gross, 2010)

For a detailed guide of the fifteen dialogues the researcher has to follow along the QCA approach, See Rihoux and Lobe's (2008, pp. 221-242) detailed guide and 15 steps as illustrated in Figure 4-2 below.

Figure 4-2: QCA and the concrete steps and feedback loops
(Adapted from Rihoux & Lobe, 2008, p.238)

4.2.1 Definition of the Outcome of Interest

The first step, culminating from the literature review during which likely variables are

identified, is the definition of the outcome. This critical first step assists in the

identification of cases with sufficient representation of the each of the sought

outcome(s). The characterisation of outcome is specifically limited to decision- and

sense-making competencies and decision confidence. Decision competence for the four

in-basket simulations was theoretically grounded, as set out in Chapter 2. In addition,

the validity of this selection was reviewed by senior management executives and senior

scholars with extensive experience and theoretical knowledge in the disciplines of

general, human resource (HR), key account, and events management. They concurred

that the simulations had verisimilitude and that the outcomes accurately reflected

decision competency, noting that decision competency is complex and challenging and

is likely to differ substantially by age, education level, managerial experience level, and

decision strategy and/or the exposure to a range of andragogical treatments. Since

participants were all MBA students or recent MBA alumni (who had graduated less than three years prior to the study), careful deliberation by the experts and deliberate analysis of participants' age, education level and experience resulted in unanimous agreement that the conditions of age, education level and managerial experience can be combined as a single condition. Further, scholars involved in the pre-tests questioned the ability of any instrument to be sensitive enough to "detect the impact of a single learning experience such as a simulation" on a student's ability, given a lifetime spent as learner (Anderson & Lawton, 2009, p. 206). Since QCA is not studying net effect but the impact of several causal conditions on a well-defined outcome within a specific context, this concern is realistic but not relevant to the nature and intent of this particular study.

4.2.2   Selecting Cases

The definition of outcome(s) is followed by an iterative process of selecting cases and conditions to ensure that the selected set of cases exposed to the configuration of causal conditions exhibit the range of outcomes.
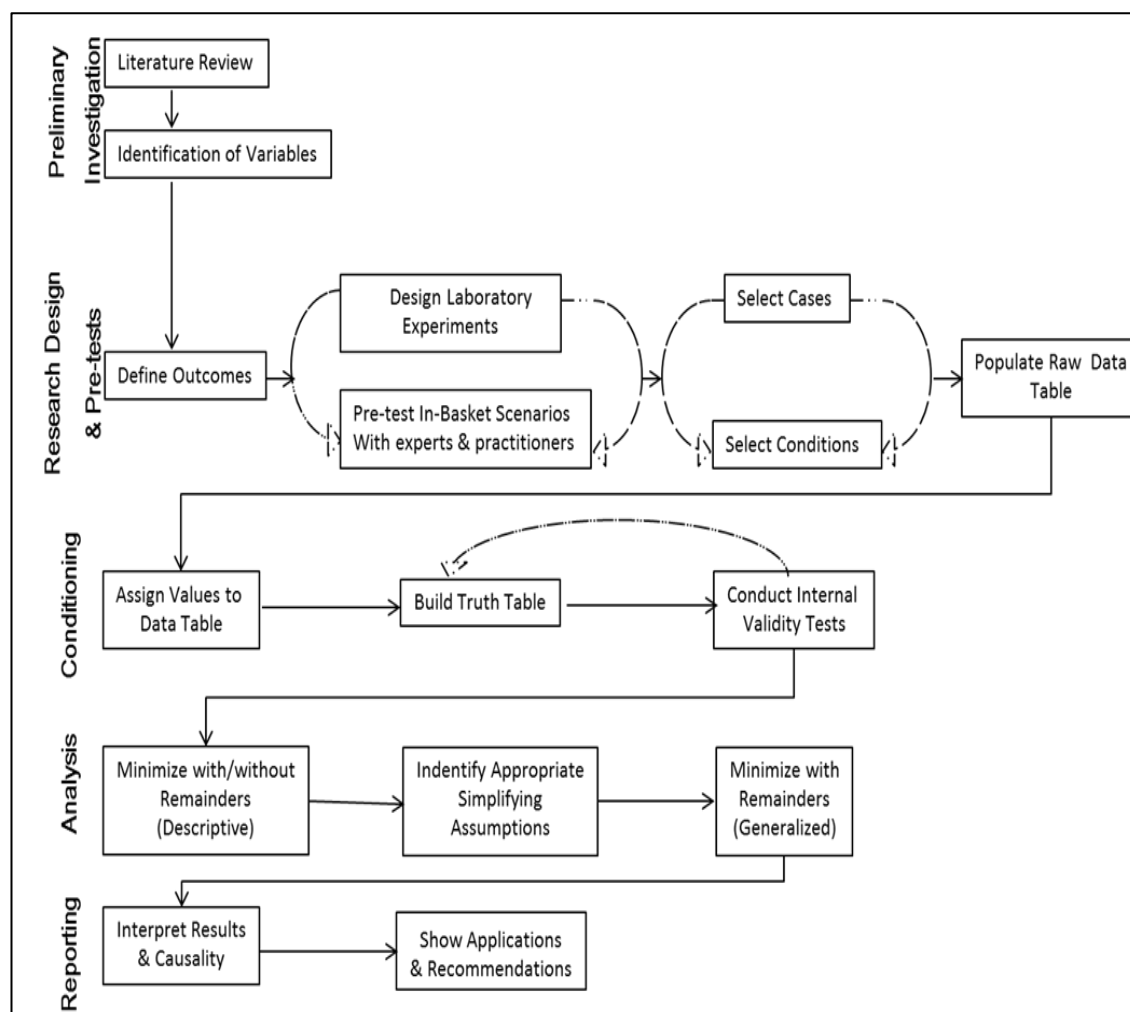
Figure 4-3: Research design and process
(Adapted from Gross, 2010; Jordan et al., 2011)

A. *Type of Cases*

A case is effectively the unit of analysis of this research and according to Kent (2009, p. 194), "each case [can be seen] as a particular combination of characteristics – as a configuration. Only cases with identical configurations can be seen as the 'same type of case'". For the purposes of this research, the proposed case unit of analysis is an MBA student with a specific level of managerial experience who is exposed (in controlled laboratory studies) to a specific combination of andragogical conditions. Each case is selected to represent a variety of ages, genders, educational levels, experience levels. In addition each case had, due to their participation in the laboratory, been recently exposed to a finite selection of decision support aids, including theoretical frameworks and extracts from peer-reviewed journal articles. The "Truth Table" (see Table 4-14)

shows the number of cases (frequency) that possess the logically possible combination of "causal" conditions likely to affect the outcome of interest, in this case the participants' decision competency or incompetency.

According to Byrne and Ragin (2009), it is desirable in selecting cases for inclusion to achieve sufficient variety in both conditions and outcome in order to ensure robust analysis. Although this may appear to be improper manipulation of the data set, the resulting heterogeneity of condition and outcome is appropriate for QCA methods, since the method's logic is not probabilistic. QCA considers causality – it does not consider whether more or fewer cases exhibit certain characteristics – which "contributes to the richest possible explanation of relationships among the widest array of data" (Gross, 2010, p. 40). The real interest of this study is in the existence of a specific combination of implicants and the resulting outcomes within the context, hence the pursuit of maximum heterogeneity in types of cases selected, where implicants are those conditions which remain after all superfluous conditions are removed and only the most parsimonious solutions, which leads to the outcome, remains (Rihoux & Lobe, 2008)

B. Number of Cases

Different variants of QCA are more suited to certain data set sizes (see Figure 3-1Figure 3-1). QCA literature avoids rigid data set size requirements, since data set size is closely linked to the studied outcome and the number of conditions considered likely to affect the outcome (see the next section). A further important consideration when determining data set size is the researcher's ability to gain sufficiently rich and empirically intimate knowledge about each individual case (Berg-Schlosser & De Meur, 2009). In a workshop on practical considerations for QCA, Fiss (2010) offers valuable advice regarding the ratio of cases to variables to ensure that "real data" can be distinguished

from "random data" and warns against situations where the ratio of cases drops below

tested thresholds. Fiss's (2009) suggested ratios are shown in Table 4-3.

Table 4-3: Ratio of causal conditions to cases

Number of Causal Conditions	Suggested Number of Cases (Marx, 2006)
4	10-12+ cases
5	13-15+ cases
6	16-25+ cases
7	27-29+ cases
8	36-45+ cases

(Source: Fiss, 2009)

Set size and resulting data space grow exponentially with each additional independent

condition and thus the number of possible combinations of conditions quickly exceeds

the number of empirically observed combinations (Ragin, 1987; Rihoux, 2006a). In

addition, authors point out that cases that display all logically possible combinations

"might be unlikely to occur in practice or be hard to detect or measure" because "size

decreases the chance that very logically possible combination will have an empirical

referent" (Fielding & Warnes, 2009, p. 281). Berg-Schlosser and DeMeur (2009, p. 27)

point out the QCA algorithm can produce robust results "even with large amounts of

empty data space", thus non-observed cases, called "logical remainders", are not

objectionable and have been justified (Ragin & Rihoux, 2004a; Rihoux, 2006a).

Authors suggest small-N data sets require between 1 and 4 cases, intermediate-N sets in

the range between 5-10 or 6 -100, and large-N sets to exceed 100 cases (Ragin &

Rihoux, 2004a; Rihoux & De Meur, 2009). When applying csQCA – where variables

can only assume binary values (0 or 1) – a total of 2^n (n = number of conditions) data

sets are required for analysis. For the mvQCA method, the number of possible

configurations is calculated by considering the number of values possible for each

condition, and multiplying said number with the value for each of the variables (Ragin & Rihoux, 2004b). This study involves 10 conditions: one 7-value condition (**age_c**), one 6-value condition (**educ_c**), three 4-value conditions (**age, man_exp, conf_c** and **chng_c**) and five 2-value conditions (**gender, group, devil, gbs** and **comp**) resulting in 7 x 6 x 4 x 4 x 4 x 2 x 2 x 2 x 2 x 2 = 86,016 possible configurations of conditions. For this study, the five of the eight variables have binary values, thus assisting in keeping the data space manageable and the number of cases for this study well within the range for either mvQCA or fsQCA, and the case size suggested by Fiss. (2-Value conditions are also called crisp sets and for a more detailed explanation of 4-value and 6-value conditions see Table 4-4 below. For the calibrated values of conditions in this study, see Tables 4-5, 4-6 and 4-7.)

4.2.3   *Selecting Causal Conditions*

"The key philosophy of QCA as a technique is to (start) by assuming causal complexity and then (mount) and assault on that complexity" (Ragin, 1987: x). As a third step in the research design process, the researcher populates the raw data table, in which each case displays a combination of conditions and an outcome or outcomes.

A.   *Identifying Conditions*

"Conditions are the variables that distinguish one case from another … and may influence the outcome under analysis" (Jordan et al., 2011, p. 1162). The selection process is an important part of the QCA methodology; it is generally grounded in theory and is likely to be an iterative process. To select initial causal conditions for consideration and analysis, Amenta and Poulsen (1994) and Yamasaki and Rihoux (2009) recommend five alternative strategies:

(1) The *comprehensive* approach where the full array of possible factors is considered in an iterative process.

(2) The *perspective* approach, where a set of conditions representing two theories are

tested in the same model.

(3) The *significance* approach, where the conditions are selected on the basis of

statistical significance criteria.

(4) The *second look* approach, where the researcher adds one or several conditions that

are considered as important although dismissed or overlooked in a previous

analysis.

(5) The *conjunctural* approach, where conditions are selected based on joint interactions

among theories which predict multiple causal combinations for a certain outcome.

This study applied the second strategy, where theories are tested in the same

experimental model. The preliminary list of conditions posited at the outset of the study

was:

- Age (**age**)
- Gender (**gender**)
- Education level (**educ**)
- Experience in management (**man_exp**)
- Confidence (**conf**)
- Group interaction (**group**)
- Simulated interaction in goal-based scenarios (**gbs or GBS**)
- Inclusion or absence of the devil's advocate (**devil**)
- Competency training materials (**comp**)
- Incompetency decision aids (**incmp or ~comp**)

As discussed in Chapter 2, all conditions have been previously identified by scholars

and tested with practitioners as significant influences on competency or incompetency.

The first three conditions (**age, educ, man_exp**) as well as the inclusion of a DA role-player (**devil**) merit further explanation (see section C below).

B.   Number of Conditions

Researchers advise against too large a number of conditions, as it adds complexity to the logic space, thus making it difficult to interpret the results. Berg-Schlosser and De Meur (2009, p. 28) recommend keeping the ratio between number of conditions and number of cases balanced and offer the following guidance: "The ideal balance is not a purely numerical one and will most of the time be found by trial and error. A common practice in an intermediate-N analysis (say 10–40 cases) would be to select from 4 to 6-7 conditions". Given the moderate to large number cases (N=150 for this study), having 10 conditions specific to each in-basket simulation (**group, gbs, devil, comp, age, gender, man-exp; bask*i*, conf*i* and chng*i***) is considered acceptable.

Berg-Schlosser and De Meur (2009) suggest various procedures such as discriminant analysis to identify strong bivariate relationships, and factor analysis to create composite conditions, where multiple conditions contribute to the same dimension. This study implements QCA procedures and Boolean algebra to determine the least number of factors that account for the common variance of the three variables of age, education level and level of managerial experience. These composite calibrated factors are indicated with the labels **age_c**; **educ_c** and **man_exp_c.** The set theoretic methods on which the fsQCA procedures are based enable researchers to investigate configurations of causal conditions with causal paths represented in Boolean algebraic form, thus enabling redundant variables to be identified and deleted (Ragin, 1987, 1994, 2000), resulting in parsimonious equations.

C. Alternative Conditions for Future Consideration

As with the list of outcomes, the QCA conditions were reviewed by experienced educationalists and management practitioners. The experts suggested additional or alternative conditions to expand the study: unconscious deliberation (and/or delayed decision-making); providing learners with checklists composed by experts; the impact of a decision-coach providing situational feedback and additional training as a complement to the heuristics (e.g. take-the-best [Gigerenzer & Goldstein, 1996]). Such investigations would require additional data fields and more detailed case data to accommodate all possible configurations of conditions and should be repeated with pre- and post-test results (temporal data sets required to detect the influence of time lapsed on the deliberation and decision-making outcomes); they clearly reasonable and worthwhile directions for future research but were beyond the scope of this investigation. Also, since this study is interested in a selection of causal paths, and QCA investigates causal conditions on a pre-defined outcome – in contrast to net effect investigation by statistical methods – investigation of the suggested causal conditions can be taken up by further studies at a later stage.

An obvious variable for consideration in management decision competency is ethnicity. Although ethnicity data has been gathered for each case, this study is purely interested in the efficacy of particular andragogical methods on decision competency or incompetency for MBA students in general. The possible effect of cultural conditions on decision (competency or incompetency) outcomes as well as their impact on decision confidence could be analysed in future research projects.

4.2.4   Scoring Cases: Conditions & Outcomes

Once the outcomes, conditions and cases are determined, the researcher collects raw data and assigns values for each QCA variable (see Appendix D for the raw data). The

allocated scores designate the degree of membership to a predetermined set, in contrast to a variable approach which attempts to place each case on a continuum of relative values. A score of 1 indicates full membership of the set, and a score of 0 indicates non-membership or exclusion of a variable. If only 0 and 1 is indicated (as in the presence of absence of a treatment condition such as the DA, this set of values is called a crisp set. FsQCA and mvQCA permit both binary values (0,1) and multiple threshold values (see Table 4-4). The researcher must be able to clearly and transparently justify all threshold values on theoretical or empirical grounds to ensure reliability of the study and its results (Rihoux & De Meur, 2009).

Table 4-4: Crisp set and fuzzy set variables

Crisp Set	Three-value fuzzy set	Four-value fuzzy set	Six-value fuzzy set	"Continuous" fuzzy set
1 = Fully in	1 = Fully in	1 = Fully in	1 = Fully in	1 = Fully in
			0.8 = Mostly but not fully in	Degree of member is more "in" than "out": $0.5 < x_i < 1$
		0.75 = more in than out	0.6 = More or less in	
	0.5 = neither fully in nor fully out	0.5 = neither fully in nor fully out	0.5 = Cross-over: neither fully in nor fully out	0.5 = Cross-over: neither fully in nor fully out
		0.25 = more out than in	0.4 = More or less out	Degree of membership is more "out" than "in": $0 < x_i < 0.5$
			0.2 = Mostly but not fully out	
0 = Fully out	0 = Fully out	0 = Fully out	0 = Fully out	0 = Fully out

(Source: Ragin 2000, p.156)

Table 4-4 captures two aspects of diversity: difference in condition and difference in degree to which the condition is present or not present and illustrates the general idea behind fuzzy sets. In the three-value fuzzy set an extra value is added to the crisp set, namely 0.5. This value indicates membership of cases that are neither fully in nor fully out of the set in question (e.g. payment of an invoice may be neither quick – less than 30 days, nor long – more than 60 days, so in this example 45 days may be given the mid-level value of 0.5). The table sets out different levels (four-, six-, and continuous) of fuzzy sets, each respectively more finely tuned to the level of membership than the one

before. All fuzzy sets of three values or more utilise levels above and below the "crossover point" of 0.5 and the two qualitative states of "fully in" and "fully out". The researcher calibrates data using substantive knowledge of each case, as well as theoretical knowledge (Ragin, 2009) to determine the number of values in the fuzzy set. The researcher purposefully calibrates each condition to indicate "the degree of membership to a well-defined and specified set" (Ragin, 2008, p. 30).

For this study some conditions are clearly dichotomised, such as **group** (participants were either in a group or not); **gbs, devil, comp** (**incmp = ~comp**). Participants either received this type of decision support aid or received the incompetency training aids. No participant received neither and thus a simple crisp set membership of 1= full inclusion and 0 = full exclusion (Ragin, 2007a) will suffice. Crisp scores for the four treatment antecedents (used inter-changeably with the term conditions) are set out in Table 4-5 below. Note that according to fsQCA methods the absence of a condition is labelled with a tilde (**~**) and its value is 1- (value of the present condition). Thus **~group** = **1-group**. So if the score for a particular case is (say) 0.99 for its group condition, then the ~group value for that case is 1- 0.99= 0.01. Note that for this study **~comp = incmp**; cases that did not receive competency training decision aids in all cases received incompetency decision aids. Thus **1-comp = incmp= ~comp.** For the condition **gender**, males received the crisp score of 1, whilst female participants (**~male**) = 1-male = 1-1= 0 = female.

Table 4-5: Crisp set scoring (values) for dichotomous conditions

Condition Variable Name	Degree of Membership	CS Score
Group Inter-active Decision-making or **group**	Participated in inter-active group decision-making events	1
	Participated in the decision laboratory as an individual with NO group interaction	0
Goal-Based Scenario Simulated Interactions **gbs**	Exposed to Goal-based Scenario briefing with instructions to play specific role in the simulated interaction	1
	Did receive Goal-based Scenario briefing and did not receive any instructions to participate in role-play.	0
Devil's Advocate Dissent Role-play **devil**	Instructions to consider the perspective of a devil's advocate and a briefing document and the concomitant badge, hat and sash was present during the deliberations	1
	No instructions regarding any specific dissent, caution or possible down-sides were included.	0
Competency Training & Decision Support Aids **comp**	Decision Support Aids included specific aids developed by scholars and theorists to assist in conscious deliberation were included with the in-basket information	1
	Decision Support Aids included specific aids highlighted by scholars and theorists as leading to increased incompetency in decision-making were included with the in-basket information (1-comp = ~comp = incmp)	0

In contrast to the crisp sets above, the antecedent conditions age (**age**), education (**educ**) and managerial experience (**man-exp**) can be characterised in terms of differences in degree. It is important to note that calibration of fuzzy sets is not merely positions of each case relative to another; it is a calibration relative to a standard. The standard is either a generally agreed upon or conventional standard (e.g. poverty standards set by the United Nations); or a standard based on "accumulated substantive knowledge … that resonates appropriately with existing theory" and is thus set by the researcher (Ragin, 2007a, p. 7). According to Ragin (2007a, p. 17), these groupings can be "preliminary and open to revision" based on increased understanding and dialogue between the cases and the findings. In this case the target set is defined as students with a postgraduate qualification (note that some participants were still in the process of acquiring a MBA degree) with more than five years' management experience.

Each of the variables in the raw data is calibrated using the fsQCA programme and the sub-routine of the "indirect method of variable calibration" (Ragin, 2008, p. 84). The

researcher specifies three values for calibrating the scale: the original value covering 95% of the data, 50% of the data values and 5% of the data values. Table 4-6 provides the original statistics and the calibrated values of the treatment and measured antecedents of this study. Table 4-7 provides an overview of the calibrated values as performed by the fsQCA software. Full details for each case can be found in the Truth Table in Appendix D.

Table 4-6: Statistics: Calibration of fuzzy sets for antecedents (demographics and experimental treatments)

	Measured Antecedents			Treatment Antecedent	
	Age	**Education**	**Management Experience**	**Overall Confidence**	**Overall Success**
Code	**age_c**	**educ_c**	**man_exp_c**	**conf_tot_c**	**success_tot_c**
Median	4	3	0.5	3	4
Minimum	1	1	1	1	1
Maximum	7	5	4	4	7
			Calibration values at:		
95%	6	5	4	4	6
50%	4	3	3	3	4
5%	2	1	2	1.5	2

Note: Refer to Table 4-7 for the spread of values in the original demographic sets
See Truth Table in Appendix E for full details of calibrated values for all cases and all antecedents.

Table 4-7: Fuzzy set scoring (values) for the measured antecedents: age, education and experience

INDICATORS	Codes used in data table ≡ Standard/ Category specified by the participant	Frequency	%	Fuzzy Score
Age (age_c)	1 ≡ 21-25 years old	0	0.00	0.01
	2 ≡ 26- 30 years old	29	19.3	0.12
	3 ≡ 31-35 years old	27	18.0	0.27
	4 ≡ 36 - 40 years old	31	20.8	0.5
	5 ≡ 41-45 years old	23	15.3	0.82
	6 ≡ 46- 50 years old	23	15.3	0.95
	7 ≡ 50+ years old	17	11.3	0.99
Education (edu_c)	1 ≡ No formal management education	31	20.7	0.05
	2 ≡ Bachelor's degree	23	15.3	0.33
	6 ≡ Diploma in Business	14	9.3	0.11
	3 ≡ Post-graduate education	28	18.7	0.5
	4 ≡ Post Masters' Degree	5	3.3	0.82
	5 ≡ Master's Degree	49	32.7	0.95
Management Experience: in Decision-Making (man_exp_c)	1 ≡ No management decision-making experience	2	1.3	0
	2 ≡ One to five years experience : 1-5 years	57	38.0	0.05
	3 ≡ Six to ten years experience: 6 - 10 years	45	30.0	0.5
	4 ≡ More than 10 years experience: > 10 years	46	30.7	0.95

4.2.5 *Calibrating the Outcome: Decision Competency or Incompetency*

The thesis of this study is that decision-making competencies improve substantially when participants receive support by using SI to extract directive feedback from peers in groups; overcome deference when prompted to dissent by peer-enacted role-playing (e.g. DA); and place themselves mentally within the context either in action learning-by-doing through experiential learning, through role-play, or by envisaging the context of the enactment of the decision. The study investigates previous research findings (e.g. Armstrong, Brodie and Parsons, 1994; Spanier, 2011) suggesting that incompetency training is effective in increasing incompetency in executive decision-making and outcomes and attempts to confirm and extend these prior findings through the analysis of empirical data.

The definition and understanding of decision competency or incompetency (broadly termed decision success and coded as **success_c** in the data and truth tables) has been vastly aided by scholars such as Gigerenzer, Boyatzis and Mintzberg (see Chapter 2 for a discussion and definitions). The standard educational measure of success and commonly acceptable level of pedagogical success is a pass mark – a student needs to achieve above 50% in a test or examination to be seen as "having successfully completed the assessment event". Unfortunately real-life business decisions are not so easily assessed as "right" or "wrong". Therefore, decision competency/incompetency as an outcome for cases in this study is remarkably fuzzy and not merely dichotomous as in "yes, successful" or "no, not successful". Table 4-8 and Table 4-9 illustrate the fuzzy set score for two different calibrations of overall decision success. Reflecting the traditional view of educators that a pass mark is at least 50% of the total marks possible, this study ascribes success according to the degree to which participants have supplied "best/correct" answers for each of questions in the four in-baskets simulations, as identified by the experts.

Table 4-8: Fuzzy scoring for outcome condition: Overall decision competence (success-tot)

OUTCOME	Standard of Competency	Frequency	%	Fuzzy Score
Achieved Decision-Competency (success-tot)	1 out of 4 correct	20	13.3	0.01
	2 out of 4 correct	61	40.7	0.33
	3 out of 4 correct	54	36.0	0.67
	4 out of 4 correct	15	10.0	0.99

Note: Calibrated by defining threshold values for full membership (0.99), full non-membership (0.01) and degree of membership

In the in-basket simulations, therefore, participants had to have selected the best/correct answer for two of the four simulations. The first outcome (**success_tot**) is aggregated over all four simulations using the median and the scale is calibrated using the QCA

sub-routine to calibrate fuzzy scores. Overall decision success is calculated in the

second outcome **(bool_success)** by applying Boolean algebra, which delivers the

minimum value over the four decision outcomes for four in-baskets or minimum (X_i),

where X is the crisp score for each separate in-basket and is each of the 4 in-basket

answers.

Table 4-9: Fuzzy scoring for outcome condition: Overall decision competence (bool_success)

OUTCOME	Standard of Competency	Frequency	%	Fuzzy Score
Achieved Decision-Competency (success_tot)	1 out of 4 correct	20	13.3	0.01
	2 out of 4 correct	61	40.7	0.33
	3 out of 4 correct	54	36.0	0.67
	4 out of 4 correct	15	10.0	0.99
Achieved Decision-Competency calculated using Boolean Algebra (bool_success)	Some answers incorrect	135	90.0	0.01
	All answers correct	15	10.0	0.99

Note: bool_success is calibrated Boolean Algebra and the fsQCA software, thus only cases will all four answers correct will receive the full membership score of 0.99.

Two additional implicants are considered for decision success/failure, namely (1) the

participants' confidence in their decisions and (2) their likelihood to change their

decision "should you be asked to review them in two weeks' time". Participants are

asked to indicate their confidence in the recorded decision on a Likert scale of 1 to 4,

with 1 = "not very confident" and 4 = "very confident; and the likelihood of changing

their mind on another Likert scale of 1 to 4, with 1 = "very likely to change" and 4 = "I

will not change my decision at all. I will stick to my current decision". These

confidence (**conf*i***) and likelihood to change (**chng*i***) outcomes were recorded and

captured separately by each participant for each of the in-basket simulations.

Table 4-10: Fuzzy scoring for outcome antecedents for in-basket simulation 1

OUTCOMES	Standard of Competency	Frequency	%	Fuzzy Score
Achieved decision-competency (bask1)	Incorrect answer	33	22	0.01
	Correct answer	117	78	0.99
Decision confidence (conf1_c)	1 ≡ Not very confident	3	2	0.01
	2 ≡ Somewhat confident	9	6	0.33
	3 ≡ Confident	71	47.3	0.67
	4 ≡ Very confident	67	44.7	0.99
Likelihood of changing the decision after deliberation (chng1_c)	1 ≡ Very likely to change my decision	0	0	0.01
	2 ≡ Somewhat likely to change my decision	17	11.3	0.33
	3 ≡ I am unlikely to change my decision. I will stick with my decision.	84	56.0	0.67
	4 ≡ I will not change my decision. I will stick with my current decision.	49	32.7	0.99

Table 4-11: Fuzzy scoring for outcome antecedents for in-basket simulation 2

OUTCOMES	Standard of Competency	Frequency	%	Fuzzy Score
Achieved decision-competency (bask2)	Incorrect answer	29	19.3	0.01
	Correct answer	121	80.7	0.99
Decision confidence (conf2_c)	1 ≡ Not very confident	2	1.3	0.01
	2 ≡ Somewhat confident	16	10.7	0.33
	3 ≡ Confident	76	50.7	0.67
	4 ≡ Very confident	56	37.3	0.99
Likelihood of changing the decision after deliberation (chng2_c)	1 ≡ Very likely to change my decision	1	0.7	0.01
	2 ≡ Somewhat likely to change my decision	23	15.3	0.33
	3 ≡ I am unlikely to change my decision. I will stick with my decision.	87	58	0.67
	4 ≡ I will not change my decision. I will stick with my current decision.	39	26	0.99

Table 4-12: Fuzzy scoring for outcome antecedents for in-basket simulation 3

OUTCOMES	Standard of Competency	Frequency	%	Fuzzy Score
Achieved decision-competency (bask3)	Incorrect answer	101	67.3	0.01
	Correct answer	49	32.7	0.99
Decision confidence (conf3_c)	1 ≡ Not very confident	1	0.7	0.01
	2 ≡ Somewhat confident	14	9.3	0.33
	3 ≡ Confident	70	46.7	0.67
	4 ≡ Very confident	65	43.3	0.99
Likelihood of changing the decision after deliberation (chng3_c)	1 ≡ Very likely to change my decision	2	1.3	0.01
	2 ≡ Somewhat likely to change my decision	16	10.7	0.33
	3 ≡ I am unlikely to change my decision. I will stick with my decision.	85	56.7	0.67
	4 ≡ I will not change my decision. I will stick with my current decision.	47	31.3	0.99

Table 4-13: Fuzzy scoring for outcome antecedents for in-basket simulation 4

OUTCOMES	Standard of Competency	Frequency	%	Fuzzy Score
Achieved decision-competency (bask4)	Incorrect answer	72	48.0	0.01
	Correct answer	78	52.0	0.99
Decision confidence (conf4_c)	1 ≡ Not very confident	0	0.0	0.01
	2 ≡ Somewhat confident	9	6.0	0.33
	3 ≡ Confident	72	48.0	0.67
	4 ≡ Very confident	69	46.0	0.99
Likelihood of changing the decision after deliberation (chng4_c)	1 ≡ Very likely to change my decision	1	0.7	0.01
	2 ≡ Somewhat likely to change my decision	15	10.0	0.33
	3 ≡ I am unlikely to change my decision. I will stick with my decision.	70	46.6	0.67
	4 ≡ I will not change my decision. I will stick with my current decision.	64	42.7	0.99

4.2.6   Constructing the Truth Table

The next step after calibrating the conditions and outcome(s) is to construct a "truth table" (Ragin, 2007b). In a truth table (see Table 4-14) variables are no longer isolated or distinct aspects of cases, but are treated as components of configurations that still allow for the retention of the uniqueness of each case.

Table 4-14: Extract of calibrated data in the Truth Table

Case	case	group	gbs	devil	comp	bask1	conf1_c	chg1_c	bask2	conf2_c	chg2_c	bask3	conf3_c	chg3_c	bask4	conf4_c	chg4_c
9	9	0.99	0.99	0.01	0.01	0.99	0.67	0.67	0.01	0.67	0.33	0.99	0.99	0.99	0.01	0.67	0.67
10	10	0.99	0.99	0.01	0.01	0.99	0.67	0.33	0.99	0.99	0.99	0.01	0.99	0.67	0.99	0.99	0.99
11	11	0.99	0.99	0.01	0.01	0.99	0.67	0.67	0.99	0.67	0.67	0.01	0.67	0.67	0.99	0.67	0.67
12	12	0.99	0.99	0.01	0.01	0.99	0.67	0.67	0.99	0.33	0.33	0.01	0.67	0.67	0.99	0.99	0.99
13	13	0.99	0.99	0.01	0.01	0.99	0.67	0.67	0.99	0.67	0.33	0.01	0.67	0.67	0.99	0.67	0.67
14	14	0.99	0.01	0.01	0.99	0.01	0.67	0.67	0.99	0.99	0.99	0.01	0.67	0.67	0.99	0.99	0.99
15	15	0.99	0.01	0.01	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.01	0.67	0.99	0.01	0.67	0.67
16	16	0.99	0.01	0.01	0.99	0.01	0.99	0.99	0.99	0.99	0.99	0.01	0.99	0.99	0.99	0.99	0.99
17	17	0.99	0.01	0.01	0.99	0.01	0.67	0.67	0.99	0.99	0.99	0.99	0.67	0.67	0.99	0.99	0.99
18	18	0.99	0.01	0.01	0.99	0.99	0.99	0.67	0.99	0.99	0.99	0.01	0.67	0.67	0.99	0.67	0.67
19	19	0.99	0.01	0.01	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.01	0.99	0.99	0.99	0.99	0.99
20	20	0.99	0.01	0.01	0.99	0.99	0.99	0.99	0.99	0.67	0.67	0.01	0.99	0.67	0.99	0.99	0.99
21	21	0.99	0.01	0.01	0.99	0.99	0.67	0.99	0.99	0.99	0.99	0.01	0.67	0.67	0.99	0.99	0.67
22	22	0.99	0.01	0.01	0.99	0.01	0.67	0.99	0.01	0.67	0.67	0.01	0.67	0.67	0.99	0.33	0.33
23	23	0.99	0.01	0.01	0.01	0.99	0.99	0.67	0.99	0.99	0.67	0.99	0.67	0.67	0.01	0.99	0.99
24	24	0.99	0.01	0.01	0.01	0.99	0.67	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.01	0.99	0.99

Note: This extract represents cases 9 to 24 (of the 150 cases) and 18 antecedents. The full Truth Table covers more than 50 pages and is available in soft copy upon request from the author.

Each row in the truth table represents a unique configuration of conditions with a single threshold value for each condition and each outcome for that case. The truth table lists all logically possible combinations of conditions and the outcomes displayed by each case (in this case each participating MBA student). It sorts the cases by the combinations of causal conditions they exhibit, using reasonable subsets of these conditions, from "recipes that seem especially promising" (Ragin, 2008a). As described earlier, all possible logical combinations of causal conditions are considered, even when no empirical instances are present in the study (Ragin, 2008a). The number of configurations is 2^k where k is the number of causal conditions; $k = 10$ for this study, resulting in 1024 configurations. When no observed empirical case is present it is termed logical remainders. There are three basic operations the software performs: negation; logical OR, and logical AND (Ragin, 2009, p. 94).

Negation:

The tilde sign (**~**) indicates negation and is calculated as follows:

(Membership in set *not-A*) = 1 – (membership in *set A*), also:**~A = 1-A.**

In this study, for example, negating the set of participants with high age transforms the set to not-high age (i.e. younger participants). For crisp set membership the scores thus change from 1 to 0 and from 0 to 1. For fuzzy set membership, full membership of 0.99 will be negated to 0.01. The only score that does not change is that of maximum ambiguity, 0.5. The tilde (~) indicates either the absence of the treatment (for **group**, **comp**, **devil** and **gbs**) or, for measured antecedents (age, experience and education), lower levels.

Logical AND:

The intersection of two or more sets is calculated by *logical AND* (Ragin, 2009, p. 96). The QCA software determines the minimum membership score for each case in the sets that are combined. *Logical AND* statements of all possible combinations determine a new fuzzy score by finding the lowest value of the antecedents in the model (statement) when a statement combines two or more antecedent conditions. For case 14 in Table 4-14, for example, the score for **group AND devil AND comp AND gbs** is equal to the min{0.99; 0.01; 0.01; 0.33}= 0.01. In Boolean algebra, the mid-level dot (●) indicates logical AND. The model **group ● gbs ● comp ● devil →success** would thus indicate the presence all four treatment conditions. It would read: the treatment conditions group AND gbs AND competency training AND devil's advocate dissent leads to success.

Logical OR:

The union of two or more sets is calculated by *logical OR*, which is determined by calculating the maximum score in each of the component sets and reflects the degree of

membership of each case in the union of sets. For case 14 in Table 4-14, for example, the score for **group *OR* devil *OR* chg1_c** would be = 0.99.

4.3   VALIDITY OF THE METHOD, PROCEDURES & TREATMENTS

Scientific researchers demand rigor and verisimilitude in experimental methods (Campbell & Stanley, 1963b; Salmon, 2003). Validity tests for research methods give an indication of how well the experiment and the instruments used in the experiment measure a given characteristic, given a certain set of circumstances and a certain set of research participants. From this definition, one measurement or "assessment technique may have many types of validity and a unique validity for each circumstance and group or items assessed" (Burns & Burns, 2008, p. 425). Cook and Campbell (1979) observe that two main types of validity are taken into account for research studies: internal and external. "Internal validity refers to the approximate validity with which I infer that a relationship between two variables is causal or that the absence of a relationship implies the absence of cause. External validity refers to the approximate validity with which I can infer that the presumed causal relationship can be generalized to and across alternate measures of the cause and effect and across different types of persons, settings and times" (p.37).

The focus of this study is on experimental educational simulation in the form of GBS, role-plays or SI and in-basket simulations and a plethora of literature covers the validity of these techniques. A comprehensive list of 21 validation concepts can be found in the work of Feinstein and Cannon (2002), ranging from algorithmic validity to plausibility, representational validity, and verification. The authors conclude that the lexicon of simulation validation research "can be roughly understood in terms of two basic dimensions: game development versus application and internal versus external validity" (p. 430). They then define the following terms: "the *developmental system* represents

issues regarding the actual development of a simulation game, drawing on principles of *representational validity.* The *educational system* represents issues involving the learning process, as the game is actually applied in a teaching environment, drawing on principles of *educational validity. Internal validity,* roughly speaking, addresses the extent to which a simulation functions in the intended manner. *External validity* asks whether the internal functioning corresponds to relevant phenomena outside the simulation*"* (p. 430).

4.3.1   Internal Validity

A. Conceptual Validity and Fidelity

Feinstein and Cannon (2002), representational validity relates to the level of realism presented to the learner, or *fidelity.* Hays and Singer (1989, p. 50) define fidelity as: "the degree of similarity between the training situation and the operational situation which is simulated. Is a two dimensional measurement of this similarity in terms of (1) the physical characteristics, for example visual, spatial, kinaesthetic, etc.; and (2) the functional characteristics, for example the informational, stimulus, and response options of the training situation".

There are opposing views in the literature on the need for a high level of fidelity. Some earlier studies found that higher levels of fidelity ensure effective training or enhanced learning (Feinstein & Cannon, 2002; Kibbee, 1961), whilst others found that higher levels of fidelity hinder learning in novice trainees due to overstimulation, and that lower levels of fidelity assist in focusing on the generalisable principles of the training (Alessi, 1988; Cannon, 1995).

Feinstein and Cannon (2002) argue for construct validity rather than fidelity, empirical validity or realism. They maintain that conceptual validity is essentially a level of theoretical accuracy between the system it models and the simulation and is

commensurate with a set of objectives: "Construct validity implies that the relationship between variables is correct, but they can be more subjective and modelled by any number of heuristic devices" (p. 433). This incorporates face validity, plausibility or verisimilitude – the degree to which the evaluator or user perceives the simulation to "ring true".

"The second form of internal validity, addresses the degree to which game participants understand the game and play it with insight … referred to as *educational validity*" (Feinstein & Cannon, 2002, p. 435). Parasuraman (1981) questions the extent to which student decisions are influenced in the intended manner by the simulation design. To be internally valid, the educational simulation needs to provide students with a simulation modelling the real business phenomenon in order to develop managerial insights and decision-making skills. According to Norris (1986, p. 447), the internal validity of simulation modelling represents "the educational value of simulations in teaching specific material to participants. Many other researchers equate internal validity with the educational effectiveness of the simulation (Bredemeier & Greenblat, 1981; Norris, 1986; Pierfy, 1977; Wolfe, 1985). Cannon and Burns (1999) suggest using the three taxonomies of educational objectives as cognitive (thinking), affective (feeling) and psychomotor (acting) patterns to evaluate the design and performance of the simulation for testing conceptual validity. The extent to which the three educational taxonomies can be observed determines the conceptual validity of the simulation. According to Feinstein and Cannon (2002, p. 435), "to achieve internal educational validity, game participants would have to discern the phenomena of being modeled".

But, as Feinstein and Cannon (2002) point out, internal validity does not necessarily equate to educational effectiveness. They provide an example where students are taught via a simulation with high verisimilitude. The game simulates a set of desirable

responses, but the overall principle derived by the students is not educationally sound: "For instance, in the interest of teaching the effect of advertising in consumer markets, a game might emphasize the advertising function and end up teaching students that advertising is always the primary key to marketing success. The game would be internally valid but externally disastrous!" (Feinstein & Cannon, 2002, p. 426).
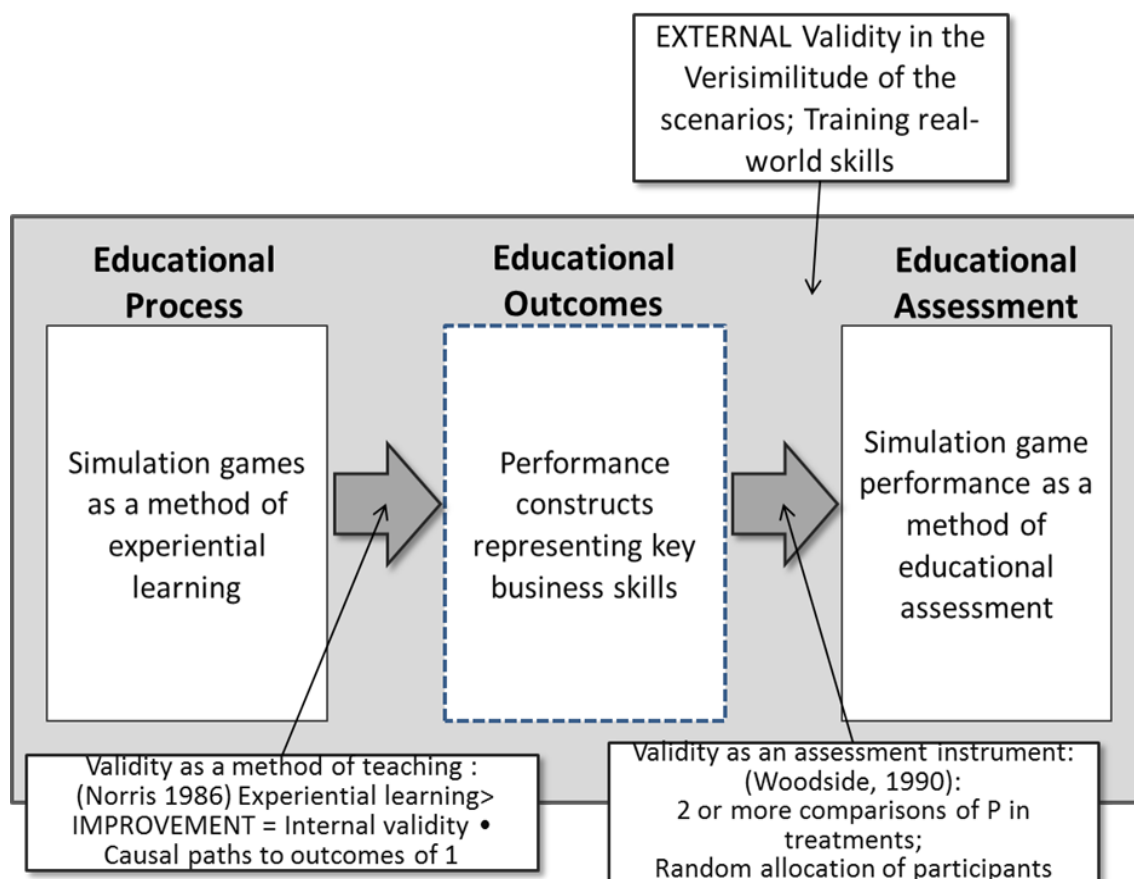
Figure 4-4: The faces of simulation game validation
(Adapted from Anderson, Cannon, Malik and Thavikulwat, 1988)

Several steps were taken during the development of the four experimental treatments to test and confirm that participants would perceive the in-basket simulations as (a) realistic and (b) likely to be encountered during real workplace experiences by real-world executives. A series of steps was followed: (1) an extensive literature review to find validated and cases used in prior studies/extant literature; (2) in-basket simulations were designed based on the researcher's and supervisors' personal experiences as practitioners in marketing and as managers; (3) experts reviewed the simulations for

realism and confirmed both the likelihood of encountering such decision scenarios in real-life situations; (4) the simulations were pre-tested with MBA students and experienced practitioners to ensure verisimilitude and that instructions were read and interpreted as intended; (5) all highlighted procedural issues were addressed; and (6) the training support materials were revised. Further details of these six steps are set out in paragraph B on page 138. Figure 3-7 shows a model for the research process of this study adapted from the "Degrees of Freedom Analysis" (DFA) model described by Woodside (2011, p. 245) for considering group decision-making in organisational behaviour (OB).
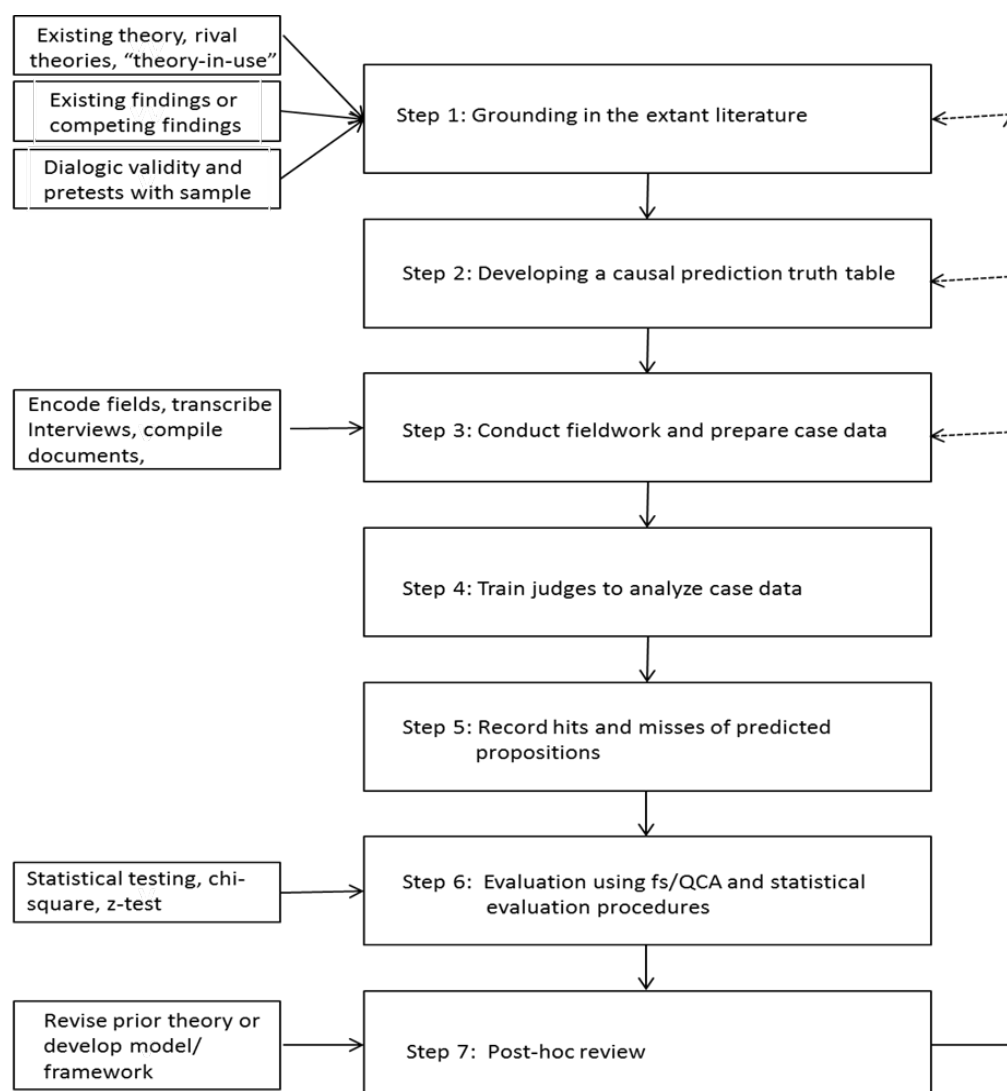
Figure 4-5: Step-by-step research process for group decision-making in organisational behaviour (OB)
(Adapted from Woodside, 2010, p. 245)

B. Procedures to Ensure Realism, Fidelity and Construct Validity

Procedures to ensure validity for the laboratory experiments consisted of three distinct and consecutive phases: (a) development and design; (b) pre-testing and pilot; and (c) main field test.

Development and Design

An extensive literature review delivered useful guidance in terms of the design of games, simulations, and GBS creation. In addition, the researcher pursued "dialogic validity" (Anderson & Herr, 1999, p. 16; Newton & Burgess, 2008, p. 26) by supplementing theoretical guidelines with informal conversations and open-ended interviews with scholars and practising management development consultants. These practitioners are actively using role-plays, simulations and in-basket simulations as training and development tools in their own business practices as well as in their own action research within their training institutions. Dialogic validity was thus achieved.

Construct Validity

Construct validity refers to the vertical inter-relationship between an unobservable construct (conceptual combination of concepts) and an ostensible measure of it, which is at an operational level. Peter (1981, p. 133) refers to the development of constructs in marketing research and states: "Although marketing has little in the way of fully developed, formally stated scientific theories, such theories cannot develop unless there is a high degree of correspondence between abstract constructs and the procedures used to operationalize them. Because construct validity pertains to the degree of correspondence between constructs and their measures, construct validity is a necessary condition for theory development and testing."

This study pursues construct validity by building pre-determined and pre-validated constructs from the seminal and conceptual work of scholars such as Simon, Armstrong,

Gigerenzer, Schank and Schwenk to explain the behaviour of students and practitioners involved in the managerial decision activities. It is common practice by marketing scholars to seek constructs and nomenclature from other disciplines and to borrow "constructs and theoretical propositions relating to them" (Peter, 1981, p. 133).

In addition, constructs have two recognised types of meaning. The first type, namely systemic meaning (Kaplan, 1967), refers to the fact that interpretation of the construct is determined by the theory in which it is grounded. Thus, to understand incompetency training as a construct, readers will have to understand training theory (andragogy and pedagogy), in which the concept is embedded. Construct validity and systemic meaning was tested with marketing scholars, management practitioners and educationalists and validity established to the satisfaction of the researcher and the main beneficiaries of the study. The second type of meaning, namely observational meaning, refers to the ability of the construct to be operationalised. Again this validity was tested with three members of each of the beneficiaries, i.e. MBA teachers, MBA graduates and MBA students. Once again, expert scholars and the researcher were satisfied that operational meaning was achieved to a very high degree.

Pre-test

To enhance ecological validity and verisimilitude, the in-basket simulations were pre-tested with MBA students and marketing and management practitioners currently employed in the roles and functions portrayed in the in-basket simulations. (Note: these MBA students did not participant in the laboratory experiments.) Two types of pre-tests were done: (1) a time-controlled pre-test with current MBA students and (2) an off-site, self-timed, uncontrolled, self-administered test completed by practitioners. After the time-controlled pre-test, participating MBA students completed the demographic section of the survey and the participants were debriefed. The debriefing focused

particularly on: (1) the simplicity and comprehensibility of the instructions; (2) realistic time allowance (to complete the reading, study the decision aids, consider an opinion and complete the decision forms); (3) verisimilitude or realism of the simulations; (4) complexity and relative comprehensiveness of the provided information; (5) the presence of escalating decisions from lower order to higher order decision-making activities; and (6) motivation and enthusiasm to complete all sections of the written questions and (7) practicality of procedural issues.

To deliberately avoid favouring one of the contending alternative theories (Woodside, 2011) contained in the multiple choice answers, all data collection forms, in particular the sections with alternative answers, were designed and tested with research experts. In line with the suggestion by Woodside (2011, p. 247) "to achieve bias reduction of questioning", …independent experts checked the decision alternatives (multiple-choice answers) as well as the sequence of answers in the questionnaire. In addition, "to allow for objectivity and verifiability in the data collection and analysis, the actual survey forms used to collect data is available for independent examination" (Woodside, 2011, p. 247).

The initial in-basket simulations were subjected to a series of pre-tests with practitioners and scholars in the field and revised. The pre-tests revealed that changes were required to word-choice in order to clarify instructions, The question sequence was changed and formatting issues such as structure and lay-out of multiple choice answers and the 4-point Likert scales were resolved (Cox, 1980; Likert, 1932. A few minor changes were made to the actual simulation descriptions. The time allocated for self-study and case reading (both the competency and incompetency training materials); analysis; group discussions; and recording of decisions were tested and adapted. For example, the time allowed for self-study was lengthened from 15 minutes to 20 minutes; the time allowed

to record decisions was reduced from seven minutes to five minutes. Pre-tests established that individuals responding to the four in-basket simulations took less than an hour and thus half the time of configurations of conditions where group interactive decisions are required. It was determined that all participants in the pre-test interventions could quite comfortably complete the full experiment within the allotted time of two hours.

Conducting Fieldwork – Main Test

Instructors

The researcher is fully aware of the importance of selecting an experienced instructor to manage the implementation phase of the experiments. "One of the largest potentially confounding factors is the instructor" (Anderson & Lawton, 2009, p. 206). The literature suggests two ways to control for the impact of the instructor (Anderson & Lawton, 2009; Gosen & Washbush, 2004). One way is to keep the instructor constant throughout the study; an alternative method is to use a large group of instructors and to randomly allocate them to the test and control groups. Since instructors were to be selected from faculty members with already heavy service and teaching responsibilities. The selection was further complicated by our inability to offer enticing rewards were not able to be offered, thus the second option was discarded in favour of having a single instructor in order to contribute to external validity.

The instructor would have to commit substantial amounts of time to prepare to deal with the 10 laboratory experiments and deal with the 150 participants and the complications related to the 12 different configurations of conditions. In addition to the requirement of a substantial amount of time, Anderson and Lawton (2009) identified two further considerations when nominating the instructor: (1) bias and (2) the competence of the instructor. The researcher ultimately selected a single professional consultant, well-

versed in role-play and in-basket simulations and well-regarded as facilitator by past students and current colleagues. This selection ensured time-commitment and competence. The study relied on the professional calibre of the nominated instructor and thorough briefings and debriefing to monitor and control for bias were implemented. As additional preparation, the facilitator was involved in all of the pre-tests. She followed carefully written and pre-tested instructions (see Appendix B) to the letter for every one of the 10 laboratories to ensure consistency for all three phases: Introduction, Experiment, and Debriefing (also see the AUTEC-approved forms in Appendices A and B) The researcher's supervisor acted as observer with the special responsibility to monitor behavioural and attitudinal biases in the instructor.

A single instructor implemented the study and briefed and debriefed all participants. Ten separate experiment laboratories were held to accommodate the demanding schedules of the MBA students and alumni and to administer the experiment at business schools further afield. Participants could self-select which of the experimental laboratories to attend within their local university or they could travel to a nearby campus, if the particular date of the laboratory suited them better.

In order to minimise instructor bias, the instructor read the brief and debrief from prepared documents. All instructions to the participants were in writing and all competency and incompetency training support material were only provided in printed document format. The facilitator had clear instructions not to interact with the participants, provide feedback, or any additional training or insights, other than to indicate the elapsed time. The time was kept with the aid of an alarm clock which was used in every lab. The experiment is highly structured into five clear sections. The first is a self-study period of 20 minutes where participants got the opportunity to study the full set of four in-basket simulations as well as the decision aids. Thereafter the

facilitator structured the remaining time into four sections of 25 minutes to allow a 15-minute group interaction phase, a 5-minute decision recording phase, and an additional 5-minute phase to prepare the next simulation. These phases were announced verbally as well as by ringing a small bell. In all but one laboratory, individuals and groups worked in the same room and individuals were briefed to follow their own time-frame. In all cases individuals completed the full experiment well before the groups. In approximately 15% of the group cases, the groups completed their discussions and decision recording before the chiming of the bell. All individual participants completed the full experiment well within the two hours allocated.

Additional Considerations regarding Internal Validity

With regard to internal invalidity factors, the researcher considers the degree to which the experimental treatment causes change(s) in specific experimental settings. Prior research (Campbell, 1957; Dimitrov & Rumrill, 2003) identifies eight categories of variable which need to be controlled, namely: history, maturation, mortality, instrument decay, testing and pretesting effects, statistical regression towards the mean, selection of participants, and interactions of factors (e.g. selection and maturation). This study followed a post-test only design with control groups as set out in Figures 4-1 and 4-2 above. In basic post-test only experimental designs, one or more experimental groups are exposed to a treatment or research intervention and the resulting change is compared to one or more control groups who did not receive the treatment.

Woodside (1990, p. 230) highlights two requirements to control sources of invalidity in true experiments: (1) two or more comparisons of subjects (individuals or groups) either exposed or not exposed to the interventions; and (2) "randomized assignment of participants to treatment exposure and to no treatment exposure (i.e. control) groups." Woodside expands on the issue of amount and allocation of participants' assignment by

pointing out that enough subjects must be randomly assigned to ensure that treatment and control groups are very similar in all aspects (including demographics and psychographics) before the treatment conditions are administered. To respond to requirement (1), the experiment was repeated 10 times with more than eight participants in each of the cells. Further, each of the treatments is contrasted by a group or individuals who do not receive the treatment, also consisting of eight or more participants. To respond to requirement (2), randomisation was carefully managed to ensure that participants self-assigned to the treatments, without prior knowledge of which treatment they were about to receive. Further randomisation was achieved by ensuring that each laboratory at the different campuses covered a random selection of the treatments, thus enabling randomisation across the different university campuses (see the section below for additional clarification of random sampling for this study).

Sampling and Randomised Allocation

Subject pools of MBA students, MBA alumni, advanced postgraduate management students and executives-in-training (on executive management or HR short courses) studying in the Faculty of Business and Law at Auckland University of Technology (AUT), the University of Waikato in Hamilton, Victoria University in Wellington and Massey University in Palmerston North served as participants in these experiments. A total of 153 learners participated in the study. Participants assigned themselves randomly to the alternative treatments. Since our interest is in the efficacy of education methodologies on managerial decision-making competencies, the choice of sample group was based on two factors. The most important factor was the likelihood that participants would exhibit a need for and therefore interest in managerial decision-making competencies to ensure commitment and a good level of interest, as well as active, enthusiastic (even dedicated) participation. A second sampling consideration was that learners need a comparable, basic level of understanding and experience in

managerial decision-making through prior training. (Self-assessed levels of experience were recorded prior to the experiment as part of the demographic data to be collected and the selection criteria of MBA programmes presupposes a certain level of business knowledge and experience. A concerted effort was made to select MBA students who had completed the compulsory papers, but random allocation to all 12 treatment cells negated the need to be overly concerned with the participants' prior level of knowledge. In addition, prior knowledge was captured as two measured antecedents (i.e. **educ and man_exp)** and was thus given full consideration during the analysis and interpretation of the findings.

Random Allocation to Cells

The following procedures were followed: Encoded sealed envelopes containing the instructions, in-basket simulations, decision aids, and simulation props such as buttons, badges and sashes were placed on round tables with four sets per table. As students entered the laboratory, they self-selected which table to sit at. At this point of the experiment there were no visible signs as to which treatment participants would be exposed to. Students participating on an individual basis, although seated in groups of four, worked on their own with no interaction with the other students at the table. Students whose self-selection allotted them to the group treatment all received the same treatment at the same table (one group). In cases where participants were exposed to the GBS treatment, each participant received a unique briefing document and set of props over and above the general instructions, in-basket simulations and decision aids. Each pack in every envelope for both groups and individuals was encoded with a unique identifier code to ensure that the data capturer and data analyst could accurately determine which configuration of conditions the participants were exposed to. At no point were the codes disclosed to or discussed with any of the participants. Codes

remained secret and hidden throughout the experiment and only the data capturer linked case codes with the unique code of each participant.

To assist with generalisability and comparative groups, subjects were randomly allocated to one of 12 different cells. In line with fsQCA, the four dichotomies (i.e. groups •~groups; competence training •~competency training; DA •~DA; GBS cases •~GBS cases) presented 81 groupings or initial configurations.

Fit Validity

An important test for the validity of a research instrument or theoretical model is "fit validity or performance validity" (Wright & Stone, 1999). This study of causal complexities as they relate to decision competence and decision confidence relies on QCA modelling, which is based on set theoretic relations and subset relations. Two quantitative measures to assess the level of correspondence between the theoretically assigned conditions, and the anticipated outcomes, as posited by Ragin (2006), are consistency and coverage. These metrics rate the "goodness of fit".

Cases are precisely assessed by their degree of consistency with the subset relation. This allows the researcher to "establish and assess individual case's degree of consistency with the outcome" (Ragin, 2009, p. 120). The following formula determines the degree of consistency (Ragin, 2008c, p. 99):

$$\text{Consistency } (X_i \leq Y_i) = \sum[\min (X_i, Y_i)]/\sum(X_i),$$

where X_i is the degree of membership in set X; Y_i is the degree of membership in outcome set Y; $(X_i \leq Y_i)$ is the subset relation under consideration and indicates the lower of the two values. If all the values of condition X_i are equal or less than the corresponding values of the outcome Y_i, the consistency is 1, signifying full

consistency. A further measure of consistency comes from the work of Rihoux and De Meur (2009):

$$\text{Consistency} = \frac{\text{Number of cases for which both a given condition and outcome are present}}{\text{Number of cases for which only the outcome is present}}$$

Ragin (2004, 2006c) suggests that substantive grounds are limited for observed consistency scores below 0.70. Values for consistency should ideally be at least 0.75 (Ragin, 2006c; Wagemann & Schneider, 2007) to indicate useful models (also called paths or solutions). In contrast, coverage is a gauge of the empirical relevance or importance of configurations of conditions (Ragin, 2006c, p. 301; Woodside & Zhang, 2012) and is expressed as:

$$\text{Coverage } (X_i \leq Y_i) = \sum(\min(X_i, Y_i))/\sum(Y_i) \text{ OR}$$

$$\text{Coverage} = \frac{\text{For a given outcome, number of cases containing a given solution term}}{\text{Total number of cases with the given outcome}}$$

When coverage is too small (below 0.2) then there are numerous ways to achieve the outcome and the studied configuration of conditions does not do a useful ("good") job of explaining the link between high membership of the configuration of conditions (X_i) and high membership of the outcome (high Y_i) (Ragin, 2006c).

A "good fit" in QCA is indicated by the coverage and consistency of the multiple configuration models. Only models that are useful – those where high configuration set membership is associated with high outcome membership, where the consistency is above 0.70, and the coverage scores are between 0.2 and 0.6- – are useful and thus covered in the findings of this research. Thus, fit validity can be accurately assessed and achieved. In some cases the fit may be limited and the models thus only marginally useful. Coverage metrics indicate the relative explanatory strength of each configural model (Wagemann & Schneider, 2007) and are thus useful to compare the relative explanatory ability of paths or models. Woodside, Hsu and Marshall (2010, p. 794) note

that "fsQCA coverage values are analogous to effect size estimates in statistical hypothesis testing". Coverage and consistency for each configuration of conditions and suggested predictive model is assessed and recorded in Chapters 5, 6 and7.

Woodside (2010, 2013) prompts marketing scholars not to consider fit validity in isolation; it needs to be considered alongside the predictive validity of tested models, and this is covered in the next section.

4.3.2 *External Validity – Equifinality and Predictive Validity*

A basic goal of scientific study is to provide credible, reliable and generalisable theoretical explanations for real-life behaviour. In contrast to internal validity, external validity is the extent to which the treatment effect can be generalized across populations or transferred to other populations and other contexts beyond the specific research settings, treatment variables and measurement instruments (Burns & Burns, 2008). Research studies list several threats to external validity: selection biases and its interaction with treatment effects; the effect of pretesting on participants' reaction; reactive effect of experimental procedures; and multiple-treatment interference. (For a thorough discussion and examples of threats to internal and external validity, see Campbell & Stanley, 1966; Campbell, 1957.)

In the earliest literature on simulations, external validity was related to realism (Kibbee, 1961). Later the concept of verisimilitude (the perception of reality by evaluators and participants) was heralded as more important. But since verisimilitude will differ for each unique participant, and in order to move away from the perceptions of individuals, researchers looked for a more testable hypothesis of external validity. Many authors offer suggestions and prescriptions for designing and implementing valid simulation research. Cannon and Burns (1999) propose linking career success or performance measurement to the simulation experience. The key question for external educational

validation according to these authors is: "how well does the educational process actually work in teaching real-world skills?" (p. 43). Wolfe (1976, p. 412) refers to external validity as the transferability of "academic insights into useful and effective real-world orientations, perceptions and business career practices".

Gosen and Washbush (2004, p. 273) term the ability to generalise the learning effects to students' careers as "transfer-internalization validity". However, Norris (1986) argues that career success is individual-based and that the success measures in the simulation and in real business will be differentially affected. Using career success as validation is further compromised by the variables associated with career success such as personal motivation, career opportunities, praise, job satisfaction, and other subjective criteria identified by Wolfe and Roberts (1986). The authors highlight the difficulty in testing for significant variations in success when these subjective criteria are employed. According to Wolfe and Roberts (1986) salary increases and promotions – although complicated by inter- and intra-company transfers, organisational differences, external economic and political factors, confidentiality of information, and other industry factors – are considerably better indices. The validity of the research is further complicated by the need to rely on self-reports, with the concomitant risk of bias.

Feinstein and Cannon (2002) return to the importance of the perception of reality – verisimilitude, believability and plausibility. Although these terms do not directly represent scientific validity, but only the perception of it, they "tend to increase the level of external validity" (p. 437) as indicators of motivation and insight, which are directly related to both internal validity and stimulating students to learn. This in turn increases productive learning of managerial and decision-making skills and therefore increases external validity.

As indicated earlier, this study employs fsQCA using Boolean algebra as its research method and analysis technique. Techniques in fsQCA deal with cases in a configurational, comparative way, where the integrity of each case is retained and cases are considered a complex combination of properties. QCA conveys a particular conception of causality using Boolean algebra as well as visual tools in the form of Venn diagrams for a "dialogue between the theory and the data" (Ragin, 1987) in order to understand and interpret results. "Multiple conjunctural causation rejects any form of permanent causality and stresses equifinality (many paths can lead to the same outcome $AB \rightarrow Y$; $AB+CD \rightarrow Y$)" (Rihoux & Ragin, 2009, p. 8). FsQCA recognises asymmetrical relationships, where low values for X associate with low and high values for Y (Woodside, 2011). In addition, this study considers a combination of antecedents and causal conditions, where no one factor is likely to be sufficient for the ideal outcome. For fsQCA as a set of techniques, "modest generalization" can be achieved but "permanent causality is not assumed" (Rihoux, 2006a, p. 9). In order for the models resulting from QCA to be valid, they need to be able to go beyond description and predict additional cases and achieve modest generalisation (Armstrong, 1991; Berg-Schlosser & De Meur, 2009; McClelland, 1998). As tools of scientific inquiry, theory and constructs are deemed adequate when they can be used to make observable predictions of untested cases or events.

McClelland's (1998) advice to researchers is to consider the critical question: Does a model predict an outcome or dependent variable in additional samples – samples not included in the original data sets used to test the theory or models? In other words, does a model have "predictive validity". Gigerenzer and Brighton's (2009b) study finds multiple regression analysis (MRA) models to be of extremely good fit, but these models perform relatively poorly when predictive validity is considered. In other words, when models resulting from MRA and traditional methods are tested for accuracy on a

separate set of data not analysed as part of the original data, the models generally perform less well. The dominant practice in management and marketing literature is to present only best-fit models "but doing so is bad practice" (Woodside, 2010, p. 9). "Testing for predictive validity with hold out samples is always possible and doing so substantially increases the added value for both empirical positivistic and interpretative case studies" (p. 9). Although Ragin (2008c) does not consider predictive validity, it is considered critical by Armstrong (1991) and Gigerenzer and Gaissmaier (2011). This study recognises the importance of predictive validity but due to its exploratory nature, it includes only fit validity. That is, this study is the first application the researcher is aware of applying Boolean algebra to a laboratory experiment testing various ways to achieve high decision competence and high decision confidence.

4.4   CONSTRUCTING CONJUNCTIVE RECIPES

Now that the fsQCA method and the logical procedures have been outlined, closer links between the research propositions (as set out in section 3.2.1) and the possible models are set out in Table 4-15 below. Refer to section 4.1 for interpretation of the Boolean algorithms.

Table 4-15: Propositions and related configural causation models

#	Context-Related Propositions	Configurations for possible parsimonious models in fsQCA
P_1	In groups, training via goal-based scenarios results in more competent decision-making than inactive knowledge learning.	gbs·group→ high success ~gbs·group→~ success
P_2	Competency increases by adding formal assignment of a devil's advocate role-player versus natural, unguided group interactive decision-making (a placebo condition) to group discussions in making decisions.	group ·devil →high success group·~devil →high success
P_3	The introduction of incompetency training and decision aids such as BCG and Priority Matrices result in less competent decision-making, but increases high decision confidence.	~comp ·devil →high conf_c ~comp ·group →~ success ~comp ·~group→~success ~comp ·devil → high conf_c
P_4	Role-playing introduced through the role of case-based scenarios/GBS, increases decision competency versus group inter-active decision-making alone.	gbs·group → high success group → ~ success
P_{5a}	Decision-making by an individual is more effective than group decision-making when the group uses no formal group-discussion protocols (e.g. formal role- playing as introduced through GBS).	gbs·~group → high success$_1$ ~gbs·group → ~high success$_2$
P_{5b}	Group interactive decision-making is more effective than individual decision-making when the group uses formal group-discussion protocols (e.g. formal role-playing as introduced through GBS.)	gbs·group → high success$_3$ high success $_3$> high success$_1$
P_6	Individuals trained in contextual influences on decision-making (e.g., drop-your-tools contexts) and the use of implicit thinking (e.g., "intuitive first choice/gut feeling") make for more competent decisions compared to groups using formal group-discussion protocols.	comp·~group → high success$_4$ comp ·group → high success$_5$ high success $_4$> high success$_5$
P_{7A}	The introduction of irrelevant information leads to cognitive overload and causes a greater proportion of incompetent decisions (for individual participants as well as in group interactive decisions).	~comp·~group →~high success ~comp ·group →~ high success
P_{7b}	The introduction of irrelevant information through complex decision aids leads to lower confidence in the decision that (for individual participants as well as group interactive decisions).	~comp·~group →~high conf_c ~comp ·group →~ high conf_c

#	Cognitive-Related Propositions	Configurations for possible parsimonious models in fsQCA
P$_8$	Decision-making by an individual with more experience in managerial judgement and decision-making (JDM) make more competent decisions compared to decision-making by individuals with lower levels of management (JDM) experience.	man_exp •group →high success ~man_exp•~group →~high success
P$_9$	Groups with higher levels of management experience, make more competent decision compared to decision-making groups with a lesser management experience.	man_exp •group → high success ~man_exp •group → ~high success
P$_{10}$	Individuals participating decision-makers with higher versus lower levels of experience in JDM make more competent decisions and are more confident in their decision competency than individual decision-makers with lower levels of experience in JDM.	man_exp •~group →high conf_c ~man_exp •~group → ~high conf_c
P$_{11}$	Individuals with high versus low levels of education and JDM experience are more competent and more confident in their decision outcomes.	edu •~group →high conf_c ~edu •~group →~high conf_c ~edu •~group →high success ~edu •~group → ~high success
	Propositions with a Combination of Contextual and Cognitive Conditions	**Configurations for possible parsimonious models in fsQCA**
P$_{12}$	Groups of participants with high levels of management experience and high levels of formal education are less competent individual decision-makers with high levels of management and education experience but the first recipe does not associate with higher levels of confidence.	man_exp•edu•~group → high success man_exp•edu•group→~high success man_exp•edu•~group → ~ high conf_c
P$_{13}$	Participants exposed to a combination of treatment conditions outperform participants who receive only one of the treatments, resulting in higher levels of decision confidence and higher levels of decision competence.	**See the results presented in Chapters 5, 6 and 7.**

4.5 ETHICAL CONSIDERATIONS

4.5.1 Principles of Partnership, Participation and Protection

According to Cohen et al. (2000), it is critical to protect the identity of all participants. To achieve this principle of anonymity, certain protocols were followed throughout the research process. The complete AUT Ethics Committee Application (AUTEC) for this thesis can be found in Appendix A. The design and practice of this research project implemented each of the three principles of the Treaty of Waitangi (Partnership, Participation and Protection) in the relationships between the researcher and all other participants.

4.5.2 Participants' Principal Rights

All prospects' and participants' rights were respected by adhering to four key principles: competence, voluntarism, comprehension, and full information (Cohen & Manion, 1994). To adhere to the principle of competence, information was provided to assist participants in making informed decisions during all stages (before, during and after) committing to participate (see the advert, information sheets and final step sheet in Appendices B and C). Students who agreed to participate, completed AUTEC-approved consent forms. Participants' privacy and confidentiality was and will be kept secure and will not be made available to any third party.

4.6 SUMMARY

The rest of the thesis is structured as follows. Chapter 5 presents the analysis of the data and configural models for overall decision competence and decision confidence. Chapter 6 presents the QCA procedures, data analysis and interpretation of the findings for the four separate in-basket simulations. Chapter 7 then investigates decision incompetence and doubt, and Chapter 8 covers implications for practitioners and scholars, limitations of this study, and suggestions for future research.

CHAPTER 5: DATA ANALYSIS AND FINDINGS FOR OVERALL COMPETENCY

5.1   QCA APPROACH TO INVESTIGATE CONFIGURATIONS OF CONDITIONS FOR OVERALL DECISION COMPETENCE

As discussed in Chapter 3, QCA uses Boolean algebra and set relationships, rather than correlations between dependent and independent variables. This research investigates the presence or absence of four treatment conditions associated with high decision competence and or decision confidence. The treatment antecedents include (1) group interaction, (2) GBS simulations, (3) DA dissent and (4) competency/incompetency training. The calibration of all antecedent conditions and the outcomes (occurrence of the two phenomena of decision competence OR decision confidence) are defined and calibrated as fuzzy sets, with the resulting membership scores reflecting the level of membership to the set, using theoretical and substantive knowledge of the cases (Ragin, 2008c) as set out in Chapters 3 and 4. Both presence and absence of antecedent conditions are considered in the configurations of causal conditions. For this study there are two types of antecedent conditions: (2) treatment antecedents and (2) measured antecedents, and these are set out in Table 5-1 below.

Table 5-1: A comprehensive list of treatment and measured antecedents

Treatment Antecedents	Code	Measured Antecedents	Code
Group interaction Individual interaction	**group** **~group***	Age Low age	**age** **~age**
Goal-based scenario simulations	**gbs** **~gbs**	Formal education level Low formal education level	**educ** **~educ_c**
Devil's advocate dissent	**devil** **~devil**	Management experience (also abbreviated exp)	**man_exp** **man_exp_c**
Competency training Incompetency training	**comp** **incmp or ~comp**	Gender (male) Gender (female)	**Gender** **~gender**
		Confidence Not confidence Confidence for all 4 in-baskets (calibrated)	**conf** **~conf** **conf-tot_c**
		Likelihood to make future changes	**chng or chg*i*** ***i is the number of the in-basket***

*Note: Absence of the condition is indicated by the tilde (~)
The tilde (~) indicates absence of a condition, or "low age" for "~age" and female for "~gender"
Antecedents with the extension " _c", indicate that scores are calibrated from the raw data;
the extensions educ_c; man_edu_c; conf_tot_c; and chg_tot_c indicate overall measures calibrated, and
the extension "tot" indicates aggregated scores over all four in-basket simulations.

QCA is widely recognised and applied as a method of causal analysis (Mahoney, 2000; Ragin, 1987, 2000; Rihoux, 2006b). In contrast to traditional statistical methods, QCA is not concerned with net effect, but rather causes are understood as combinations of conditions that are non-linear (Ragin, 2000) with theoretic connections that are asymmetrical rather than symmetrical. Unique configurations of conditions are studied which are sufficient to predict the outcome: high values of configurational conditions (X_i) associate with high values of the outcome. In this study decision competence (Y_1) OR decision confidence (Y_2) are the outcome conditions. QCA recognises that the phenomenon (here decision competence or decision confidence), may be caused by different combinations of conditions, also called "multiple conjunctural causation" (Ragin, 2007a). Next, the study applies the QCA method to explore causal models (configurations of conditions) for these outcomes decision competence and decision confidence over all in-basket assessments (as defined in Chapter 3 and calibrated in Chapter 4).

5.2   DATA & TRUTH TABLE

5.2.1   *Cases & Fuzzy Scores*

This study examines data for 150 cases (MBA participants completing four in-basket simulations over a period of two hours). A full overview of the 150 cases appears in Appendix D. While recognising that not all managers have MBA qualifications or some form of formal decision-making training, for practical reasons and reasonable sampling only cases that recorded all measured antecedents in full were analysed. Thus, the original 153 respondents were reduced to 150 cases due to incomplete fields on the decision sheets and/or demographic records.

Figure 5-1 provides an example of an extract from the raw data for six cases (data files appear in Appendix D).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Configurations of conditions encoded				IN-BASKET Task #1			IN-BASKET Task #2			IN-BASKET Task #3			IN-BASKET Task #4			DEMOGRAPHICS						
2	CASE	Group/In(	GBS/No	Devil/~	Training	Decis	Confiden(	Change	Decision	Confiden(	Change	Decision	Confiden(	Change	Decision	Confiden(	Change	Age	Educate	Experienc	GENDER	Languag	Nationality
3	1	1	1	0	0	1	4	3	1	2	2	1	3	3	1	3	3	4	5	3	1	Spanish	Chilean
4	2	1	1	0	0	1	4	3	0	3	3	1	4	4	0	4	4	3	1	3	1	Eng	NZ
5	3	1	1	0	0	0	4	3	0	4	3	1	4	4	0	4	4	4	1	3	1	Afr	RSA
6	4	1	1	0	0	1	3	4	1	4	4	1	3	3	0	3	4	2	5	3	1	Hindi	Indian
7	5	1	1	0	0	1	4	4	1	4	3	1	4	4	0	4	4	3	4	2	1	Hindi	Indian
8	6	1	1	0	0	1	4	4	1	3	3	1	4	4	0	4	4	3	1	2	0	Hindi	NZ

Figure 5-1: Example of cases in the raw data file

A fuzzy set scale transforms the variables into membership, either crisp sets as in the case of gender (males =1.0, females = 0.0) or continuous variables into membership values ranging between 0 and 1 (see **age_c** in column M in Figure 5-2 below). To avoid losing cases, this study used threshold values of 0.01 and 0.99, rather than 0 and 1, as recommended by Fiss (2009). To calibrate fuzzy values from original "raw" values, the study uses median values to calibrate 0.5 associated with 50% of the data, 0.05 values associated with the cumulative 5% of the data and the 0.95 value associated with 95% of the data. (This procedure can be calibrated using the fuzzy set QCA software

available from fsQCA.com or COMPASSS.net). An illustrative example is provided in

Figure 5-2.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	case	group	gbs	devil	comp	bask4	conf4_c	chg4_c	conf_tot	chgn_tot	success_c	gender	age_c	educ_c	man_exp	conf_tot_c	chgn_tot_c
2	1	0.99	0.99	0.01	0.01	0.99	0.67	0.67	12	11	0.99	0.99	0.5	0.82	0.5	0.27	0.12
3	2	0.99	0.99	0.01	0.01	0.01	0.99	0.99	15	14	0.33	0.99	0.27	0.05	0.5	0.95	0.82
4	3	0.99	0.99	0.01	0.01	0.01	0.99	0.99	16	14	0.01	0.99	0.5	0.05	0.5	0.99	0.82
5	4	0.99	0.99	0.01	0.01	0.01	0.67	0.99	13	15	0.67	0.99	0.12	0.82	0.5	0.5	0.95
6	5	0.99	0.99	0.01	0.01	0.01	0.99	0.99	16	15	0.67	0.99	0.27	0.95	0.05	0.99	0.95
7	6	0.99	0.99	0.01	0.01	0.01	0.99	0.99	15	15	0.67	0.01	0.27	0.05	0.05	0.95	0.95
8	7	0.99	0.99	0.01	0.01	0.01	0.99	0.99	15	15	0.01	0.99	0.99	0.05	0.95	0.95	0.95
9	8	0.99	0.99	0.01	0.01	0.01	0.99	0.99	16	16	0.33	0.99	0.5	0.95	0.05	0.99	0.99
10	9	0.99	0.99	0.01	0.01	0.01	0.67	0.67	13	12	0.33	0.99	0.12	0.18	0.05	0.5	0.27
11	10	0.99	0.99	0.01	0.01	0.99	0.99	0.99	15	13	0.67	0.99	0.27	0.5	0.95	0.95	0.5
12	11	0.99	0.99	0.01	0.01	0.99	0.67	0.67	12	12	0.67	0.99	0.82	0.5	0.95	0.27	0.27

Figure 5-2: Extract of the Truth Table to illustrate fuzzy set calibration
(A soft copy of the full truth table is available upon request.)

The difference between the raw data and the final configuration table is the calibration

of membership as well as composed conditions such as **conf_tot** (see column I in Figure

5-2) and **chg4_c**, that is, a variable reflecting the level of membership of cases when all

four measured antecedents of decision confidence over all four in-basket simulations is

aggregated into a single membership value. These aggregated values (**age_c;**

man_exp_c) are statistically calculated using distribution of scores as stated earlier. The

calibration of education and decision success (**educ_c** and **success_c**) relies on

theoretical knowledge and substantive knowledge of each case (Ragin, 2008c). For the

antecedent representing formal education (**educ_c**), students selected from the six levels

provided in the demographic section of the survey and compared to known standards

such as the entry requirements for the MBA programme.

The antecedent of success (**success_c**) was calibrated by determining the proportion of

correct answers for each of the in-basket simulations and comparing it to achievement

standards. Thus, participants with correct answers for all four simulations received a

fuzzy score of 1 (or 0.99 as indicated above); those with 3 out of 4 correct answers

received 0.67; those with 2 out of 4 correct answers received 0.5; and those with a

single correct answer received 0.33. Participants who did not have any correct answers

received a fuzzy score of 0.01. Boolean algebra was used to compute decision success (**bool_success** in the Truth Table). For this computation, the QCA software compares success over all four simulations and determines the calibrated value for each case. In addition, the final configuration table also reflects the success for each in-basket simulation as **bask*i*** (where *i* = the simulation number). For example, bask4 = the success or failure in answering the question for in-basket simulation 4).

This study develops complex causal conditions from the four simple treatment antecedents and the six measured antecedents. For practical and scope reasons, the present study does not include the two measured antecedents of language or nationality.

5.2.2   *Fuzzy Truth Table – Evaluating Consistency & Coverage*

The truth table is the next step after calibration (Ragin, 2007b). The fuzzy set membership scores are transformed into a truth table using the QCA algorithm to display all 2^k (k = number of causal conditions) logically possible combinations of conditions as well as the empirical outcome(s) (Ragin, 2008a).This study has four causal conditions (treatment antecedents), resulting in $2^4 = 16$ theoretically possible combinations. When measured antecedents are included in this calculation, the number is 2^{10} or 1,024 possible configurations. Relevant and useful configurations must have a frequency threshold based on the number of cases greater than 0.5 membership in each configuration (Ragin, 2004), a consistency threshold above the minimum level of 0.75, and coverage of between 0.2 and 0.6. Cases that do not meet these criteria should be deleted since they are irrelevant to the study of the outcome phenomenon. Researchers Rihoux and Ragin (2009, p. 109) define set-theoretic "consistency" as "the degree to which the empirical evidence is consistent with the set theoretic relation question". The formula is:

Consistency $(X_i \leq Y_i) = \sum(\min(X_i, Y_i))/\sum(X_i),$

where "min" indicates the lower of two values for X_i and Y_i represents membership scores in the outcome. For example, if 107 cases of the 150 cases displaying a causal combination (for example, competency training AND gbs AND group) also display the outcome condition (decision competence) then the proportion consistent is 0.71. Ragin (2004, 2006c) suggests that substantive grounds are limited for observed consistency scores below 0.7. See Figure 5-3 and Figure 5-4 for graphs reflecting coverage and consistency.

The next step after establishing that a set relation is consistent is to calculate coverage. According to Ragin (2006c, p. 300), "It is pointless to compute the coverage of a cause or combination of causes that is not a consistent subset of the outcome". Coverage is a gauge of the empirical relevance or importance of configurations of conditions (Ragin, 2006c, p. 301; Woodside & Zhang, 2012) and is expressed as:

$$\text{Coverage } (X_i \leq Y_i) = \sum(\min(X_i, Y_i))/\sum(Y_i)$$

The concepts and calculated values of consistency and coverage for each in-basket simulation as well as the overall decision competence are discussed in detail in section 5.3 below.

Only configurations with coverage of between 0.2 and 0.6 were considered relevant in this study. Configurations above 0.7 were considered irrelevant and discarded. When coverage is too small (below 0.2) then there are numerous ways to achieve the outcome and the studied configuration of conditions does not do a useful ("good") job of explaining the link between high membership of the configuration of conditions (X_i) and high membership of the outcome (high Y_i) (Ragin, 2006c). For example, a rather disappointing finding of the study is, given consistency of 0.70 and coverage of 0.13, that a combination of the treatment antecedents

(**comp** ● **gbs** ● **group** ● **devil**) indicates the irrelevance of this configuration of conditions, meaning that the high decision competence does not associate with a high outcome condition. Following Ragin (2006c), irrelevant configurations of conditions were rejected on empirical grounds by the researcher. Figure 5-3 and Figure 5-4) show relevant and irrelevant (also called trivialised) configurations in this study.

consistency of 0.88 and coverage of 0.24

Necessary configuration of conditions (gbs●~devil●comp ≡ GBS simulations AND not devil's advocate dissent AND competency training)

Outcome (e.g. bask2 ≡ success or decision competence for in-basket 2)
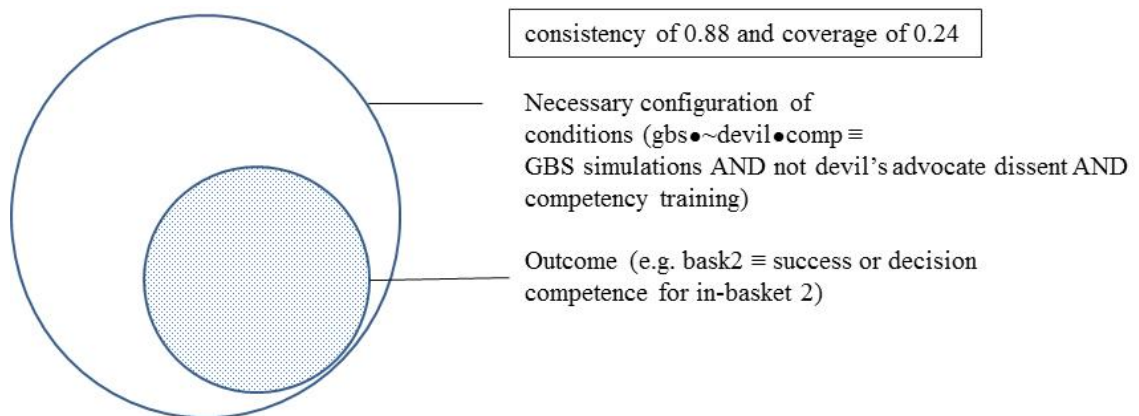
Figure 5-3: Empirically relevant necessary configurations of conditions

consistency of 0.70 and coverage of 0.13

Unnecessary or irrelevant configuration of conditions (e.g. comp●gbs●group●devil ≡ competency training AND gbs simulations AND group interaction and devil's advocate dissent)

Outcome (e.g. success_c ≡ decision success in all for in-baskets)
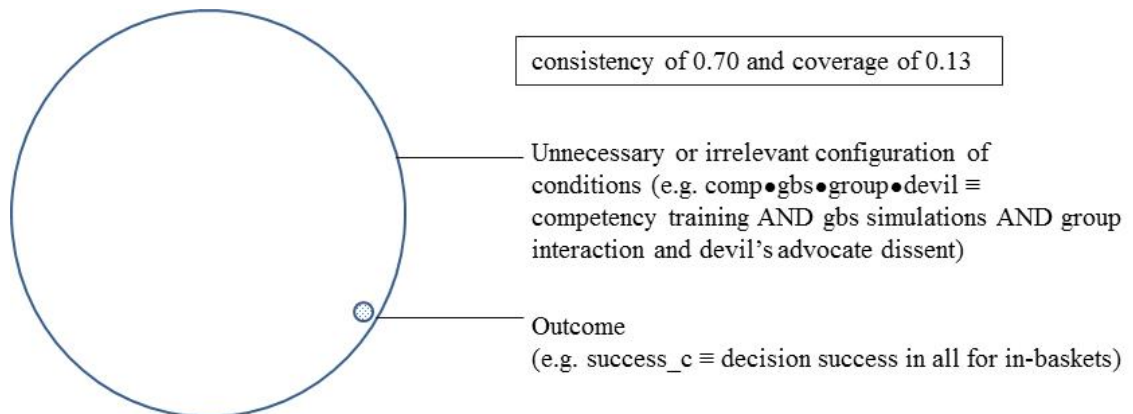
Figure 5-4: Empirically trivial necessary configurations of conditions

5.2.3   *Necessary and Sufficient Conditions*

Ragin (1987, p. 99) explains "A cause is defined as necessary if it must be present for a certain outcome to occur. A cause is defined as sufficient if it by itself can produce a certain outcome." If there are several antecedents, the word "cause" may refer to either

single values or combined values of several antecedents (variables). In Boolean algebra, sufficient conditions are conceptually equivalent to prime implicants, thus a single prime implicant is a necessary cause. In other words, the necessity rule is: "When a causal combination is necessary for an outcome, all instances of the outcome should exhibit the same combination of causal conditions … Naturally, if a combination of conditions is necessary for a particular outcome, the each single causal condition is also necessary for the outcome" (Ragin, 2000, p. 100). Using set theory to understand the arithmetical relationship for fuzzy sets, if the fuzzy membership scores in the outcome are less than or equal to fuzzy membership in the cause, then the outcome is a subset of the cause. This arithmetical relationship ($Y_{i \leq} X_i$) is depicted as an XY plot in Figure 5-5.
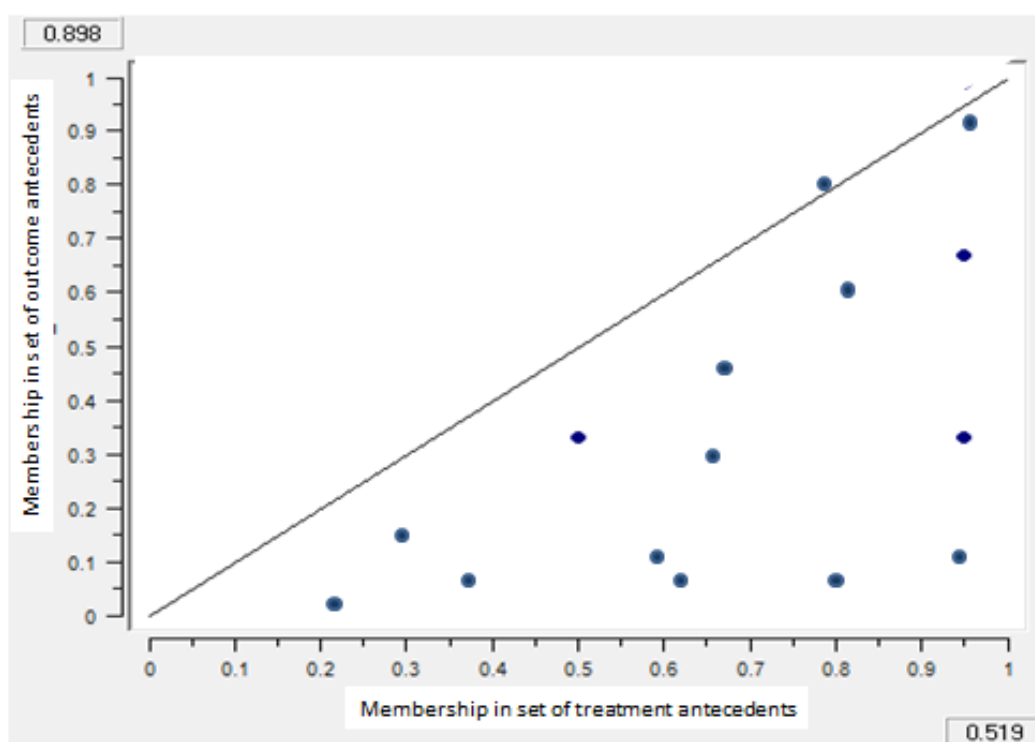
Figure 5-5: XY plot of necessity (outcome is subset of cause)

"To support the argument of sufficiency, the researcher must demonstrate that the cause is a subset of the outcome" (Ragin & Drass, 2008). In terms of set theory, sufficiency is the evaluation of whether the cases displaying the causal conditions form a subset of the cases displaying the outcome: $Y_{i \geq} X_i$.
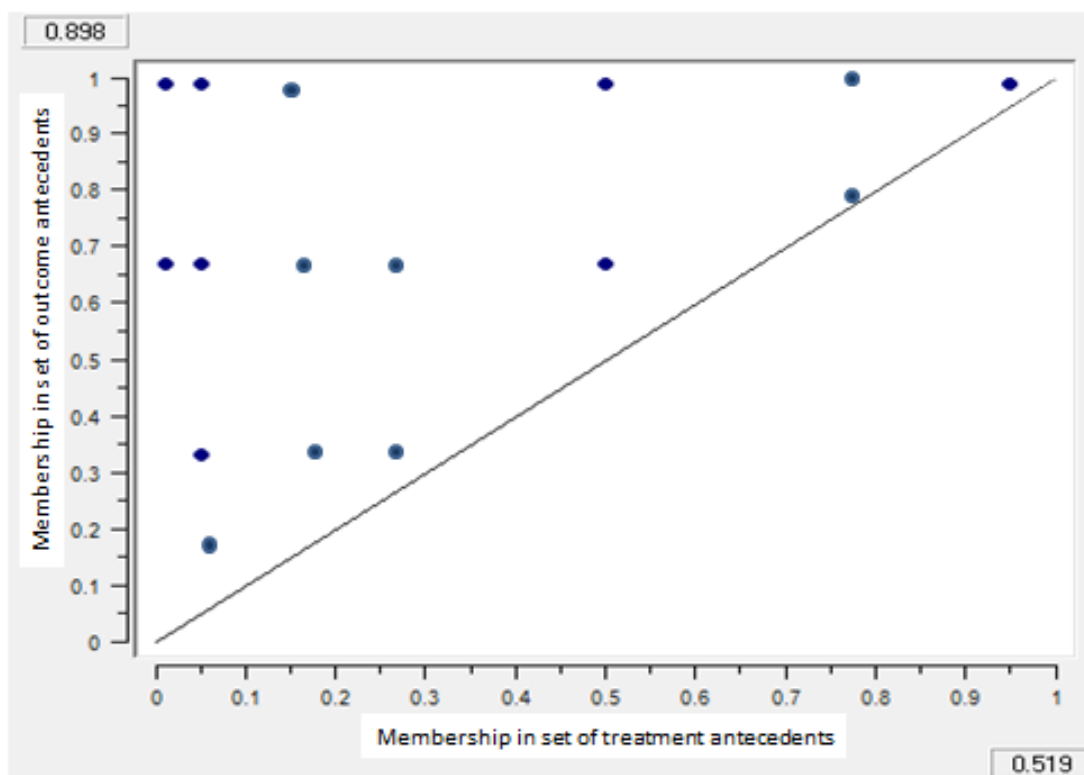
Figure 5-6: XY plot of sufficiency (cause is a subset of outcome)

Ragin (2000, p. 91) suggests that the researcher must "work backward from instance of the outcome to the identification of relevant causes … A necessary cause must be present for the outcome in question to occur. Thus, an instance of the outcome should be preceded by the cause of exhibit the cause in some way". None of the four treatment antecedents is necessary for a high membership of the outcome of "decision competence" (**success_c**) for all in-basket simulations. After conducting this test for configurations of conditions for the simulations separately (**bask1, bask2, bask3** and **bask4**) sufficient causal conditions were identified and these are discussed in the next section.

5.3   FINDINGS AND INTERPRETATIONS OF OVERALL DECISION COMPETENCE AND DECISION CONFIDENCE

Ragin (2008d, p. 13) states that "fsQCA presents three solutions to each truth table analysis: (1) a 'complex' solution that avoids using any counterfactual cases (rows without cases – 'remainders'); (2) a 'parsimonious' solution, which permits the use of

any remainder that will yield simpler (or fewer) recipes; and (3) an 'intermediate'
solution, which uses only the remainders that survive counterfactual analysis based on
theoretical and substantive knowledge (which is input by the user). Generally,
intermediate solutions are best."

The intermediate and parsimonious recipes for the individual in-basket simulations
(**bask$i$,** where $i \in \{1;2;3;4\}$) are now discussed, as well as the overall decision success
and decision confidence (**conf$i$_c** where $i \in \{1;2;3;4\}$, i is the same as the indicator for
number of simulation; the "**c**" indicates calibration using the median [as 0.5] recipes).
The findings of the QCA minimisation procedure produced several sufficient
configurations of conditions for the experiments' "high decision success" outcome, but
these configurations differ substantially over the four in-basket simulations and are
therefore discussed individually. Ragin (2000, p. 87) warns against over-reliance on the
QCA methodology alone, where the researcher views cases as configurations by
"adopting the laser beam-like focus of the case-oriented approach" and adds that
"Viewing cases as configurations is not a panacea". To overcome this caveat the
discussion of findings will refer back to the extant literature on predictions and
forecasts; simulations; in-basket simulations; GBS; DA dissent, group interaction for
decision-making; competency training and incompetency training and experiential
learning.

5.3.1 Aggregate of All In-basket Simulations: Decision Success

Table 5-2: Parsimonious solutions for decision Success over all 4 in-basket simulations

```
************************
*TRUTH TABLE ANALYSIS*
************************

File:  G:/DeVilliers/20 Jan 13.csv
Model: success_c = f(group, gbs, devil, comp)

 Rows:      10




 Algorithm: Quine-McCluskey
      True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.707391

                      raw         unique
                   coverage     coverage     consistency
                   ----------   ----------   ----------
group*gbs*comp      0.131446     0.131446     0.707391  See graph below
solution coverage: 0.131446
solution consistency: 0.707391
```

It is disappointing to note that the intermediate solutions offered by the QCA procedure result in causal recipes that are not useful. The first causal recipe in Table 5-2 combines the four treatment conditions (group, gbs, devil and competency training). Unfortunately the consistency is very low and coverage is below the acceptable minimum level of 0.2 (0.13). Ragin et al. (2004) indicate that a minimum consistency of 0.75 is required to consider a model of configurations of antecedents as "useful" and robust, with 0.70 considered the absolute minimum. These numbers indicate that the set theoretic relationships with this combination of causal conditions (treatment antecedents) explain too few of the cases of useful outcomes.

The model therefore has limited coverage in the number of cases. In other words, there are others models (configurations X) that will work equally well in predicting high

decision competence (Y_1). This is not the only model that will give researchers a

reasonably accurate assessment of high decision competence.

When a single measured antecedent (**conf_tot_c** $\equiv$ calibrated total confidence reported

by the respondents) is combined with the four treatment antecedents, however, a useful

model for high decision success does result.

Table 5-3: Models for overall high decision competence (all four in-baskets simulations)

```
************************
*TRUTH TABLE ANALYSIS*
************************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: success_c = f(conf_tot_c, comp, devil, gbs, group)

 Rows:      8                                  --- PARSIMONIOUS SOLUTION ---
                                               frequency cutoff: 1.000000
                                               consistency cutoff: 0.753590

                                                              raw        unique
 Algorithm: Quine-McCluskey                                coverage    coverage    consistency
      True: 1                                             ----------  ----------  ----------
   0 Matrix: OL                                  devil*~comp      0.084922    0.010229    0.587210
 Don't Care: -          See graph below         ~gbs*~comp*conf_tot_c  0.289518    0.214825    0.759559
                                                group*gbs*~conf_tot_c  0.120656    0.050868    0.895942
 --- INTERMEDIATE SOLUTION ---                  group*gbs*comp   0.131446    0.061658    0.707391
 frequency cutoff: 1.000000                     solution coverage: 0.461042
 consistency cutoff: 0.753590                   solution consistency: 0.709817
 Assumptions:

                            raw        unique
                         coverage    coverage    consistency
                        ----------  ----------  ----------
 * conf_tot_c*~comp*~devil*~gbs   0.235847    0.214825    0.773793
   ~comp*devil*~gbs*group         0.084922    0.063900    0.587210
   ~conf_tot_c*~devil*gbs*group   0.120656    0.050868    0.895942
 ** comp*~devil*gbs*group         0.131446    0.061658    0.707391
   solution coverage: 0.461042
   solution consistency: 0.709817
```

* Example: The causal path for decision competency for which participants report high levels of competence;
        combined purposely absence of the treatment antecedents of competency training, devils' advocate and GBS.

** Example: Participants in the high competence treatment, with GBS simulations, working in groups, but with no devil's
        advocate dissent experience, display high levels of decision competence.
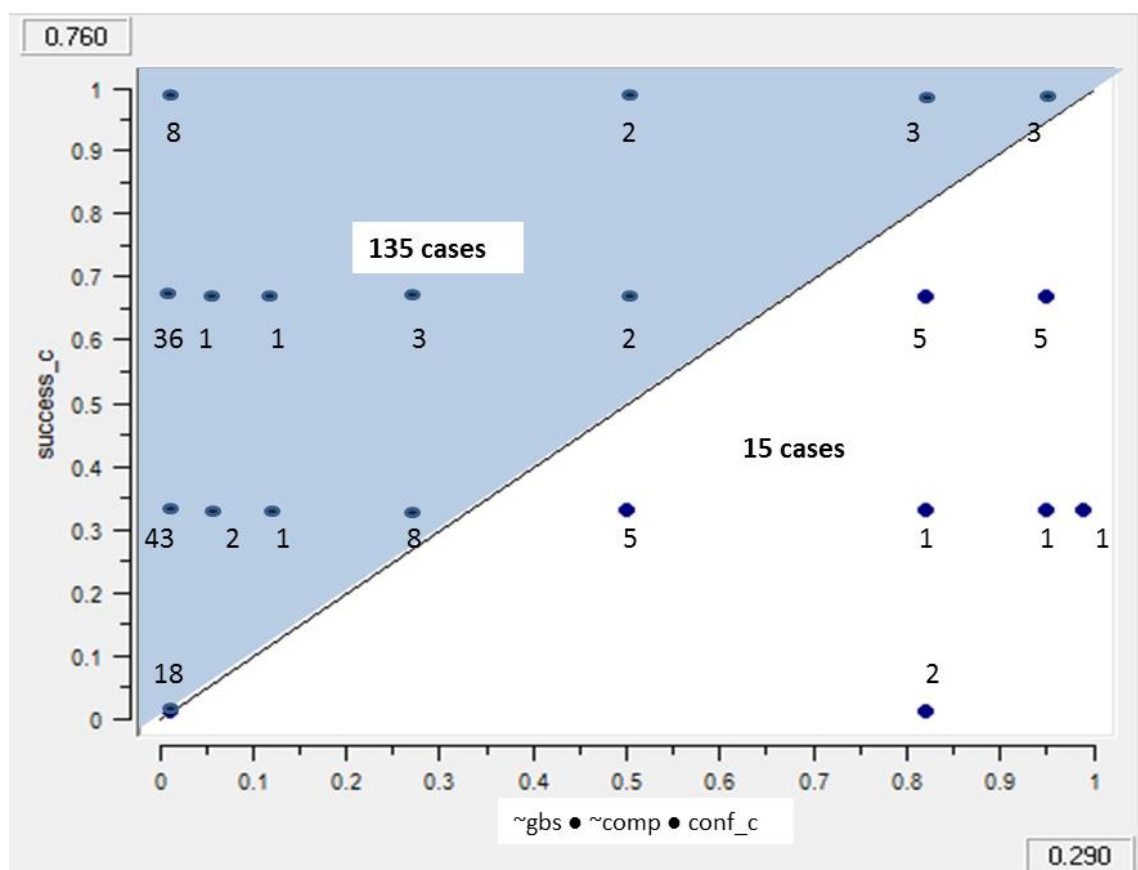
Figure 5-7: Scatter plot of decision success for all four in-basket simulations
Note: The number of cases is indicated by the numbers below the dots

The only parsimonius solution (**~gbs ●~comp● conf_c**) that is of some use is the one

displayed in Figure 5-7. Intermediate solutions are displayed in Table 5-4 below. The

causal path which configures the conditions "not competency training", "not DA

dissent", "not GBS" and the measured antecedent of high confidence indecisions is

useful to achieve decision competence in the participants. The overall solution

consistency is 77% and the solution coverage is 23%. These numbers indicate that the

set theoretic relationship between high outcome and the causal conditions is moderately

useful in predicting decision competence.

Table 5-4: Models for overall high decision competence (all in-basket simulations): Measured antecedent of confidence; competency Training antecedent; DA; GBS; and group treatment antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: success_c = f(conf_tot_c, comp, devil, gbs, group)

 Rows:      14




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720001
Assumptions:

                              raw         unique
                           coverage     coverage    consistency
                           ----------   ----------  ----------
~comp*~gbs*group           0.181334     0.066284    0.586051
~conf_tot_c*~devil*group   0.173347     0.012472    0.782416
conf_tot_c*~comp*~devil*~gbs  0.235847  0.133267    0.773793    See graph below
~conf_tot_c*~comp*~devil*gbs  0.129064  0.057175    0.782498
comp*~devil*gbs*group      0.131446     0.061659    0.707391
solution coverage: 0.545542
solution consistency: 0.662074
```

** (marker pointing to the `conf_tot_c*~comp*~devil*~gbs` row)

**Example: Participants with high levels of confidence and deliberately not exposed to the competency treatment, and not devil's advocate dissent and not involved in the GBS simulations, display decision competency overall in all four the in-baskets.

Figure 5-8 depicts the XY-plot of one of the causal recipes (**conf_c ● ~comp ● ~devil ● ~gbs**) and the outcome of overall decision competence for all four in-basket simulations. In this case decision competence is a fuzzy set determined by the number of correct answers for all four simulations. Figure 5-8 shows the vast majority of cases in the upper left triangle, indicating a moderate consistency score (0.24) for sufficiency. Note that the configural statement does not reflect decision competence for all participants (cases): while a student with high scores is consistently a member of the set of competent decision-makers, the configural statement is not necessary for indicating decision competence. Cases with low scores in the configural statements (X) include both low and high scores in decision confidence. The configural statement is thus sufficient, but not necessary for identifying decision competence.
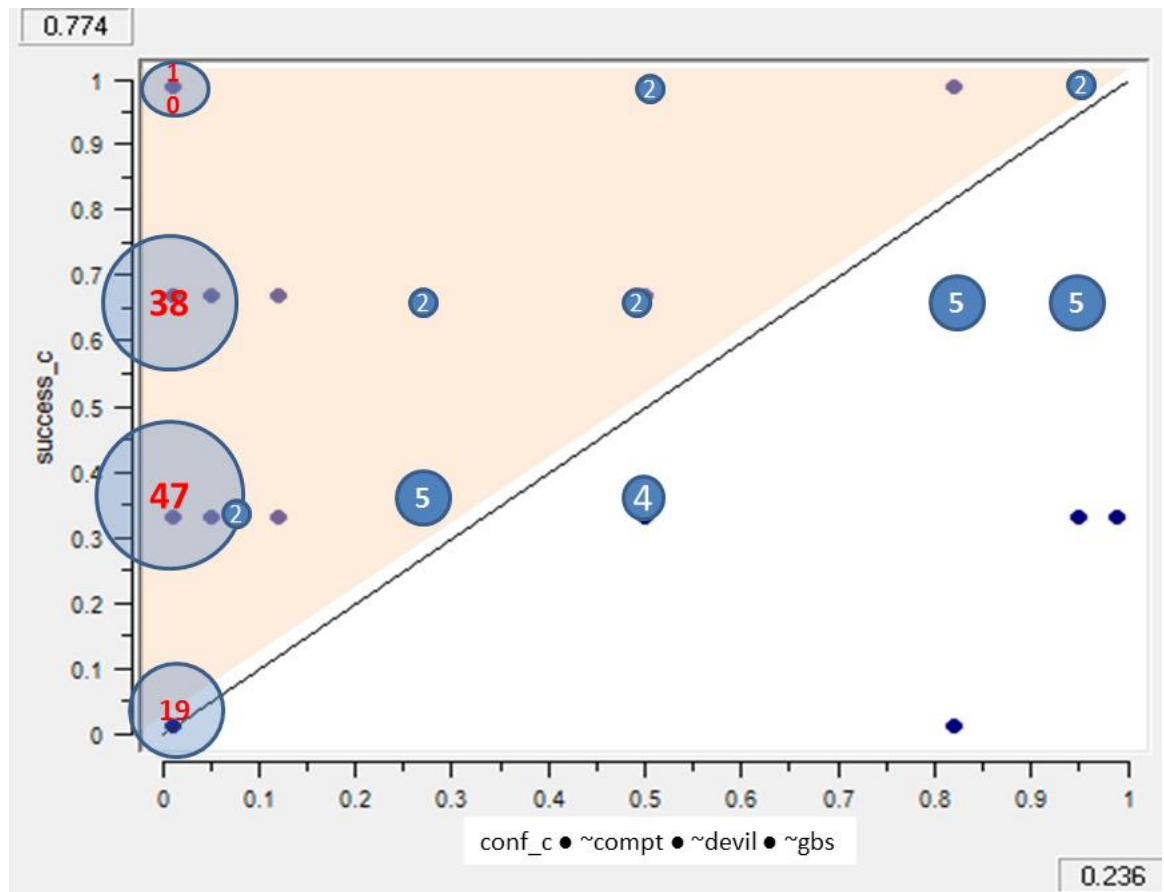
Figure 5-8: Models for overall decision competence: measured antecedent of overall confidence AND treatment antecedents of incompetency training AND not DA AND not GBS

This study analysed the impact of the treatment antecedent on decision competency separately. Disappointingly, all four treatment antecedents have minimal predictive value (see Table 5-5).

Table 5-5: The effect of each treatment antecedent individually on overall decision competence

	Coverage	Consistency
Group interaction	0.47	0.53
GBS simulations	0.45	0.49
DA dissent	0.11	0.44
Competency training	0.46	0.46
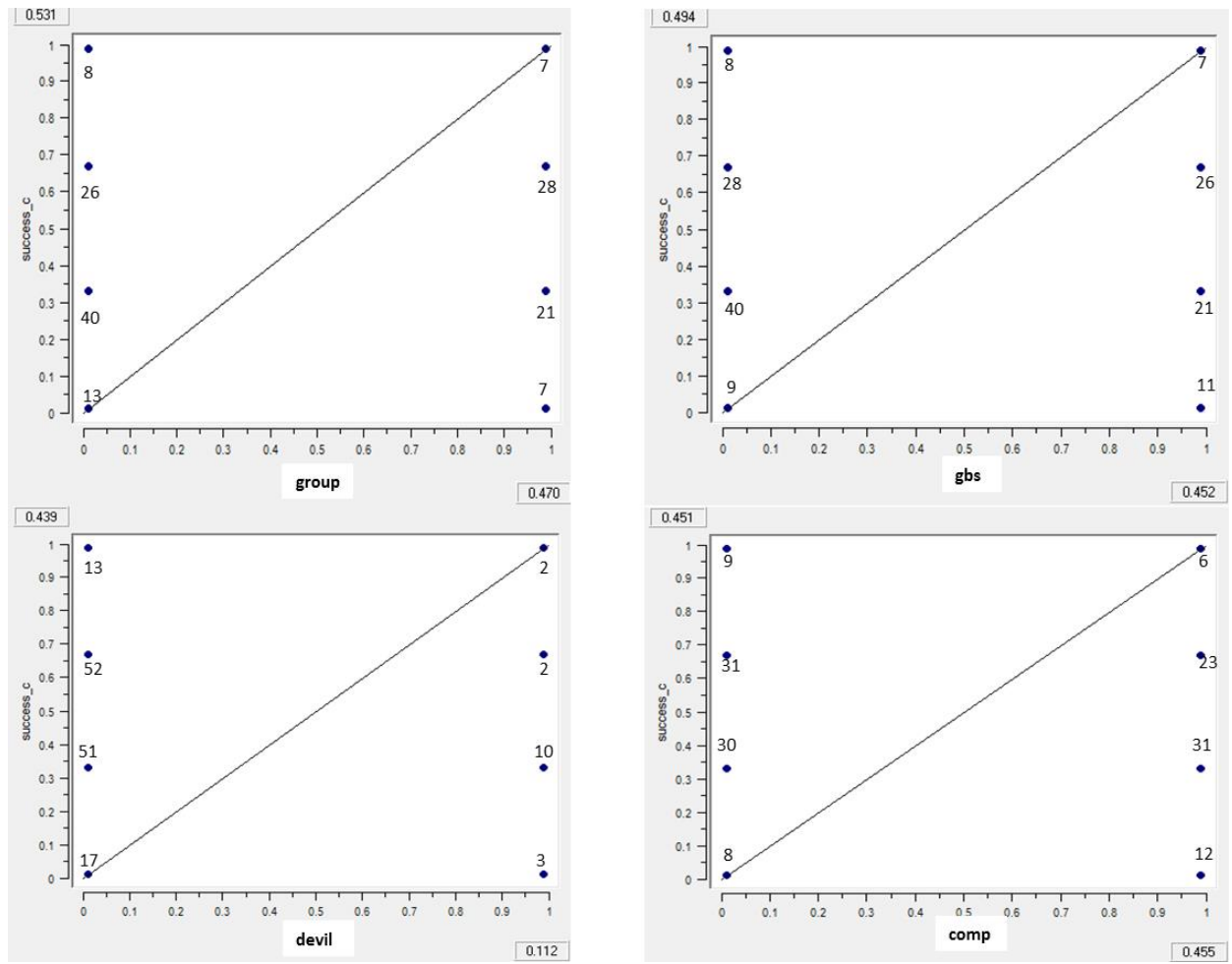
Figure 5-9: XY plots of invalid models of overall decision competence

Table 5-6 below reveals possible models for decision success (in all four in-basket simulations) as a function of the six measured antecedents: likelihood-to-change_total (**chgn_tot_c**), overall confidence (**conf_tot_c**), managerial experience (**man_exp_c**), level of formal education (**edu_tot_c**), gender (**gender**) and age (**age_c**). Figure 4-9 shows the plot of one of the useful models (*),

gender•~age_c•~man_exp_c•conf_tot_c, which indicates that young (**~age**), male (**gender**) participants with low levels of management experience (**notme ≡ ~man_exp_c**) and high levels of total confidence (**conf**) displayed high decision competency overall in all four simulations.

Table 5-6: Findings for measured antecedents' impact on overall decision competence

```
--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.724466
```

	raw coverage	unique coverage	consistency	
gender*~age_c*~man_exp_c*~chgn_tot_c	0.277747	0.012612	0.776646	See graph below
age_c*man_exp_c*~conf_tot_c*~chgn_tot_c	0.298066	0.046384	0.736241	
gender~age_c*~man_exp_c*conf_tot_c	0.314742	0.035874	0.793921	
~educ_c*~man_exp_c*conf_tot_c*chgn_tot_c	0.350056	0.038397	0.803991	
age_c*man_exp_c*conf_tot_c*chgn_tot_c	0.345852	0.035454	0.687849	
gender*~educ_c*~man_exp_c*~conf_tot_c*~chgn_tot_c	0.219731	-0.000000	0.805756	
~gender*educ_c*~man_exp_c*~conf_tot_c*~chgn_tot_c	0.110006	0.022702	0.717550	See graph below
~gender*~age_c*educ_c*conf_tot_c*chgn_tot_c	0.120376	0.029008	0.760850	
gender*age_c*~educ_c*man_exp_c*~chgn_tot_c	0.224356	-0.000000	0.679542	
gender*age_c*~educ_c*man_exp_c*conf_tot_c	0.254484	-0.000000	0.711599	

```
solution coverage: 0.824131
solution consistency: 0.651851
```

*Example: Young, male participants with low levels of management experience and high levels of total confidence display high decision competency overall in all four the in-baskets.

Figure 5-10 – 5-12 show the plots of three of the five marginally useful models to predict decision competence that are related to gender-related configurations.
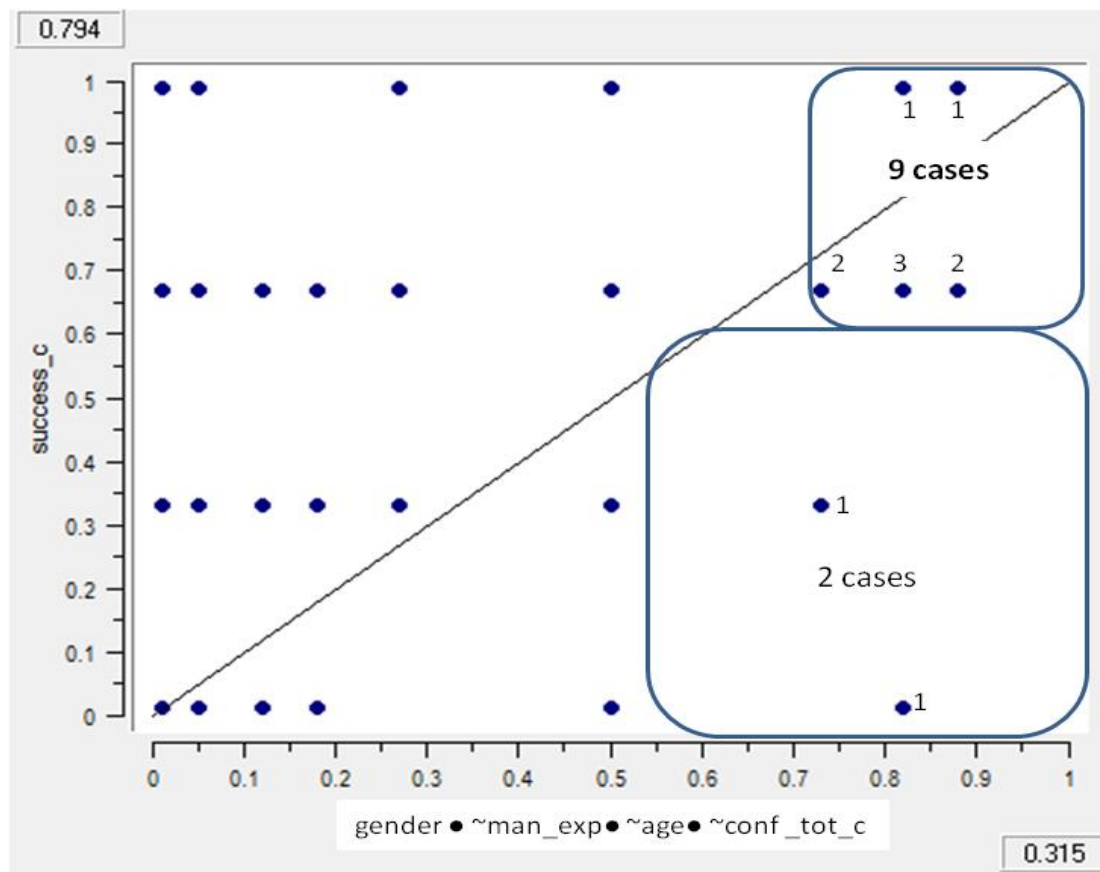
Figure 5-10: Useful model for the measured antecedents' impact on overall high decision competency
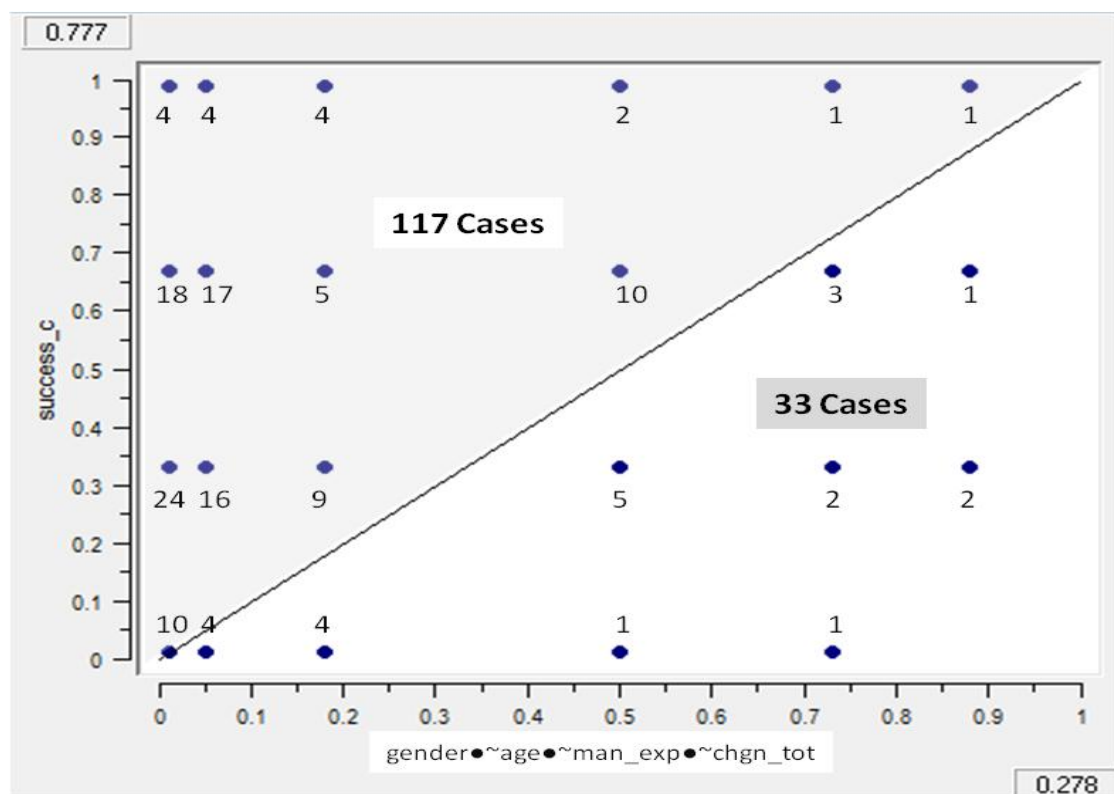
Figure 5-11: Moderately useful model for decision competence of male participants
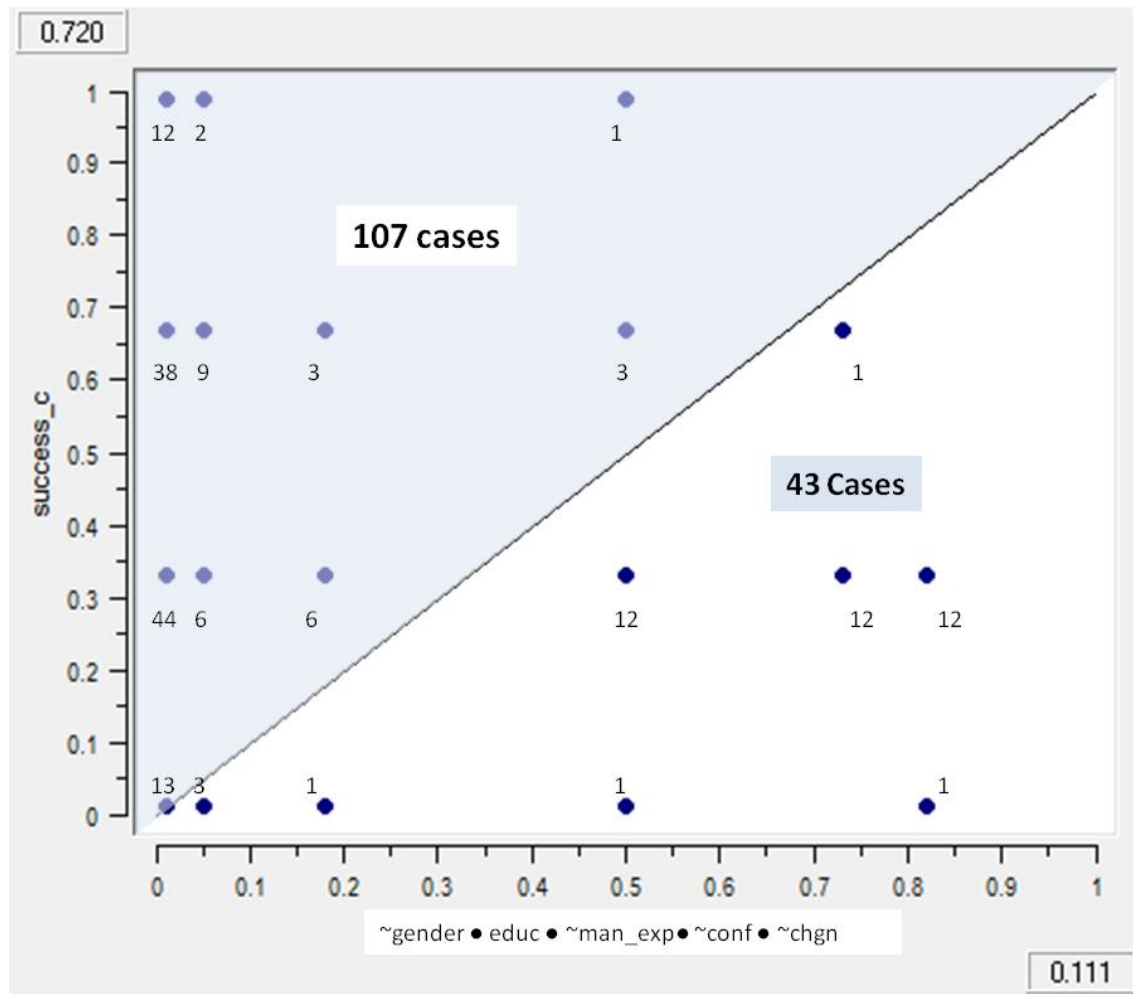
Figure 5-12: Model for path association with high decision success (/competence) for female participants

The analysis of the impact of measured antecedent of **gender** on decision confidence was retested in isolation. A not-useful (trivial) model or correlation was found with a consistency well below the minimum level of 0.75 at 0.49. The coverage was measured at 0.72 (see Figure 5-13).
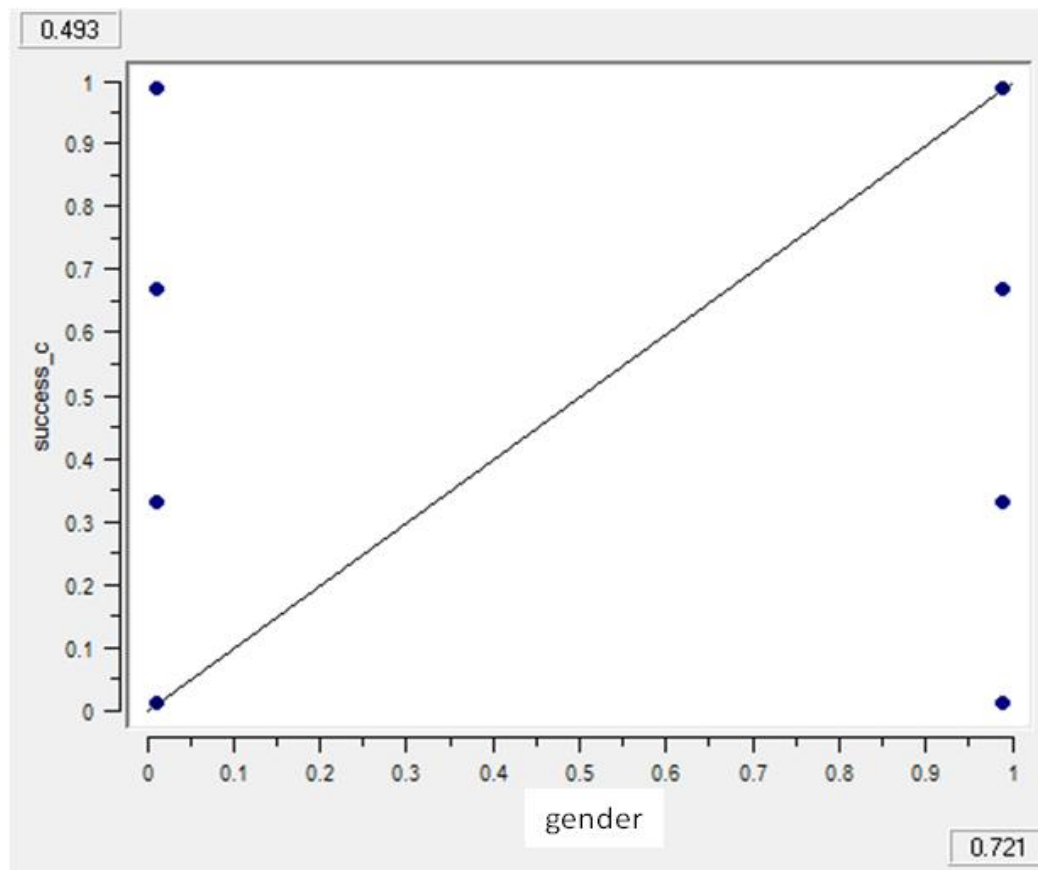
Figure 5-13: fsQCA output for impact of gender on overall decision competence

Taking heed of Ragin's (2000, p. 88) caution to avoid myopia when using QCA and over-reliance on the solutions offered by the software, analyses of tenths of configurations of treatment and measured conditions in order to find additional causal recipes were completed. Considering experience, age and education as antecedents (calibrated by using the median, 0.05 and 0.95 values determine fuzzy values, as explained earlier), the models were not useful (see Table 5-7).

Table 5-7: Overall decision competence by measured antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: success_c = f(educ_c, age_c, man_exp_c)

 Rows:       8




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 2.000000
consistency cutoff: 0.730345
Assumptions:

                raw        unique
             coverage    coverage    consistency
             ----------  ----------  ----------
~man_exp_c    0.678251    0.228700    0.598048
educ_c        0.612668    0.163117    0.660822
solution coverage: 0.841368
solution consistency: 0.587763
```

But when Boolean algebra is used to calculate the fuzzy set values for a combination of the measured antecedents of age, experience and education (see Table 5-8 and Figure 5-14 below), the resulting model is moderately useful. This means that high age (**age**) AND education (**edu**) level AND high levels of management experience (**exp**) predict high decision success for a significant number of the cases. This can be interpreted as older participants who report high levels of formal education AND high levels of management experience demonstrating high levels of decision competence.

Table 5-8: Overall decision success (success) when antecedents are calibrated using Boolean algebra (educ•age•educ)

```
 Algorithm: Quine-McCluskey
       True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 11.000000
consistency cutoff: 0.730345

                 raw        unique
              coverage    coverage    consistency
              ----------  ----------  ----------
exp_age_edu    0.296804    0.296804    0.730345
solution coverage: 0.296804
solution consistency: 0.730345
```

This model is somewhat useful to predict decision competence in other cases, since the consistency is marginally acceptable (0.73) and the coverage is 0.30, as guided by Rihoux and Ragin (2007). Figure 5-14 shows that the majority of cases are in the upper left triangle ($Y_i > X_i$), with only 42 of the 150 cases in the lower right triangle, indicating moderate consistency in the fuzzy set.
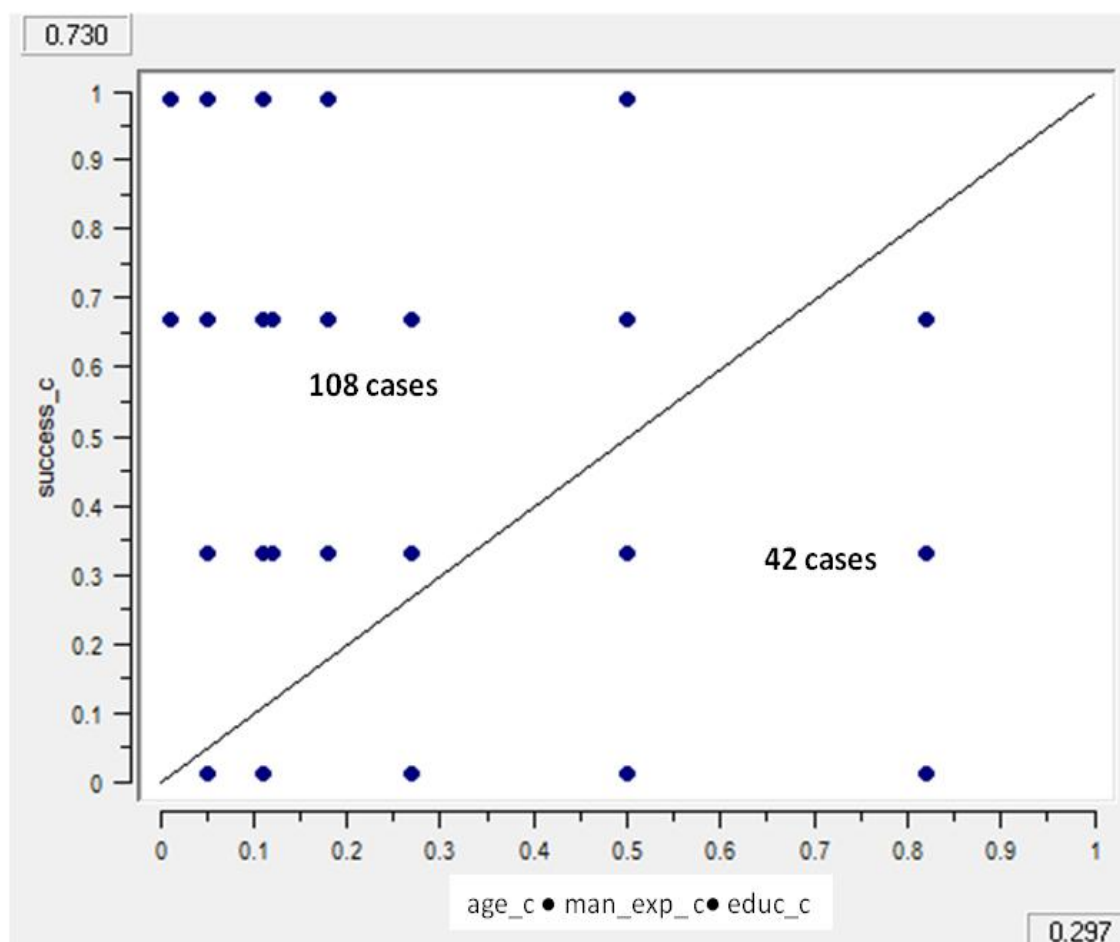
Figure 5-14: Age AND education AND management experience association with high overall decision competence

Unfortunately all additional or new propositions related to overall decision competence (/success) were falsified by contrary cases or associate with very low outcome levels. The next section investigates decision confidence as an outcome of the treatments.

Not-Decision Competence of Decision Failure (~Success)

As stated in Chapter 3, the possible logical configurations of conditions totals 2,046. The fsQCA procedure was executed hundreds of times, with careful consideration,

analysis and interpretation of large number of models. Many were disregarded due to consistency or coverage scores not meeting the required levels. In pursuit of thoroughness "not-decision competence" (**~success**) was investigated and two useful models resulted from the fsQCA procedures.

Table 5-9: Decision failure (~success) by treatment antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp)

 Rows:     10




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

                raw         unique
                coverage    coverage    consistency
 .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. .. ..
 ~devil          0.890134    0.732437    0.903368
 group*~gbs      0.267563    0.109866    0.924109          See graph below
 solution coverage: 1.000000
 solution consistency: 0.901010
```

Experimental treatments for which participants make decisions in groups, but are not given GBS training (no specified roles and or any highlighted goals), results in high failure membership OR participants who make decisions in group interactive decision-making treatment AND not give the benefit of GBS simulated interaction associated with high decision failure. A useful recipe (consistency > 0.75 and coverage > 0.2) for decision incompetence is a combination of the treatment antecedents of groups and not GBS simulations. In other words, if participants are placed in groups but not given training in GBS, they have high membership in the set of incompetent decision-makers. This result guides educators and practitioners to use GBS simulations (which include clear goal specification and SI or role-play) to assist groups making decisions and avoid failure. Figure 5-15 illustrates the impact of **group• ~gbs** on decision failure. Note that

not_bool_success indicates **1-success** calibrated by using Boolean algebra (i.e. overall

success = 0 for all for in-basket simulations).
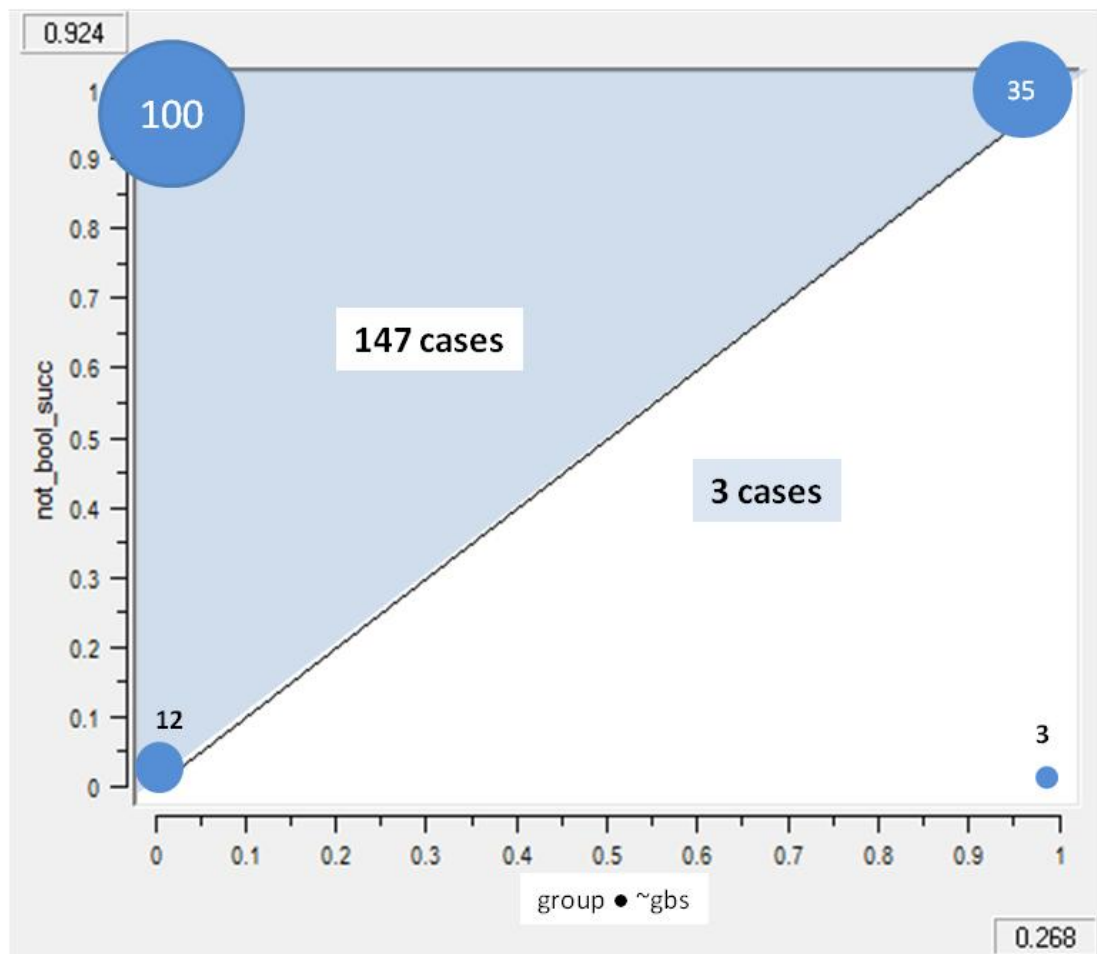
Figure 5-15: Plot of decision failure by configuration (group ● ~gbs)

In summary, **group** AND **not gbs** OR **not devil** associates with high decision failure

(**group●~gbs + ~devil → ~success).**

5.3.2   *Aggregate of All In-baskets Assessments: Decision Confidence*

Careful implementation of the fsQCA procedures and analysis of the truth table

algorithms relating to the four treatment conditions (**group, gbs, devil, comp**),

delivered disappointing results. When the impact of the four treatment antecedents on

decision confidence was analysed, the resulting models were not affirmed. Although the

consistency was within the acceptable range, the coverage was below the minimum

acceptable level of 0.2, indicating that other models could equally well (or poorly in this

case) predict high decision confidence (Rihoux & Ragin, 2007). Table 5-10 shows the

intermediate solutions for decision *confidence* when configurations of treatment

antecedent conditions are considered.

Table 5-10: Intermediate solutions for overall decision confidence

```
File:  E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: conf_tot_c = f(comp, devil, gbs, group)

 Rows:       3




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.717697
Assumptions:

                          raw         unique
                       coverage      coverage      consistency
                       ----------    ----------    ----------
comp*~gbs*group         0.151536     0.135028      0.758260
~comp*~devil*gbs*group  0.112469     0.095961      0.717697
solution coverage: 0.247497
solution consistency: 0.727832
```

When paths (configurations of conditions) associated with high decision confidence

combine measured antecedents (**age_c; man_exp_c and educ_c**; excluding **gender**)

and only one treatment antecedent **group**, useful models are indicated when consistency

is > 0.7 and coverage between 0.2 and 0.6.

Table 5-11: Decision confidence by the configuration of conditions (group ● age_c ● educ_c ● man_exp_c)

```
File:  C:/Users/rouxelle/Desktop/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: conf_tot_c = f(group, age_c, educ_c, man_exp_c)

 Rows:        12



 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.715043

                    raw         unique
                  coverage     coverage    consistency

~age_c*~man_exp_c   0.434357    0.041598    0.734189
group*educ_c        0.326841    0.063387    0.794121
age_c*man_exp_c     0.462969    0.044349    0.742761
~group*~man_exp_c   0.328051    0.019808    0.642180
~group*age_c        0.427094    0.015957    0.715392
solution coverage: 0.916144
solution consistency: 0.681595
```


Figure 5-16: Impact on overall decision confidence by path (group ● educ_c)

This study also investigated the question: "How is overall decision confidence affected by a combination of (only) the measured antecedents?"

Table 5-12: Overall decision confidence

```
Model: conf_tot_c = f(man_exp_c, educ_c, age_c, gender)

 Rows:       16




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.762843
Assumptions:

                         raw         unique
                       coverage     coverage     consistency
                      ----------   ----------   ----------
age_c                  0.665346     0.243205     0.721394
~man_exp_c*gender      0.429294     0.129856     0.724420
man_exp_c*educ_c       0.322438     0.036756     0.836904
solution coverage: 0.858809
solution consistency: 0.697409
```

The model of management experience AND formal education (**man_exp_c ● educ_c**) is highly useful in predicting decision confidence for this study (see Table 5-12 above and description of the plot in Figure 5-17 below). In other words, as would be commonly accepted, researchers can with a high level of certainty predict that MBA graduate managers will have high levels of formal education (postgraduate qualifications) and high levels of managerial experience (more than five years judgement and decision-making [JDM] experience).
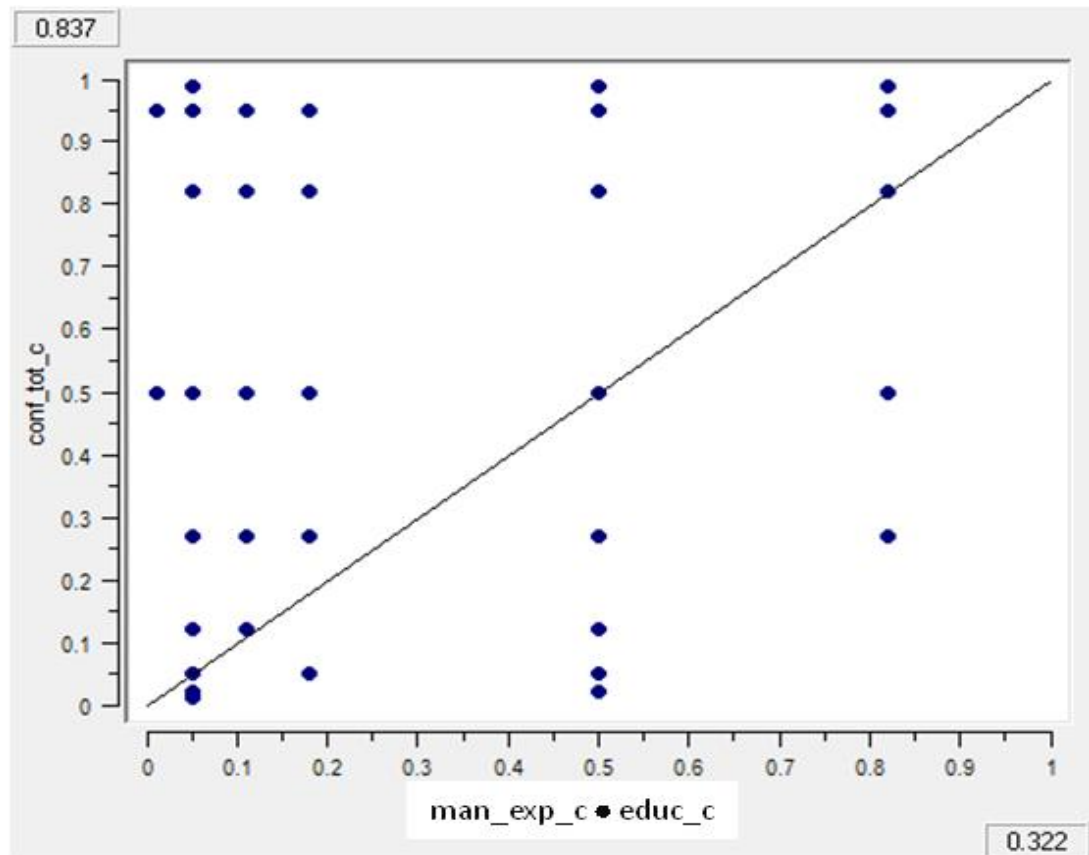
Figure 5-17: Plot for path (man_exp_c ● educ_c) impact on decision confidence

A number of authors indicate that MBA graduates can be arrogant, which implies they are confident without being necessarily able to back their attitude up with performance. When compared to the models produced for decision competence, the **man_exp●age_c●educ_c** model is only repeated for exceptional cases – those cases where full success (i.e. four out of four correct decisions) has been achieved as displayed by a Boolean algebraic score of 1 - AND only when combined with the measured antecedent of age. As expected, the intermediate solution in Table 5-12 above and illustrated in Figure 5-18 below indicates that age **(age_c)** is a predictor of decision confidence (with a consistency of 0.72, coverage 0.67). Thus age is a marginally useful model to predict decision confidence.
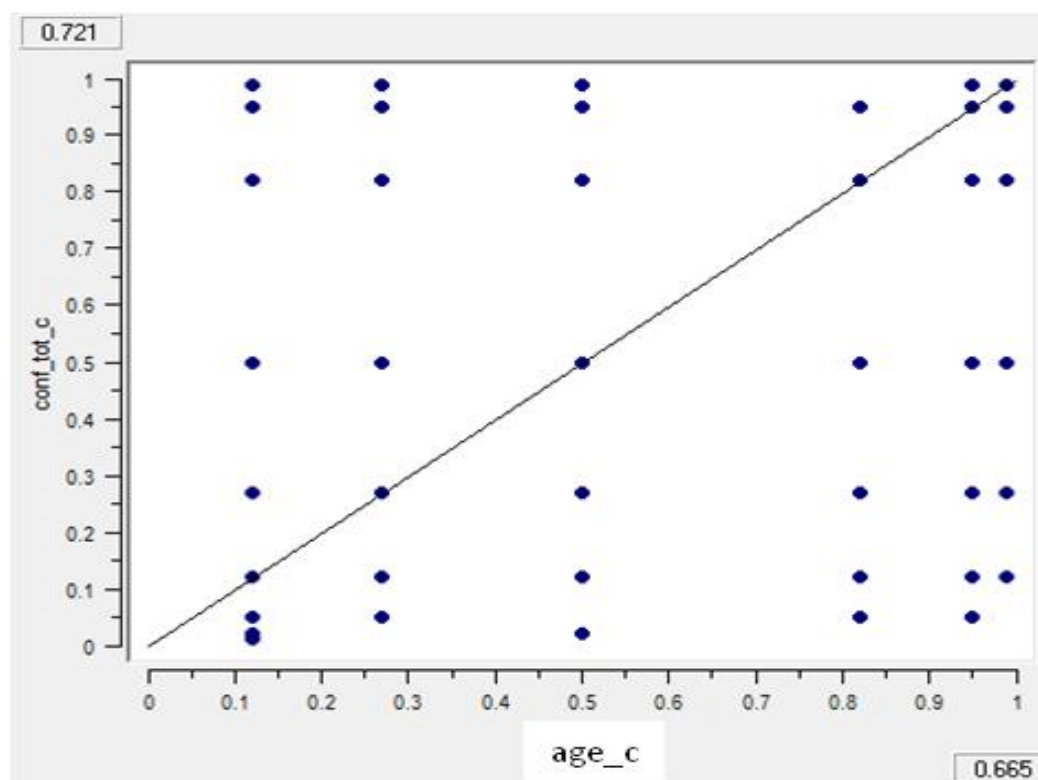
Figure 5-18: fsQCA plot of the association between age and overall decision confidence

The marginally useful (consistency 0.72) configuration of measured conditions

~man_exp_c • gender is not unexpected. High decision confidence for males (**gender**)

with low levels of management experience (**~man_exp_c** ≡ JDM five years and less)

associates with high levels of decision confidence (see Figure 5-19 below). This result is

construed and expected in line with assertions in the literature that MBAs lack relevance

in the real world (Bennis & O'Toole, 2005; Clinebell & Clinebell, 2008; Kedrovsky,

2005; Pfeffer & Fong, 2002b) and critics' complaints that MBA programmes focus

mainly on technical skills, often ignoring critical soft skills such as teamwork and inter-

personal and cultural skills (Porter & McKibbin, 1988). Other criticisms about MBA

graduates are that they are arrogant; overly confident; demand inordinately high starting

salaries; and that their expectations exceed their abilities. They have almost no loyalty

towards their employers and are largely focused on rising through ranks as fast as

possible, with no regard for the "collateral damage" they leave behind (Cheit, 1985;

Mintzberg & Lampel, 2001; Neelankavil, 1994). It seems that these assertions have

some merit, but only for the male participants in this study. Analyses of paths of

decision confidence for female participants did not result in any useful models for

accurately predicting female participants' decision confidence within the context of this

study.
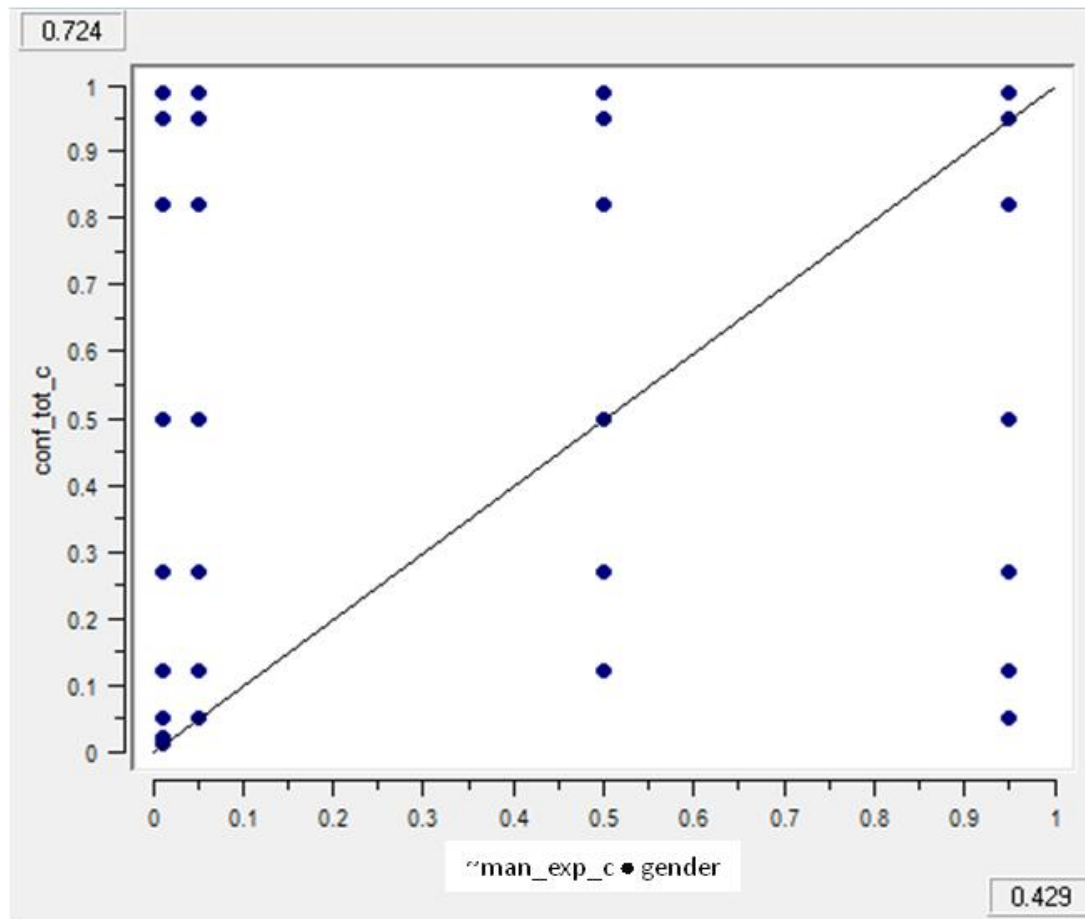
Figure 5-19: Decision confidence by configured conditions (~man_exp_c●gender)

5.3.3   Summary of Core Findings

Table 5-13 below sets out the core findings of this study. Note that these are not "key

success factors" as the dominant discourse seems to follow in traditional statistical

methods of marketing research. This research finds that no single treatment or measured

antecedent is necessary for high decision competence, but that the single measured

antecedent of age is marginally sufficient to impact decision confidence. Also, the

single treatment antecedent of **~devil** was found to be sufficient to impact high decision

incompetence (failure).

Table 5-13: All solutions for overall decision competence & decision confidence

All models of overall decision competence and overall decision confidence (all four in-basket simulations)	Consistency	Coverage
Decision Competence		
~gbs●~comp●conf_tot_c	0.76	0.29
conf_tot_c●comp●~devil●~gbs	0.77	0.24
gender●~age_c●~man_exp_c●~change_tot_c	0.78	0.28
age_c●man_exp_c●~conf_c●~chgn_tot_c	0.74	0.30
gender●~age_c●~man_exp_c●conf_tot_c	0.80	0.31
~educ_c●man_exp_c●conf_tot_c●chgn_tot_c	0.80	0.35
gender●educ_c●~man_exp_c●~conf_tot_c●chgn_tot_c	0.81	0.22
man_exp●age●edu_c **(using Boolean Algebra)**	0.73	0.30
NOT-Decision Competence **(using Boolean Algebra)**		
~devil	0.90	0.89
group●~gbs	0.92	0.27
Decision Confidence		
age_c	0.72	0.67
~man_exp●gender	0.72	0.43
man_exp_c●edu_c **(using Boolean Algebra)**	0.83	0.32

It is clear from these configural recipes that none of the treatments are singularly

necessary and sufficient to associate with high decision competence. We can also

deduce that educationalists need to be cognisant of the impact of measured conditions

on participants' decision competence and decision confidence. The presence of all six

measured antecedents in the configuration of conditions set out in Table 5-13 indicates

that none of these are negligible when designing development interventions. The only

treatment that is not necessary AND not sufficient in impacting decision competence is

group. One certain statement is that high decision *incompetence* is associated with

group interactive decision-making and not receiving a GBS treatment (**group ● ~gbs**).

The implication for educationalists is that group work with the absence of clear goals

AND combined with clear task objectives as used in SIs AND training group members

to consider the impact of the decision on different functions/objectives (normally represented by the role-players) is highly likely to result in poor decision outcomes.

Chapter 5 investigates the decision competency and decision confidence performance of all participants over all in-basket simulations. It thus reflects overall performance and does not analyse or demonstrate how participants performed in each of the separate in-basket simulations, which differed substantially in cognitive complexity. Chapters 6 will discuss findings for the fsQCA analysis for each of the in-basket simulations separately, and will investigate decision competence and decision confidence as outcomes. Chapter 7 will discuss the investigation of the outcomes: decision incompetence and decision doubt for the aggregate results of all four simulations as well as the results for the individual in-basket assessments.

CHAPTER 6: DATA ANALYSIS AND FINDINGS FOR COMPETENCY AND CONFIDENCE AS MEASURED FOR EACH IN-BASKET SIMULATION

This chapter covers the QCA analysis of memberships of outcome conditions, decision confidence and decision competence for each of the individual in-basket simulations. The treatment and measured antecedents are re-explored during the same 2-hour experiment and results were recorded for the same participants, in the same physical contexts and all other variables were controlled to remain unaltered. In a way, each of these in-baskets simulations acts as a re-test and repeat of the study. It is important to note that the discipline and level of complexity of the decisions varied substantially for each of the in-basket simulations. The next four sections analyse the raw data gathered from each of the participants, for each of the separate in-baskets and interpret the fsQCA analysis of the truth table and combinations of treatment and measured conditions for each simulation, hereafter referred to as In-basket 1, In-basket 2, In-basket 3 and In-basket 4 respectively.

6.1 FINDINGS & INTERPRETATIONS OF DECISION COMPETENCE AND DECISION CONFIDENCE: IN-BASKET 1

Since QCA assumes equifinality (multiple causal paths may lead to an outcome) it recognises that different combinations of conditions may be sufficient for the occurrence of the phenomenon (decision competence OR decision confidence). The next sub-section investigates conjunctural causation (combinations of conditions) for the decisions make in In-basket 1. In-basket 1 probes decision success for Mr Pizza's Advertising; where well-supported advertising decisions are contrasted with low-evidence sponsorship decisions. Competency training highlighted the need for evidence-based decisions. In contrast, incompetency training (a form of placebo) highlighted relevant (and irrelevant) issues such as integrated promotional activities, clear direction and customer benefits (see Appendix C for full details).

6.1.1 In-basket 1: Assessments of Decision Success Causal Paths

Table 6-1 illustrates the intermediate solutions of causal models for high decision confidence for In-basket 1 assessments for which consistency registers above 0.75. There are three causal models with acceptable consistency scores, but the third model is useless due to the low coverage score. The first two models in Table 6-1 separately and individually account for more than half of the sum of the memberships of the outcome and are both thus useful causal models. Model 1 is explained in the example of the table and therefore model 2 is described here.

Table 6-1: Decision competence by treatment conditions for In-basket 1

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: bask1 = f(comp, devil, gbs, group)

 Rows:       8



 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.810078
Assumptions:

                        raw          unique
                     coverage      coverage      consistency
                    ----------    ----------    ----------
* ~comp*~devil        0.527548      0.278410      0.886572
  ~devil*gbs*~group   0.299759      0.151859      0.855528
  ~comp*~gbs*group    0.173210      0.059056      0.911232
solution coverage: 0.738465
solution consistency: 0.870687
```

* Example: the model of not competency training and not devil's advocate is useful to explain high membership of high decision competence; with a consistency assessed at 0.89 and coverage of 0.53.
  The dotted line encircles useful models.

The causal path: **~devil ● gbs● ~ group** explains that participants receiving the goal-based scenario (GBS) treatment AND non-exposure to devil's advocate (DA) dissent AND not working in groups (making the decisions as individuals) display high decision competence. This recipe explains approximately 30% of sum of the memberships in the outcome.

Further analysis of the causal paths uncovered the impact of the measured antecedent of

confidence on the outcome of decision competence. Table 6-2 below sets out the four

useful models which resulted from the QCA procedure. They are encircled with a dotted

box and the plot for the fourth useful path is depicted in Figure 6-1. Note: The

contribution of the discretely measured antecedent "confidence" (stated confidence in

the decision for In-basket 1 ≡ conf1_c; c indicates calibrated confidence levels resulting

from the direct method calibration of median to determine fuzzy set degree of

membership) results in five models of which only four are useful.

Table 6-2: Analyses of models for success for In-basket 1: Causal paths for improved decision competence using all four treatment antecedents and the measured antecedent of decision confidence

```
************************
*TRUTH TABLE ANALYSIS*
************************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask1 = f(group, gbs, devil, comp, conf1_c)

 Rows:      15




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.763285


                              raw        unique
                           coverage    coverage   consistency
                           ---------   ---------   ---------
~gbs*~devil*~comp          0.291322    0.060951    0.896186
~group*gbs*~devil          0.299759    0.066804    0.855528
~devil*~comp*conf1_c       0.419421    0.084711    0.897568
~group*~devil*conf1_c      0.478650    0.110020    0.845756    See graph below
group*~gbs*~comp*conf1_c   0.150999    0.056302    0.930011
solution coverage: 0.829201
solution consistency: 0.857397
```

**Example: Participants not exposed to group interaction (working as individuals) AND not exposed to the devil's advocate dissent AND very confident in their decision for in-basket one, display high decision competence.

When comparing the four predictive causal models set out in Table 6-2above, **~devil** (not DA dissent) is a necessary condition to achieve high membership in the set of decision success for In-basket 1 (**bask1**). For all other causal recipes the causal conditions are sufficient to deliver decision competence; consistency is well above 0.75 and the coverage range between 0.29 and 0.47, which indicates that the models are useful in predicting decision competence.

The causal recipe of **~ group ● ~devil● ~conf1_c** is explained in Table 6-2 above and the XY plot appears in Figure 6-1 below.
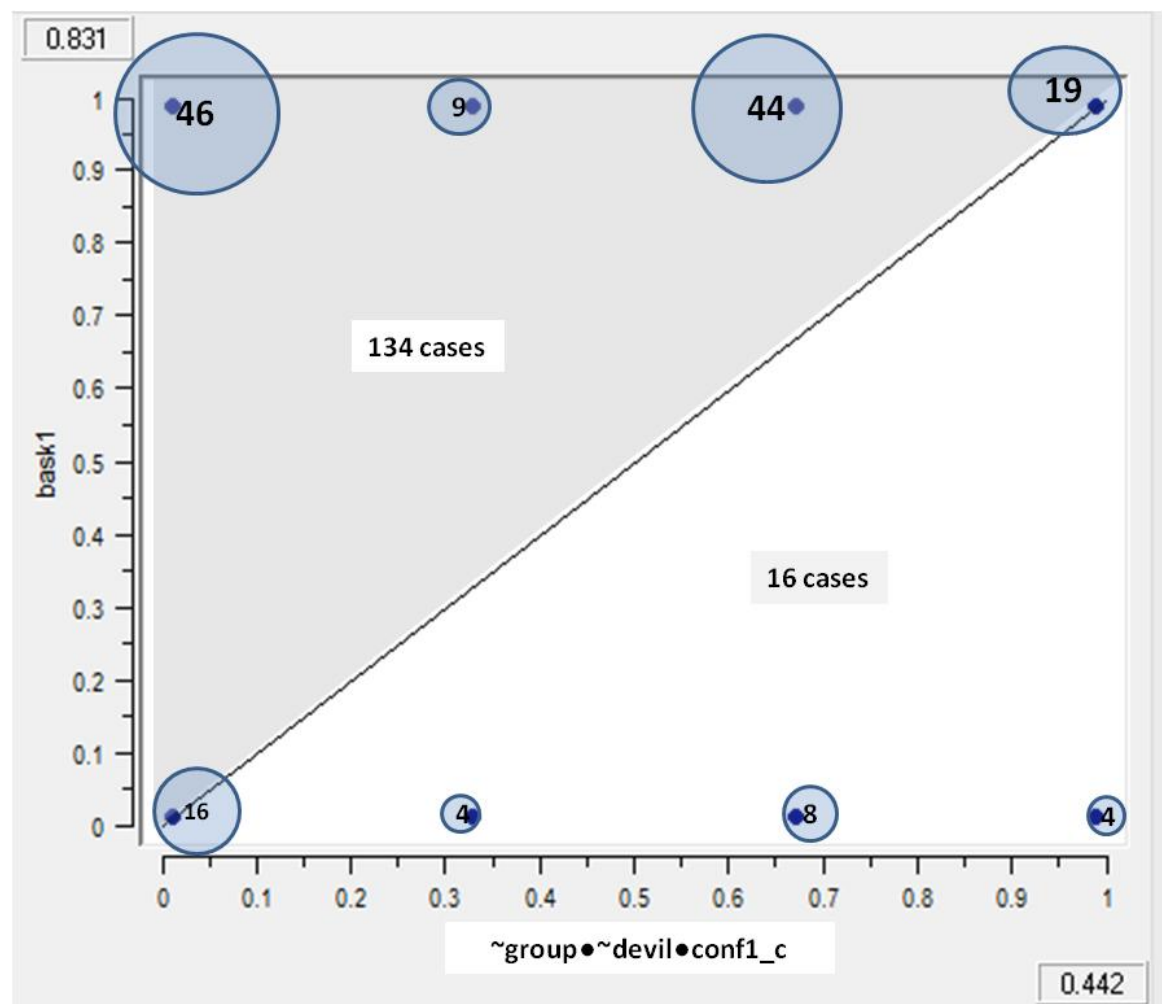
Figure 6-1: Plot of membership in decision competence for In-basket 1 assessment against membership of the three-condition causal recipe

The plot in Figure 6-1 registers a high consistency score (0.83) and coverage of 0.44, indicating that the fsQCA algebraic evidence supports the claim that membership in the three-condition model of decision competence results in high decision competence.

Table 6-3: Decision competence by treatment antecedents AND two measured antecedents related to participants' level of personal confidence

```
***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask1 = f(conf1_c, chg1_c, group, gbs, devil, comp)

 Rows:      24




 Algorithm: Quine-McCluskey
      True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.757463

                    raw        unique
                  coverage    coverage    consistency

conf1_c*~comp     0.475723    0.044938    0.889282
chg1_c*~comp      0.436639    0.011364    0.890449
* gbs*~comp       0.249139    0.038740    0.880710
~group*comp       0.299759    0.286846    0.797892
solution coverage: 0.821109
solution consistency: 0.856194
```

* Example: The model of not competency training AND gbs simulation is useful to explain high membership of high decision competence for In-basket 1 decisions with a consistency assessed at 0.88 and coverage of 0.25.
The dotted line encircles useful models with consistency >0.7 and coverage >0.2.

It is interesting to note that the addition of the one confidence-related antecedent, namely **chg1_c,** affects the models for decision competence. For this analysis, high membership in the Decision Competence set is predicted by the configuration:

conf1_c ● ~comp + chg1_c ●~ comp + gbs ● ~comp +~group ●comp→ high bask1

(**bask1** indicates decision success for assessments in In-basket 1 = **success1**). The consistency for this configuration of solutions is 0.85 and the coverage 0.82. This points to the need for educationalists and practitioners to consider the cognitive and affective development of managers when placing them in groups or within simulated interactions (e.g. GBS). In addition, the impact of incompetency training tools (such as BCG matrix and overload of information) may be negated and even turned into a positive when combined with high levels of confidence or when decision-makers are place in GBS simulations. The model **~group •comp** is in line with the research propositions since individuals (**~group**) who are guided by competency training aids are likely to make more competent decisions that individuals who do not receive the competency training aids.

Additional exploration of possible solutions of high decision outcome against antecedent conditions appears in Table 6-4 below. In this QCA procedure, configurations of all six measured antecedents are analysed. Those recipes which merit further investigation (consistency above 0.75 and coverage between 0.2 and 0.6) and are thus useful models are demarcated by dotted boxes. Four confirmed models achieved high set membership.

Table 6-4: Analyses of models for success for In-basket 1: Causal paths for improved decision competence using all four treatment antecedents and the measured antecedents decision confidence and likelihood to change

```
************************
*TRUTH TABLE ANALYSIS*
************************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask1 = f(gender, age_c, educ_c, man_exp_c, conf1_c, chg1_c)

 Rows:      23




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.707547

                                            raw       unique
                                         coverage   coverage   consistency
                                         --------   --------   --------
~man_exp_c*conf1_c*chg1_c                0.454459   0.067407   0.830292
educ_c*conf1_c*chg1_c                    0.401687   0.041581   0.808665
gender*age_c*~educ_c*man_exp_c           0.208506   0.022727   0.754517
age_c*~educ_c*man_exp_c*conf1_c          0.246298   0.019370   0.742924
gender*age_c*man_exp_c*conf1_c           0.248967   0.011622   0.757663
gender*~age_c*~educ_c*~man_exp_c*conf1_c 0.173210   0.008781   0.850740
gender*~age_c*educ_c*~man_exp_c*chg1_c   0.150999   0.006801   0.837632
~gender*~age_c*educ_c*~man_exp_c*~conf1_c*~chg1_c 0.043905 0.002927 0.757800
solution coverage: 0.706353
solution consistency: 0.798774
```

Figure 6-2 below shows the XY plot of the four-condition recipe, marked ♠, against the outcome (high decision competence) along with relevant consistency (0.75) and coverage scores (0.21). The recipe is only marginally useful since the model registers the barely acceptable low level of consistency of 0.75, indicating that the evidence supports the claim that membership in the four condition recipe is a subset of membership of the outcome of decision competency, but the relatively low coverage score indicates that the model is NOT a very important pathway to decision competence. In contrast the three-condition pathway marked with the symbol ♦ in Table 6-4 above is an important pathway to decision competence, with a consistency score of 0.83 and a coverage score of 0.45.
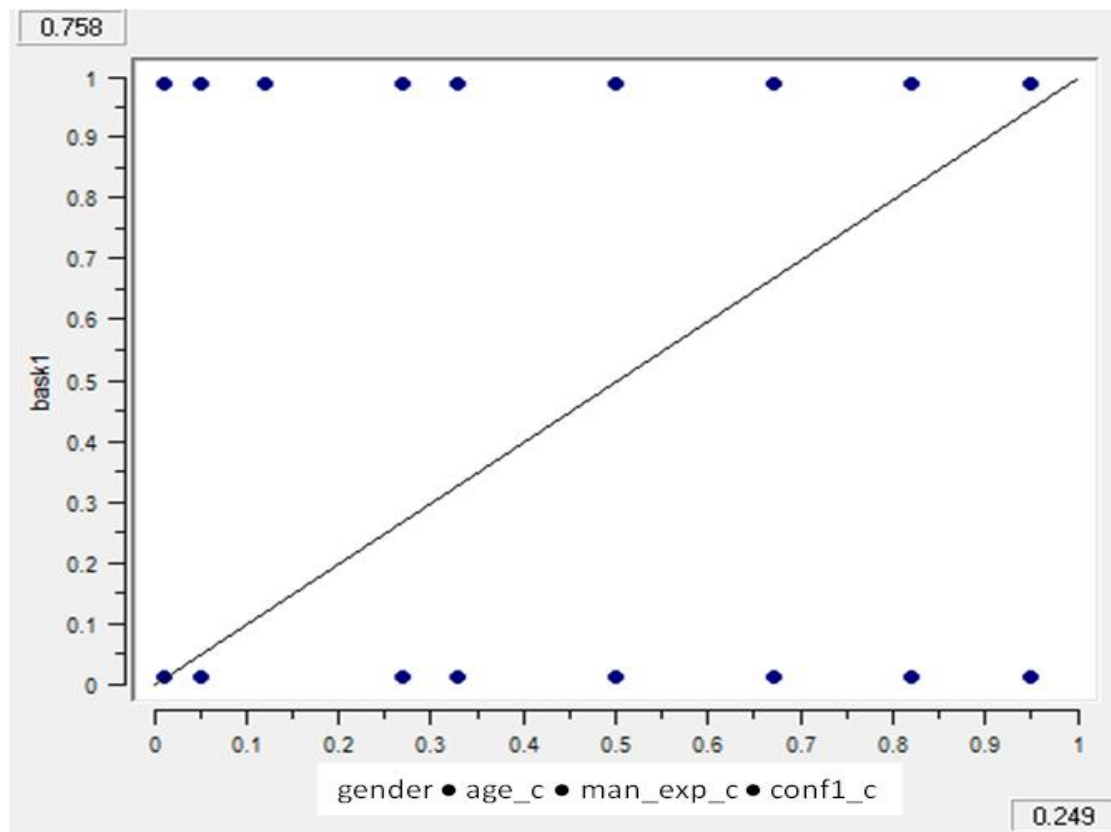
Figure 6-2: Plot of membership in decision competence against membership in the four-condition causal recipe ♠
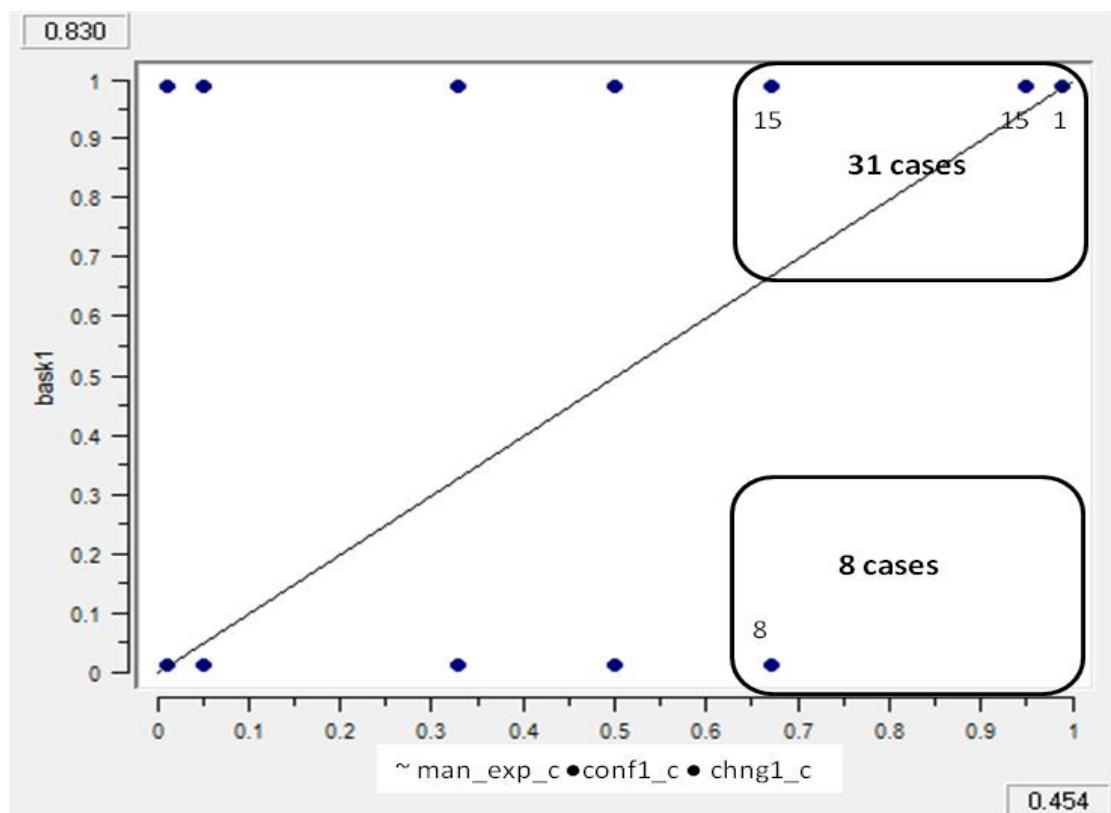
Figure 6-3: Plot of decision competence by configural model: ~man_exp_c● conf1_c ●chg1_c

6.1.2   In-basket 1: Assessment of Decision Confidence Models

In the next QCA procedure, all treatments and the four measured antecedents were

considered, and the two confidence antecedents directly related to In-basket 1 (**conf 1_c**

and **chgn1_c**) were analysed as outcome, rather than measured antecedents. Although

the consistency scores of a number of models permit interpretation, the coverage scores

of all but one causal model are too low. The model highlighted in Table 6-5 is plotted in

Figure 6-4 below.

Table 6-5: Models for decision confidence for In-basket 1: Causal paths for improved decision confidence with all four treatment antecedents and all measured antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf1_c = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

Rows:      50




  Algorithm: Quine-McCluskey
        True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.803279
```

	raw coverage	unique coverage	consistency
~group*~devil*gender*age_c*man_exp_c	0.212233	0.033790	0.849658 See graph below
~group*~gbs*~devil*~gender*~age_c*man_exp_c	0.059709	0.010949	0.764513
~group*~gbs*~devil*~comp*~age_c*man_exp_c	0.082036	0.031223	0.853963
group*gbs*~devil*~comp*~age_c*man_exp_c	0.063730	0.040034	0.957584
~group*gbs*~devil*comp*~educ_c*man_exp_c	0.078871	0.013687	0.861682
group*~gbs*~devil*gender*~age_c*man_exp_c	0.071600	0.044055	0.876440
~group*gbs*~devil*gender*~educ_c*man_exp_c	0.103679	0.012746	0.878898
~group*~gbs*~devil*age_c*~educ_c*man_exp_c	0.132763	0.030197	0.955077
~group*~gbs*~devil*comp*gender*age_c	0.090590	0.024893	0.972452
gbs*~devil*gender*age_c*~educ_c*man_exp_c	0.132763	0.013772	0.846238
group*~gbs*devil*age_c*educ_c*man_exp_c	0.064158	0.037382	0.961539
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c	0.033362	0.017622	0.962963
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c	0.047904	0.020445	0.967185
group*gbs*~devil*comp*~gender*~age_c*educ_c	0.039008	0.022241	0.938270
group*~gbs*devil*~comp*gender*educ_c*~man_exp_c	0.044312	0.020445	0.945256
group*~gbs*~devil*comp*gender*~age_c*educ_c	0.036869	0.009324	1.000000
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c	0.046450	0.014371	0.917230
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c	0.040975	0.009495	0.928294

```
solution coverage: 0.722755
solution consistency: 0.870313
```

** Example : Higher levels of decision confidence are demonstrated by older (age_c) individual (`~group) male (gender) participants with non-exposure to devils' advocate treatment, (~devil) and high levels of managerial experience (man_exp_c).

High decision confidence is recorded for male (**gender**) participants working as

individuals (**~group**) AND not exposed to DA treatment (**~devil**) AND older (**age**) and

with high levels of management experience (**man_exp_c**), as shown in Chapter 5. Thus,

the only useful model for this configuration of conditions (consistency > 0.7 and

coverage > 0.2) indicates that older, male participants, with high levels of management (JDM) experience who make decisions as individuals (**~group**) AND do not receive DA dissent treatment associate with high decision confidence. A number of authors report on gender differences in decision-making habits and decision confidence (Bandura, 1986; Bussey & Bandura, 1999; Crow, Fok , Hartman, & Payne, 1991). Bandura (1986) notes the impact of personal factors, especially personal experiences, beliefs and judgements on decision behaviour. Readers who are experienced educators or managers are likely to intuitively agree that experience and age (which relates to life and business experience and JDM experience) might aid decision confidence, and a number of authors concur that the more often one engages in a type of behaviour, the stronger one's self-confidence is about that particular behaviour and vice versa (Bandura & Schunk, 1981; de Acedo Lizárraga, de Acedo Baquedano, & Elawar, 2007). Further, the absence of any cautionary advice or dissent – as is likely to be experienced in group interactive decisions or where DA role-players are present – reduces the possibility of self-doubt affecting participants' decision confidence. Bandura (1982) observes that "In applying existing skills strong self-efficaciousness intensifies and sustains the effort needed for optimal performance, which is difficult to realize if one is beleaguered by self-doubts … High self-percepts of efficacy may affect preparatory and performance effort differently, in that some self-doubt bestirs learning but hinders adept execution of acquired capabilities. In applying existing skills strong self-efficaciousness intensifies and sustains the effort needed for optimal performance, which is difficult to realize if one is beleaguered by self-doubts"(p.123). Most of the gender differences identified in empirical studies are minimal (Crow et al., 1991; de Acedo Lizárraga et al., 2007; Hatala & Case, 2000).

Some studies however elucidate gender differences in decision-making and point to issues such as norms and values (Tannen, 1990), social status and power (West & Zimmerman, 1991). In addition, men were found to be more assertive, realistic, more dominant and more objective by one study (Wood, 1990). Further, women are more concerned with the impact of decisions on the community: "Women are more aware of the constraints that the setting and close persons put on them. Conversely, men assign more importance to the analysis of the information required to carry out the decision and to the definition of the goals or purposes of the decision" (de Acedo Lizárraga et al., 2007, p. 387). For In-basket 1, the case scenario describes a decision which affects resource allocation and gives a choice between two parties' recommendations. The conclusion offered in the study by de Acedo Lizárraga et al. (2007) is thus a possible explanation for the singular useful path in this analysis.
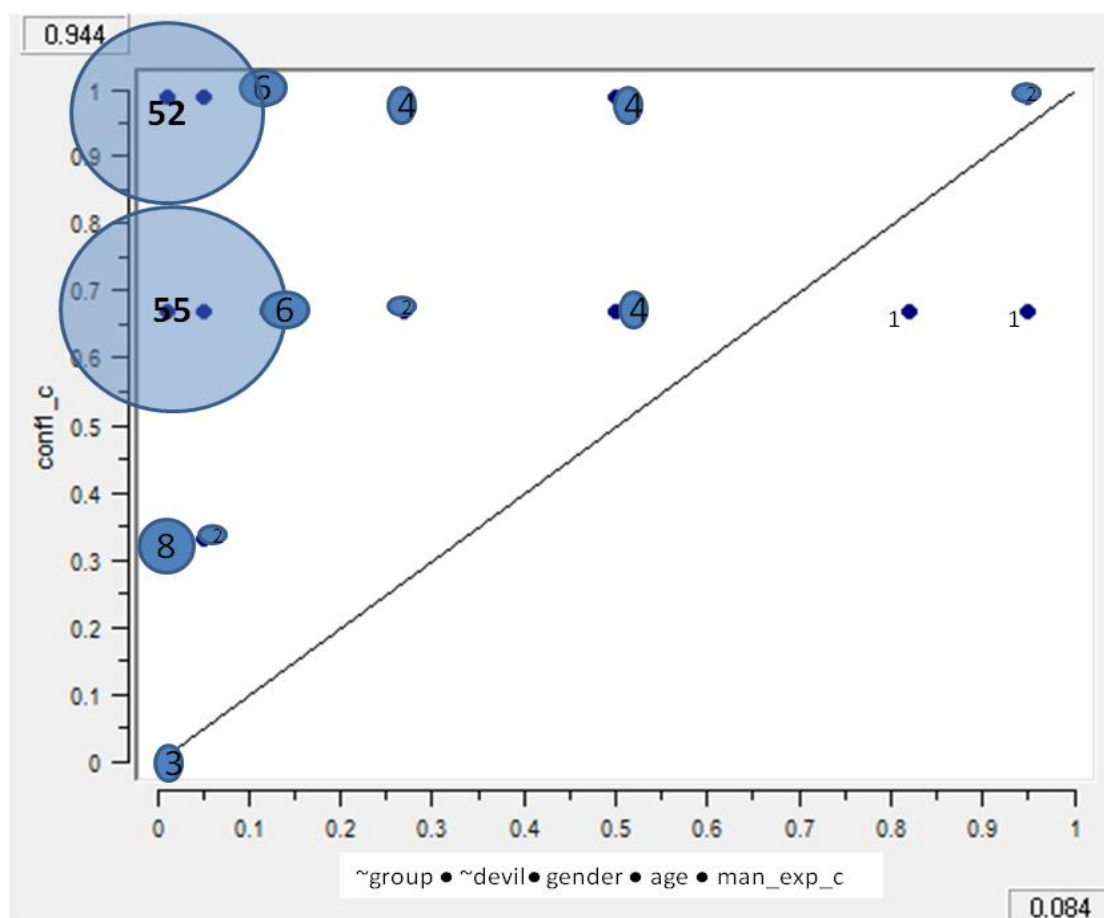
Figure 6-4: Plot of membership for decision confidence for in-basket 1 against members in the causal recipes including all four treatment and three measured antecedents.

Additional investigation into decision confidence as an outcome of the four treatments

delivered the results set out in Table 6-6 below.

**Table 6-6: Findings from fsQCA for decision confidence as an outcome for
configurations of the four treatment conditions**

```
File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: conf1_c = f(group, gbs, devil, comp)

 Rows:      10




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.739231

                 raw         unique
               coverage     coverage    consistency
               ---------    ---------   ----------
~devil         0.879384     0.720788    0.779733
group*~gbs     0.279212     0.120616    0.842540
solution coverage: 1.000000
solution consistency: 0.787205
```

The conclusion is that participants in In-basket 1 who worked in groups (**group**) AND

who did not receive the GBS simulated interaction (**~gbs**) OR who did not receive the

treatment of DA role-play (**~devil**) associate with high decision confidence (**conf1_c**):

group ● ~gbs + ~devil → conf1_c

This could result from the "self-efficacy mechanisms governing the motivational

effects" of participants, as discussed in the work of Bandura (1982, 1986; Bandura &

Cervone, 1983). Participants are likely to benefit from the combined effort and exposure

to alternative views, but might feel less confident when their views are challenged by

the cautionary views expressed by the DA. This finding is less immediately apparent,

and the research would benefit from in-depth qualitative interviews with the cases in

this cell (students exposed to the treatments). Unfortunately such case knowledge was

not available at the time of this analysis.

The next section investigates conjunctural causation (combinations of conditions) for the decisions made in the In-basket 2 assessment scenario.

6.2 FINDINGS & INTERPRETATIONS OF DECISION COMPETENCE AND DECISION CONFIDENCE: IN-BASKET 2

In-basket 2 probed decision success for L-Guys and T-Guys; where profit and market share decisions are contrasted. The competency training provided highlighted the need to achieve high levels of profit. In contrast, incompetency training provided the BCG matrix and the Experience Curve (see Appendix C for details and extracts).

6.2.1 In-basket 2: Assessments of Decision Success Causal Paths

Considering causal models which only included the four treatment antecedents resulted in the useful results set out in Table 6-7 below.

Table 6-7: Decision competence in In-basket 2 assessments by four treatment conditions

```
***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  G:/DeVilliers/20 Jan 13.csv
Model: bask2 = f(comp, devil, gbs, group)

 Rows:       12




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.745013
Assumptions:

                  raw          unique
                coverage     coverage     consistency
              ------------  ------------  ------------
~devil*~group   0.575617     0.285643     0.796681
comp*~devil     0.445037     0.089773     0.832139   See graph below
~gbs*group      0.281811     0.204030     0.873515
solution coverage: 0.934710
solution consistency: 0.826753
```

An example of the resulting model (indicated with ♦) reads: participants exposed to the competency training treatment AND not exposed to DA dissent measured high in their level of decision competence with a measured consistency of approximately 83% and this model explains ≈ 45% of cases. All three models are highly useful, with consistency scores well above 0.75 and coverage scores between 0.2 and 0.6 as directed by scholar Ragin (2008).

Analyses of models for success for In-basket 2 of configurations and causal paths for improved decision competence by all four treatment antecedents resulted in the following complex solution:

~devil ● ~group + ~devil ● comp + comp ● group → bask2

Individual participants who did not receive instructions to consider the cautionary view of a DA associate with high decision competence for the In-basket 2 assessments. Although this could result from the limited diversity in the data set, it also stands to reason that individuals working on their own, not distracted by alternatives and competing viewpoints, could focus energy and rely on their own knowledge and skills to determine effective answers. The causal path **~devil ● comp** could reasonably be explained by similar reasoning, that is, a keen focus on key issues highlighted in the competency training decision aids (e.g. "drop your tools" such as the BCG matrix and use simple heuristics such as profit orientation). The plot of this useful model for decision competence (bask2) appears in Figure 6-5, which shows that by far the largest number of cases are in the upper triangle and the ratio of high decision competence (high Y) to high membership of the two-condition configuration (**comp●~devil**; high X) is approximately 5:1 (53:11), making this a highly predictive model with very high proportional representation of success (**bask2**). See the visual scatter plot of the two-condition model marked ♦ in Figure 6-5.
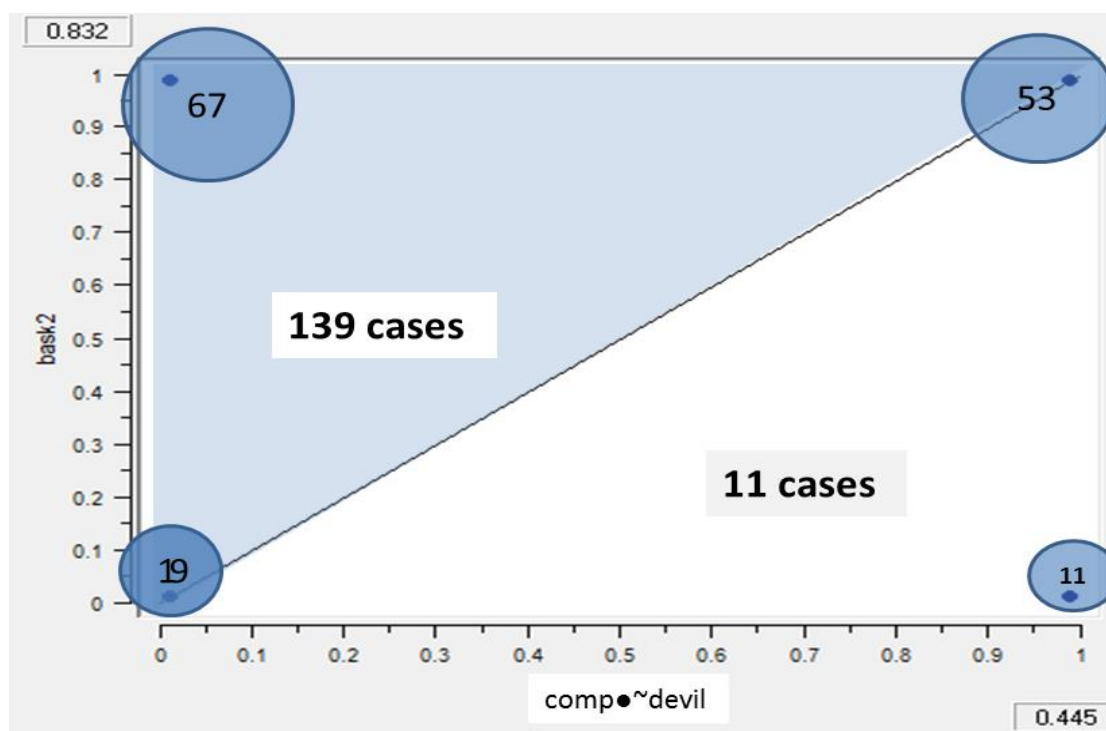
Figure 6-5: Plot of decision competence for In-basket 2 by conjunctive condition: comp● ~devil (♦)

The third component of the model **group ●comp** highlights the strength of QCA and delivers a logically expected result. Participants working as members of a four- or five-person group and who received the competency training aids were likely to display high levels of decision competence. Unfortunately this does not translate into decision confidence, as evidenced by the results detailed below.

When configurations of conditions which include the measured antecedent of decision confidence (**conf2_c**) are analysed, a number of useful models result. These models appear in Table 6-8 below. Once consistency has been established as above 0.70, useful models are established when consistency for the models is calculated between 0.2 and 0.6. The resulting useful models are enclosed in the dotted boxes.

Table 6-8: Analysis of causal models for decision success for In-basket 2: Configurations and causal paths for improved decision competence

```
*************************
*TRUTH TABLE ANALYSIS*
*************************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask2 = f(group, gbs, devil, comp, conf2_c)

 Rows:      18




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.756025

                            raw          unique
                         coverage      coverage     consistency
                        ----------    ----------    ----------
group*~gbs*~comp         0.151233      0.026815      0.822464
group*~gbs*conf2_c       0.236176      0.051965      0.886804
~devil*~comp*~conf2_c    0.130746     -0.000000      0.801839
~group*~devil*~comp      0.298134      0.074617      0.802330
gbs*~devil*~conf2_c      0.128415     -0.000000      0.813291
~group*~devil*conf2_c    0.419720     -0.000000      0.818979    See graph below
gbs*~devil*comp          0.249167      0.045303      0.884162
~devil*comp*conf2_c      0.356096     -0.000000      0.872653
solution coverage: 0.919054
solution consistency: 0.840774
```
** (left of gbs*~devil*comp row)

** Example: Participants receiving the goal-based scenario treatment AND non-exposure to devil's advocate dissent AND includes competency training, display high decision competence

The four paths to decision success for In-basket 2 are:

(1) **group • ~gbs • conf2_c** OR (2) **~group • ~devil • ~comp** OR

(3)**~group • ~devil • ~conf2_c** OR (4) **gbs • ~devil • comp**. See Figure 6-6 for the XY plot of success membership against the three-condition causal recipe (3). As for overall decision success, decision competence for In-basket 2 decisions is not clearly related to a configuration of treatment antecedents. This confirms the findings of Gigerenzer (2004, 2008) and Schank (1994; Schank et al., 1993) that different teaching methods must be used to achieve decision competence and these methods should be reviewed and revised for different decision contexts/contents. In addition, it prompts educators and practitioners to consider self-efficacy and group efficacy (Bandura, 1982) and the impact thereof on decision-making behaviour. Figure 6-6 depicts the scatter plot of the three-condition configural model (**~group • ~devil • conf_2**) and demonstrates its fit.
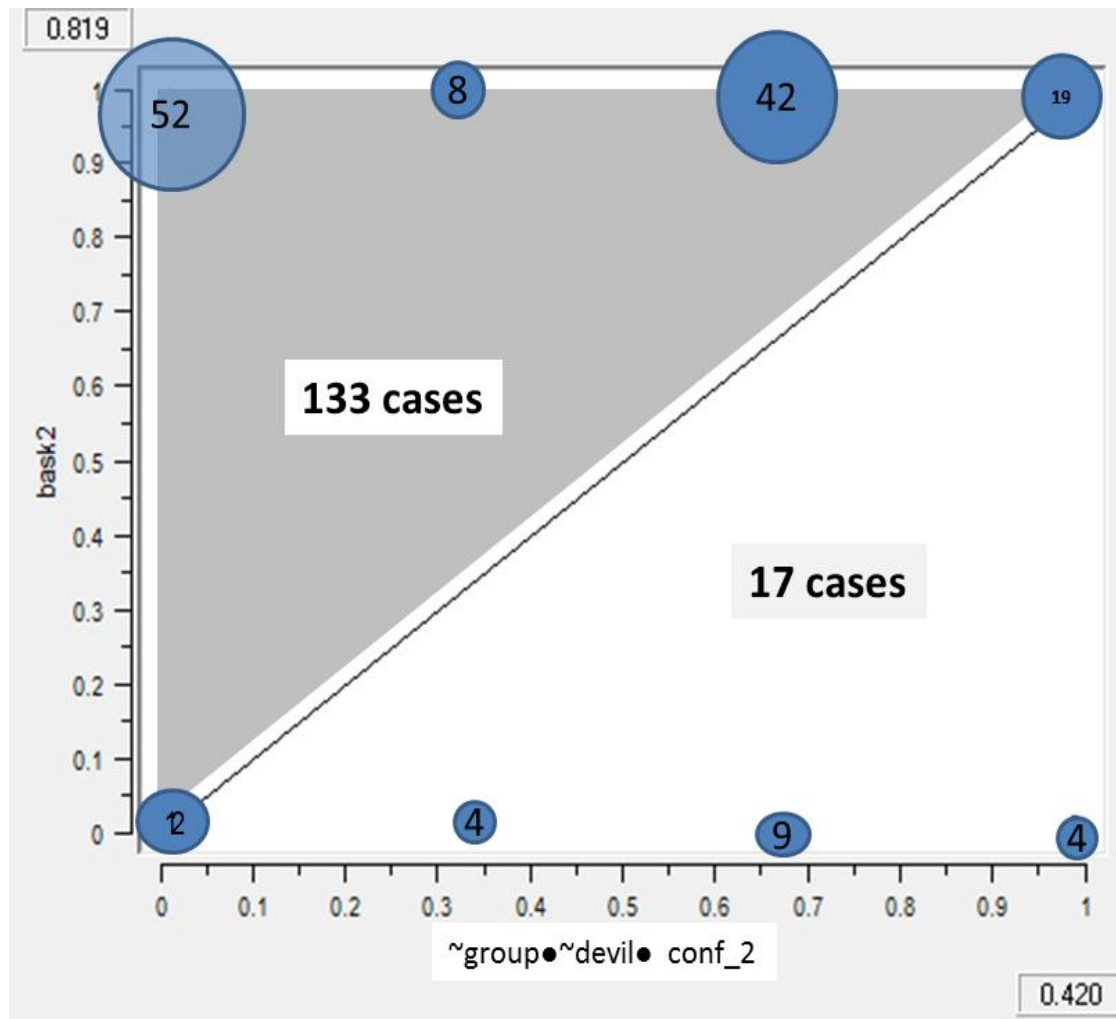
Figure 6-6: Model for high decision competence against membership in the 3-condition causal recipe: ~group ● ~devil ● conf_2

Next, configural paths including all treatments and all measured antecedents were analysed and only one reasonably useful recipe resulted (see Table 6-9 below).

Table 6-9: Analysis of causal models for decision competence for In-basket 2: Configurations and causal paths considering all measured and treatment antecedents

```
Model: bask2 = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows:      50




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.707943


                                                       raw        unique
                                                    coverage    coverage    consistency
                                                    ----------  ----------  ----------
~group*~devil*gender*age_c*man_exp_c                 0.205780    0.089857    0.846233
~group*~gbs*~devil*~comp*~age_c*man_exp_c            0.073951    0.023318    0.790739
~group*gbs*~devil*comp*~educ_c*~man_exp_c            0.081696    0.021319    0.916822
group*~gbs*~devil*gender*~age_c*man_exp_c            0.063625    0.019071    0.800001
~group*~gbs*~devil*comp*gender*age_c                 0.086609    0.021735    0.955005
group*~gbs*devil*age_c*educ_c*man_exp_c              0.063708    0.028731    0.980769
group*gbs*~devil*~comp*~gender*~age_c*~man_exp_c     0.024484    0.005663    1.000000
~group*~gbs*~devil*~comp*age_c*~educ_c*man_exp_c     0.058544    0.013908    0.875467
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c     0.033728    0.018404    1.000000
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c      0.043888    0.025067    0.910190
group*gbs*~devil*comp*~gender*~age_c*educ_c          0.033728    0.004580    0.833330
group*~gbs*~devil*comp*gender*~age_c*educ_c          0.034477    0.009077    0.960556
group*~gbs*devil*~comp*gender*age_c*educ_c           0.044970    0.012825    0.960854
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c        0.042638    0.024983    0.992248
group*gbs*~devil*~age_c*educ_c*~man_exp_c            0.064374    0.000000    0.832974
group*~devil*gender*~age_c*educ_c*~man_exp_c         0.074534    0.000000    0.835668
~group*~devil*~comp*gender*~age_c*~educ_c*~man_exp_c 0.064041    0.000000    0.842278
~group*gbs*~devil*gender*~age_c*~educ_c*~man_exp_c   0.076366    0.000000    0.906126
~group*gbs*~devil*comp*gender*~age_c*~man_exp_c      0.065623    0.003664    0.974042
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c      0.047552    0.000000    0.964527
solution coverage: 0.621669
solution consistency: 0.862308
```

The only useful model for high decision competence against membership in the four-condition causal recipe: **~group ● ~devil ● gender ● age_c ● man_ex_c** is plotted in Figure 6-7 below. This notable path indicates that older males (above 40 years) with high levels of management experience (above 6 years), who made the decisions as individuals (did not work in groups = **~groups**) and were not trained to use DA dissent (**~devil**) demonstrate high levels of decision competence (**bask2**). Since configurations including the measured antecedent (**~gender** ≡ female) display low consistency and low coverage it is not reasonable to develop gender-related comparisons. In other words,

propositions regarding female participants were empirically trivialised by the QCA

analysis, so the only useful model is related to older, experienced male participants.
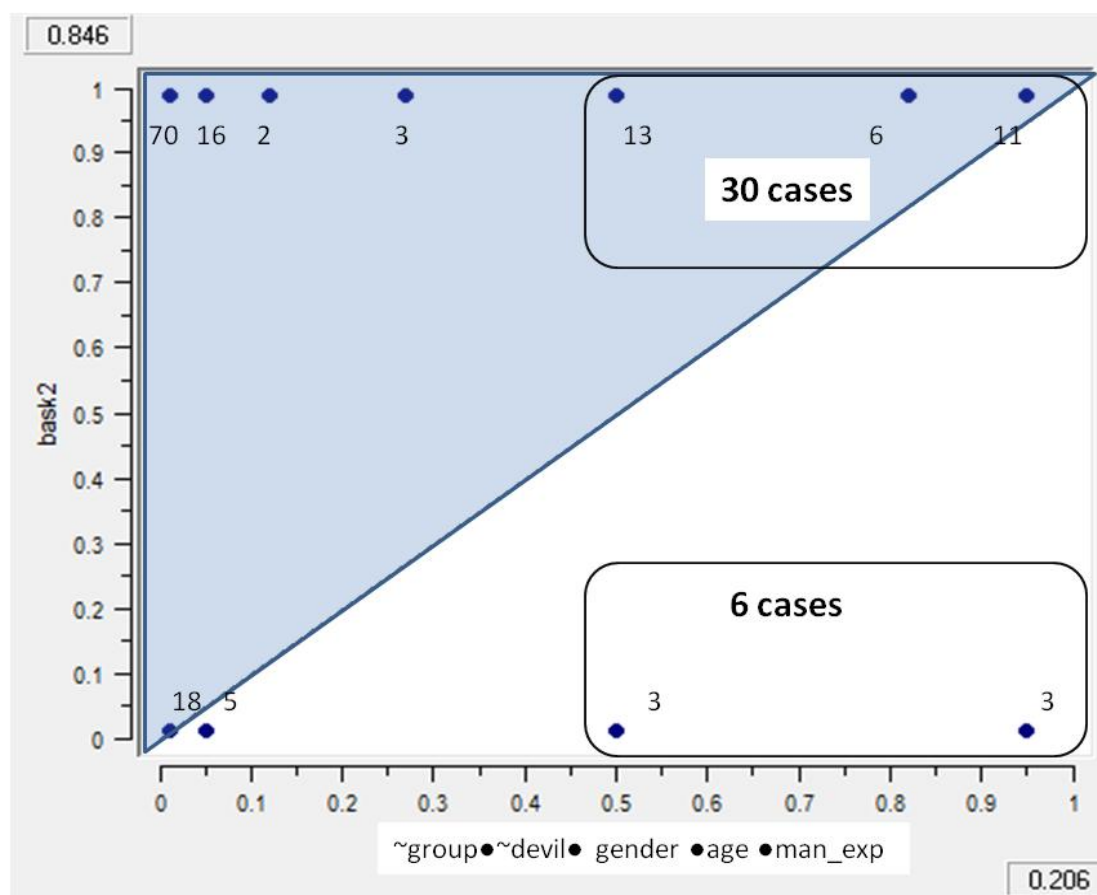
Figure 6-7: Decision competence (bask2) by configural model:
~group ● ~devil ● gender ● age_c ● man_exp_c

It is interesting to note that the findings for decision competency in the In-basket 1 and

In-basket 2 simulations differ noticeably and that mere comparison of the results

confirms Bandura's (1982, 1986) position that the researcher should not look for a

single, specific cause of behaviour. Human behaviour is affected by personal

judgements, experiences, norms and values, but is simultaneously affected by cognitive,

behavioural, and environmental factors in conjunction and differentiates between them.

Bandura states that outcomes will be affected in different ways depending on each

situation and on the individual.

The research propositions concerning the impact of measured antecedents were investigated using QCA procedures and the resulting models are shown in Table 6-10 below. Useful models are demarcated by the dotted box.

Table 6-10: Analysis of causal models for decision success for In-basket 2: Configurations and causal paths for improved decision competence involving only measured antecedents (excl. likelihood to change)

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask2 = f(conf2_c, man_exp_c, educ_c, age_c, gender)

 Rows:      24




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700341
Assumptions:

                                   raw         unique
                                coverage      coverage     consistency
                                ----------    ----------   ----------
conf2_c*educ_c                  0.404147      0.067039     0.845176
conf2_c*age_c                   0.501166      0.173218     0.836414
~man_exp_c*~educ_c*~age_c       0.237508      0.063708     0.780301
~man_exp_c*educ_c*gender        0.184794      0.019570     0.770219
solution coverage: 0.704780
solution consistency: 0.809934
```

Note: Useful models are demarcated by the dotted-line box. Only three of the four intermediate solutions are reasonable and display satisfactory levels of consistency and coverage.

Three useful models result from the analysis. The first useful two-condition model (**conf2_c ● educ_c**) registers a consistency score of 0.85 and a coverage score of 0.40. This is a moderately useful two-condition model indicating that participants with high confidence in their decisions for In-basket 2 AND high education levels exhibit decision competence. As the second model in Table 5-9 indicates, participants with high confidence AND high age (older than 40) exhibit high decision competence. The second model **conf2_c ● age_c** has a consistency score of 0.84 and covers approximately 50%

of all cases and is thus highly useful. The 3-condition model **~man_exp_c ● ~educ_c ●**

~age_c is useful and has a coverage score of 0.24**.** The model is interpreted as:

participants with low levels of management experience, low education levels and low

age recorded, associates with high decision success for In-basket 2 assessments. The

borderline consistency of 0.77 is recorded for the three-condition model

(**man_exp_c•~edu_c• gender**). The fourth causal model is, according to Ragin (2008c,

p. 118), "hazardous to interpret", with the coverage measure reported below 0.2. It is

rejected due to the low coverage score (0.18).

6.2.2   In-basket 2: Assessment of Decision Confidence Models

Following Rihoux and Ragin (2009), decision confidence is considered an outcome as

well as a measured antecedent. When considered an outcome (for In-basket 2

assessments), the possible recipes combining the four treatment conditions of **group,**

gbs, devil and comp were analysed and the possible recipes assessed. Useful models

(consistency >0.75; 0.2< coverage <0.8) appear in Table 6-11 below and are demarcated

by a dotted box. The table below investigates only treatment conditions.

Table 6-11: Analysis of causal models for decision confidence for In-basket 2: Configurations and causal paths for improved decision confidence involving all four treatment antecedents

```
Model: conf2_c = f(comp, devil, gbs, group)

  Rows:      20




  Algorithm: Quine-McCluskey
       True: 1
    0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.713846
Assumptions:

                    raw           unique
                    coverage      coverage     consistency
---------------------------------------------------------
~devil*~gbs         0.468386      0.146695     0.767537
~comp*~devil        0.457102      0.120724     0.738423
~gbs*group          0.286406      0.117500     0.825507
~devil*group        0.344795      0.087946     0.826534
solution coverage: 0.882501
solution consistency: 0.770325
```

Using fuzzy set QCA methods, the degree of membership of cases in each of the

logically possible recipes was assessed and all four models were considered for further

analysis. The treatment antecedent **~devil** (not exposed to DA dissent) is a necessary

condition for three models, but is not sufficient for high decision confidence. **~devil**

explains high membership of the outcome high decision confidence when combined

with other treatments such as group interactive decision-making (**group**) OR combined

with incompetency training (**~comp**) OR combined with (**~gbs**). Therefore, MBA

graduates records high confident in their decisions for In-basket 2 when exposed to low

or no involvement in DA dissent(**~devil**) and the placebo GBS treatment (**~gbs**). The

causal recipe **~gbs • group** is a useful model to explain high membership in the

outcome decision confidence. The model indicates that participants who make decisions

aided by group interaction AND who do not receive the goals and SI of GBS treatments

report high levels of confidence. It is interesting to note that incompetency training (in

this case use of the BCG matrix) improved confidence. This observation seems easy to explain since most students are familiar with the BCG model and educationalists agree that prior knowledge or familiarity with the training matter is likely to improve confidence, which in turn results in higher levels of engagement and commitment (Linnenbrink & Pintrich, 2003; Tobias, 2010).

If consistency scores of ≥ 0.75 are considered, then the analysis yields only two useful parsimonious solutions: **~gbs** and **group**. Ragin (2008c, p. 120) warns against "infatuat[ion] with parsimony". He adds that "when using it as a guide for understanding cases, the three- or four-condition recipe might offer a more complete account, connect better with the observed causal process and offer a better basis for understanding the causal mechanisms at work … The more complex explanation might be preferred to the more parsimonious explanation on substantive and theoretical grounds". Using substantive knowledge and QCA analyses, it is clear that the parsimonious solutions are too restrictive and scholars will be guided better by the intermediate and more complex solutions. The results of further analysis of the impact of measured antecedents on decision confidence is shown in Table 6-12.

Table 6-12: Decision confidence as outcome by measured antecedents

```
File:  C:/Users/rouxelle/Desktop/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: conf2_c = f(age_c, educ_c, man_exp_c, gender)

 Rows:      14




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.838710

                  raw        unique
               coverage    coverage    consistency
              ----------  ----------  ----------
~man_exp_c     0.572273    0.101917    0.789571
age_c          0.644367    0.179383    0.858489
educ_c         0.514240    0.039405    0.867896
solution coverage: 0.913129
solution consistency: 0.796687
```

All three of the above models are useful. The complex configuration for high decision confidence is: **educ_c + age_c + ~man_exp_c → conf2_c**. In other words, the findings provide very good support for all three antecedents that high fuzzy-set membership in **educ_c** OR high age OR low levels of management experience associates with high confidence for In-basket 2 assessments. Thus participants with postgraduate qualifications associate with high membership in decision confidence. Or, participants that are older than 40, or high **age_c**, associate with high decision confidence. A rather surprising finding is that low levels of management experience (**~man_exp_c**) associate with high decision confidence for participants in assessment In-basket 2. Some explanation may be found in the nature of the case (the context) since the dilemma is a choice between profit and market share, but once again we should defer to Bandura's (1986) insight that cognitive, behavioural, and environmental factors affect behaviour in conjunction, but differs for context and for individuals. These recipes indicate that the measured conditions are sufficient, but not necessary, to impact decision confidence.
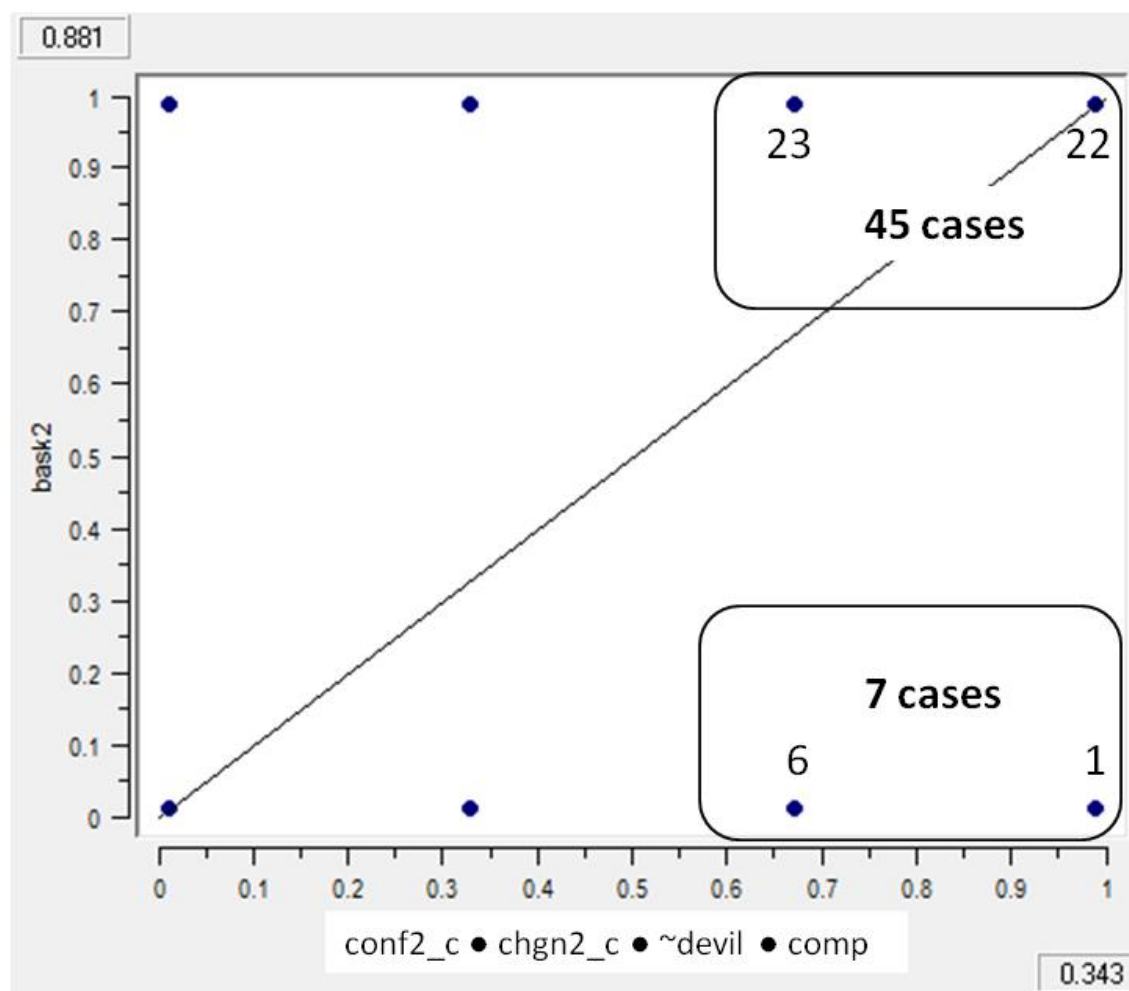
Figure 6-8: Decision confidence (conf2_c) by measured condition educ_c

As for the overall study (all four In-basket simulations aggregated) and for the In-basket 1 assessments, no single solution for In-basket 2 was found (even if consisting of a configuration of multiple causal conditions) for decision competence. Although frustrating for the researcher (for whom a nice, simple, clear pathway would be a cause for celebration), this finding confirms the work of scholars like Simon, Armstrong and Bandura that contextual changes are important and that no single educational method or training methodology will suffice to achieve generalisable statements about "what works best". There is still no single answer to the question "how" educationalists develop decision competence through combinations of training methods. To investigate patterns and inter-relationships between conditions (variables) further, the next section explores decision competence and decision confidence for the In-basket 3 assessments.

6.3   FINDINGS & INTERPRETATIONS OF DECISION COMPETENCE AND DECISION CONFIDENCE: IN-BASKET 3

In-basket 3 probes decision success for the RED annual RISC sales conference. Decision-makers had to select from nine alternative hotels to recommend as preferred conference facility to a prospective client. The decision demands students to be mindful of client goals and pre-set requirements, as well as the use of "take the best" and other decision heuristics. Competency training highlighted decision heuristics and sense-making tools, whilst incompetency training focused on the weighted priority matrix (see Appendix C for the full set of decision aids).

6.3.1   In-basket 3: Assessments of Decision Success Causal Paths

Upon examination of the evidence that supports high membership in decision competence and the conjunctive causal recipes impacting **bask3**, the only useful intermediate solution, is summarised in Table 6-13 below.

Table 6-13: Analysis of causal models for decision confidence for In-basket 3: Configurations and causal paths for improved decision confidence involving all four treatment antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask3 = f(comp, devil, gbs, group)

 Rows:      1




  Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
 Don't Care: -

 --- INTERMEDIATE SOLUTION ---
 frequency cutoff: 8.000000
 consistency cutoff: 0.778281
 Assumptions:

                         raw        unique
                      coverage    coverage    consistency
                     ----------  ----------  ----------
** comp*~devil*gbs*group   0.208401    0.208401    0.778281
 solution coverage: 0.208401
 solution consistency: 0.778281
```

** Example: QCA analysis result in one useful configuration of treatment conditions: high membership of the configuration: competency training AND no presence of devil's advocate dissent AND gbs simulated interaction AND group decision-making will result in high levels of decision competency. This configuration of conditions has a consistency of ± 78% and covers± 21% of cases.

Figure 6-9 shows the plot for the four-condition recipe (**comp ● ~devil ● gbs ● group**).

Note that most points (cases) are consistently above the diagonal; the few stray cases are

well below the diagonal ($X_i < Y_i$). Interestingly, the parsimonious solution offers one

less condition in the configuration, but is still 81% consistent over all cases and covers ±

21% of all cases.

Table 6-14: Parsimonious solution for bask3 (decision competence)

```
--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

                      raw         unique
                   coverage     coverage     consistency
                  ----------   ----------   ----------
group*gbs*comp     0.208401     0.208401      0.778281
solution coverage: 0.208401
solution consistency: 0.778281
```

The difference between the four-condition recipe and the three-condition recipe is thus

ignorable. Ragin (2008c, p. 120) states, "The scientifically based impulse is to favour

the more parsimonious three-condition recipe". The scatter plot in Figure 6-9 could thus

equally well represent the XY plot for the parsimonious solution.
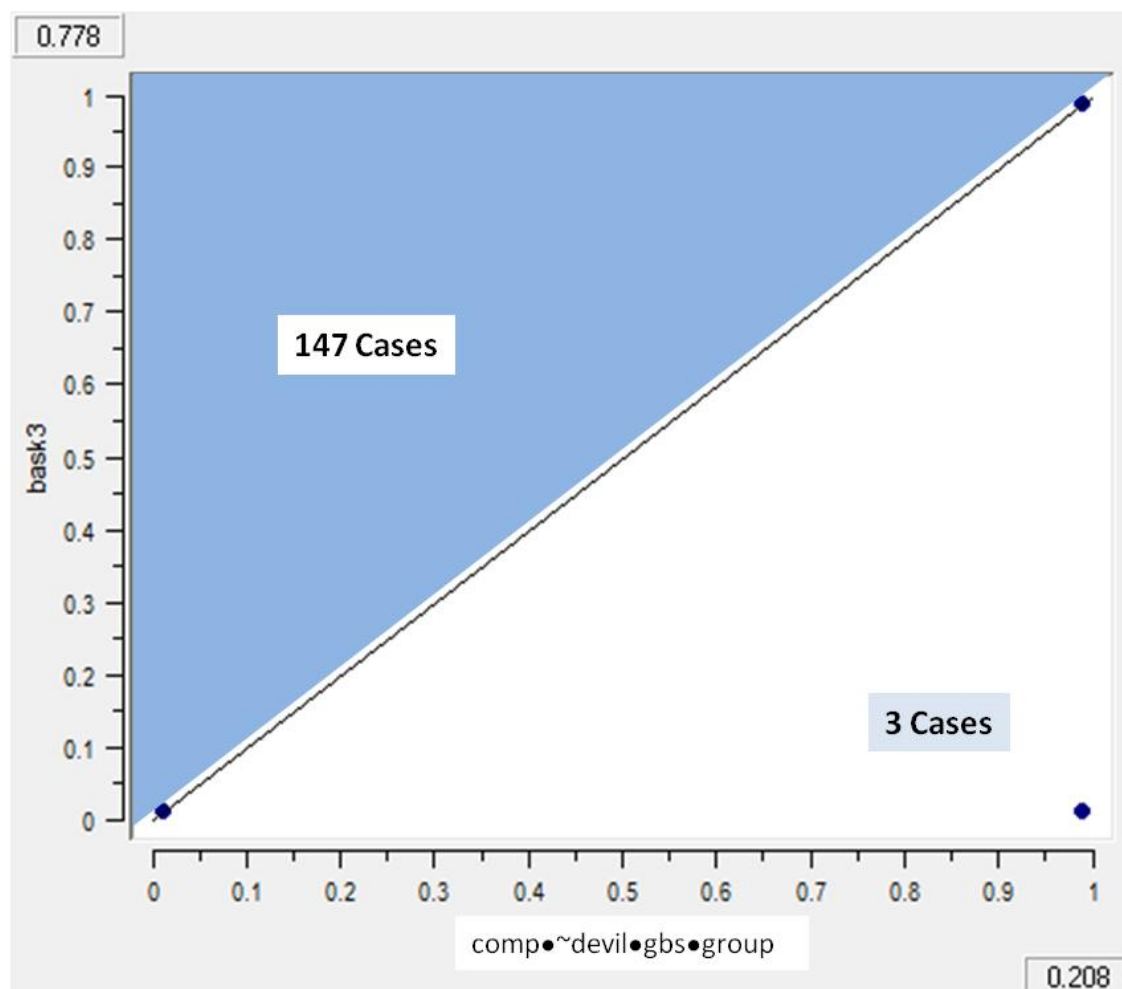
Figure 6-9: Decision competency for In-basket 3 by a configuration of treatment conditions

The degree of membership in the outcome of decision success (**bask3**) registers an acceptable consistency of just above the minimum (0.78) but the coverage is barely acceptable (0.20). It is interesting to note that this is the first in-basket simulation where the four treatment antecedents are all present in the useful causal recipe for high decision competence. In the three preceding analyses, (**overall success**, **bask1** and **bask2**) assessments, some measured antecedents had to be part of the configuration to generate useful causal models, or configurations of conditions included a maximum of two of the treatment antecedents. Table 6-15 shows the results when an additional antecedent is configured into the possible solutions, namely the measured antecedent confidence (**conf3_c**).

Table 6-15: Analysis of causal models for decision competence for In-basket 3: Configurations and causal paths for improved decision competences involving all four treatment antecedents and the measured antecedent conf3_c

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask3 = f(conf3_c, comp, devil, gbs, group)

 Rows:       4




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.706170
Assumptions:

                          raw         unique
                        coverage     coverage    consistency
                       ----------   ----------   ----------
conf3_c*~devil*gbs*group   0.314621     0.145396     0.724652
comp*~devil*gbs*group      0.208401     0.039176     0.778281      See graph below
solution coverage: 0.353798
solution consistency: 0.727575
```

** conf3_c*~devil*gbs*group ... comp*~devil*gbs*group (Useful models appear in the dotted-line box)

** Example: Participants who report high levels of decision confidence for the decisions of in-basket 3 AND work in groups AND who receive the goal-based scenario treatment AND not exposed to devil's advocate dissent; record higher level of decision competence.
Useful models appear in the dotted-line box.

Both causal models are useful (consistency above 0.75 and coverage >0.2). The degree of membership score supports the claim that the four-condition recipes indicate a subset of membership in the outcome of decision competence. The model marked ** provides evidence for the claim that high membership in the desired outcome of high decision competence results from high membership in the configuration of antecedents: competency training AND not DA AND GBS and group interactive decision-making procedures. The plot for the useful model (**comp • ~devil • gbs • group**) is depicted in Figure 6-10 below and shows that most cases are in the upper triangle or near to it. According to Mendel and Korjani (2007c, p. 21), the most important and desirable region is the upper right-hand corner of the plot and needs to be compared with the

lower right-hand corner of the plot. The upper right-hand corner and the number of cases with high decision competence and high membership in the causal conditions are indicated by the shaded triangle (A).
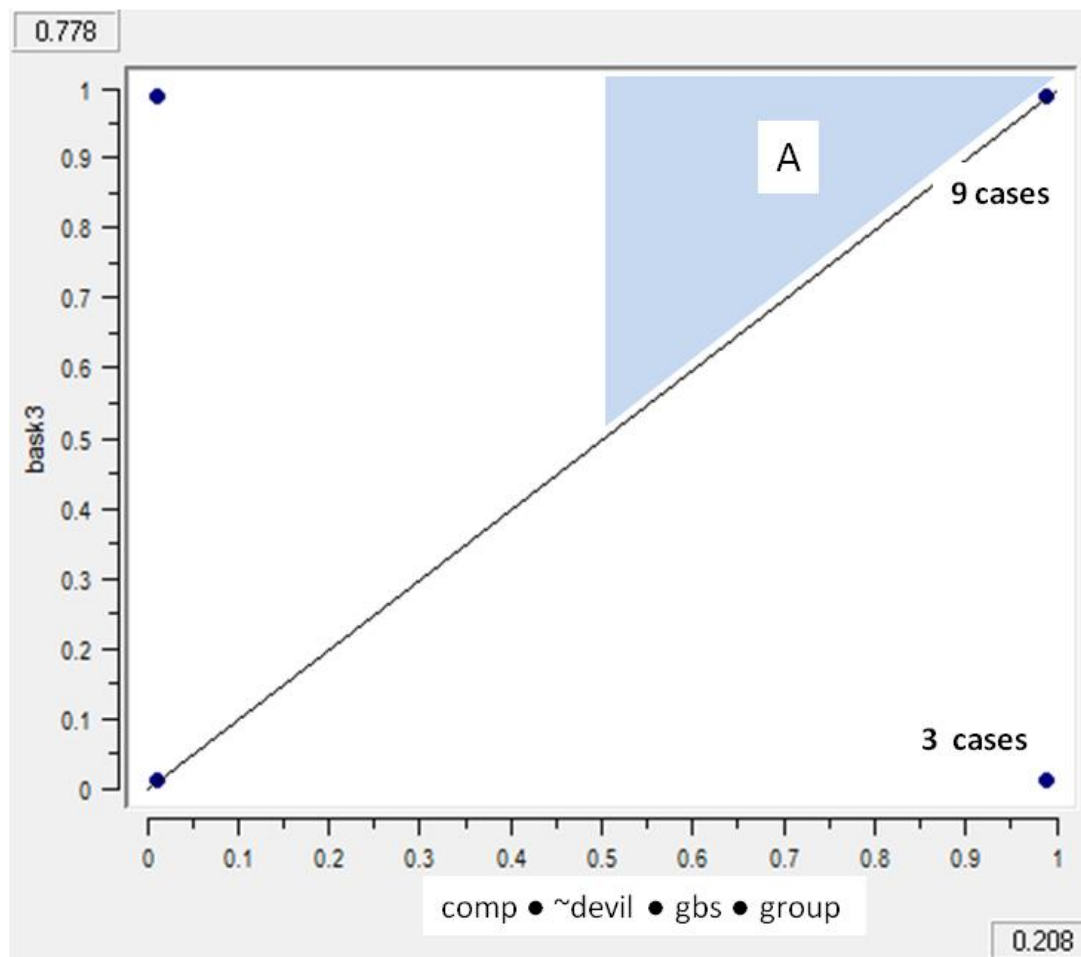
Figure 6-10: Useful model for decision success for In-basket 3

Further investigation into the 1,024 logically possible configurations of antecedent resulted in no useful models for high membership in decision competence outcome. The QCA procedure trivialised all possible models of decision competence (**bask3**). Consistency scores are below the minimum level of 0.7, trivialising possible configurations and rendering the models useless. For illustrative purposes, Table 6-16 shows some of the hundreds of unsuccessful QCA procedures for the outcome antecedent decision competence (**bask3**).

Table 6-16: Trivialised causal models for decision competence for In-basket 3

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask3 = f(gender, age_c, educ_c, man_exp_c, conf3_c, chg3_c, group, gbs, devil, comp)

 Rows:      55




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.721961

                                                                  raw        unique
                                                                coverage   coverage   consistency
                                                               ----------  ---------- ----------
gender*~age_c*~educ_c*~man_exp_c*conf3_c*chg3_c*group*~devil*~comp   0.109250   0.021002   0.772858
~age_c*~educ_c*~man_exp_c*conf3_c*chg3_c*group*gbs*~devil*~comp     0.089459   0.014540   0.856864
~gender*~age_c*educ_c*~man_exp_c*conf3_c*group*gbs*~devil*comp      0.060784   0.028877   0.746898
gender*~age_c*educ_c*~man_exp_c*conf3_c*chg3_c*group*gbs*~devil     0.106422   0.058562   0.902398
gender*~age_c*educ_c*~man_exp_c*~conf3_c*~chg3_c*group*~gbs*~devil*~comp  0.059572  0.015953  0.817174
gender*~age_c*educ_c*~man_exp_c*conf3_c*chg3_c*~group*~gbs*~devil*~comp   0.062399   0.032108   0.721961
gender*age_c*~educ_c*man_exp_c*~conf3_c*~chg3_c*~group*gbs*~devil*~comp   0.045840   0.015549   0.799296
gender*~age_c*educ_c*~man_exp_c*conf3_c*~chg3_c*group*~gbs*devil*~comp    0.063005   0.015347   0.936937
~gender*age_c*~educ_c*man_exp_c*~conf3_c*~chg3_c*group*gbs*~devil*comp    0.044427   0.012520   0.866142
gender*age_c*educ_c*~man_exp_c*conf3_c*chg3_c*group*~gbs*devil*~comp      0.064418   0.016761   0.811705
gender*age_c*~educ_c*man_exp_c*conf3_c*chg3_c*group*gbs*~devil*comp       0.065024   0.030695   1.000000
solution coverage: 0.373184
solution consistency: 0.757999
```

6.3.2 In-basket 3: Assessment of Decision Confidence Models

As previously discussed for In-baskets 1 and 2, decision confidence (**conf3_c**) can be considered an outcome antecedent and causal recipes are developed and QCA procedure executed to determine useful configurations of conditions resulting in high membership in decision confidence. Exploration efforts resulted in the marginally useful model (**group• ~gbs**) with the borderline consistency score of 0.75 and a very useful model (**~devil**) with consistency score of 0.78 and coverage of 0.89. As in previous tables, the dotted box demarcates useful models (if only marginally useful), which in the case of confidence as an outcome antecedent, includes both models (**~devil**) OR (**group• ~gbs**): thus **~devil + group• ~gbs → high conf3_c.**

Table 6-17: Analysis of causal models for decision confidence for In-basket 3: Configurations and causal paths for improved decision confidence which includes all four treatment antecedents and the measured antecedents confidence and likelihood to change (conf3_c)

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf3_c = f(group, gbs, devil, comp)

 Rows:      10




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.705883

                raw        unique
              coverage    coverage   consistency
            --------------------------------------
~devil        0.889541    0.749223    0.781857     See graph below
group*~gbs    0.250777    0.110459    0.750132
solution coverage: 1.000000
solution consistency: 0.780336
```

The single-condition model **~devil** is highly useful in predicting high decision confidence for In-basket 3. Figure 6-11 shows the scatter plot of membership in decision confidence against membership in the single-condition causal recipe (**~devil**).
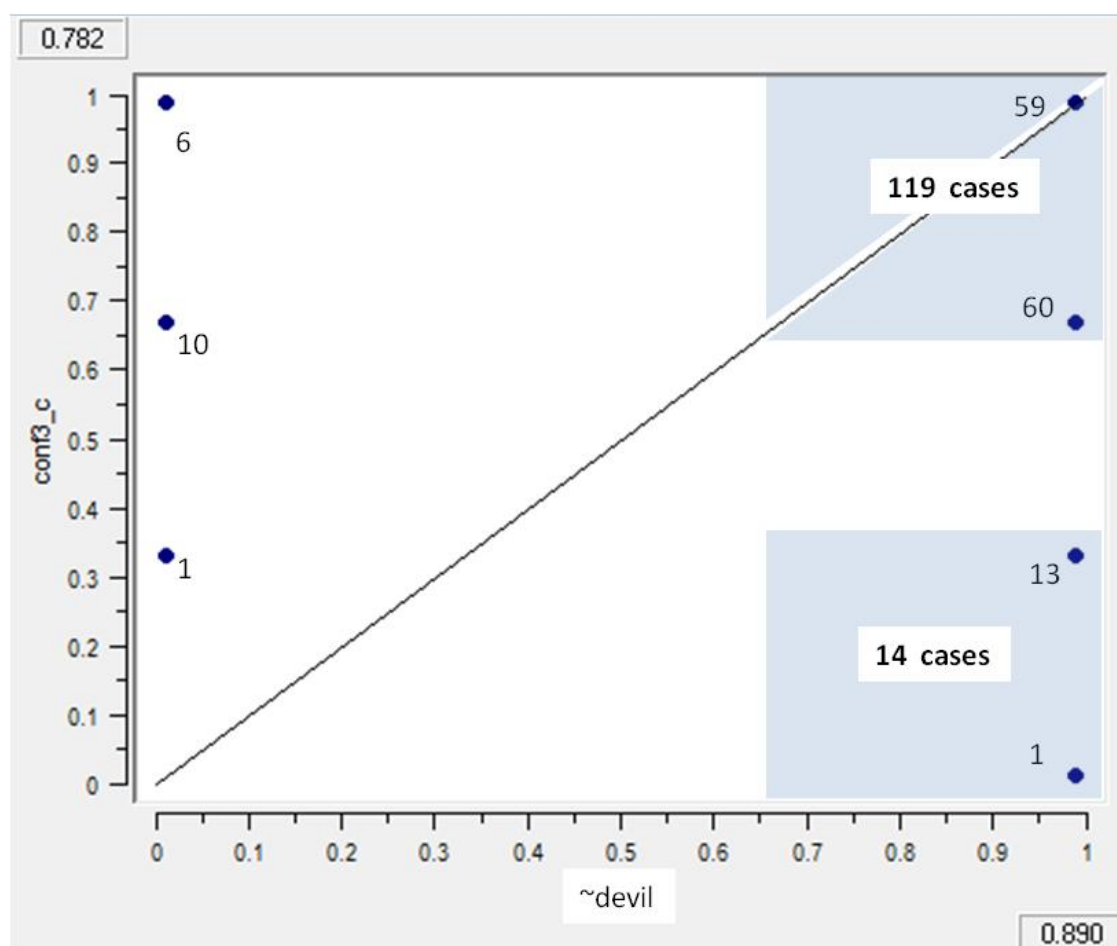
Figure 6-11: Model for decision confidence for In-basket 3 by antecedent condition ~devil
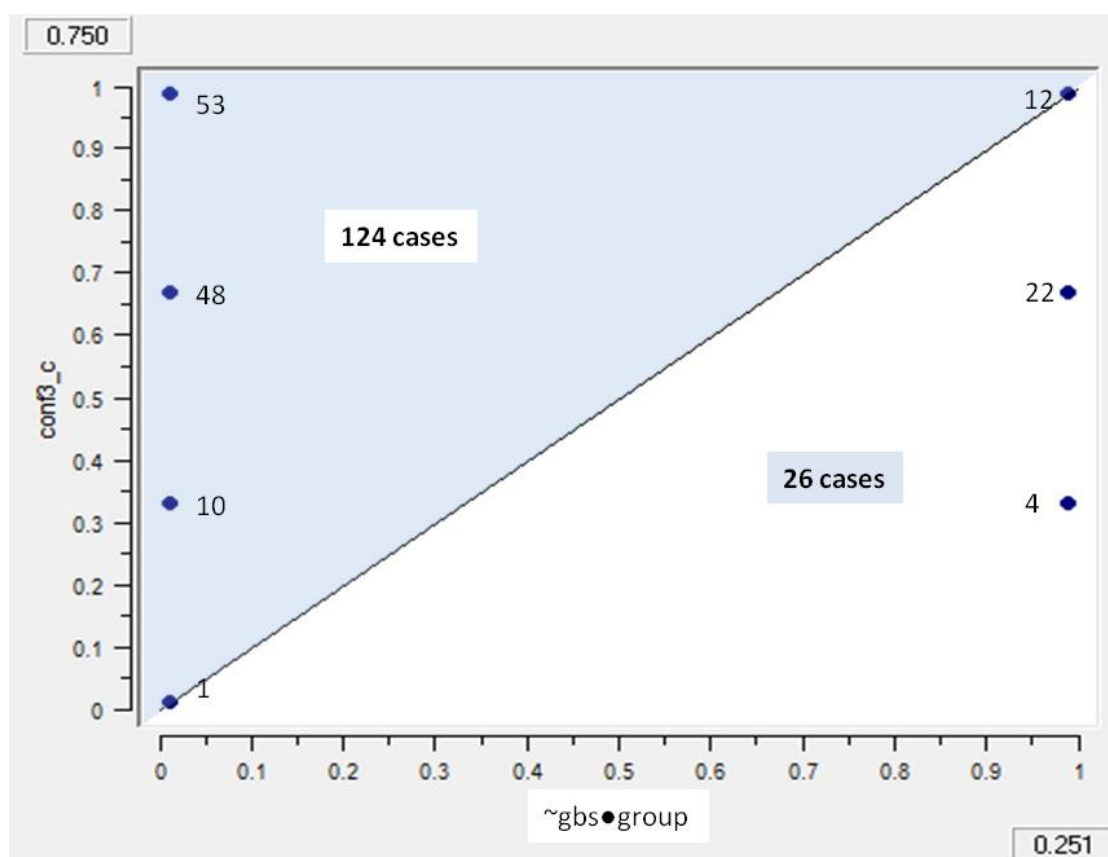
Figure 6-12: Model for decision confidence for In-basket 3: The influence of treatment antecedents on decision confidence

Figure 6-12 shows that participants display high decision confidence when they receive the group interactive decision-making treatment (**group**) AND no exposure to GBS simulation (**~gbs**). The recipe (**group ● ~gbs**) offers a model for understanding the causal conditions sufficient to result in high decision confidence for In-basket 3 assessments. Once again we see that non-exposure to the cautionary voice or deliberate dissent offered by the DA role-player has a positive impact on confidence. In discussing group efficacy Bandura (1982, p. 143) proposes that "The strength of groups, organizations, and even nations lies partly in people's sense of collective efficacy that they can solve their problems and improve their lives through concerted effort … It should be noted that knowledge of personal efficacy is not unrelated to perceived group efficacy". A logical explanation might be that participants who perceive their fellow MBAs to be competent and intelligent might benefit from this perception and report high levels of confidence when placed in groups. Unfortunately the treatment

antecedent **group** is not necessary for decision confidence, although it is sufficient

when configured with the condition **~gbs**.

Table 6-18: Analysis of causal models for decision confidence for In-basket 3: Configurations and causal paths for improved decision confidence which includes only the four measured antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf3_c = f(gender, age_c, educ_c, man_exp_c)

 Rows:      14




 Algorithm: Quine-McCluskey
        True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.844178

                  raw        unique
               coverage    coverage    consistency
               ----------  ----------  -----------
~man_exp_c     0.610460    0.135226    0.874089
age_c          0.613825    0.145409    0.848705
educ_c         0.511737    0.032965    0.896312
solution coverage: 0.907749
solution consistency: 0.821925
```

* Example: High confidence is an outcome of high levels of education
Note: the dotted-line box demarcates all useful models

Interestingly, low membership in management experience (**~man_exp**) associates with

high levels of decision confidence. Another useful model to predict high membership of

decision confidence for In-basket 3 is high **age**. Further, high education, i.e. participants

with graduate qualifications, associates with high levels of decision confidence

(**conf3_c**). This is almost an exact replication of the results for In-basket 2, even in

terms of the order of magnitude of the scores, as shown in Table 6-19.

Table 6-19: Comparative analysis of decision confidence for In-baskets 2 and 3

Decision Confidence(In-basket 2)= conf2_c		
~devil ● ~gbs	0.77	0.47
~comp ● devil	0.74	0.46
~gbs ● group	0.83	0.29
~devil ● group	0.83	0.35
~man_exp_c	0.79	0.57
age_c	0.86	0.64
educ_c	0.87	0.51
Decision Confidence(In-basket 3)= conf3_c		
~devil	0.78	0.89
~gbs ● group	0.75	0.25
~man_exp_c	0.87	0.61
age_c	0.85	0.61
educ_c	0.90	0.51

6.4 FINDINGS & INTERPRETATIONS OF DECISION COMPETENCE AND DECISION CONFIDENCE: IN-BASKET 4

In-basket 4 explores decision success for the scenario of Mary, a highly competent and long-term key staff member, who offends a key client. Decision-makers had to select from five not-so-ideal solutions, a single, preferred course of action. The decision demands insight into key talent development as well as key client retention and service recovery theories. According to the consulting experts involved in developing the In-basket simulation and alternative choices, soft skills such as empathy and mindfulness would be beneficial to the decision-maker (see Appendix C for the full set of decision aids).

6.4.1 In-basket 4: Assessments of Decision Success Causal Paths

A thorough analysis of logical pathways to decision competence (**bask4** success) resulted in numerous useful models. Table 6-20 below shows the intermediate solution for membership in the outcome of decision competence (**bask4**). Results displayed in

Table 6-20 indicate that a useful causal recipe for decision competence is the three-condition model: **comp ● ~devil ● group → bask4**. For decisions in In-basket 4, the combination of competency training (**comp**) AND exposure to group interaction (**group**) AND no presence of DA dissent (**~devil**) associates with high decision competence. This configuration of treatment antecedents has a coverage score of 0.23 of cases with a consistency score of 0.82. The XY plot is depicted in Figure 6-13.

Table 6-20: Analysis of causal models for decision competence for In-basket 4: Configurations and causal paths for improved decision competence which includes all four treatment antecedents

```
--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281
Assumptions:

                        raw           unique
                        coverage      coverage     consistency
                        ----------    ----------   ----------
comp*~devil*group       0.233000      0.233000     0.822464
solution coverage: 0.233000
solution consistency: 0.822464
```
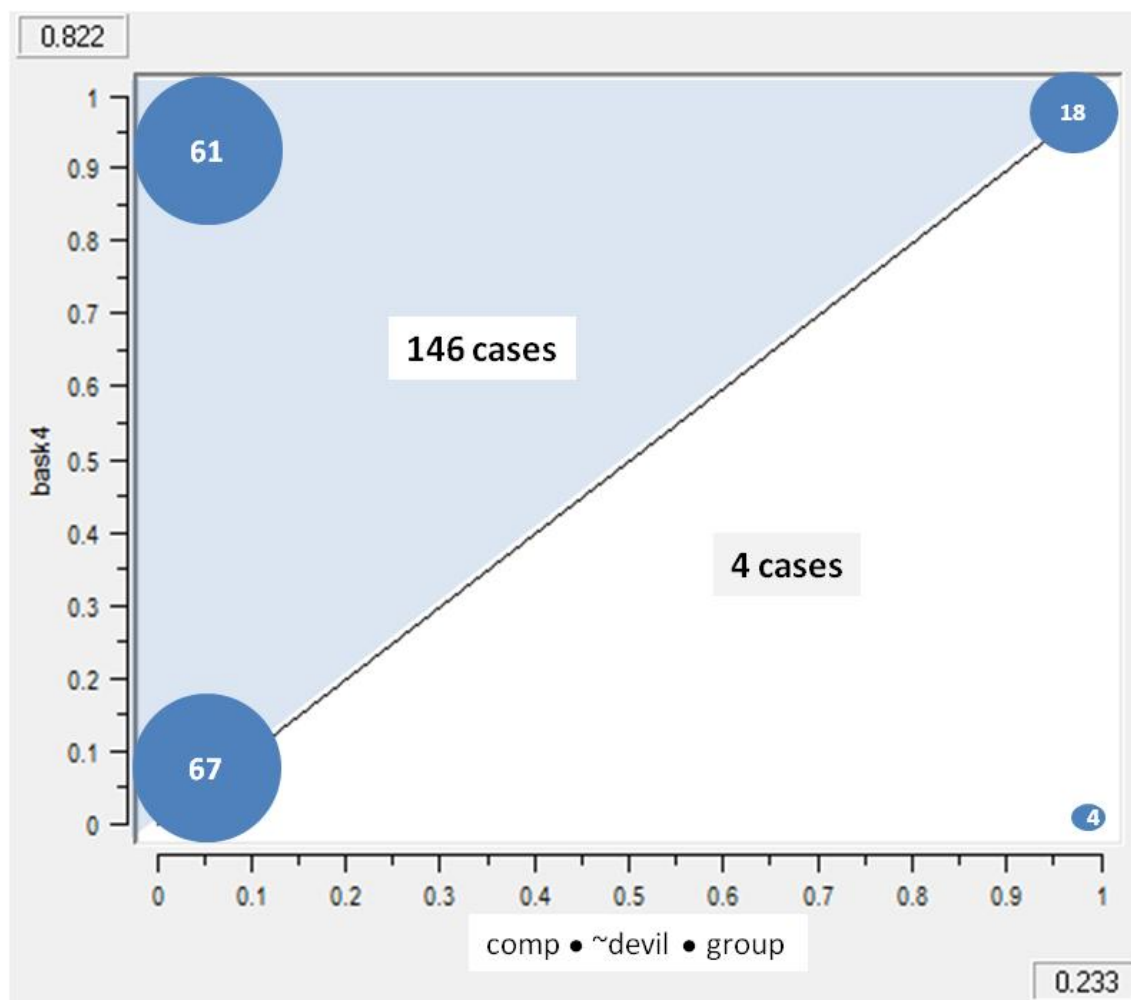
Figure 6-13: Model for decision competence for In-basket 4: Causal path for improved decision competency considering the four treatment antecedents

The plot above has substantially more cases in the upper triangle than below the diagonal, and a correspondingly high consistency score of 0.82. The graph plots high membership in the outcome condition against membership of the configuration of treatment conditions. Note the difference between number of cases with high Y_i value and the number with high X_i value (a ratio of approximately 4.5:1). This signifies a useful model with high consistency and coverage of 0.23, indicating that model is useful to forecast high membership in the outcome to a reasonable degree. Table 6-21 shows the useful results of careful analysis of multiple possible causation configurations of all combinations of the four treatment antecedents and the measured antecedents of decision confidence (**conf4_c**). For In-basket 4, participants high in the combination of confidence AND who participate in the GBS treatments AND given the opportunity to

discuss the simulations with co-participants AND exposed to competency training

display high levels of decision competence (outcome **bask4**). When measured

antecedents related to decision confidence (**conf4_c** and **chg4_c**) are included in the

configuration model, only one new causal path is useful, with a consistency level above

0.75 and coverage score between 0.2 and 0.6: **~gbs ● ~devil ● comp ● conf4_c + group**

● ~devil ● comp → high bask 4. In the case of In-basket 4 ~**devil** is a necessary

condition, but not sufficient for high decision competence (**bask 4**). Only in

combination with other treatment antecedents AND the measured antecedent of

confidence (**conf4_c**) are some useful and sufficient models uncovered.

Table 6-21: Analysis of causal models for decision competence for In-basket 4: Configurations for treatment antecedents (age; group: comp; devil) in combination with the measured antecedent (conf4_c)

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask4 = f(group, gbs, devil, comp, conf4_c)

 Rows:     16




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700576

                              raw         unique
                           coverage     coverage    consistency
                          ----------   ----------   ----------
**group*~devil*comp           0.233000     0.121375     0.822464
~group*~gbs*~devil*~comp      0.233000     0.045676     0.698462
group*~gbs*comp*~conf4_c      0.040287     0.008468     0.830688
~group*~gbs*~devil*conf4_c    0.330511    -0.000000     0.691729
~gbs*~devil*comp*conf4_c      0.250449    -0.000000     0.767900
solution coverage: 0.598409
solution consistency: 0.729205
```

** Example: For in-basket 4, participants given the opportunity to discuss the simulations with co-participants (group) AND not devil's advocate dissent AND who receive competency training, associates high levels of decision competence.

Note: The dotted-line box demarcates useful models.

Additional analysis attempts at finding useful models by combining all measured

antecedents were not successful (see Table 6-22 below). None of the logically possible

configurations of measured antecedents are useful for In-basket 4. Low consistency

scores indicate that the evidence does not support the claim that membership in any

model is a subset of the membership of decision competence, which in turn indicates

that it is not reasonable to attempt an interpretation of causal sufficiency for any recipes.

Where consistency is above 0.75, the coverage is too low (0.05) and thus the

investigated model (**~chg4 • ~conf4 • ~man_exp • educ_c • ~age_c • ~gender**) is

trivialised. The same is true for all configured models combining measured and

treatment antecedents, as illustrated in Table 6-23.

Table 6-22: Analysis of causal models for decision competence for In-basket 4: Configurations of measured antecedents only

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask4 = f(chg4_c, conf4_c, man_exp_c, educ_c, age_c, gender)

 Rows:       3




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656
Assumptions:
```

	raw coverage	unique coverage	consistency
~chg4_c*~conf4_c*~man_exp_c*educ_c*~age_c*~gender	0.057737	0.004362	0.789473
chg4_c*conf4_c*~man_exp_c*educ_c*~age_c*~gender	0.123429	0.070054	0.700656
~chg4_c*conf4_c*~man_exp_c*educ_c*age_c*~gender	0.048627	0.001026	0.737353

```
solution coverage: 0.128817
solution consistency: 0.662707
```

Table 6-23: Trivialised models for decision competence for In-basket 4: Models considering configurations of measured antecedents and all treatment antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask4 = f(group, gbs, devil, comp, conf4_c, chg4_c, age_c, educ_c, man_exp_c, gender)

Rows:      57




Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.719864
```

	raw coverage	unique coverage	consistency
~group*~gbs*~devil*~comp*conf4_c*chg4_c*~age_c*~man_exp_c	0.112138	0.051065	0.844445
group*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*~man_exp_c	0.084039	0.023480	0.830165
~group*~gbs*~devil*comp*conf4_c*chg4_c*age_c*gender	0.087375	0.049397	0.791861
~group*~gbs*~devil*~conf4_c*~chg4_c*~age_c*educ_c*~man_exp_c*~gender	0.042725	0.004362	0.818182
~group*~gbs*~devil*conf4_c*chg4_c*~age_c*~educ_c*~man_exp_c*~gender	0.075956	0.015781	0.922118
~group*gbs*~devil*comp*conf4_c*~age_c*~educ_c*~man_exp_c*gender	0.060944	0.006543	0.742188
~group*gbs*~devil*comp*chg4_c*~age_c*~educ_c*~man_exp_c*gender	0.058763	0.004362	0.735153
group*gbs*~devil*conf4_c*chg4_c*~age_c*educ_c*~man_exp_c*~gender	0.051193	0.008468	0.817619
group*~gbs*~devil*comp*conf4_c*chg4_c*~age_c*~man_exp_c*gender	0.050552	0.015525	0.889389
group*gbs*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*~gender	0.042725	-0.000000	0.693747
group*~gbs*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*gender	0.042982	0.007955	0.835411
~group*~gbs*~devil*conf4_c*chg4_c*age_c*educ_c*man_exp_c*gender	0.057480	0.005132	0.742952
group*~gbs*~devil*comp*conf4_c*chg4_c*age_c*~educ_c*man_exp_c	0.060175	0.035668	0.957142
group*~gbs*~devil*~comp*conf4_c*~chg4_c*~age_c*~educ_c*~man_exp_c*gender	0.029895	0.010649	0.784512
~group*~gbs*~devil*~comp*~conf4_c*~chg4_c*age_c*educ_c*man_exp_c*gender	0.035925	0.004362	0.918033
~group*gbs*~devil*comp*conf4_c*chg4_c*age_c*~educ_c*~man_exp_c*~gender	0.031306	0.012061	0.903704
group*~gbs*devil*~comp*conf4_c*chg4_c*age_c*educ_c*man_exp_c*~gender	0.027714	0.008468	1.000000
group*~gbs*devil*comp*conf4_c*chg4_c*age_c*educ_c*man_exp_c*gender	0.030151	0.010906	0.827465

```
solution coverage: 0.445856
solution consistency: 0.774633
```

Note: All hypothetical models are falsified - coverage scores below 0.2

No intermediate or parsimonious solutions are valid or indicate high set-theoretic membership in the outcome high decision competence for In-basket 4.

6.4.2 In-basket 4: Assessment of Decision Confidence Models

Analysis of the possible outcome antecedent high decision confidence investigated causal path propositions involving all four treatment antecedents of **group, gbs, devil and comp**.

Table 6-24: Analysis of causal models for decision confidence for In-basket 4: Models considering configurations of all four treatment antecedents

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf4_c = f(group, gbs, devil, comp)

 Rows:     10




 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.766305

                   raw        unique
                coverage     coverage    consistency
                ----------   ----------   ----------
~devil          0.887550     0.729752    0.804611  See graph 5.19 A below
** group*~gbs   0.270248     0.112450    0.833766  See graph 5.18 below
solution coverage: 1.000000
solution consistency: 0.804848
```

** Example: The treatment antecedent of group interactive decision-making, in combination with limited or low exposure to *gbs* simulations, associates with high levels of decision confidence for participants in in-basket 4.

Two fuzzy subset relations consistent with sufficiency are associated with the scrutinised outcome **~devil** OR **group•~gbs.** The relatively high consistency scores permit interpretation of the causal sufficiency of these two recipes and interpretation of the coverage scores, indicating the usefulness of the models.
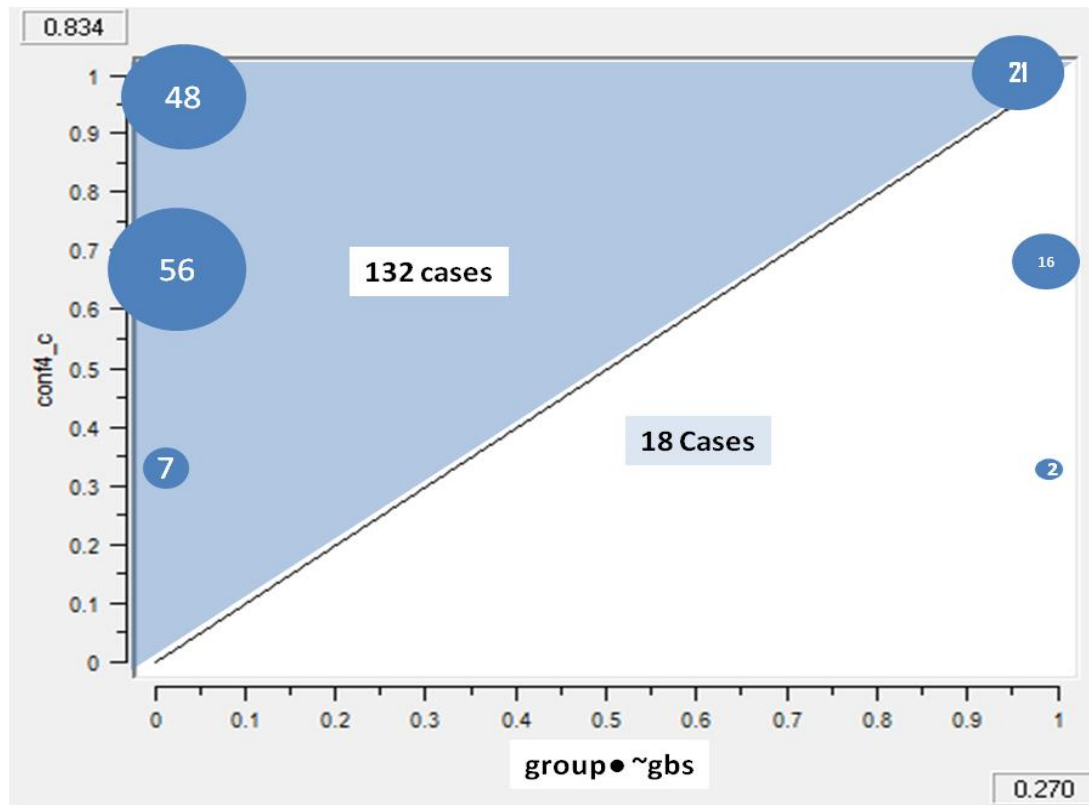
Figure 6-14: Model for decision confidence for In-basket 4
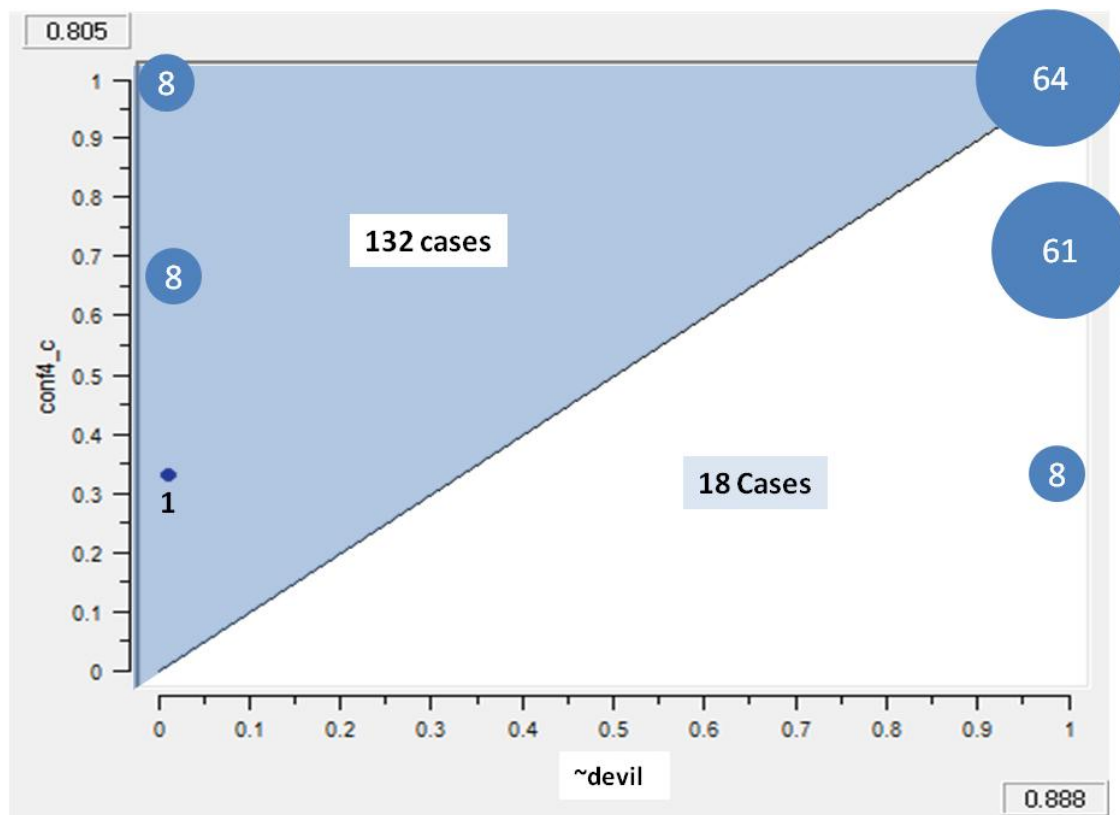
Figure 6-15: Decision confidence for In-basket 4 by condition ~devil

In this case **~devil** is sufficient to cause decision confidence, but not necessary (since it does not appear in every case of the configuration of conditions) (Ragin, 2004). This seems to align with the argument that exposure to cautionary comments by respected peers or contradictory statements by other members in the group might lead to self-doubt or lower levels of confidence in the decision, thus not having such a role-player present might associate with high decision confidence (**conf4_c**). Further analysis into decision confidence for In-basket 4 (**conf4_c**) investigated causal paths combining measured antecedents. The complex solutions resulting from the QCA analysis appear in Table 6-25 below.

The conjunctive solution **edu_c +age+ ~man _exp→ conf4_c** leads to high decision confidence in 90% of the studied cases and the context determined by the study.

Table 6-25: Analysis of causal models for decision confidence for In-basket 4: Configurations of measured antecedents: age; gender_c; man_exp; educ_c

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf4_c = f(gender, age_c, educ_c, man_exp_c)

 Rows:      14




 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.929587

                 raw        unique
              coverage    coverage    consistency
              --------    --------    -----------
~man_exp_c    0.586178    0.121402    0.865686
age_c         0.618642    0.168842    0.882234
educ_c        0.498411    0.037149    0.900393   See graph below
solution coverage: 0.904786
solution consistency: 0.844976

Note: All three single-condition recipes are useful, consistency >0.75 and coverage scores
      between 0.2 and 0.6. Useful models are demarcated by the dotted-line box.
```

For in-basket 4, participants' high formal education (**educ_c**) OR high age (**age_c**) OR low level management experience (**~man_exp_c**) associated with high decision

confidence (**conf4_c**). The graph in Figure 5-16 plots membership of decision

confidence in In-basket4 against the membership in the single-condition causal recipe:

educ_c. The plot has a large number of cases above the diagonal (X=Y) and a

correspondingly high consistency score of 0.9. The coverage of $\pm$ 0.5 indicates that the

model is useful and covers 50% of all cases in the study.
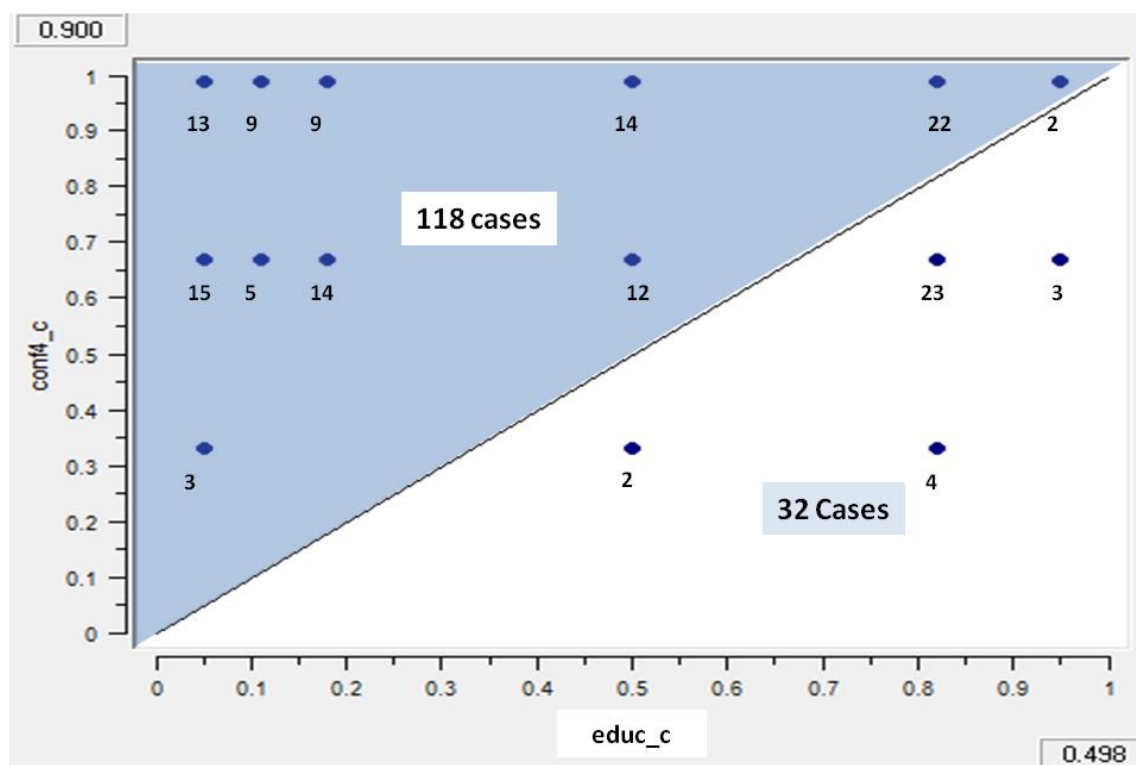
**Figure 6-16: Model for decision confidence for In-basket 4 as affected by the
measured antecedent of education (edu_c)**
Note: The number of cases is indicated by the number below each dot

Other conditions to consider when probing high membership for high decision

confidence are, as expected, high **age_c** OR low management experience

(~man_exp_c). Once again, the analysis for high decision confidence in In-basket 4

replicates the results for the other three in-baskets assessments:

age_c + ~man_exp_c + educ_c → high conf4_c.

6.5   DISCUSSION, CONCLUSIONS & IMPLICATIONS

6.5.1   Discussion

The main purpose of this study is to examine decision competence and how different treatments (development interventions or teaching methods) can improve decision competency and/or reduce incompetency. A fresh approach, namely fsQCA, is used as a methodology to conceptualise and discover causation models associated with performance outcomes. One of the key benefits of QCA is that it allows for equifinality, or multiple paths to the same outcome (Mahoney, 2007; Wagemann & Schneider, 2010) and it also allows for "the possibility to produce generalizations" (Rihoux & Lobe, 2008, p. 224). This means that causal effects of one variable may depend on the causal combinations (both the presence and absence of that condition) and simultaneously different configurations of conditions may produce similar outcomes. For this study, several different combinations of conditions are causally sufficient to cause the outcomes under investigation, that is **decision competence** (**success_c**; **bask1; bask2; bask3** and **bask 4** for the overall and individual In-basket assessments). The second outcome under investigation is that of **decision confidence**. Not only is confidence an important measure of the feasibility of a decision, but the QCA analysis indicates that it is a key contributor to overall decision success. The analysis and interpretation in this section also considers **decision confidence (conf_tot_c; conf1_c;conf2_c; conf3_c and conf4_c).**

6.5.2   Comparative Analysis

Rihoux and Lobe (2008, p. 236) instruct the researcher to "strive to identify similarities across the 'thick' case narratives ... building on the terms of the minimal formula; typically those cases that are clustered in connection with a given parsimonious term are examined in parallel … By engaging in the cross-case, focused comparative interpretations, [one] not only discover common (bits of) narratives across cases, but

also some other, unsuspected elements that were not comprised in the QCA model". In this study of multiple conjectural causation for decision competence, no single cause (treatment) is necessary (must appear in every case of decision confidence) OR sufficient to cause high membership in decision confidence when configurations of measured antecedents are analysed (see Table 6-26 for plausible consequential configurations). These are called "insufficient but necessary part of a condition which is itself unnecessary but sufficient for the result" (Goertz, 2003, p. 68), which is abbreviated to "INUS". Wagemann and Schneider (2010, p. 382) highlight that "In the process of analyzing data with QCA, it is the rule rather than the exception that a single condition is neither necessary nor sufficient, yet plays a crucial causal role." For the outcome decision confidence, a number of single-condition paths are valuable these are shown in Table 6-26 below.

Table 6-26: All models of decision competence & decision confidence

	Consistency	Coverage
Decision Competence (Overall – all four in-baskets)		
~gbs ● ~comp ● conf_tot_c	0.76	0.29
conf_tot_c ● comp ● ~devil ● ~gbs	0.77	0.24
gender ● ~age_c ● ~man_exp_c ● ~change_tot_c	0.78	0.28
age_c ● man_exp_c ● ~conf_c ● ~chgn_tot_c	0.74	0.30
Gender ● ~age_c ● ~man_exp_c ● conf_tot_c	0.80	0.31
~educ_c ● man_exp_c ● conf_tot_c ● chgn_tot_c	0.80	0.35
gender ● educ_c ● ~man_exp_c ● ~conf_tot_c ● chgn_tot_c	0.81	0.22
man_exp ● age ●edu_c (using Boolean Algebra)	0.73	0.30
NOT-Decision Competence (Overall) (using Boolean Algebra)		
~devil	0.90	0.89
group ● ~gbs	0.92	0.27

Decision Confidence (Overall) = conf_tot_c		
age_c	0.72	0.67
~man_exp ● gender	0.72	0.43
man_exp_c ● edu_c (using Boolean Algebra)	0.83	0.32
Decision Competence (In-basket 1) = bask1		
~comp ● devil	0.89	0.53
~devil ● gbs ● ~group	0.86	0.30
~gbs ● ~devil ● ~comp	0.90	0.29
~devil ● ~comp ● conf1_c	0.90	0.42
~group ● ~devil ● conf1_c	0.85	0.49
chg1_c ● ~group ● ~devil	0.83	0.44
~man_exp ● conf1_c ● chgn1_c	0.83	0.45
educ_c ● conf1_c ● chg1_c	0.81	0.40
age ● ~educ ● man_exp_c ● conf1_c	0.74	0.25
gender ● age ● man_exp_c ● conf1_c	0.76	0.25
conf1_c ● ~comp	0.89	0.48
chg1_c ● ~ comp	0.89	0.44
gbs ● ~comp	0.88	0.25
~group ● comp	0.80	0.30
Decision Confidence (In-basket 1) = conf1_c		
~group ● ~devil ● gender ● age_c ● man_exp_c	0.85	0.21
group ● ~gbs	0.84	0.28
~devil	0.78	0.88

Decision Competence (In-basket 2) = bask2		
comp ● ~devil	0.83	0.45
~devil ● ~group	0.80	0.58
~gbs ● group	0.87	0.28
~gbs ● group ● conf2_c	0.89	0.24
~group ● ~devil ● comp	0.80	0.30
~group ● ~devil ● conf2_c	0.82	0.42
Gbs ● ~devil ● comp	0.88	0.25
~group ● ~devil ● gender ● age_c ● man_exp_c	0.85	0.21
~educ_c ● ~age_c ● ~man_exp_c	0.78	0.24
conf2_c ● age_c	0.84	0.50
conf2_c ● educ_c	0.85	0.40
group ● ~devil ● conf2_c ● chg2_c ● gender ● age_c ● man_exp_c	0.84	0.18
conf2_c● ~group ● ~devil	0.82	0.42
conf2_c ● chg2_c ● ~devil ● comp	0.88	0.34
Decision Confidence (In-basket 2) = conf2_c		
~devil ● ~gbs	0.77	0.47
~comp ● devil	0.74	0.46
~gbs ● group	0.83	0.29
~devil ● group	0.83	0.35
~man_exp_c	0.79	0.57
age_c	0.86	0.64
educ_c	0.87	0.51
Decision Competence (In-basket 3) = bask3		
comp ● ~devil ● gbs ● group	0.78	0.21
conf3_c ● ~devil ● gbs ● group	0.72	0.31
Decision Confidence (In-basket 3) = conf3_c		
~devil	0.78	0.89
~gbs ● group	0.75	0.25
~man_exp_c	0.87	0.61
age_c	0.85	0.61
educ_c	0.90	0.51
Decision Competence (In-basket 4) = bask4		
comp ● ~devil ● group	0.82	0.23
~gbs ● ~devil ● comp ● conf4_c	0.77	0.25

Decision Confidence (In-basket 4) = conf4_c		
~devil	0.80	0.89
~gbs ● group	0.83	0.27
~man_exp_c	0.87	0.57
age_c	0.88	0.62
educ_c	0.90	0.50

Wagemann and Schneider (2010, p. 386) point out two ways in which QCA overcomes shortcomings of commonly applied frameworks and statistical methods, which are also true for this study: (1) "hardly ever is a singly condition found to be sufficient for all cases under examination. Instead, empirical and research reality most of the time reveals that conditions are only sufficient in combination with other conditions ('conjectural causation')"; (2) QCA can take equifinality of comparative case studies idiosyncratic explanation into account, but has limited generalisability of the results beyond the cases under examination. Although these are clearly set out as benefits for studying complex trends in social sciences, these benefits simultaneously complicate the analysis and interpretation of this study. Equifinality, which has causal equivalence as central idea (different conditions or combinations of conditions may satisfy the causal requirement), for instance, points to a number of paths to high decision competence. If only those solutions (or configurations of conditions, i.e. paths) with consistency above 0.70 (that is 70% of all membership scores lie above the main diagonal in the XY plot) are considered, 42 possible paths emerge for decision competence (or ~decision competence) and 23 equivalent paths for decision confidence result.

The logical equivalence of causation models towards the outcome decision confidence (and separately decision confidence) does not exclude the possibility of assessing their different degrees of empirical importance (Ragin, 2006c; Wagemann & Schneider, 2010), which is "usually achieved through the coverage measure" (Wagemann & Schneider, 2010, p. 383). Pathways (solution models) with a consistency score of 1 and

coverage of 0.5 or above are regarded as very useful, since consistency measures the degree to which cases with a given set of causal conditions exhibit the outcome and coverage measures the degree to which a given path explains the cases analysed and determines the relevance of each causal recipe (Ragin, 2008c). Table 6-27 shows all models in this study with a consistency above 0.75 AND coverage above 0.50.

Table 6-27: Important models of decision competence and decision confidence

	Consistency ≥ 0.75	Coverage ≥ 0.50
NOT-Decision Competence (Overall) (using Boolean Algebra)		
~devil	0.90	0.89
Decision Confidence (In-basket 1) = conf1_c		
~devil	0.78	0.88
Decision Competence (In-basket 2) = bask2		
~devil ● ~group	0.80	0.58
conf2_c ● age_c	0.84	0.50
Decision Confidence (In-basket 2) = conf2_c		
~man_exp_c	0.79	0.57
age_c	0.86	0.64
educ_c	0.87	0.51
Decision Confidence (In-basket 3) = conf3_c		
~devil	0.78	0.89
~man_exp_c	0.87	0.61
age_c	0.85	0.61
educ_c	0.90	0.51
Decision Confidence (In-basket 4) = conf4_c		
~devil	0.80	0.89
~man_exp_c	0.87	0.57
age_c	0.88	0.62
educ_c	0.90	0.50

6.5.3   Finding, Interpretations & Implications

The main finding of this study is that simply combining all treatments in pursuit of high competence is not an effective strategy. There is no single (either complex or

parsimonious) recipe which results in high decision competence. Sadly, there is also no catch-all, single training solution to aid in the development of managerial decision confidence. Different recipes relate to decision competence and to decision confidence, not only in the four different In-basket simulations, but also when measured antecedent (the self-recorded knowledge and skill levels as reflected by the measures management experience and education level as well as the demographic age) are considered. One certain statement is that high decision incompetence is associated with group interactive decision-making and not receiving a GBS treatment **(group•~gbs)**. The implication for educationalists is that group work in the absence of clear goals AND combined with clear task objectives as used in SIs AND training group members to consider the impact of the decision on different functions or objectives (normally represented by the role-players) is highly likely to result in poor decision outcomes.

Practitioners often express a generally held belief that managerial experience alone is a sufficient condition to achieve high decision competence. This belief could NOT be confirmed. In contrast, a marginally useful model (due to low consistency of 0.71; coverage 0.45) for not-decision success (**~success_c** interchangeable with decision incompetence) affirmed by the study is that if participants self-report both low levels of management experience **(~man_exp_c)** AND low levels of education **(~educ_c)**, then high membership in the outcome not decision competence (**~success_c**) results. In other words, participants who report both low levels of education and low levels of managerial experience are less competent in making effective decisions.

When high membership to decision confidence is carefully analysed in configured models, only one useful model relates to high decision confidence: **group • educ_c** and one marginally useful model (due to low consistency of 0.74; coverage 0.46): **age_c •man_exp_c.** The measured antecedents in these models indicate sufficiency, but not

necessity. It is important to note that no single antecedent could predict decision confidence to a high level. From these two moderately useful models educationalists can infer that high decision confidence associates with decision-makers who receive group interactive decision-making AND record high levels of education. Also, high decision confidence is associated with decision-makers who report both high levels of management experience (above 5 years) AND who are above 35 years old.

This study confirms and extends the findings of Simon and colleagues (1982, 1989, 1992) that cognitive ability alone, experience alone or prior knowledge of decision makers alone will not lead to decision competency. Managerial decision-makers should be concerned with and cognisant of the context. Similarly, educationalists developing managerial decision competency need to raise awareness among future decision-makers of the context. This reaffirms the work by Boyatzis (1982), Boyatzis, Baker, Leonard, Rhee, & Thompson (1995) and Boyatzis and McKee (2005) that stresses the importance of "mindful" leadership.

In summary, different recipes are related to high performance and differ from decision scenario to decision scenario (as reflected by the different results for the four In-basket simulations). All four treatments (antecedents) together do not deliver the desired or expected results. From this it can be deduced that all treatments in combination do not necessarily result in either improved competence or in improved confidence. This finding is isomorphic with real life, where there is often not one single, clear-cut catch-all recipe to success. In the words of my wise, but not so famous mother: "too much of a good thing is a bad thing" or in the words of my learned friend Arch Woodside: "too much of a muchness results in garbage".

In addition, observations throughout the experiments indicated that merely having the tool(s) and decision aids in writing is not sufficient to affect the outcome(s). Based on

the work of experiential learning theorists (Schank, 1994; Schweiger et al., 1986; Schwenk, 1984; Senge, 1990; Shaw & Linnecar, 2007) and own experience, having access to the decision aids and competency training tools is not sufficient. Participants need time to practise how to use the tools. Future researchers should allow ample time for practical, inter-active training of the participating students and allow students time to practice using the decision aids before implementing the experiment. Alternatively pre-test and post-test methods could be employed. The Chapter 8 presents additional suggestions for future studies.

Table 6-28 summarises the findings and relates the causation models back to the original propositions.

Table 6-28: Propositions and causation models

#	Context-Related Propositions	Configurations for possible parsimonious models in fsQCA	Useful Recipes/ Evidence in support of model?
P_1	In groups, training via goal-based scenarios results in more competent decision-making than inactive knowledge learning.	**gbs•group→ high success** **~gbs•group→~ success**	NO YES
P_2	Competency increases by adding formal assignment of a devil's advocate role-player versus natural, unaided group interactive decision-making (a placebo condition) to group discussions in making decisions**.**	**group •devil →high success** **group•~devil →~high success**	NO Partial(some contexts)
P_3	The introduction of incompetency training and decision aids such as BCG and Priority Matrices result in less competent decision-making, but result in high decision confidence.	**~comp •devil →high conf_c** **~comp •group →~ success** **~comp •~group→~success** **~comp •devil → high conf_c**	Confidence related to measured antecedents not treatments
P_4	Role-playing introduced through the role of GBS, increases decision competency versus group inter-active decision-making alone.	**gbs•group → high success** **group → ~ success**	NO
P_{5a}	Decision-making by an individual is more effective than group decision-making when the group uses no formal group-discussion protocols (e.g. formal role-playing as introduced through GBS).	**gbs•~group → high success₁** **~gbs•group → ~high success₂**	NO YES
P_{5b}	Group interactive decision-making is more effective than individual decision-making when the group uses formal group-discussion protocols (e.g. formal role-playing as introduced through GBS.**)**	**gbs•group → high success₃** **high success ₃> high success₁**	See Chapter 5 for different combination of causal conditions
P_6	Individuals trained in contextual influences on decision-making (e.g., drop-your-tools contexts) and the use of implicit thinking (e.g., "intuitive first choice/gut feeling") make for more competent decisions compared to groups using formal group-discussion protocols.	**comp•~group → high success₄** **comp •·group → high success₅** **high success ₄> high success₅**	NO NO

| P_{7a} | The introduction of irrelevant information leads to cognitive overload and causes a greater proportion of incompetent decisions (for individual participants as well as in group interactive decisions). | **~comp•~group → ~high success**
~comp •group →~ high success | NO
NO |

| P_{7b} | The introduction of irrelevant information through complex decision aids leads to lower confidence in the decision that (for individual participants as well as group interactive decisions). | **~comp•~group → ~high conf_c**
comp •group →~high conf_c | NO
NO |

#	**Cognitive Ability-Related Propositions**	**Configurations for possible parsimonious models in fsQCA**	Useful Recipes/ Evidence in support of model?
P₈	Decision-making by an individual with more experience in managerial judgement and decision-making (JDM) make more competent decisions compared to decision-making by individuals with lower levels of management (JDM) experience.	**man_exp •~group →high success** **~man_exp •~group → ~high success**	NO NO
P₉	Groups with higher levels of management experience, make more competent decision compared to decision-making groups with lesser management experience.	**man_exp •group → high success** **~man_exp ·group → ~high success**	NO NO
P₁₀	Individuals participating decision-makers with higher versus lower levels of experience in JDM make more competent decisions and are more confident in their decision competency than individual decision-makers with lower levels of experience in JDM.	**man_exp •~group →high conf_c** **~man_exp•·~group → ~high conf_c**	NO NO
P₁₁	Individuals with high versus low levels of education and JDM experience are more competent and more confident in their decision outcomes.	**edu •~group →high conf_c** **~edu •~group → ~high conf_c** **~edu •~group →high success** **~edu •~group → ~high success**	NO NO NO NO

Propositions with a Combination of Contextual and Cognitive Conditions	Configurations for possible parsimonious models in fsQCA	
P₁₂ Groups of participants with high levels of management experience and high levels of formal education are less competent than individual decision-makers with high levels of management and education experience but the first recipe does not associate with higher levels of confidence	**man_exp●educ●~group → high success** **man_exp●educ●group→ ~high success** **man_exp●educ●~group → ~ high conf_c**	**NO** **NO** **NO**
P₁₃ Participants exposed to a combination of treatment conditions outperform participants who receive only one of the treatments, resulting in higher levels of decision confidence and higher levels of decision competence.	**A vast number of configurations of conditions tested by the fsQCA software are discarded due to too low consistency and unacceptable coverage scores.**	

CHAPTER 7: DELIMITING PERFORMANCE OUTCOME: RATIONALISING INVESTIGATING DECISION INCOMPETENCE & DECISION DOUBT

7.1 RATIONALISING INVESTIGATING DECISION INCOMPETENCE AND DECISION DOUBT

Common correlational analysis using frequentist statistical analysis (SEM and MRA) assumes symmetrical relationships between the dependent variable and the independent variables (Fiss, 2011; Ragin, 2006b, 2008a; Woodside, 2013). This is called a "net effects" estimation approach to research (Ragin, 2006b). This means that if the researcher using traditional statistical analysis models a high performance outcome (e.g. the ability to develop product innovations) then the inverse (namely the inability for inventors to successfully implement innovations) results from the same causes, except that the sign of the coefficients change (Fiss, 2011). Net effects thinking is problematic since significant correlations among the independent variables almost always occur in studies with high numbers of variables (e.g. 10 or more).

In addition, the net effects approach focuses on "analytically separable independent variables and their degree of inter-correlation" (Ragin, 2006b, p. 21), while qualitative comparative analysis (and specifically fsQCA) focuses on individual cases that retain their unique characteristics and are defined by the configurations of "causally relevant conditions they display". Ragin (2006b, p. 17) present four advantages of fsQCA over MRA: (1) the algorithm focus of QCA overcomes problems in multi-collinearity and examining complex interaction effects; (2) a key strength of algorithm analysis is the investigation of configurations of causally relevant conditions, whereas logistic regression results are silent on the issue of causal combinations; (3) "the algorithm focus retains explanation details at the case level that variable level findings do not report while still providing sample or population-level generalizations" (Prado & Woodside, 2013, p. 5); and (4) net effect statistics attempts to estimate context-

independent net effects, whilst fsQCA considers context-dependent outcomes related to multiple possible "paths" or "models".

Woodside (2013, p. 464) calls for a paradigm shift from symmetric to asymmetric thinking with reference to real-life business scenarios and stresses that "reality usually includes more than one combination of conditions that may lead to high values in outcome condition (i.e. high values in a dependent variable; thus, reality usually indicates that any insightful combination of conditions has an asymmetrical relationship with an outcome condition and not a symmetrical relationship." Reality is more complex than for the mere negation of the signs of the "antecedent conditions in an adoption causal recipe with high consistency to provide high consistency in non-adoption" (Prado & Woodside, 2013, p. 36). Crafting theory from an algorithm-building methodology such as fsQCA offers important advantages over statistical tools such as MRA (McClelland, 1998; Ragin, 2008c; Woodside, 2013). Goldstein and Gigerenzer (2009) and Woodside (2013) warn against investigating relationships for more than three variables using regression analysis only. They recommend as alternative or complementary strategy reporting regression findings in parallel with findings from using algorithms.

Woodside (2013, p. 464) states that "A symmetric relationship indicates that high values in X are both necessary and sufficient for high values of Y to occur and that low values of Y occur with low values of X" and this is shown in Figure 7-1.
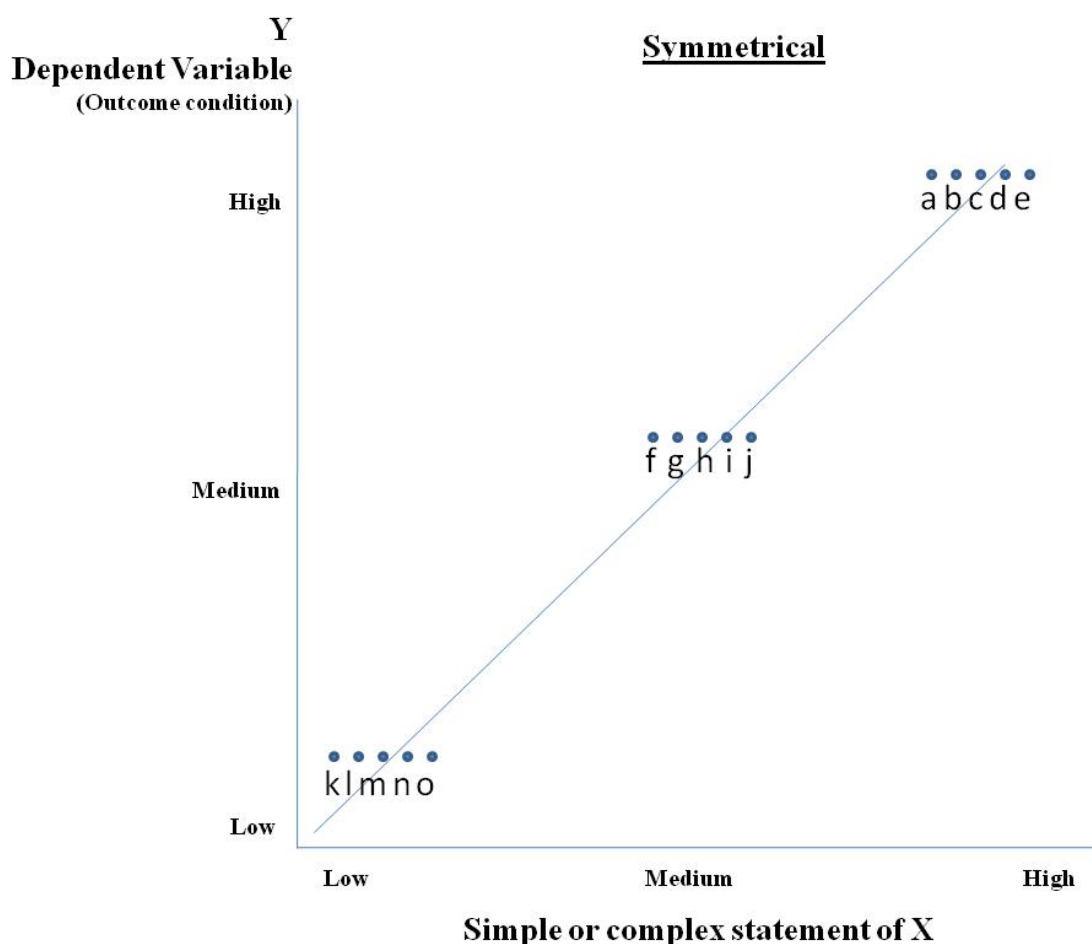
**Figure 7-1: Symmetrical relationship between X and Y for 15 cases
of synthetic data**
(Source: Woodside, 2013, p. 464)

The contrasting view of proponents of fsQCA is that "the set of causal conditions

leading to the presence of the outcome may frequently be different from the set of

conditions leading to the absence of the outcome. Shifting to a causal, core-periphery

view of typologies allows for such differing sets of causal conditions to exist across the

range of an outcome, with one set leading, for instance, to average performance; a

different set, to high performance; and yet another set, to very high performance" (Fiss,

2011, p. 395). Figure 7-2 illustrates an asymmetric relationship between high values of

X and high values of Y, where low values of X – single or combined combinations of

causal factors – may also result in high values of Y, indicating that additional causal

recipes may associate with high outcome conditions.
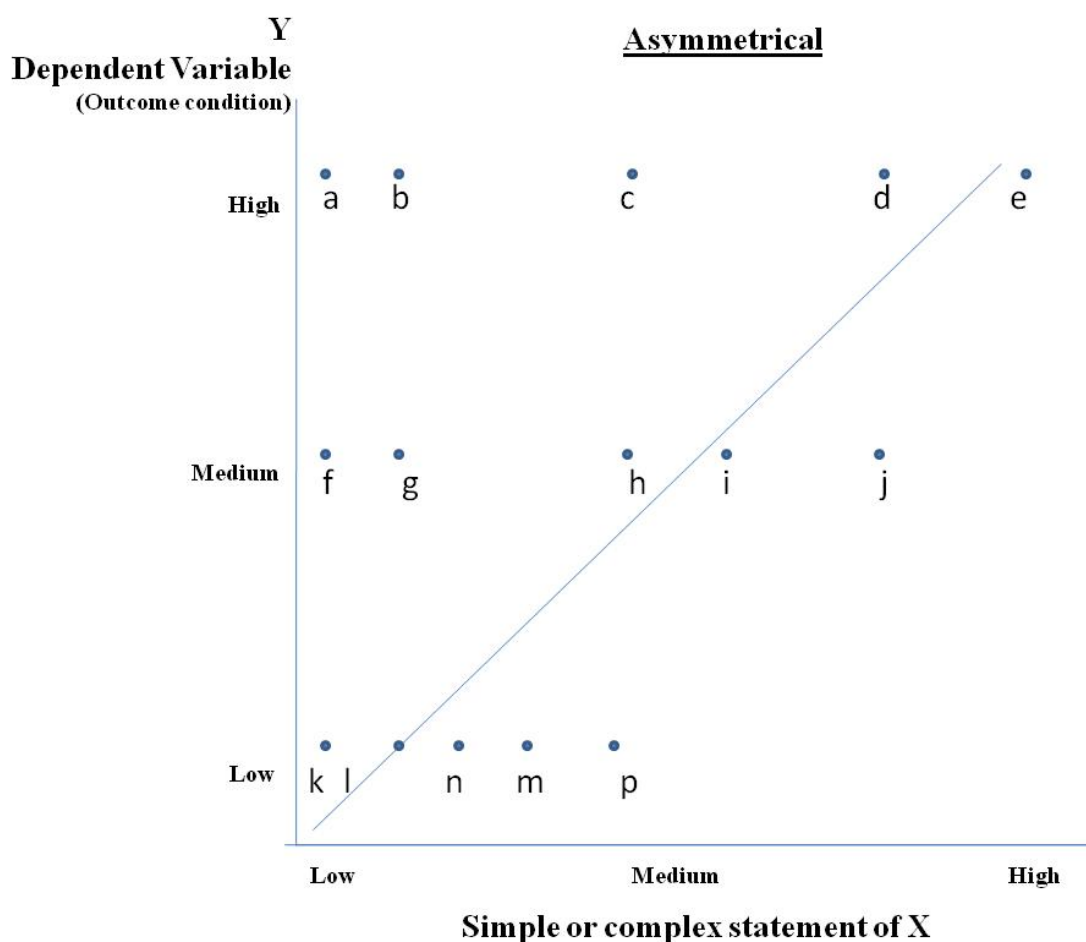
**Figure 7-2: Asymmetrical relationship between X and Y for 15 cases
of synthetic data**
(Source: Woodside, 2013, p. 464)

Lambert and Fairweather (2010, p. 50) investigate successful and unsuccessful product

innovations and find four useful models for innovation success and three, very different

(not merely negated) configurations of conditions for unsuccessful innovation. They

conclude that "there is no single pathway to success … Successful innovation is the

product of both individual inventive ability and the ability to manage the factors – the

innovation network – within which the invention is developed into an innovation. It

would seem that innovation success is more likely when more of the key factors are

given attention. The pathways to failure show that invention by itself is not enough." A

study into acceptance versus rejection of international product certification standards by

Prado and Woodside (2013) states that "Causal asymmetry occurs for adoption versus

non-adoption of product certification, that is, the causal recipes leading to adoption are often quite different from non-adoption than the negation of terms in these recipes. From these and other studies it is clear that "the set of causal conditions leading to the presence of the outcome may frequently be different from the set of conditions leading to the absence of the outcome" (Fiss, 2011, p. 395). Not only may different configurations of conditions lead to the presence or absence of an outcome, but from the perspective of asymmetrical relationships, one simple condition (independent variable in MRA) can have both a positive and a negative impact on the outcome, depending on the context. The context refers to the presence or absence of other treatment and measured antecedent conditions (Prado & Woodside, 2013).

The primary outcomes for this fsQCA study are decision competence (success + **bask*i***) and decision confidence (**conf*i***). Building on the insights and recommendations of Ragin, Goldstein and Gigerenzer, Armstrong and Woodside, the analysis now turns to examine what simple or complex configurations of conditions lead to the absence of high decision performance, labelled decision incompetence (DI) (**~ success** + **~bask*i***) and the absence of decision confidence, labelled decision doubt (DD) (**~conf_tot_c** + **~conf*i***).

The next section uses fsQCA analysis procedures to re-examine the 150 cases in this study as configurations to investigate context-specific configurations of conditions associated with non-performance or DI, and DD. It seeks answers to the following questions: What conditions either enable or disable specific connections between causes and outcomes? Under what conditions does group-interactive decision-making matter and under what conditions does management experience or education level matter? Do these conditions differ for males and females (**gender** and **~gender**)? Which treatment conditions combined with which measured antecedents predict high DI? Do some

measured antecedents alone predict high DI or DD? If so, are they necessary and sufficient to cause DI or DD? Ragin (2006b, p. 17) reports on similar analyses and notes that "These kinds of questions are outside the scope of conventional net-effects analyses, for they are cantered on the task of estimating context-independent net effects". Section 7.2 presents the findings when aggregated results over all four in-baskets are analysed. Sections 7.3 - 7.6 respectively present the results for the four In-basket assessments.

7.2 Examining Decision Incompetence (DI) and Decision Doubt (DD) aggregated over all In-baskets

7.2.1 DI of All In-basket Assessments

The first task is to consider consistency of the subset relation in order to assess sufficiency, having previously selected, scored and calibrated the causal conditions and outcome conditions. As Ragin (2000, 2006b) explains, the subset relationship between the combination of causal conditions and the outcome(s) under investigation is an estimate of causal sufficiency. The strength of evidence threshold for this study is 0.75 since "generally, scores on this measure that are lower than .75 indicate conspicuous departure from the set-theoretic relation in question ($X_i \le Y_i$)" (Ragin, 2006b, p. 32). Table 7-1 shows the results of the fsQCA analysis to determine membership in the outcome DI over all four in-basket assessments. The outcome **~success_c** indicates DI. The study first considers the impact of the four treatment conditions group inter-active decision-making (**group**), devil's advocate (DA) dissent (**devil**), goal-based scenario (GBS) simulations (**gbs**) and competency training aids (**comp**) on DI.

Table 7-1: Treatment conditions linked to DI

```
Model: ~success_c = f(comp, devil, gbs, group)

 Rows:        1




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.794433
Assumptions:

                          raw        unique
                       coverage     coverage    consistency
                      ----------   ----------   ----------
comp*devil*~gbs*group   0.094354    0.094354     0.794433
solution coverage: 0.094354
solution consistency: 0.794433
```

Further investigation is necessary since none of the models are very useful, due to the low coverage of less than 0.2. When configurations of all four treatment antecedents (**group; devil; gbs and comp**) are combined with the three measured antecedents (**gender; age_c; educ_c and man_exp_c**), consistency levels indicate a large number of possible models for consideration, but for most solutions (models) the coverage is well below 0.2, thus trivialising them (see Table 7.2). A single marginally useful model: **~group ● ~devil ● gender ● age_c ● man_exp_c** has a consistency score of 0.74 and coverage above the threshold of 0.27.

As indicated by Ragin (2006, p. 37), "the calibration of fuzzy sets is central of fuzzy-set analysis". In rigorously investigating DI, this study recalibrates the outcome DI using Boolean algebra. DI or **~bool_success** (**not_bool_success**) is defined as not achieving correct answers for all four in-basket assessments. Here Boolean algebra determines the minimum value of **~success_c** over all cases and all configurations. The results in Table 7-3 indicate cases of decision-makers who did not achieve decision competence

(**~bool_success** or **not_bool_success**) when analysing all configurations of all treatment conditions.

Table 7-2: Treatment and measured antecedents linked to DI

```
Model: ~success_c = f(man_exp_c, educ_c, age_c, gender, comp, devil, gbs, group)

 Rows:       86




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.711250
Assumptions:
```

	raw coverage	unique coverage	consistency
man_exp_c*age_c*gender*~devil*~group	0.273016	0.076424	0.735274
~man_exp_c*~age_c*~comp*~devil*~gbs*~group	0.094736	0.026958	0.663402
~man_exp_c*~age_c*~gender*~devil*~gbs*~group	0.095244	0.031155	0.820372
man_exp_c*~educ_c*age_c*~devil*~gbs*~group	0.170015	0.041073	0.822769
~man_exp_c*~age_c*gender*~devil*~gbs*group	0.075407	0.040692	0.620943
~man_exp_c*~age_c*~comp*~devil*gbs*group	0.067523	0.034461	0.682520
age_c*gender*comp*~devil*~gbs*~group	0.098550	0.021236	0.711662
man_exp_c*educ_c*age_c*devil*~gbs*group	0.076679	0.049339	0.773077
~man_exp_c*~educ_c*gender*~comp*~devil*gbs*~group	0.071719	0.014369	0.871716
~man_exp_c*~educ_c*~gender*comp*~devil*gbs*~group	0.035097	0.008647	0.816568
~man_exp_c*educ_c*age_c*~comp*~devil*gbs*~group	0.057604	0.016785	0.782383
~man_exp_c*~educ_c*age_c*comp*~devil*gbs*~group	0.071083	0.013988	0.849544
~man_exp_c*educ_c*~age_c*~gender*comp*~gbs*group	0.044507	0.021109	0.864197
man_exp_c*~educ_c*age_c*gender*~comp*~devil*gbs	0.104654	0.018311	0.861780
~man_exp_c*educ_c*~age_c*gender*comp*~devil*gbs	0.058113	0.017167	0.771960
educ_c*~age_c*gender*comp*~devil*~gbs*group	0.040437	0.005722	0.737818
~man_exp_c*educ_c*gender*~comp*devil*~gbs*group	0.051246	0.028230	0.735399
man_exp_c*educ_c*~age_c*~gender*comp*~devil*gbs*group	0.033825	0.014751	0.939929

```
solution coverage: 0.785351
solution consistency: 0.691757
```

Table 7-3: Configurations of conditions associating with DI (using Boolean algebraic recalibration)

```
File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp)

 Rows:      10




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

                 raw        unique
             coverage     coverage    consistency
             ----------   ----------   ----------
~devil        0.890134     0.732437     0.903368
group*~gbs    0.267563     0.109866     0.924109
solution coverage: 1.000000
solution consistency: 0.901010
```

Experimental treatments for which participants make decisions in groups but are not given GBS training (no specified roles and highlighted goals) resulted in high failure membership OR participants who make decisions in group interactive decision-making treatment AND are not given the benefit of GBS simulations associate with high DI. A useful recipe (consistency > 0.75 and coverage > 0.2) for DI is a combination of the treatment antecedents of groups and not GBS scenario simulations. In other words, if participants are placed in groups AND not given training in GBS, they have high membership in the set of incompetent decision-makers. This result guides educators and practitioners to use GBS simulations (which include clear goal specification and SI or role-play) to assist groups making decisions in order to avoid failure. Figure 7-3 illustrates the impact of **group ● ~gbs** on decision failure. Note that **not_bool_success** indicates **1-success** calibrated by using Boolean algebra (i.e. overall success = 0 for all for In-baskets).
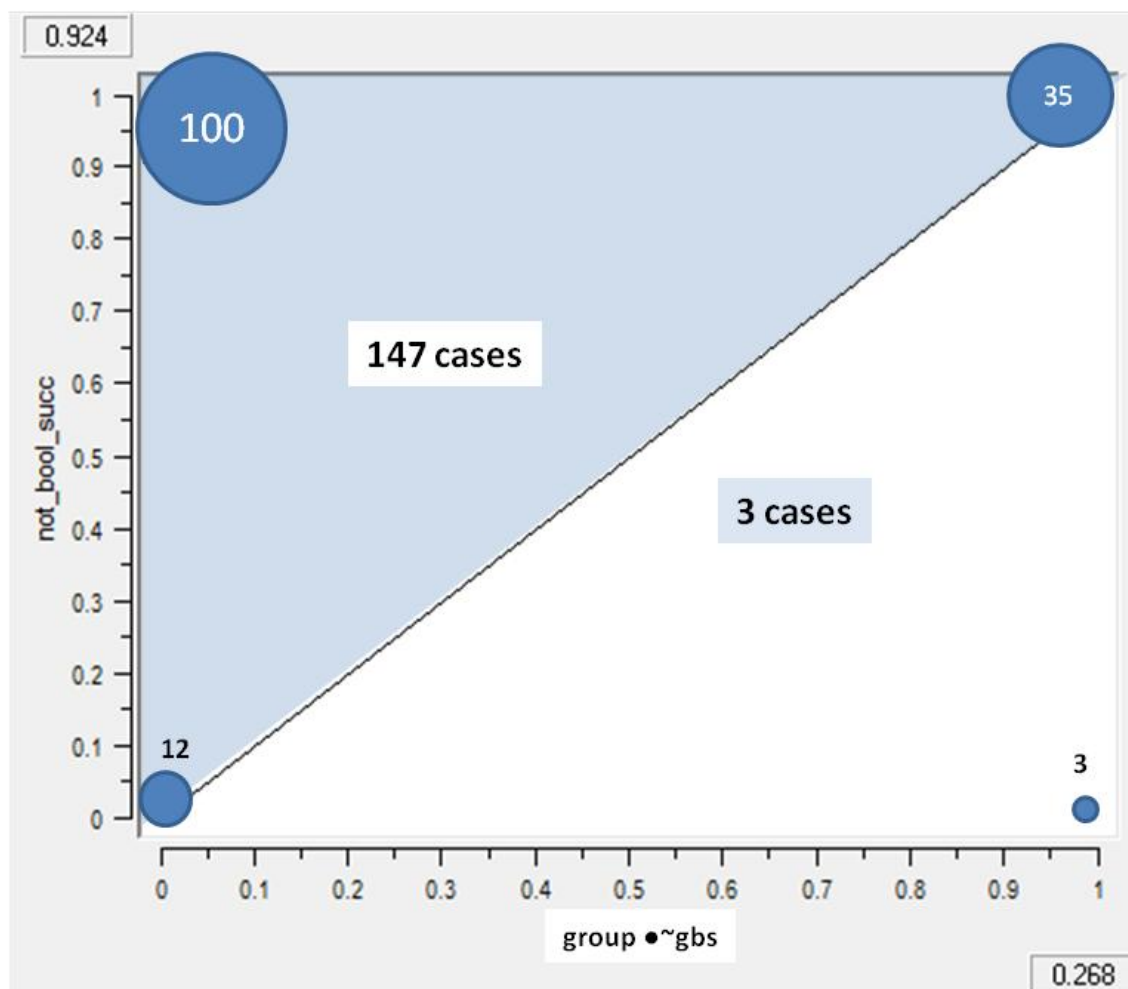
Figure 7-3: Plot of DI (failure) by configuration
(group ● ~gbs)

In summary, group AND not gbs OR not DA dissent associates with high DI (**group ●**

~gbs + ~devil → ~success).

Table 7-4: Configurations of conditions associating with DI
(using Boolean algebraic recalibration)

```
File:  C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows:      50




 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.731449

                                              raw       unique
                                           coverage   coverage  consistency
                                           --------  --------- -----------
~group*~devil*gender*age_c*man_exp_c       0.206353  0.038341  0.945548
~group*~gbs*~devil*~gender*~age_c*~man_exp_c 0.062556 0.019208  0.916758
~group*~gbs*~devil*~comp*~age_c*~man_exp_c  0.071450  0.025934  0.851291
group*gbs*~devil*~comp*~age_c*~man_exp_c    0.054485  0.035052  0.937018
~group*gbs*~devil*comp*~educ_c*~man_exp_c   0.069283  0.014051  0.866355
group*~gbs*~devil*gender*~age_c*~man_exp_c  0.064873  0.040807  0.908901
~group*gbs*~devil*gender*~educ_c*~man_exp_c 0.092078  0.014350  0.893401
~group*~gbs*~devil*age_c*~educ_c*man_exp_c  0.109193  0.027653  0.899077
~group*~gbs*~devil*comp*gender*age_c        0.074365  0.022870  0.913682
gbs*~devil*gender*age_c*~educ_c*man_exp_c   0.130942  0.012033  0.955289
group*~gbs*devil*age_c*educ_c*man_exp_c     0.050972  0.034903  0.874359
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c 0.030269 0.016517 1.000000
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c  0.036248 0.012257 0.837651
group*gbs*~devil*comp*~gender*~age_c*educ_c 0.036323  0.021674  1.000000
group*~gbs*devil*~comp*gender*educ_c*~man_exp_c  0.033632 0.020105 0.821167
group*~gbs*~devil*comp*gender*~age_c*educ_c 0.032212  0.008146  1.000000
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c  0.034604 0.007474 0.782095
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c 0.030942 0.006278  0.802322
solution coverage: 0.653812
solution consistency: 0.901113
```

Table 7-4 reveals the findings for DI of the configurations of the eight treatment and measured conditions considered for **~success** earlier in this chapter. In Table 7-4 the consistency is higher than the threshold value of 0.75 for all solutions. Coverage scores are below the threshold of 0.2, except in the case of the configuration: **~group● ~devil● gender ● age_c ● man_exp_c.** Although recalibration using Boolean algebra results in the same useful solution, this result is important and confirms that the causal conditions linked to DI are combinatorial in nature. This result confirms the proposition of Ragin and Fiss (2008) regarding causal asymmetry. In this study, causes leading to overall decision competence in all four In-baskets are quite different from those leading to the absence of the outcome, DI (compare Table 7-4 and Table 5-13, for example). Merely

negating all signs of antecedent conditions in the models for decision competence does not result in the models for DI.

7.2.2 DD of all In-basket Assessments

The fsQCA analyses reveal multiple paths to high levels of decision doubt (**~conf_tot_c** or DD). None of the models are empirically relevant, however, since the coverage scores do not meet the minimum requirement of 0.2. Table 7-5 shows these trivialised models.

Table 7-5: Trivialised models for overall DD

```
File:  E:/PhD_some stuff in final run to complete/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows:      50




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.705736

                                                        raw       unique
                                                     coverage   coverage   consistency
                                                     ---------  ---------  ----------
~group*~gbs*~devil*~gender*~age_c*~man_exp_c          0.131067   0.058684   0.848850      See graph
~group*gbs*~devil*comp*~educ_c*~man_exp_c             0.125994   0.026890   0.696262
~group*~gbs*~devil*~comp*~age_c*educ_c*~man_exp_c     0.101302   0.016066   0.821674
group*gbs*~devil*~comp*~gender*~age_c*~man_exp_c      0.038221   0.012853   0.768707
~group*gbs*~devil*gender*~age_c*~educ_c*~man_exp_c    0.135803   0.038052   0.793478
~group*~gbs*~devil*comp*gender*age_c*~man_exp_c       0.064434   0.025030   0.667250
group*gbs*~devil*gender*~age_c*educ_c*~man_exp_c      0.077626   0.029765   0.785958
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c       0.088618   0.000000   0.885135
~group*~gbs*~devil*gender*age_c*educ_c*man_exp_c      0.088111   0.033655   0.729691
group*~gbs*devil*~comp*gender*age_c*educ_c           0.064265   0.038897   0.676154
~group*gbs*~devil*comp*gender*age_c*man_exp_c         0.115847   0.060376   0.687751
group*~gbs*devil*~gender*age_c*educ_c*man_exp_c       0.052258   0.021140   0.782278
~group*~gbs*~devil*~comp*~gender*age_c*~educ_c*man_exp_c  0.063420  0.026044  0.966495
~group*gbs*~devil*~comp*~gender*age_c*educ_c*~man_exp_c   0.043971  0.018603  0.828025
group*~gbs*devil*comp*~gender*~age_c*educ_c*~man_exp_c    0.037206  0.006088  0.774648
group*gbs*~devil*comp*~gender*age_c*~educ_c*man_exp_c     0.047861  0.014713  0.860182
group*gbs*~devil*comp*~gender*~age_c*educ_c*man_exp_c     0.038559  0.005412  0.805654
solution coverage: 0.643497
solution consistency: 0.654567
```

Although the consistency for the configuration: **~group ● ~gbs ● ~devil ● ~gender ● ~age_c ● ~man_exp_c** is well above the threshold value of 0.75 at 0.85, the consistency for this complex antecedent condition is below 0.2 (0.13). The model may thus be considered marginally useful. Substantive knowledge of the theory and dialogue

between the cases and theory is required to determine the model's value (Ragin, 2006).

The plot in Figure 7-4 provides additional insights.

This marginally substantive model indicates that DD is associated with not group

interactive decisions, not DA dissent, female, young, and with low levels of

management experience. The results confirm that the complex configuration of

treatment and measured conditions generates the relevant outcome. No single simple

condition in isolation indicates the outcome of DD. For example, it is not evidenced that

young participants (**~age_c**) are less confident in their decisions than older ones

(**age_c**), nor that participants in group interactive decision interventions (**group**) are

more confident in their decisions than their individual counterparts (**~group**), nor any

other simple indication of a single condition resulting in DD for any participants.

For males the causal link between DD and the conditions is annotated by the following

expression:

~group ● gbs ● ~devil ● gender● ~age_c● ~man_exp_c ● ~educ_c→ high DD

where the tilde (**~**) indicates either the absence of the treatment (for **group**, **comp**, **devil**

and **gbs**) or, for measured antecedents (age, experience and education), lower levels (see

Table 4-6 and Table 4-7). Note that this expression has very similar levels of coverage

(0.13 and 0.14 respectively) for the models for female and male participants. Conditions

in the same order will assist to compare and contrast the two gender-specific models,

thus the re-arranged conditions reveal the difference between DD for male and female

participants:

~group ●~devil●~age_c● ~man_exp_c●gender●gbs● ~educ_c (male participants) (1)

~group ●~devil●~age_c●~man_exp_c●~gender● ~gbs (female participants) (2)

Note that the first four antecedent conditions are the same for both male and female

expressions, but their confidence outcome is differently affected by the GBS treatment

(**gbs**). For female participants the absence of the GBS treatment (**~gbs**) contributes to

DD, whilst for men the presence of the GBS treatment contributes to high DD. In

addition, male participants' education levels (**edu_c**) play a role in their DD in that

education levels below postgraduate qualifications (**~edu_c**) link to high DD.
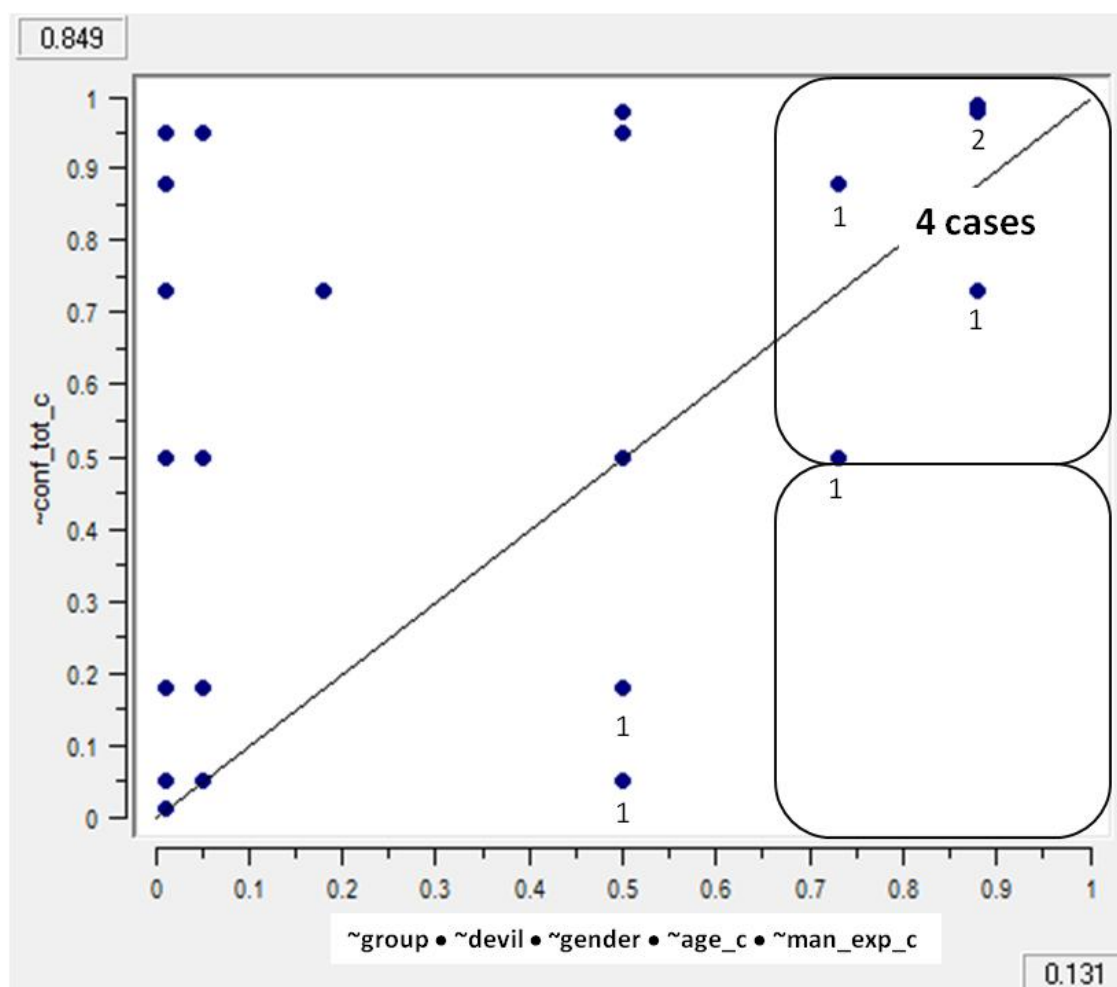
Figure 7-4: Plot of marginally useful model for DD
(~conf_tot_c) – female

Note: The number below each ● in the graph, indicates the number of cases represented by the ●

The DI and DD for each of the four In-baskets are investigated in the following

sections.

7.3 Examining decision incompetence (DI) and decision doubt (DD) for In-basket 1

7.3.1 DI (In-basket 1)

Configurations of conditions do not associate with high DI for In-basket 1 assessments.

Table 7-6 reveals that no model meets either the requirement of a minimum consistency score of 0.75, or the minimum consistency score of 0.2.

Table 7-6: Trivialised models for DI in In-basket 1 assessments

```
Model: ~bask1 = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c, conf1_c)

 Rows:     53




 Algorithm: Quine-McCluskey
       True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.723127


                                                               raw        unique
                                                            coverage    coverage    consistency
                                                            ----------  ----------  ----------
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c*conf1_c     0.074468    0.021277    0.646154
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c*conf1_c        0.104019    0.049941    0.734861
group*~gbs*devil*comp*age_c*educ_c*man_exp_c*conf1_c         0.097813    0.044622    0.764433
~group*~gbs*~devil*comp*~gender*~age_c*~educ_c*~man_exp_c*~conf1_c  0.065603  0.021277  0.723127
~group*~gbs*~devil*~comp*~gender*~age_c*educ_c*~man_exp_c*~conf1_c  0.074468  0.030142  0.747774
~group*gbs*~devil*comp*~gender*~age_c*~educ_c*~man_exp_c*conf1_c    0.063830  0.019504  1.000000
group*~gbs*~devil*comp*gender*~age_c*~educ_c*~man_exp_c*conf1_c     0.068853  0.024527  0.728125
group*gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c*conf1_c       0.061170  0.013298  0.731449
group*gbs*~devil*comp*~gender*~age_c*educ_c*man_exp_c*conf1_c       0.066785  0.016253  0.798586
~group*~gbs*~devil*comp*gender*age_c*educ_c*man_exp_c*conf1_c       0.079492  0.035166  0.741047
solution coverage: 0.338949
solution consistency: 0.584906
```

7.3.2 DD (In-basket 1)

Table 7-7 reports the findings for DD of the cases participating in the In-basket 1 assessments and shows that no solution supports high DD for any configuration of conditions. Ragin (2006b, p. 34) states that "parsimonious solution[s] … incorporate many combinations, without regard for their empirical plausibility … instead, the researcher evaluates the plausibility of the counterfactual combinations, a less

parsimonious solution is derived. This intermediate solution is obtained by first deriving the most complex solution (not shown here) and then using only 'easy' counterfactuals to produce an intermediate solution. The intermediate solution is a superset of the most complex solution and a subset of the most parsimonious", hence no useful intermediate solutions are indicated.

Table 7-7: Trivialised models for DD for In-basket 1

```
Model: ~conf1_c = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows:       50




 Algorithm: Quine-McCluskey
       True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.739558

                                     raw          unique
                                  coverage      coverage     consistency
                                 ----------    ----------    ----------
devil*~gender                     0.103323      0.058006      0.463413
~group*comp*~gender*~age_c        0.121148      0.075831      0.653094
~comp*~gender*~age_c*educ_c       0.130212      0.084894      0.556847
group*gbs*comp*gender*~educ_c     0.083988      0.006344      0.640552
group*comp*gender*age_c*~educ_c   0.103625      0.000000      0.462886
group*~devil*comp*gender*age_c    0.103625      0.000000      0.497100
group*comp*gender*~educ_c*man_exp_c 0.105740    0.006344      0.540121
group*gbs*comp*gender*age_c       0.077643      0.000000      0.563595
group*gbs*comp*gender*man_exp_c   0.075529      0.000000      0.632911
solution coverage: 0.335046
solution consistency: 0.422155
```

7.4   Examining DI and DD for In-basket 2

7.4.1   DI (In-basket 2)

For the outcome decision confidence for In-basket 2, cases are negated (**~bask2**), meaning that the outcome of DI is investigated for all 150 participants. Investigation of the truth table shows only 29 cases with high membership in DI. For these cases, no model indicating high association with **~bask 2** is useful, due to the low consistency (<0.75) and coverage (<0.2). Additional analyses of tenths of alternative iterations of the truth table and alternative combinations of conditions resulted in no useful models,

since the proportion of cases that are explained by the model (solution coverage) is so

low that these models are useless in fit.

Table 7-8: Trivialised models for DI for In-basket 2

```
Model: ~bask2 = f(man_exp_c, educ_c, age_c, gender, comp, devil, gbs, group)

 Rows:        8




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.701754
Assumptions:

                                                              raw         unique
                                                           coverage     coverage    consistency
                                                           ----------   ----------   ----------
~man_exp_c*~age_c*~gender*comp*~devil*~gbs*~group           0.137366     0.087233     0.837067
~man_exp_c*~educ_c*~age_c*gender*~comp*~devil*gbs*group     0.111297     0.033423     0.778036
~man_exp_c*educ_c*~age_c*gender*~comp*devil*~gbs*group      0.093583     0.043450     0.701754
man_exp_c*~educ_c*age_c*gender*~comp*~devil*gbs*group       0.109291     0.031417     0.746574
solution coverage: 0.273396
solution consistency: 0.693808
```

7.4.2   DD (In-basket 2)

The raw data for decision confidence (recorded as **conf2**), as well as the calibrated

fuzzy sets (**conf2_c**), are the lowest compared to all other declarations of confidence in

the four In-baskets. Thus, results for DD (**~conf2_c**) for In-basket 2 decisions are of

great interest to the researcher. Unfortunately neither parsimonious solutions nor

intermediate solutions offered any new insights (not provided by the overall results),

since the alternative configurations did not achieve the minimum threshold score of

0.75. In addition, the resulting parsimonious solutions explain such a low proportion of

membership (coverage <0.2) that additional case information (not available at the time)

would be necessary to interpret their usefulness.

Table 7-9: Trivialised models for DI for In-basket 2

```
Model: ~conf3_c = f(man_exp_c, educ_c, age_c, gender, comp, devil, gbs, group)

 Rows:      28




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.729970
Assumptions:

                                                        raw        unique
                                                     coverage     coverage    consistency
                                                    ----------   ----------   ----------
~man_exp_c*educ_c*~age_c*~gender*~devil*~gbs*~group  0.143025     0.086753     0.689265
~man_exp_c*~educ_c*~gender*comp*~devil*gbs*~group    0.062720     0.018757     0.633136
man_exp_c*educ_c*age_c*~comp*devil*~gbs*group        0.103165     0.059203     0.730287
man_exp_c*~educ_c*age_c*comp*~devil*gbs*group        0.102579     0.046307     0.678291
man_exp_c*~educ_c*age_c*~gender*~comp*~devil*~gbs*~group  0.087046  0.030774   0.765464
~man_exp_c*educ_c*~age_c*gender*~comp*~devil*~gbs*group   0.110785  0.066823   0.812900
~man_exp_c*~educ_c*~age_c*gender*comp*~devil*~gbs*group   0.073857  0.016413   0.752239
~man_exp_c*educ_c*~age_c*~gender*~comp*~devil*gbs*group   0.053341  0.009379   0.805310
man_exp_c*educ_c*~age_c*gender*comp*~devil*~gbs*group     0.070047  0.012603   0.773463
man_exp_c*educ_c*~age_c*~gender*comp*~devil*gbs*group     0.065064  0.008793   0.784452
solution coverage: 0.437867
solution consistency: 0.586803
```

7.5   Examining DI and DD for In-basket 3

7.5.1   *DI (In-basket 3)*

DI for in-basket 3 (**~bask3**) considers high membership in the set not-decision competence. The intermediate solutions following fsQCA analysis considering all four treatment antecedents are highly useful with consistency well above 0.75. The solution **~devil ● ~group** scores 0.80 for consistency and 0.69 for coverage.

Table 7-10 shows the algorithm: **~devil ● ~group + comp ● ~gbs ● group → ~bask3,** with a solution consistency of 0.81 and coverage of 0.83. The high levels of consistency and coverage reveal that the solution terms play a crucial role in the treatment procedures leading to DI. Figure 7-5 displays the scatter plot for the configuration encased by the dotted box, clearly indicating the high score for coverage and thus the high degree of membership in the outcome DI for In-basket 3.

Table 7-10: Highly useful models for DI for In-basket 3 (treatment conditions)

```
Model: ~bask3 = f(comp, devil, gbs, group)

 Rows:          6




 Algorithm: Quine-McCluskey
       True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.707754
Assumptions:

                      raw           unique
                   coverage        coverage      consistency
                  ----------      ----------     ----------
~devil*~group       0.687899       0.672970       0.796681       See graph
comp*~gbs*group     0.161226       0.146297       0.892071
solution coverage: 0.834196
solution consistency: 0.810482
```
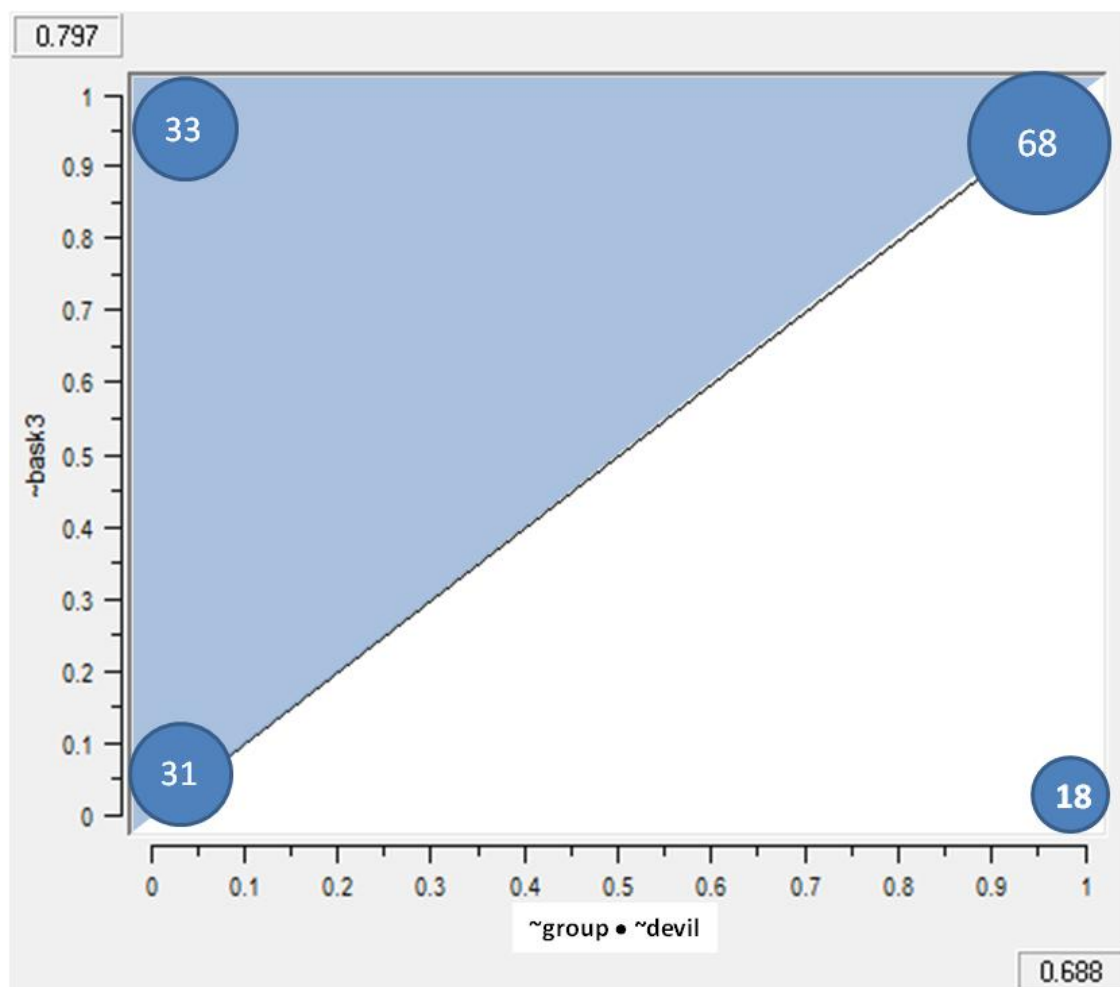
Figure 7-5: Plot of highly useful model for DI (~bask3)
Note: The numbers in each circle represents the number of cases

Further analysis of the association between high DI (**~bask3**) and the measured

antecedents (age, gender, management experience and education level) resulted in only

one useful solution: **conf3_c ● man_exp_c ● age_c** (indicated by the dotted box in

Table 7-11), with consistency and coverage scores above the threshold values. The

absence of the DA treatment and the group inter-active decision procedures predicts

high DI for In-basket 3 assessments.

Table 7-11: Highly useful models for DI for In-basket 3 (measured conditions)

```
Model: ~bask3 = f(conf3_c, man_exp_c, educ_c, age_c, gender)

 Rows:      18




 Algorithm: Quine-McCluskey
      True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.711520
Assumptions:

                                      raw          unique
                                   coverage      coverage     consistency
                                  ----------    ----------    ----------
conf3_c*~man_exp_c*~gender         0.185808      0.059116      0.770533
conf3_c*educ_c*~gender             0.152568      0.012042      0.757411
conf3_c*man_exp_c*age_c            0.366939      0.131668      0.750000   See graph
~man_exp_c*educ_c*~age_c*~gender   0.110669      0.012042      0.752877
man_exp_c*~educ_c*age_c*~gender    0.087878      0.010450      0.755993
man_exp_c*educ_c*age_c*gender      0.168889      0.009355      0.777371
solution coverage: 0.546875
solution consistency: 0.757513
```
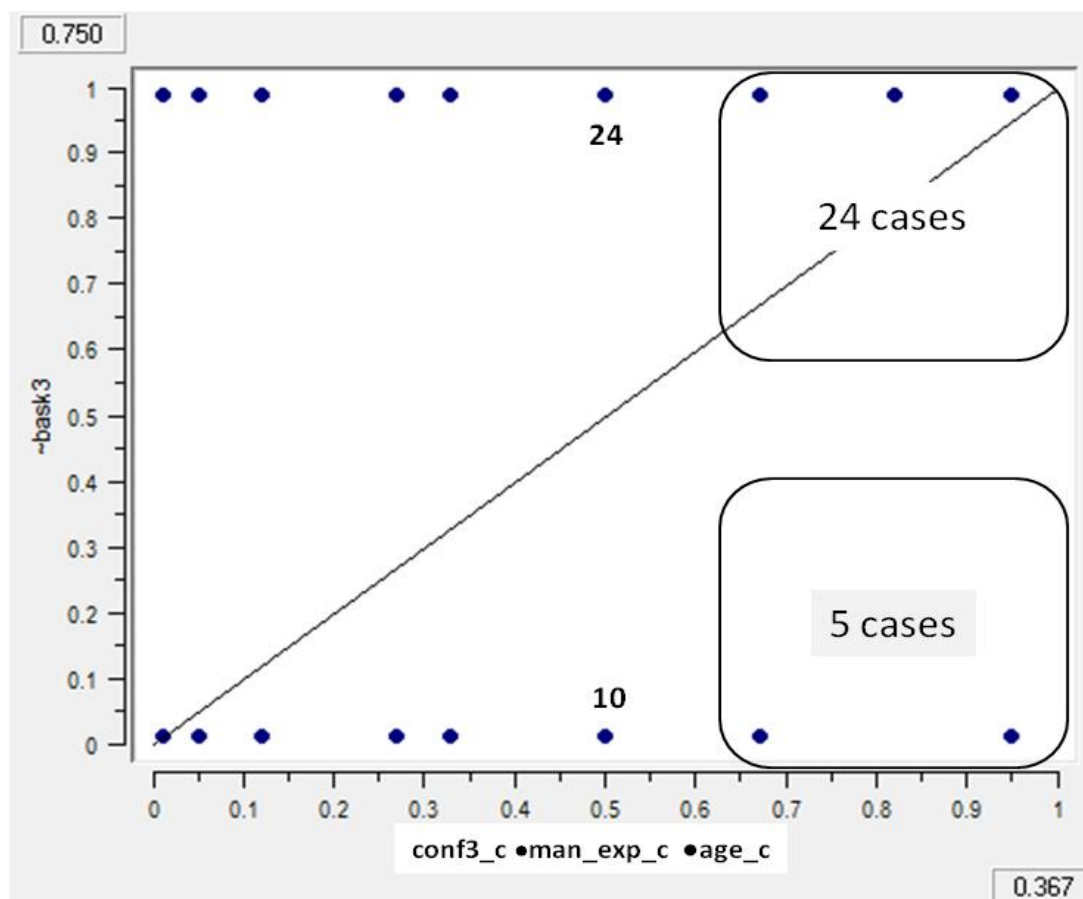
Figure 7-6: Scatter plot of DI for In-basket 3 (~bask3)

This means that high DI (**~bask3**) associates with high confidence in the decision for In-basket 3 AND high levels of management experience (>5 years) AND high age (>40 years). In other words, older participants with high levels of management experience who also self-report high levels of confidence in this particular simulation associate with high DI. The levels of solution consistency and coverage (0.75 and 0.37 respectively) reveal that this solution is important and sufficient to result in high DI.

7.5.2   DD (In-basket 3)

The dotted box in Table 7-12 captures all configurations with a consistency above the minimum threshold of 0.75, meaning that each solution term is a subset of the outcome. According to Ragin (2006c, p. 293), "Set-theoretic consistency assesses the degree to which the cases sharing a given condition or combination of conditions agree in displaying the outcome in question" (e.g. DD) and coverage "assesses the degree to

which a cause or causal combination 'accounts for' the empirical relevance." Thus the

models in the dotted box may associate with high DD, but because the coverage score is

low the models are empirically irrelevant.

Table 7-12: Not useful models for DD for In-basket 3

```
Model: ~conf3_c = f(man_exp_c, educ_c, age_c, gender, comp, devil, gbs, group)

 Rows:      28




 Algorithm: Quine-McCluskey
      True: 1
   0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.729970
Assumptions:

                                                    raw          unique
                                                  coverage      coverage     consistency
                                                 ----------    ----------    ----------
~man_exp_c*educ_c*~age_c*~gender*~devil*~gbs*~group    0.143025      0.086753      0.689265
~man_exp_c*~educ_c*~gender*comp*~devil*gbs*~group      0.062720      0.018757      0.633136
man_exp_c*educ_c*age_c*~comp*devil*~gbs*group          0.103165      0.059203      0.730287
man_exp_c*~educ_c*age_c*comp*~devil*gbs*group          0.102579      0.046307      0.678291
man_exp_c*~educ_c*age_c*~gender*~comp*~devil*~gbs*~group  0.087046      0.030774      0.765464
~man_exp_c*educ_c*~age_c*gender*~comp*~devil*~gbs*group   0.110785      0.066823      0.812900
~man_exp_c*~educ_c*~age_c*gender*comp*~devil*~gbs*group   0.073857      0.016413      0.752239
~man_exp_c*educ_c*~age_c*~gender*~comp*~devil*gbs*group   0.053341      0.009379      0.805310
man_exp_c*educ_c*~age_c*gender*comp*~devil*~gbs*group    0.070047      0.012603      0.773463
man_exp_c*educ_c*~age_c*~gender*comp*~devil*gbs*group    0.065064      0.008793      0.784452
solution coverage: 0.437867
solution consistency: 0.586803
```

7.6   Examining DI and DD for In-basket 4

7.6.1   DI (In-basket 4)

When considering only treatment antecedents, fsQCA analysis resulted in no useful

models for DI for In-basket 4 (see Table 7-13). When the analysis is expanded to

include all treatment and measured antecedents, the consistency scores of some models

are well above the minimum prescribed score of 0.75, but the consistency is still too low

(< 0.2) for the models to be considered useful and thus in need of interpretation. All

models are empirically irrelevant and thus trivialised by the fsQCA analysis. Multiple

additional analyses resulted in empirically trivial information, as demonstrated by the

example in Table 7-14.

Table 7-13:Trivialised models for DI for In-basket 4 (all conditions)

```
Model: ~bask4 = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows:      50




 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700704


                                                     raw         unique
                                                  coverage      coverage     consistency
                                                  ----------    ----------   ----------
~group*gbs*~devil*gender*age_c*~educ_c            0.197197      0.023175     0.793855
~group*gbs*~devil*gender*age_c*man_exp_c          0.178463      0.032057     0.786545
group*gbs*~devil*~comp*~age_c*~educ_c*~man_exp_c  0.059117      0.009992     0.823981
~group*~gbs*~devil*~gender*age_c*~educ_c*man_exp_c 0.064252     0.025396     0.672965
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c   0.056481      0.013600     0.702934
group*~gbs*devil*~comp*gender*educ_c*~man_exp_c   0.055648      0.014155     0.731749
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c   0.051762      0.007633     0.630067
gbs*~devil*~comp*gender*age_c*~educ_c*man_exp_c   0.104496      0.013045     0.788482
group*~gbs*devil*comp*age_c*educ_c*man_exp_c      0.050375      0.018040     0.810266
~group*gbs*~devil*comp*~gender*~age_c*~educ_c*~man_exp_c 0.030808 0.009992   1.000000
group*~gbs*devil*comp*~gender*~age_c*educ_c*~man_exp_c 0.039412  0.013877    1.000000
group*gbs*~devil*comp*~gender*~age_c*educ_c*man_exp_c 0.031363   0.010547    0.798586
gbs*~devil*~comp*gender*~age_c*~educ_c*~man_exp_c 0.079378       0.000000    0.783562
~group*gbs*~devil*~comp*gender*~educ_c*~man_exp_c 0.075077       0.000000    0.836167
~group*~gbs*~devil*~comp*age_c*~educ_c*man_exp_c 0.074383        0.000000    0.667497
group*gbs*~devil*~comp*gender*~age_c*~man_exp_c   0.070081      0.000833     0.796530
~group*~devil*~comp*gender*age_c*~educ_c*man_exp_c 0.113378      0.000000     0.755083
group*gbs*~devil*gender*~age_c*educ_c*~man_exp_c  0.054677      0.000000     0.674655
group*~gbs*devil*~comp*gender*age_c*educ_c       0.058424       0.000000    0.749108
group*~gbs*devil*gender*age_c*educ_c*man_exp_c    0.047322      0.000000     0.637381
solution coverage: 0.529558
solution consistency: 0.690929
```

Table 7-14: Trivialised models for DI for In-basket 4 (treatment conditions)

```
Model: ~bask4 = f(comp, devil, gbs, group)

  Rows:        3




  Algorithm: Quine-McCluskey
        True: 1
    0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.704375
Assumptions:

                                raw           unique
                              coverage       coverage      consistency
                             ----------     ----------     ----------
~comp*~devil*gbs*~group       0.197613       0.176797       0.707754
~comp*~devil*~gbs*group       0.129615       0.108798       0.704375
comp*devil*~gbs*group         0.102415       0.081599       0.790150
solution coverage: 0.388010
solution consistency: 0.703930
```

7.6.2   DD (In-basket 4)

As for the investigation of configurations of conditions associating with high DI for In-basket 4, the fsQCA analysis of algorithms for DD resulted in no useful models, as illustrated by a sample of some of the results in Table 7-15.

Table 7-15: Trivialised models for DD for In-basket 4

```
Model: ~conf4_c = f(man_exp_c, educ_c, age_c, comp, devil, gbs, group)

  Rows:        2




  Algorithm: Quine-McCluskey
        True: 1
    0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.731391
Assumptions:

                                                      raw           unique
                                                    coverage       coverage      consistency
                                                   ----------     ----------     ----------
man_exp_c*educ_c*~age_c*comp*~devil*gbs*group       0.074147       0.074147       0.731391
solution coverage: 0.074147
solution consistency: 0.731391
```

7.7 SUMMARY

Table 7-16 shows the aggregated findings from the four In-basket simulations for DI –
the same set of 150 cases analysed to produce the findings for decision competence in
Chapter 4. DI causal recipes are not the negated opposite of causal recipes for decision
competence. The models are complex and more often than not contain three or four
terms for both DC and DI outcomes. The asterisk (*) in Table 7-16 indicates a
marginally useful model.

Table 7-16: All models of overall DI

	Assessment Context	Consistency	Coverage
Decision Incompetence (~success)			
~group • ~devil • gender •man_exp_c • age_c	→ **~success** (**overall**)	0.74	0.27
~devil	→ **~success** (**overall**)	0.90	0.89
group • ~gbs	→ **~success** (**overall**)	0.92	0.72
~devil+ group • ~gbs	→ **~success** (**overall**)	0.90	1.00
~devil • ~ group+ comp • ~gbs • group	→ **~bask3**	0.83	0.81
conf3_c • man_exp_c • age_c	→ **~bask3**	0.75	0.37
Decision Incompetence (not_bool_success)			
~devil • ~group • ~ gender • age_c • man_exp_c	→ **~bool_success**	0.95	0.21 *

Table 7-17: All models of overall DD (~conf_tot_c)

	Assessment Context (Overall)	Consistency	Coverage
~devil ● ~group● ~ gbs ● ~gender ● ~age_c ● ~man_exp_c	→ **~conf_tot_c**	0.85	0.13 *
~group ● gbs●~devil ● gender ● ~age_c ● ~man_exp_c ● ~educ_c	→ **~conf_tot_c**	0.80	0.14 *

Similarly, Table 7-17 shows the aggregated findings from the four In-basket simulations for DD (no useful models for DD occur for any of the individual in-basket assessments). One certain statement is that high DI associates with group interactive decision-making AND not receiving a GBS treatment **(group ● ~gbs)**. Not only is the consistency very high (0.92), but the model is empirically highly relevant and covers 72% of all cases. The implication for educationalists is that group-work in the absence of clear goals as in case-based scenarios AND not training group members to consider the impact of the decision on different functions/objectives (normally represented by the role-players) is highly likely to result in poor decision outcomes.

The most striking feature of Table 7-17 is that **~success** is the only outcome which associates with a single node solution (**~devil**) over the entire study (consistency is 0.9). This is a highly useful and empirically important model since the coverage score is 0.89. The condition **~devil** is present in all but two of the configurations of conditions that associate with high membership in the outcome set DI. It is thus not a necessary but a sufficient condition for DI in the context of this laboratory experiment. The condition (**~devil**) also appears in the causal model for high DD. **Not-devil** (**~devil**) is thus sufficient to cause DI or DD, but is not necessary for either outcome.

The utility of exploring complex causal combinations in an effort to explain outcomes is clear. The results may also account for conflicting conclusions regarding the role of different andragogical methods and measured antecedents when scholars attempt to explain decision competency and decision incompetency. Learning about these complex causal models will aid educationalists' and practitioners' understanding of some of the factors (antecedent conditions) useful to consider when designing and re-engineering curricula.

Due to the complexity of the models and the diversity of conditions for different contexts, educationalists might have to refer to guides or checklists, rather than have a set of simple causal models to memorise, as this study aimed to produce. In the words on the cover of Gawande's book, *The Checklist Manifesto* (2009), "We live in a world of great and increasing complexity, where even the most expert professionals struggle to master the tasks they face. Longer training, ever more advanced technologies – neither seems to prevent grievous errors. But in a hopeful turn… Gawande finds a remedy in the humblest and simplest of techniques: the checklist." In an article by the same title, Gawande and co-author Zipple (2010) laude the benefits of checklists and state, "Checklist reduce the risk of being trapped by own flaws and limitations. Done well, a checklist can be a powerful way to reduce the risk that essential steps are overlooked in completing a task" (p.77). As Gladwell (2010) proclaims in his review of Gawande's book, "Experts need checklists—literally—written guides that walk them through the key steps in any complex procedure." A next step to follow this study could (and perhaps should be) the development of checklists to aid scholars and practitioners in selecting teaching methods and tools to build management competencies in nurturing their opposable minds.

CHAPTER 8: CONCLUSIONS, LIMITATIONS AND CONTRIBUTIONS TO THEORY AND PRACTICE

8.1 CORE PRINCIPLES

The core principle on which this study is based is that what often appears as "common sense" or "known truths", and what sometimes appears in the literature as truth without evidence and without formal testing of its validity, needs to be formally and scientifically studied. An example of such truths can be found in the book *Redirect* by Timothy Wilson (2013), which challenges the "known truth" that victims of trauma or abuse will benefit from immediate psychological counselling or crucial incident stress debriefing (CSID). Wilson provides evidence that offering grief counselling immediately after a tragedy or traumatic incident is not helpful as a strategy. The recommended and "better" strategy is to allow victims/survivors to deal with the trauma by using story-telling and journal writing a few weeks after the critical event.

Propositions on how to develop decision competence and what training methods affect management decision competency often appear in the literature as truth without evidence. The core purpose of this research is to formally test the validity of combinations of training methods for business schools to improve decision competency. Scientific assessment of methods is common practice in psychology and applied business, both in laboratory and field contexts, and it somewhat surprising that business schools have not made much progress in testing useful configurations of teaching methods to improve decision competence. Using treatment and control groups as a method of finding tested and valid interventions is well established (Campbell & Stanley, 1963b) both in laboratory and field contexts, but the majority of research papers still seems to use self-administered surveys and focus on net outcomes.

Armstrong and Green (2007) writes of hostility towards such testing and cites the resistance of academics and the long battle to get a paper about a widely used decision aid – the Boston Consulting Group (BCG) matrix – published in recognised academic literature. He advises researchers to pursue scientific research, concomitant with resistance, in the pursuit of excellence. Another cornerstone to this study is the belief that "method shapes thinking and theory crafting" (Gigerenzer, 1991cited in Woodside, 2013, p. 1). Woodside (2011) warns against the limitations of the dominant methods of MRA and SEM and suggests that scholars use algorithms and fiscal as tools to develop theory in social science and management. Rong and Wilkinson (2011) expose many shortcomings in use of cross-sectional self-report surveys to collect data on decision-making executives. They lament that most studies do not include attempts to create and test alternative causal sequences in managerial research. In response to the warnings and advice offered by these celebrated authors, this study takes up the challenge to look beyond "net effects" and the reliance on self-report surveys in order to find necessary and/or sufficient "key success factors" for decision competence.

This study relates to the above quests and the view that method drives theory, which runs counter to the dominant logic that method naturally follows theory. This thesis proposes that configural recipes which combine treatment and measured antecedents need examination for their impact on associating with high decision competence outcomes, rather than adopting the dominant logic of proposing to study the "net effect" of the individual treatment conditions (variables) and the relative size of the net impact by comparing standardised betas. This study adopts the view that no single treatment or measured antecedent is sufficient or necessary for high decision competence.

Further, following Armstrong and Brodie (1994), a true experimental design with administration of treatment and control (placebo) conditions for proper or scientific

testing of the real value of propositions was implemented. This research takes a meaningful step towards examining combinations of tools for conscious thinking and contextual elements by studying different thinking tools as well as characteristics of the participants such as age, gender, education and management experience. The study of such combinations is a core recommendation of Simon (1992), in which the author presents a dual-blade (scissors) analogy that combines cognitive intelligence (here decision competence) with the context of the problem. A valuable advantage of the design and analysis methodology adopted in this study is that the researcher can study the potential configural causes of high competence outcomes and simultaneously, with the same rigour, the configural causes of making poor choices of incompetent decisions. This study therefore extends the work of Armstrong, Weick, Gigerenzer, and Simon and build on the study by Spanier (2011) on sacrosanct announcements in managerial education as to successful competency training methods.

This study's laboratory experiment examines four decisions in four separate marketing management realms and is to the best of the researcher's knowledge the first to experiment on a large scale with tools for thinking well and for improving training in marketing decision-making by using true experiments and configural analysis (QCA) to test propositions and useful recipes for competence and incompetence. Using fsQCA allows robust research despite small-N cases. Often experiments cannot be designed to have sufficient statistical power (of at least 30 cases per cell) to test models and propositions. Configural analysis in contrast permits testing for few cases (5-10) per cell and is thus isomorphic with what happens in real life.

The study replicates four decision points in the separate domains, thus generating multiple decisions and contexts but keeping the measured antecedents related to the decision-makers (participants) constant. Four sacred pronouncements challenged by

scholars in the literature and by this study are: (1) facts and evidence-based decisions versus peer opinions and overconfidence in one's incompetence; (2) the use of fast and frugal heuristics versus analytical hierarchical processes (AHP) such as the use of weight prioritisation matrix; (3) market share and competitor orientation versus profit maximisation; (iv) media overage versus cash-flow and return on investment (ROI). As stated earlier, none of these models are necessarily associated with high incompetence, but both goals and context impact their effectiveness as decision aids. An example quoted earlier in this thesis is the proposal by Weick et al. (1999) of highly reliable organisation theory (HRO) as a counterpoint to profit maximisation. Such theories run counter to the dominant logic and frequently shock because they contain recommendations that are likely to change preconceived beliefs and firmly held misconceptions – in direct opposition to the dominant logic of the time.

8.2   SUMMARY OF CONTRIBUTION OF THIS STUDY

This thesis makes a modest contribution that extends the theories relating to management competency development and education in decision- and sense-making and adds to the seminal works of Boyatzis, Armstrong, Schank, Brodie, Gigerenzer and other management and marketing experts. The propositions are rigorously tested with regards to the managerial training methods best suited to aid in decision competency and decision confidence. The study makes nominal advances in guidelines regarding new or improved tools to prevent graduate managers from making incompetent choices or decisions, and reductions in their inability to drop their tools and previously acquired knowledge – should the circumstances favour doing so. Although there is evidence to support the statement by Spanier (2011, p. 94) that "good decision-making can be taught", the QCA procedures and additional analysis of data sets did not always succeed in identifying clear-cut causal conditions or "solutions" to indicate unambiguously "how". Unfortunately there are no simple answers to this, as demonstrated in Chapters

4, 5 and 6. . The many different configurations of causal conditions (equifinality) send a clear message to educators and talent developers: Simon's (1992) scissors analogy and Bandura's three-factor human efficacy theory need to be constantly borne in mind when considering teaching methods. That is, educators need to be constantly aware that cognitive, behavioural, and environmental factors impact competency development. Context, conduct and cognition are important considerations for any and all managerial development interventions. No catch-all method (e.g. placing students in groups, using role-play or providing competency training in isolation) will work for all contexts, all problems and/or all students. Educators and managers need to assist students and protégés with a tool kit of decision-making aids, but students need to practise how to use them and when to not use ("drop") them.

This study contributes to the body of knowledge regarding organisational knowledge, organisational learning, management development and experiential learning. A further contribution of particular use to management practitioners and HR specialists is the four tested in-basket simulations for use in assessment and selection centres. Experientialists (Feldman & Lankau, 2005; Gosen & Washbush, 2004) ask for high quality exercises and this study contributes four laboratory and field-tested in-basket simulations. Faculty responsible for re-engineering the MBA curricula (or other management education and development interventions) now have access to empirically supported knowledge regarding the four laboratory tested teaching methodologies.

This study applies QCA as method and set of techniques to the study of managerial decision competency and incompetency, as well as to the study of MBA andragogy. This study is, to the best of the author's knowledge, the first to apply the fsQCA approach to these disciplines. Given the limitations and complications experienced with traditional statistical and quantitative methods, the existence of a well-documented

example of the application of this tool in managerial development could be of great value.

QCA demands transparency from the researcher and this means that it is possible for other researchers to take this study as a starting point and to "re-visit the analysis, for instance taking a few cases out or bringing a few cases in, adding one or two conditions, changing the way some conditions have been dichotomized, etc. … Because QCA is a case-sensitive technique (De Meur et al, 2008), the result of these other analyses will most probably yield some different formulae … which in turn will further enrich cross-case interpretation" (Rihoux & Lobe, 2008, p. 237). In this way, the conceptual work and detailed experimental tools (e.g. in-basket simulations, competency and incompetency training aids) will greatly reduce the preparatory time and labour-intensity of an experiment of this nature by providing pre-tested materials to use as launch-pad into further research. But, there are many unanswered questions and thus the research journey has only just begun. The next section sets out some suggestions and warnings for future research projects to assist in extending the work done thus far even further.

Although not explicitly covered in this thesis, the author is proud to report on feedback from participants on the impact of the study on their business lives. Oral feedback immediately after concluding the laboratories, and more recently written feedback from participating MBA students, indicated enhanced self-confidence in completing in-basket assessments during job interviews, plus the additional benefit of experimenting with the "new" decision aids used in the laboratory. The author is both a lecturer and business consultant so feedback of this nature is very rewarding. Evidence of said feedback is available upon request.

8.3   LIMITATIONS AND INSIGHTS USEFUL FOR DESIGNING REPEAT STUDIES

What I know now that I did not know before and what I would have done differently

The following limitations may have affected the results of the study. First, although the researcher made every attempt to control all variables in the experiment, a large number of variables may affect the causal conditions as well as the final outcome of the experiment. Such variables may include factors impacting on participants' cognitive abilities and cause varying levels of interest and motivational distractions or "noise", such as fatigue; personal debilitating emotional factors; existing dislikes or likes between group members resulting in bias towards expressed options (even if randomly allocated students are in a relatively small corps within the university); unpleasant previous experience in events similar to those described in the scenarios; and physical discomfort due to circumstances outside of the control of the researcher such as ailments and other such inter- and intra-personal factors.

The experimental studies were timed to (1) accommodate pressures of examinations, so studies were performed in weeks 2 to 5 of the 8-week terms, and (2) participants could select from four different times of the day and four different days of the week.

Secondly, competency and incompetency training was provided in the form of written instructions. Learner styles differ, and some learners, classified as "auditory" in the literature, absorb information better when presented verbally, whilst others, classified as "kinesthetic", learn better through demonstrations and touch. Accordingly, the use of written competency and incompetency training matter is a likely impact factor that was not controlled for in this experiment. Whilst random assignment of participants might have reduced or even negated this impact, the study cannot report on the effect of learner style with any authority. In addition, with the wisdom of 20-20 vision after

completing the study and the analysis if the data, the researcher would implement the in-basket training quite differently. Students should be able to verbalise their interpretation of the written training support material and at least have one practice session, focused solely on the teaching method (not the decisions, but the process of getting to the decisions). Although the role-play, the goals, the use of the devil's advocate dissent and the need to extract insights from the group members were actively and thoroughly stressed in the briefing leading up to the 2-hour experiment, future research should allow participants to practise these inter-active, simulated roles before the experiment. Although the study does not provide evidence for the following claim, it is the researcher's perception that there was so much focus on getting to the decision that procedural instructions took a back seat and the front seat belonged to "getting the answer right".

Third, a large proportion (39.3%) of the participating student sample indicated fewer than 5 years management decision-making experience. While it would be highly desirable to use currently employed managers to improve the generalisability to business executives, of primary importance to this study is the improvement of andragogy for MBA students, thus negating this limitation for this study. Further, the skill set and demographics of the participating students are compatible with the larger population of practising managers. Age, gender, race and experience levels vary greatly within organisations and demographics gathered from NZTE correspond well with the demographics provided by the participants. These demographic indicators may differ substantially in other countries and in other universities.

8.3.1 *Pre-existing Experience and Skills*

Without a pre-test it was not possible to identify pre-existing skills or decision competencies. A pre-test though might have (1) prepared the students to anticipate

contextual factors and (2) allowed discussion amongst the very small MBA consort and thus contaminated the results. In hindsight, it is desirable to have a more quantitative measure of pre-test decision competence than the self-recorded measure of experience as captured in the demographic section of the study. The assumption that all MBA students have comparable levels of decision competency might not be sound and further evidence and a quantifiable, assessable measure of pre-test decision competency is required. Prior knowledge could (and perhaps should) be ascertained by pre-tests. Another way to examine this problem is to selectively pre-familiarise some participants with the issues related to the decisions and determine the impact of this prior exposure to the results achieved by participants not exposed to the materials and competency training aids. Random allocation to the control group should have countered this, which means that the outcome is compared to a control group, rather than improved performance of an individual against his/her own prior performance.

In addition, it is highly desirable to repeat the study with currently employed managers and compare those results with the results achieved for MBA students. The value of such a repeated study might contribute to the predictive validity as well as the generalisability of the study. I recognise the importance of predictive validity, however this study does not include estimating predictive validity, only fit validity due to its exploratory nature.

An additional and highly desirable extension to the experiment would have been to add in-depth interviews to build on the gathered case knowledge. Although it was already difficult to achieve (a big ask of over-extended MBA students) a 2-hour laboratory experiment involving 150 MBA students, the analysis, understanding and interpretation of results are likely to have been improved by asking in-depth, qualitative question of participants to gain insight into the reasons behind their decisions. Open-ended

questions to supplement the quantitative (already recorded) answers with more

qualitative answers about the participants' decision processes, their reasoning, as well as

the impact of the different competency and incompetency training aids on (i) their

decision (in)competence and (ii) their decision confidence/doubt would have been

extremely valuable. If such an interview were too difficult to achieve (for time reasons)

an additional question such as the one below, could be included in the survey.

1	The provided decision support aid is highly relevant and I referred to the component about:	2	The provided decision support aid is somewhat relevant and I referred to it in a general manner when making my decision about the scenario	3	The provided decision support aid is not very relevant and I found it somewhat of a distraction when making my decision about the scenario	4	The provided decision support aid is a distraction and I rejected it when making my decision about the scenario.
Comment in some detail about the usefulness of the decision aid (Which component or element did you refer to?):							

Figure 8-1: Suggested self-report mechanism to capture additional case details

8.3.2 Time and Timing

Although the pre-test indicated that the 2-hour time allocated for the four in-basket

decisions was (1) realistic (as managers might allocate for the for decision-tasks or be

the relative time allowed for these activities because of other pressures encountered in

the real world) and (2) sufficient, some non-verbal indicators (such as surprise or upset

when the instructor indicated time was up) flagged the limited time allotment as a

possible impact factor. This is especially relevant for the eight cells for which one of the

causal factors included interactive group decision-making and discussion. No concerns

were raised in experimental groups where decisions were made as individuals and all

participants handed their decision sheets in well before the two hours expired. It might

thus be useful to add an additional causal condition in future experiments where the time allotment is much more generous (say three to four hours) to measure and record the impact of additional time for more in-depth group discussions and more time to consider the options available. An additional indicator that the time allocated for this study might have been too short is the very cryptic sentences used in the open-ended questions. Again, the recommended remedy is a series of qualitative questions to be conducted immediately upon conclusion of the simulated group decision intervention and after participants have completed the decision and demographic sheets. This might have assisted the researcher to have better understanding of the factors impacting participants' final decisions and allowed for richer insight into each of the cases in a cell. However, in the words of Gigerenzer and Brighton (2009b, p. 116),"more information, computation and time is not always better", so allowing for different conditions in future experiments (including additional discussion or decision time) and allowing different heuristics and their application by the participants need further examination.

8.3.3 *Bounded Rationality*

Participants were provided with limited information and although typical of MBA cases, this is not reflective of real-life marketing and management decisions. One of the complaints about MBA training is the inability of students to determine relevant and irrelevant information. This lack of information and availability of an abundance of irrelevant information (as in real life) was addressed in a small way through the provision of some facts to be ignored, but very minimally. Further, incompetency training tested participants' competency in determining relevant facts in different contexts and "drop tools" strategies to make the most effective decisions. In future in-basket simulations should perhaps be reduced in number to keep the time realistic, but

the number of information sheets and decision support aids should be increased to reflect real-life more closely.

8.3.4   Consensus

Groups were not required to reach consensus. The researcher deliberately chose not to ask participants to reach consensus and instructed the instructor to stress this point carefully during the pre-experiment briefing. Reasons for this were: (1) more time is needed; (2) one decision per cell might not indicate participants' own choice despite the interaction; (3) group dynamics are quite different when groups attempt to reach consensus; and (4) demanding consensus implies a group facilitator or leader will need to lead people to that point. The researcher did not want to complicate the decision-making process by either appointing a group leader or investing the additional time required for newly formed groups to decide on or allow a natural leader to appear. Although this can be seen as a key strength, future studies could consider a comparison between consensus decision-making outcomes and group interactive decision-making results.

8.3.5   Group Dynamics

Consensus is closely linked to team work and group dynamics. In real-world scenarios managers often make group decisions during or after interaction with teams they are familiar with. (This may vary substantially from circumstance to circumstance.) Decision-makers may have spent many hours developing team norms and team goals and thus the dynamics may be very different from those displayed during the experiment. The issue of team formation status (i.e. where they are in the process of forming, storming, norming, performing, mourning) has not been accommodated (Firestien & McCowan, 1988; Osborn, 1963; Putman & Paulus, 2009; Todd, 2005), nor its impact tested in this study. Participants were given very brief instructions about

group interaction in order to optimise the 20 minutes provided for group interaction during the experiment. These instructions were brief and pointed, but there is no evidence that these instructions (1) were adopted/accepted or (2) implemented during the group discussions. In addition, the 20 minutes groups were allowed for interactive role-play and decision-making for each separate in-basket did not allow much time to build cohesive groups (or enter into the five-phase group development process) and see the impact of group dynamics. Some groups may know each other better than others; again random allocation should overcome this, but no specific controls were in place to have similar levels of personal experience in the same team.

In addition, future experiments replicating or extending this study could ask participants to assess the impact to some level by using the suggested additional feedback sheet in Figure 8-2. Although this is a self-report survey, this additional case knowledge could provide additional insight(s) of value to educators and practitioners.

A) Please indicate how much of your decisions were affected
by the group discussion. Please tick ☑ your option:

1	I did not change any of my decisions or reasons during or after the group discussions.	2	I considered the group's opinions, but changed only the reasons, not the decisions.	3	I changed a few decisions and/or reasons based on the group discussions.	4	I changed the majority of my answers and/or reasons based on the group discussions.

B) Please indicate how much your decisions were affected by
the devil's advocate in the group. Please tick ☑ your option:

1	I did not change any of my decisions or reasons because of the caution expressed by the devil's advocate.	2	I considered the devil's advocate's caution and reconsidered my decisions in the fewer than half of cases.	3	I changed more than half of my decisions and/or reasons based on the caution expressed by the devil's advocate.	4	I changed the majority of my answers and/or reasons based on the caution expressed by the devil's advocate.

Figure 8-2: Suggested self-report mechanism on final feedback sheet

8.3.6 Range of Topics

The decision topics were deliberately selected to be mostly marketing related (market share, key clients, service recovery, pricing, advertising, selling and sales training). To ensure verisimilitude and generalisability a broader range of management decisions might be necessary. In addition, the in-basket simulations were only a few pages of details, whereas in real-life business scenarios an information over-load, as well as the inter-linked nature of decisions, are likely to be part of the decision dilemma. To be a better copy of reality, future research regarding decision competence could include more complex scenarios, with more useful and more useless information in the scenario material. In addition, decisions impacting more than one strategic business unit should be included with more than one or two aspects to compare. In addition, the decisions in the four in-basket simulations were mostly tactical in nature. Little to no incentive was provided for participants to consider the wider context within neither the firm nor the long-term impact of the decision. Agency theory (Eisenhardt, 1989) also suggests that decision-makers are likely to consider their own gain and this factor was not built into

the decision-making activities. The extant literature indicates that this plays a significant role in the decisions managers make.

8.3.7   Multiple Choice

Participants were provided with a limited range of answers to each of the in-basket assessments. In addition, qualitative studies would allow gaining additional insights into the reasoning process by following the decisions with in-depth interviews. Participants were not given the opportunity to rationalise or qualify their decisions due to the very limited time-frame. Pre-tests indicated that busy executives and MBA students were not likely to spend more than two hours in the laboratory. The additional time required to interview participants will thus remain a challenge for future research. A suggestion to consider is the use of open-ended questions that might improve participants' ability to indicate an unlimited range of choices and decisions, considering a variety of factors. The multiple-choice style decision sheets might have provided answers that do not represent participants' decisions fully. Students were not given the alternative of another option, beyond those provided in the multiple-choice, nor the opportunity to indicate their level of satisfaction with the answers provided or choices made.

8.3.8   Confidence and Likelihood to Change Decisions

Participants' self-confidence in their decisions was only tested with a single question. Future researchers should not merely rely on self-recorded measures but should test this confidence. In addition, the question about likelihood to change the decision (after two weeks) relied on a selection from four Likert scale indicators. Although the nature and scope of this study did not allow the researcher to repeat the experiment after two weeks to validate/disprove the participants' choice, it would be advisable to do so in future research of this nature. Following the experiment up with an additional chance to reconsider the decision would allow testing hypotheses about the power of

"unconscious deliberation" but may counter the "take the best" heuristic. This needs to be tested fully.

Although fsQCA is designed for small-N experiments, some scholars may find it desirable to replicate the study with a larger and more diverse study sample, thus improving the generalisability. The study considered only students from four universities in New Zealand and although the recorded demographics indicated a very diverse group of participants (age, gender, ethnicity and nationality) it is highly desirable to replicate this experiment with large student groups in other business faculties within New Zealand and in other countries.

8.4   A FINAL THOUGHT

Finally, the need for accurate assessment of the value of tools to increase decision competence via controlled experimentation will continue beyond any single study. Similar to real-world decision-makers, researchers need to avoid the fallacy that the tools presently being used cannot be improved upon. This study makes a real and measurable contribution to the refinement of research instruments designed to investigate and assess the impact of competency and incompetency training on nurturing executives' opposable minds through decision competency and incompetency development. My research in this field will continue, and it is hoped that the findings of this research will encourage other researchers in the field to further refine our understanding of both effective and ineffective decision-making processes.

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APPENDIX A:

AUTEC APPROVAL: 20 October 2013

AUTEC APPLICATION: EA1 – 11/257_2011

MEMORANDUM

Auckland University of Technology Ethics Committee (AUTEC)

To:	Roger Marshall
From:	**Dr Rosemary Godbold** Executive Secretary, AUTEC
Date:	20 October 2011
Subject:	Ethics Application Number 11/257 **Competence and incompetence training in executive decision making: Developing contextual intelligence through hard-soft skills that nurture the opposable mind.**

Dear Roger

Thank you for providing written evidence as requested. I am pleased to advise that it satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC) at their meeting on 26 September 2011 and that on 13 October 2011, I approved your ethics application. This delegated approval is made in accordance with section 5.3.2.3 of AUTEC's *Applying for Ethics Approval: Guidelines and Procedures* and is subject to endorsement at AUTEC's meeting on 31 October 2011.

Your ethics application is approved for a period of three years until 13 October 2014.

I advise that as part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through http://www.aut.ac.nz/research/research-ethics/ethics. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 13 October 2014;

- A brief report on the status of the project using form EA3, which is available online through http://www.aut.ac.nz/research/research-ethics/ethics. This report is to be submitted either when the approval expires on 13 October 2014 or on completion of the project, whichever comes sooner;

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are reminded that, as applicant, you are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

Please note that AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to make the arrangements necessary to obtain this.

When communicating with us about this application, we ask that you use the application number and study title to enable us to provide you with prompt service. Should you have any further enquiries regarding this matter, you are welcome to contact me by email at ethics@aut.ac.nz or by telephone on 921 9999 at extension 6902.

On behalf of AUTEC and myself, I wish you success with your research and look forward to reading about it in your reports.

Yours sincerely

Dr Rosemary Godbold
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Rouxelle de Villiers rdevilli@aut.ac.nz

From the desk of …	Private Bag 92006, Auckland 1142	Tel: 64 9 921 9999
Dr Rosemary Godbold	New Zealand	ext 8860
Executive Secretary	E-mail: ethics@aut.ac.nz	Fax: 64 9 921 9925
AUTEC		page 1 of 1

Auckland University of Technology Ethics Committee (AUTEC)

EA1

Please read the notes at the end of the form before submitting this application.

A. General Information

A.1.   Project Title

If you will be using a different title in documents to that being used as your working title, please provide both, clearly indicating which title will be used for what purpose.

THESIS TITLE: Competence and Incompetence Training in Executive Decision-Making: Developing Contextual Intelligence through Hard-Soft Skills that Nurture the Opposable Mind.

PROJECT TITLE: Management Decision-making *(It is not advised to use the title of "incompetence" as far as the participants is concerned.)*

A.2.   Applicant Name and Qualifications

When the researcher is a student (including staff who are AUT students), the applicant is the principal supervisor. When the researcher is an AUT staff member undertaking research as part of employment or a staff member undertaking research as part of an external qualification, the applicant is the researcher. Staff should refer to Section 11.4 of Applying for Ethics Approval: Guidelines and Procedures to check requirements for ethics approval where they are studying at another institution.

Professor Roger Marshall

Doctor of Philosophy, University of Western Australia

A.3.   Applicant's School/Department/

Marketing and Advertising Department

A.4.   Applicant's Faculty

Faculty of Business and Law

A.5.   Student Details

Please complete this section only if the research is being undertaken by a student as part of an AUT qualification.

A.5.1.   Student Name(s):

Rouxelle de Villiers

A.5.2.	Student ID Number(s):

0838399

A.5.3.	Completed Qualification(s):

B.Sc. (Mathematics; Physics): University of Stellenbosch, South Africa

MDP: (Equivalent to in-house MBA); University of Stellenbosch Business School

CM (SA): Chartered Marketer; IMM South Africa (RSA)

HDE (SA): Higher Diploma in Education; University of Stellenbosch, RSA

M.Comm: (Marketing& Communications):University of Stellenbosch, RSA

A.5.4.	E-mail address:

rdevilli@aut.ac.nz

A.5.5.	School/Department/Academic Group/Centre

Department of Marketing & Advertising; Faculty of Business and Law

A.5.6.	Faculty

Business and Law, AUT

A.5.7.	Name of the qualification for which this research is being undertaken:

PhD

A.5.8.	Research Output

PhD Thesis

A.6.	Details of Other Researchers or Investigators

Please complete this section only if other researchers, investigators or organisations are involved in this project. Please also specify the role any other researcher(s), investigator(s) or organisation(s) will have in the research.

A.6.1.	Individual Researcher(s) or Investigator(s)

Please provide the name of each researcher or investigator and the institution in which they research.

Professor Arch.G. Woodside, Boston College and AdjunctProf. AUT University
Prof. Roger Marshall; AUT University, Auckland New Zealand

A.6.2.	Research or Investigator Organisations
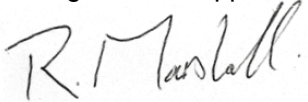
Not applicable

A.7.	Are you applying concurrently to another ethics committee?

No

A.8.	Declaration

The information supplied is, to the best of my knowledge and belief, accurate. I have read the current Guidelines, published by the Auckland University of Technology Ethics Committee, and clearly understand my obligations and the rights of the participant, particularly with regard to informed consent.

Signature of Applicant

Date

04/09/2011

R. Marshall.

(*In the case of student applications the signature must be that of the Supervisor*)

Date

04/09/2011

R de Villiers

(*If the research is a student project, both the signature of the Supervisor, as the applicant, and the student are required*)

A.9.	Authorising Signature

Signature of Head	Name of Faculty/Programme/School/Centre Marketing, Advertising, Retailing & Sales	Date 7/9/11

B. General Project Information

B.1.	Project Duration

B.1.1.	Approximate Start Date of Primary Data Collection

Upon AUTEC approval, November 2011

B.1.2.	Approximate Finish Date of Complete Project

June 2012

B.2.	Are funds being obtained specifically for this project?

If your answer is yes, then you must complete section G of this Application Form.

No

B.3.	Types of persons participating as participants

Please indicate clearly every one of the following categories that applies to those participating in your research.

B.3.1.	Researcher's students

No

B.3.2. Adults (20 years and above)

Yes. MBA and post-graduate students, currently studying at AUT university, Auckland.

B.3.3. Legal minors (under 16 years old)

No

B.3.4. Members of vulnerable groups

e.g. persons with impairments, limited understanding, etc. If your answer is yes, please provide a full description.

No

B.3.5. Hospital patients

No

B.3.6. Prisoners

No

B.4.   Does this research involve use of human remains, tissue or body fluids which does not require submission to a Regional Ethics Committee?

e.g. finger pricks, urine samples, etc. (please refer to section 13 of the AUTEC Guidelines). If your answer is yes, please provide full details of all arrangements, including details of agreements for treatment, etc.

No

B.5.   Does this research involve potentially hazardous substances?

e.g. radioactive materials (please refer to section 15 of the AUTEC Guidelines). If your answer is yes, please provide full details.

No

B.6.   Research Instruments

B.6.1. Does the research include the use of a written or electronic questionnaire or survey?

If your answer is yes, please attach to this application form a copy of the finalised questionnaire or survey in the format that it will be presented to participants.

Yes. Participants will be given four in-basket scenarios (short cases or scenarios a practicing manager may encounter, approximately one A4-page long) about four business decisions. Participants will be given the opportunity to select from predetermined answers and (for one scenario: Conference Hotel Selection) to create their own unique responses. Participants will be randomly allocated to the treatment cells (a cell is a group of participants receiving the same information and asked to consider the same decision). All participants will be asked to complete a Decision Form to indicate their selection of answers. After completing the four answers, they will be asked to complete a brief questionnaire and a short section of demographic information. This demographic section does not include name, surname or any other identifiers of individuals.

B.6.2. Does the research involve the use of observation?

If the answer is 'Yes', please attach to this application a copy of the observation protocol that will be used.

No

B.6.3. Does the research involve the use of other research instruments such as performance tests?

If the answer is yes, please attach to this application a copy of the protocols for the instruments and the instruments that will be used to record results.

No

B.6.4. Who will be transcribing or recording the data?

If someone other than the researcher will be transcribing the interview or focus group records or taking the notes, you need to provide a confidentiality agreement with this Application Form.

Not applicable.

B.7. How does the design and practice of this research implement each of the three principles of the Treaty of Waitangi (Partnership, Participation and Protection) in the relationships between the researcher and other participants?

Please refer to Section 2.5 of AUTEC's Applying for Ethics Approval: Guidelines and Procedures (accessible in the Ethics Knowledge Base online via http://www.aut.ac.nz/about/ethics) and to the relevant Frequently Asked Questions section in the Ethics Knowledge Base.

1) *The principle of partnership.*Trust is an essential ingredient in any partnership relationship. Thus, in order to establish and maintain trust, all information will be made available to all participants from the outset of the project. The Information Sheet and Instruction Sheets will make every attempt to provide clear and transparent information about the purpose and procedures of the study. The studywill be conducted as a joint venture. To help establish this trust, respondents are informed in the Instruction Sheet that they may obtain a copy of the research outcomes. This research has been positioned so that both the researcher and the participant recognise the atmosphere of mutual respect. Participants will be encouraged, as partners in the study, to provide additional ideas regarding the topic upon completion of the study. Participants will be informed that the final report may use their anonymous comments and their privacy and confidentiality will be secure. As all respondents will be students, the study will be of benefit to them as results in experience in using in-basket decision-making and the other decision-techniques in the study. In addition, the (overall, anonymous) results will be available to their lecturers' to help aid in curriculum development.

2) *The principle of participation* has been applied for recruiting participants and in the design of the decision input sheet. The research will be conducted on the basis of informed and voluntary consent. The participants are free to ask questions if they have any concerns about the procedure or meaning of the decision input. When and where the decision scenario will be conducted will be discussed with the potential participants beforehand to make sure that it is appropriate to the

participants. The participants are assured that they may withdraw from the research at any time and this will not lead to any disadvantages to them.

3) *The principle of protection* requires the researcher to respect the values, practices and beliefs of the culture and social groups of all participants during the research process. Participants are assured of confidentiality. Participants will have the opportunity to opt out of responding to the decision input process and any point and throughout the study. The researcher will be sensitive to any discomfort from the respondents, and inform them that they need not make a decision if they are uncomfortable. The researcher will always protect interviewees from any discomfort or psychological harm.

B.8.   Does this research target Maori participants?

No

B.8.1. If 'Yes", what consultation has been undertaken when designing the research?

Please identify the group(s) with whom consultation has occurred and provide evidence of their support and any impact this consultation had on the design of the research. Researchers are advised to read the Health Research Council's Guidelines for researchers on health research involving Maori*, available via the Ethics Knowledge Base.*

B.9.   Does this research target participants of particular cultures or social groups?

Please refer to Section 2.5 of AUTEC's Applying for Ethics Approval: Guidelines and Procedures *(accessible in the Ethics Knowledge Base online via* http://www.aut.ac.nz/about/ethics*) and to the relevant Frequently Asked Questions section in the Ethics Knowledge Base.*

No

B.9.1. If 'Yes" please identify which cultures or social groups are being targeted and how their cultures or social groups are being considered in the research design.

B.9.2. If your answer to B.9 was 'Yes", what consultation has occurred with these cultures or social groups in the design of the research?

Please identify the group(s) with whom consultation has occurred and provide evidence of their support and any impact this consultation had on the design of the research.

B.10.   Is there a need for translation or interpreting?

If your answer is 'Yes', please provide copies of any translations with this application and any Confidentiality Agreement required for translators or interpreters.

No. All elements of the research project will be produced and administered in

English. All participants will be either first language or second language English

speaking students.

C. Project Details

C.1.   Aim of project:

The aim of the research is to test four teaching methodologies' effectiveness in improving competency or affecting incompetency in managerial decision-making. In addition, researchers and authors reading about the outcome(s) will learn how different business contexts may influence management decision processes. The proposed study includes a series of laboratory experiments that probe propositions relevant to claims of competent-based and incompetent-based training in thinking and deciding processes for effective executive decision-making.

P_1: Training via goal-based scenarios (a goal-based scenario GBS, represents a specific context-case where the goal or mission is clear to the participant) results in more competent decision-making than inactive teacher-centered knowledge learning.

P_2: Competency increase by adding formal assignment of a devil's advocate (a cautious person who constantly checks for possible shortcomings and problems) versus a facilitative leader (a type of placebo condition) to group discussions in making decisions.

P_3: Role-playing (use of structured analogies) increases competency versus the use of group discussion without role playing.

P_4: Role-playing with GBS increases competency versus GBS alone or role-playing alone.

P_{5a}: Decision-making by an individual is more effective than group decision making when the group uses no formal group-discussion protocols (e.g., devil's advocate, formal role-playing).

P₅ᵦ: Group decision making is more effective than individual decision making when the group uses formal group-discussion protocols.

P₆: Individuals trained in contextual influences on decision-making (e.g., "drop-your-tools" contexts) and the use of implicit thinking (e.g., relying on "intuitive first choice"/ "gut feeling") make more competent decisions, compared to groups using formal group-discussion protocols.

The plan is to use an experimental design, anchored in a series of laboratory experiments to compare the relative merits of evidence and non-evidence based pedagogies on participants' decision-making and managerial competencies. The proposed study includes a series of four in-basket simulations (real decisions practicing managers would come across in their to-do in-baskets) and role-plays simulating decision-making scenarios. Three decision categories (HR, Marketing, and General Management) are tested in four in-basket exercises and simulated interactions (SI) as well as independent thought. All four simulations (in-baskets and SI) will be pre-tested with two groups, involving six senior faculty in marketing and management disciplines and four senior business executives in private enterprise, but a post-test only design with be used to confirm or contradict the asymmetrical relationships between the antecedents of competencies and incompetencies in executive decision-making. This means that the students will not experience any pre-test of the experimental treatments.

The actual experiment involves 160 MBA and post-graduate management students, each completing the one-and-a-half hour simulation of working through the four cases in

their in-baskets and making four business decisions. Each participant completes a post-test questionnaire to provide demographic and attitudinal data.

C.2.   Why are you proposing this research?
(ie what are its potential benefits to participants, researcher, wider community, etc?)

Research Benefits: The anticipated findings should extend the theories relating to management competency development and education in sense and decision-making. Outcome expectations for this study include advances in guidelines regarding new or improved tools to prevent graduate managers from thinking and making incompetent choices or decisions and reductions in their inability to drop their tools and previously acquired knowledge--should the circumstances favour doing so.

This study contributes to the body of knowledge regarding organizational knowledge, organizational learning, management development and experiential learning. A further contribution, of particular use to management practitioners and HR specialists, are the tested in-basket cases which will be of use to assessment and selection centers.

In addition, faculty responsible for redesigning/reviewing the MBA curricula (or other management education and development interventions) will receive empirically supported knowledge regarding two validated teaching methodologies. Implications for pedagogical application of decision in-basket simulations in the class room will be thoroughly analyzed and a detailed checklist should assist educators to design, implement and improve experiential learning tools such as simulated interactions and written simulations.

Dr. Ken Lee, MBA director at AUT, has been consulted regarding both the procedure and the expected outcome(s) and he is supportive of the project and its logistical implications. (Permission letter from Ken Lee enclosed.)

C.3.   Background:
Please provide sufficient information, including relevant references, to place the project in perspective and to allow the project's significance to be assessed. Where appropriate, provide one or two references to the applicant's (or supervisor's) own published work in the relevant field.

Several scholars (Armstrong and Green (2005; 2004); Dijksterhuis and Nordgren (2006); Gigerenzer (2000, 2004, 2007), Dunning and Kruger (1999, 2003), Gilovich (1991), Gladwell (2005); Mintzberg (2004), Schank, (1995; 1999; 1993)) claim that training using different management paradigms (e.g., Boston Consulting Group's growth-share matrix; over-praising performance; knowledge-based lecturing without trainee practice; the analytical hierarchical procedure, and the use of additional compensatory evaluation tools) serve to increase incompetency in thinking and deciding by executives. Evidence-based testing of these claims are rare; examinations that are available of such claims have telling weaknesses (e.g., lacking in comparable control and treatment groups). This study examines andragogical methods (i.e., learning strategies focused on adults) and their effectiveness (and lack thereof) in improving sense-making and decision-making competencies in graduate managers in MBA programmes. The dissertation will test several hypotheses using an experimental design, involving 160 MBA students and executive learners. The study's proposal includes a series of four in-basket simulations and role-plays simulating decision-making scenarios versus traditional lecture trainer-learner formats. Three decision categories (HR, Marketing, and General Management) are tested in the four in-basket exercises and simulated interactions (SI) as well as independent thought. The study examines the effect of goal-based scenarios; devil's advocate dissent; group versus individual decision making using different processing tools; accessing implicit knowledge; and "drop your tools" training on decision competency and incompetency outcomes.

The proposal includes planning on a total of 160 participants (in 16 cells where the information and decision issues are the same), treated as separate and unique cases, in order to build on the dialogue between theory and data, using fs/QCA methodology. The expected findings should extend priori theories and current practices in management development interventions (both in industry and in educational institutions), relating to decision-competency training.

C.4.   Procedure:

C.4.1. Explain the philosophical and/or methodological approach taken to obtaining information and/or testing the hypothesis(es).

Design of the Study: Multiple case studies method as an extension to pure laboratory experiments will be employed (Ragin, 1987). The study includes a series of laboratory scenarios that replicates and substantially extends the research of Gigerenzer, Green and Armstrong, and Schank in examining alternative management training tools and probing hypotheses relevant to claims of competent-based and incompetent-based training in thinking and deciding processes for effective executive decision-making.

Configurational Comparative Methods (CCM) using Boolean algebra aims to capture the complexity of the different cases and the configurations of causal variables. Propositions will be examined using a set of techniques, including fuzzy set qualitative comparative analysis. CCM tests different configurations of conditions that may affect different outcomes and reports on the asymmetrical relationships between antecedent conditions and the related outcome.

C.4.2. State in practical terms what research procedures or methods will be used.

The laboratory experiment will use post-test only scenarios, with control group design. This means that the four in-baskets (as discussed earlier), will not be pre-tested on the participants, but on objective, expert outsiders who will ensure that the scenarios represent cases which are likely to be encountered in real business life. Practical implementation of the study includes running 2-hour group work-sessions, where participants will be provided with four in-basket scenarios (Appendix A) and within the same 2-hour timeframe the participants will complete the Decisions Form as well as the demographic information sheets. In practice, it means that participants will be given a set of scenario sheets (an overview of the scenario or case - much like the ones practicing managers may encounter in their in-baskets in real life) plus additional data or information relevant to or irrelevant to the case; and information about possible decisions strategies taught in formal management courses. The proposal includes running four of these 2-hour experiments (during which all elements of the study will be completed),

combining the treatment groups and the control groups in one session, repeated 4 times. A total of 40 participants per group (160 in grand total) will result in 16 cells (/groups exposed to the combinations conditions under which the decisions are made, including group versus individual; devil's advocate versus no devil's advocate; GBS versus no GBS). The experiment facilitated by a decision-coach (John Tan) and will be conducted in classroom settings (WF 403) here at AUT.

C.4.3. State how your data will be analysed.

To assess whether or not the information in the scenarios and the teaching method improves decision competencies (allow for profit maximization,etc.) the in-basket exercises will be presented to six marketing, management and MBA faculty with experience in management, post-graduate and executives students. Each of the selected expert staff members will receive the scenarios and will be asked to assume that he or she has been asked to be a business consultant to the firm. Each advisor (expert faculty member) will be asked to conclude and state which option/choice in each treatment relates most effective decision. Each faculty member will be asked if further information is necessary to answer this question. In addition, the scenarios will be pre-tested with four practising managers and their responses compared with those of the scholars/faculty. Answers provided by anonymous participants will be compared to the "most effective decisions" which have been predetermined through the process described above. The combination of conditions to which the participants were exposed when making the decision will be analysed and related to the outcome, thus identifying the causal conditions which relates most closely to the most effective decisions. A well-regarded configurational comparative analysis method to identify patterns of relationships in order to refine or construct theory is QCA (Qualitative Comparative Analysis) will be used and is discussed here below.

326

C.4.4. Provide the statistical or methodological justification for this.

Data will be analysed using fuzzy set Qualitative Comparative Analysis (fs/QCA). The method is a well established and well proven method to analyse small N (small number of cases) for "systematically matching and contrasting cases in order to establish common causal relationships" (Rihoux & Ragin, 2009). QCA techniques meet the advantages of both the "qualitative" (case-orientated) and "quantitative" (variable-orientated) techniques (Rihoux, 2003, 2006, 2008, Rihoux and Lobe 2009). QCA offers techniques that are based on Boolean algebra and set theory. QCA techniques allow for "conjuntural causation" which means that different combinations of factors may lead to the same results across observed cases (Collier, 1999) and its analysis rules are fixed and therefore offers replicability and removes vagueness. Thus the technique is transparent. Software is used to check propositions against existing theories and a "truth tables" are created which summarizes and cluster cases together. Contradictions in data are plainly displayed in the "truth tables" produced by the software. "QCA techniques are analytical, transparent, and replicable and can process various sorts of data, from numerical to more qualitative and subjective; they require an ongoing dialogue between case-orientated knowledge and theoretical knowledge" (Rihoux & Ragin, 2009, p.17). It is possible through fs/QCA to produce generalizations. As such it helps the researcher gain new insights and re-examine existing theories of develop new theories. Its logical foundations dates back to "Mill's canons" (Mill, 1843). What makes this technique so useful to this particular study is that is does not rely on the basic assumptions of mainstream statistical approaches: (1) permanent causality is not assumed but is context based; (2) causal symmetry is not assumed and the relationship between different combinations of conditions may produce the same outcome $(AB + CD \rightarrow Y)$. Cases in the research are compared as "whole units" defined by a combination of features ("configuration") that relates to a given outcome.

C.5.   References

Please include the references for your responses to this section in the standard format used in your discipline.

Please note that this is a representative extract of the reference list (which is already over 480 entries long) and includes mostly seminal works which guide this study.

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Schank, R. C., Fano, A., Jona, M., & Bell, B. (1993). *The Design of Goal-based Scenarios.* Evanston, IL: Nortwestern University Press.

D. Participants

D.1.   Who are the participants?

Currently enrolled MBA and postgraduate students (in Marketing, Management and Human Resource management) and practitioners participating in AUT executive short courses (AUT Talent2 Short Courses). The MBA Director Ken Lee has been approached at the outset of the process and has provided permission. This support and permission has been reconfirmed on 13 September 2011, after the approval of the D9 by the PhD Examination Board. **A letter indicating Ken Lee's support is attached.**

Advertising through dissemination of information to MBA students using the formal and informal communication channels currently used to communicate programme information to students. [These channels include the AUT online announcement system, in-class announcements (as discussed in section D2.1) and printed leaflets (Advertisement enclosed) to be handed out to all prospective participants as set out in D.1.1.)] Information Sheets will be provided to post-graduate students and executive short course participants. Anonymity will be maintained throughout. (See suggested advertisement in Appendix D). Students will be informed that they will neither be advantaged of disadvantaged by deciding to participate or deciding not to participate.

D.1.1.   What criteria are to be used for selecting participants from those recruited?

Participants will self-nominate freely and anonymously and all participant information will be treated in highest confidence throughout the process. Participants maywithdraw freely and without any repercussions at any point during the research process. Participants will only be selected from the post-graduate groups indicated; no other pre-selection criteria will enable or disable participants from joining or declining to join the research project.

D.1.2.   Are there any potential participants who will be excluded?

If your answer is yes, please detail the criteria for exclusion.

No. Potential participants will only be removed from the list or excluded from participating if/when they themselves decline to participate in the first instance or through action or inaction during the project. There are no disincentives or penalties to withdraw at any stage during the research project.

D.2.   Are there any potential conflicts of interest or possible coercive influences in the professional, social, or cultural relationships

between the researcher and the participants (e.g. dependent relationships such as teacher/student; parent/child; employer/employee; pastor/congregation etc.)?

Yes, dependent relationships between lecturers and students.

D.2.1. **If your answer was 'Yes', please identify the nature of the relationships concerned and provide full information about the processes being incorporated into the research design to mitigate any adverse affects that may arise from them.**

Relationships: MBA participants may have a lecturer/learner-relationship with the either the researcher or the lecturer in whose class the opportunity to participate is being promoted. To mitigate any possible coercive influences, neither course credits nor promotion by the lecturer(s) will be required. The supervisors and researcher will not involved in the recruitment, consent and data collection processes of any of their own students Participants from the two other prospect groups, namely post-graduate marketing and management students and executive learners on the AUT executive programme, will have no dependent relationship with the researcher, nor with the person asked to promote the project to these potential participants. An objective non-related outsider will be asked to present the opportunity to participate and the information brochures to all prospective participants.

Rouxelle de Villiers taught on the MBA programme, but will have no current relationship with the prospective participants. The aim is to run the study in Term 6 and Term 1 and 2 of 2012. During this time the researcher will not be teaching on the MBA programme and care will be taken to use an objective non-related outsider to recruit and collect data from any students who may or might have been lectured by Rouxelle de Villiers.

Processes to prevent coercion or any adverse effects of interactions and relationships:

1) Permission will be obtained to conduct this decision-exercise *outside of normal class time(s)* from the appropriate Head of Department and class lecturer(s).

2) An in-class announcement will be made, supported by appropriate printed matter (information sheets) handed out in-class several days prior to the intended decision exercise. There information sheets and printed matter will be pre-approved by the relevant HODs and director of MBA director.

3) The in-class announcement to the participants will be made by the researcher or an objective outsider, not the attending lecturer. The lecturer will be precluded from making this announcement to avoid conflict of interest. The researcher will be precluded from announcing to any of her own classes in order to mitigate conflict of interest.

4) The experiment/study will be executed in the Business School (WF building), Rooms WF403, WF 503 or WF 703 at the times indicated on the Consent Forms. (See Appendix E)

5) The researcher will make statements verbally and in writing that there are no right or wrong answers. Verbal confirmation will be given that the researcher has no interest in the individual whose decision is considered and that no information to identify the decision-maker will be sought, captured or recorded. Anonymity will be maintained throughout the process. No-one involved in the capture, analysis or interpretation of the experiment will be able to identify who is participating in the study.

6) At implementation/execution of the experiments, learners will not be identified in any way and they will be allocated to the treatments in a totally random manor. All learners will be provided with an Instruction Sheet, the four in-basket scenarios, and a sheet to record their decisions. Learners can withdraw at any point and they are under no obligation to proceed with the exercise. Learners can withdraw until the point where they hand in their decision sheets. If they do not want to proceed they simply hand the package in with no decision made, or check 'I choose to withdraw' at the bottom of the decision form. Anonymity will be maintained.

7) The researcher is not interested in identifying the person or individual who has made as specific set of decisions, or in any individual learner and see learners as anonymous "cases" in the fuzzy set.

D.3.　　　How many participants will be selected?

160 (One hundred and sixty)

D.3.1.　What is the reason for selecting this number?

The number of co-varied conditions and the required group size as determined by the fussy-set Qualitative Comparative Analysis Method. According to the seminal work of highly regarded research experts such as Campbell and Stanley (1963), Rihoux and Ragin (2009) and Woodside (2011) a minimum of 4 "cases" will suffice to apply the QCA analysis method this study will employ. Since this study will have sixteen sets of co-varied conditions and participants make decisions either as individuals (5 per co-varied condition sets or case cells) or as groups (3 per group times in 5 co-varied condition sets or case cells); there are a total of 8 cells with 5 members (40 individual participants) and 8 cells with 3X5 (15) members (120 individual participants); bringing the total to 160 participants.

D.3.2.　Provide a statistical justification where applicable,　 if you have not already provided one in C.4 5. above.

See above

D.3.3. Is there a control group?

Yes: A random selection of 2 cases out of the 16 cases in the study. Control groups are necessary to indicate how participants who do not receive the different training and teaching support aids fare in making effective decisions in order to determine how effective or ineffective the various configurations of conditions are in affecting decision competencies are

D.4.   Describe in detail the recruitment methods to be used.

If you will be recruiting by advertisement or email, please attach a copy to this Application Form

An Information Sheet containing all relevant information, including the commitment required in terms of time and duration of the study is provided (See Appendix B). An invitation to participate will be sent to prospective participants via Alumni, post graduate offices, MBA clubs and associations as well as at the end or beginning of formal classes. Permission to access to members of associations, e-mail data-bases and other communication channels will be obtained from the relevant authorities (Dr Ken Lee: MBA; Dr Russell Hurray: Executive Short Course and Leonard Blocksberg: MBA club president) prior to contact with prospective participants. The copy of the supplied Advertisement (Appendix D) will be used in e-newsletters and AUT Online announcements to draw attention to the opportunity and to generate interest to participate.

D.5.   How will information about the project be given to participants?

(e.g. in writing, verbally). A copy of information to be given to prospective participants is to be attached to this Application Form. If written information is to be provided to participants, you are advised to use the Information Sheet exemplar.

Verbal announcement and presentation of written the enclosed Information Sheet

D.6.   Will the participants have difficulty giving informed consent on their own behalf?

Consider physical or mental condition, age, language, legal status, or other barriers. If the answer is yes, please provide full details.

No, consent occurs through active participation with the option to decline participation.

D.6.1. If participants are not competent to give fully informed consent, who will consent on their behalf?

All participants are legally independent and only competent participants will be approached.

D.6.2. Will these participants be asked to provide assent to participation?

If the answer is yes, please attach a copy of the assent form which will be used. Please note that assent is not the same as consent (please refer to the Glossary in Appendix A of the AUTEC Guidelines and Procedures.

No. All participants are of age and legally independent to make their own decisions.

No. According to AUTEC requirements, a Consent Form may not be necessary when surveys are anonymous and researchers are unable to indentify individual participants. The Information Sheet and all other written material used during the experiment will clearly state that consent is indicated by participating in and completion of the research project. At no point will the researcher be able to identify participants.

D.7. Will the participants remain anonymous to the researcher?

Please note that anonymity and confidentiality are different. If the answer is yes, please state how, otherwise, if the answer is no, please describe how participant privacy issues and confidentiality of information will be preserved.

Yes. Demographics will be recorded, but no names will be provided. The researcher will at no point become aware of the identity of the participants and their related answers.

D.8. In the final report will there be any possibility that individuals or groups could be identified?

If the answer is yes, please explain how and why this will happen.

No. Data collection is anonymous and decisions will be amalgamated.

D.9. Will feedback or findings be disseminated to participants (individuals or groups)?

If the answer is yes, please explain how this will occur and ensure that this information is included in the Information Sheet.

Yes, please see the attached Instruction Sheet. Participants may access findings on the www.surveymethods.com website.

D.10. Will the findings of this study be of particular interest to specific cultures or social groups?

If your answer is 'Yes', please identify how the findings will be made available to them.

No

E. Other Project Details

E.1. Where will the project be conducted?

Please provide the name/s of the Institution/s, town/s, city or cities, region or country that best answers this question.

New Zealand; AUT University; University of Auckland

E.2. Who is in charge of data collection

E.3. Who will interact with the participants?

Rouxelle de Villiers (PhD Candidate and lecturer at AUT university, Auckland, NZ); - In person advertisements before classes, during association meetings and dealing

with the information sheets. Rouxelle will debrief students after each of the four studies to inform them of the real intention and the importance of contextual information in making decisions.

John Tan (Lecturer AUT) – facilitator during the random allocation of participants and available on the four days experimental days to answer student questions

Professor Roger Marshall (AUT) – supervisor to the PhD candidate

Professor Arch Woodside (Boston College) – supervisor to the PhD candidate and expert advisor regarding collection, analysis and reporting of research data.

E.4. What ethical risks are involved for participants in the proposed research?

Please consider the possibility of moral, physical, psychological or emotional risks to participants, including issues of confidentiality and privacy. Researchers are urged to consider this issue from the perspective of the participants, and not only from the perspective of someone familiar with the subject matter and research practices involved.

None

E.4.1. Are the participants likely to experience any discomfort, embarrassment (physical, psychological, social) or incapacity as a result of the research's procedures?

No, neither the concept nor the terms "competency" or "incompetency" will be used to the participants during, before, or after the project.

The research process/experiment requires approximately two hours of the participants' time. Since most classes or workshops here at AUT vary between one and three hours, this is not seen as an issue in need of special attention. All levels of the business building have water fountains and ablution facilities and any participant can leave the room at any time to make use of these facilities.

E.4.2. If there are risks, please identify their probability and describe how they will be mitigated.

Please describe how these will be minimised or mitigated (e.g. participants do not need to answer a question that they find embarrassing or they may terminate an interview or there may be a qualified counsellor present in the interview or the findings will be reported in a way that ensures that participants cannot be individually identified, etc.) Possible risks and their mitigation should be fully described in the Information Sheets for participants.

Although scholars and authors use the label "incompetency training", this label or term will not be used in any of the research documents or verbally. Participants may associate the term incompetency as a comment on their own adequacy or inadequacy to perform decisions. To prevent this potential misinterpretation, neither participants and their decisions nor any research materials that they may come in contact with, will be labelled or communicated at any time competent or

incompetent. (Project title which will appear on all printed matter dealt with by participants is: *Management Decisions*)

A further risk is that students regard some of the theoretical concepts, models and frameworks provided in the treatment currently taught in their classrooms as "suspicious" or "inferior". For this reason materials will be labled "training support material or scenario documents" and hand-outs will be coded for use by the researcher ONLY, so that no student will at any point in time be aware of the treatment conditions/configurations they were exposed to. As stated above, no label will have the words competency, incompetency or ineffective appear anywhere in the material.

E.4.3. If the participants are likely to experience any discomfort, embarrassment, or incapacity, what provision for counselling has been made, either with AUT Counselling (who also provide an online service) or with other counselling professionals (this is to be at no charge to the participants)?

Please refer to section 2.3 of AUTEC's Applying for Ethics Approval: Guidelines and Procedures *in the Ethics Knowledge Base. If the answer is No, please explain the arrangements which have been made to have qualified personnel available to deal with unexpected adverse physical or psychological consequences?*

The counselling resources of AUT University will be made available to any participant who experience discomfort or embarrassment as a result of this project. This is a standard and free professional service offered to all students at AUT, and since all participants will be registered students at AUT, they will be eligible to access this service anonymously and without charge.

E.5. What risks are involved for the researcher(s) in the proposed project (such as physical, social, psychological, or safety risks)?

If this project will involve interviewing participants in private homes, undertaking research overseas, or going into similarly vulnerable situations, then a Researcher Safety protocol should be designed and appended to this application.

None. The experiment and brief demographic survey does not include direct participant interviews.

E.6. Will there be any other physical hazards introduced to AUT staff and/or students through the duration of this project?

If the answer is yes, please provide details of management controls which will be in place to either eliminate or minimise harm from these hazards (e.g. a hazardous substance management plan).

No

E.7. Is deception of participants involved at any stage of the research?

If the answer is yes, please provide full details of and rationale for the deception. Please refer to Section 2.4 of AUTEC's Applying for Ethics Approval: Guidelines and Procedures *when considering this question.*

Yes. Although not intended as deception, participants will not be informed of the full intention of the research since to inform participants of the importance of considering

the context of the information provided in the scenarios may alter their decisions. The intent of the research is to see if participants pick up on the relevance of the context of the decision in an unprompted and "unwarned" manner. To manage this deception, the researcher will debrief participants after the completion of the Decision Form and will provide participants with another opportunity to withdraw from the study. The participants will be verbally instructed that they may withdraw at this point with no negative impact or result. In addition, after completing the experiment, all participants will be provided with a further opportunity to attend a separate meeting where they can learn more about the deception in the research and at which they may ask any questions and raise any queries or concerns about the research.

Participants will be required to spend a maximum of 2 hours to complete in-basket scenarios, the Decision Forms (including the demographic information section).

E.8.Will any information on the participants be obtained from third parties?

If the answer is yes, please provide full details. This includes use of third parties, such as employers, in recruitment.

No

E.9.Will any identifiable information on the participants be given to third parties?

If the answer is Yes, please provide full details.

No, information of this type will not be collected.

E.10.   Provide details of any payment, gift or koha and, where applicable, level of payment to be made to participants.

Please refer to Section 2.1 of the AUTEC's Applying for Ethics Approval: Guidelines and Procedures and Appendix A of that document for AUTEC's policy on Payment and Koha, especially in relation to recruitment.

Not applicable

F. Data and Consent Forms

F.1.   Who will have access to the data?

Rouxelle de Villiers (researcher), Professor Roger Marshall (supervisor), Professor A.G. Woodside (supervisor).

F.2.   Are there plans for future use of the data beyond those already described?

The applicant's attention is drawn to the requirements of the Privacy Act 1993 (see Appendix I). If there are future plans for the use of the data, then this needs to be explained in the Information Sheets for participants.

No

F.3.   Where will the data be stored once the analysis is complete?

Please provide the exact storage location. AUTEC normally requires that the data be stored securely on AUT premises in a location separate from the consent forms. If you are proposing an alternative arrangement, please explain why.

AUT university premises, Department of Marketing and Advertising, WU3 (Room WU 313). The original records will be amalgamated and the printed matter

destroyed. The digital, amalgamated records will be stored on a CD/DVD and kept in a locked cabinet by Professor Roger Marshall in the archive folders of the AUT computer hard drive of the Business Faculty and separate from the printed Consent Forms

F.4. For how long will the data be stored after completion of analysis?

AUTEC normally requires that the data be stored securely for six years. If you are proposing an alternative arrangement, please explain why.

Six Years

F.5. Will the data be destroyed?

If the answer is yes, please describe how the destruction will be effected. If the answer is no, please provide the reason for this.

Yes, by AUT controlled document destruction

F.6. Who will have access to the Consent Forms?

AUTEC advises that it may be hard to keep the study anonymous, (especially due to the work in groups), a Consent Form (CF) is necessary. The consent form is attached (See Appendix E). These forms will be dealt with by the facilitator (John Tan) and will be kept separate from any Decision forms.

F.7. Where will the completed Consent Forms be stored?

Please provide the exact storage location. AUTEC normally requires that the Consent Forms be stored securely on AUT premises in a location separate from the data. If you are proposing an alternative arrangement, please explain why.

CFs will be stored separate from the data forms on AUT University campus (Department of Marketing and Advertising, WU3.) Consent forms will be kept separate from the Decision Forms.

F.8. For how long will the completed Consent Forms be stored?

AUTEC normally requires that the Consent Forms be stored securely for six years. If you are proposing an alternative arrangement, please explain why.

Six years, if they become necessary

F.9. Will the Consent Forms be destroyed?

If the answer is yes, please describe how the destruction will be effected. If the answer is no, please provide the reason for this.

Yes, by AUT controlled document destruction.

G. Material Resources

G.1. Has an application for financial support for this project been (or will be) made to a source external to AUT or is a source external to AUT providing (or will provide) financial support for this project?

No

G.1.1. If the answer to G.1 was 'yes', please provide the name of the source, the amount of financial support involved, and clearly explain how the funder/s are involved in the design and management of the research.

G.2. Has the application been (or will it be) submitted to an AUT Faculty Research Grants Committee or other AUT funding entity?

If the answer is yes, please provide details.

No

If the answer to G.2 was 'yes', please provide the name of the source, the amount of financial support involved, and clearly explain how the funder/s are involved in the design and management of the research.

G.3. Is funding already available, or is it awaiting decision?

Please provide full details.

Funding as an academic staff member through the annual Individual Development Fund (IDP) process is sufficient for this project.

G.4. Please provide full details about the financial interest, if any, in the outcome of the project of the researchers, investigators or research organisations mentioned in Part A of this application.

There is no financial interest in this project.

H. Other Information

H.1. Have you ever made any other related applications?

If the answer is yes, please provide the AUTEC application / approval number(s)

No

I. Checklist

Please ensure all applicable sections of this form have been completed and all appropriate documentation is attached as incomplete applications will not be considered by AUTEC.

Section A	General Information Completed	
	Signatures/Declaration Completed	
Section B	Project General Information Completed	
Section C	Project Details Completed	
Section D	Participant Details Completed	
Section E	Other Project Details Completed	
Section F	Data & Consent Forms Details Completed	
Section G	Material Resources Completed	

Section H   Other Information Completed   ☐

Spelling and Grammar Check (please note that a high standard of spelling and grammar is required
in documents that are issued with AUTEC approval)   ☐

Attached Documents (where applicable)

Participant Information Sheet(s)   ☐

Consent Form(s)   ☐

Questionnaire(s)   ☐

Indicative Questions for Interviews or Focus Groups   ☐

Observation Protocols   ☐

Recording Protocols for Tests   ☐

Advertisement(s)   ☐

Hazardous Substance Management Plan   ☐

Any Confidentiality Agreement(s)   ☐

Other Documentation   ☐

Before submitting this application, please note the following:

❖ *If you think that your research may be of low ethical risk, use the EA8RA self assessment form to make sure that this is the correct form for your application;*

❖ *Incomplete or incorrectly formatted applications will not be considered by AUTEC;*

❖ *Please check online for the most recent version of this form before submitting your application;*

❖ *Please do not alter the formatting of this form or delete any sections. If a particular question is not applicable to your research, please state that as your response to that question;*

This form needs to be submitted, along with all associated documents as follows:

❖ *In printed form;*

❖ *With the required signatures in sections A.8 and A.9;*

❖ *Single sided;*

❖ *Using clips rather than staples;*

❖ *By 4 pm on the agenda closing date at:*

The AUTEC Secretariat
Room WO201, WO Building
56 Wakefield Street, City Campus.

❖ *The Internal Mail Code is D-89. If sending applications by Internal Mail, please ensure that they are posted at least two days earlier to allow for any delay that may occur.*

APPENDIX B:

ETHICS APPROVED LABORATORY INSTRUCTIONS

INFORMATION SHEETS FOR PARTICIPANTS

ETHICS APPROVED CONSENT FORM

LABORATORY DEBRIEFING SHEET

AN INVITATION TO be a member an exclusive group
investigating management decision making

An Invitation:
You are invited to participate in a research study involving MBA students in New
Zealand. You qualify to participate if you have postgraduate training in management,
marketing or business administration. Your participation is voluntary and you can
withdraw any time during the research without any adverse consequences.

What you contribute:
You will be required to meet once and contribute NO MORE than 2 hours of your
valuable time.

What you get:
You will gain experience in dealing with in-basket cases, a management decision-
making tool often used in recruitment and selection processes. This experience should
not only assist in preparing you for future business decisions you might encounter, but
is likely to enhance your competencies in interviewing and recruitment processes, both
as employer and employee. You will receive training in decision-making processes that
other post-graduate students may not be exposed to. To thank you for this investment in
time, your name will be entered into an audited lucky draw to win one of two iPad
personal computers. The research results should contribute to students', educators' and
practitioners' understanding of how various business contexts influence managerial
decision-making. (The research informs a thesis of doctoral studies, ultimately leading
to a PhD degree at AUT University, Auckland, New Zealand.)

What is the purpose of this research?
The aim of this study is to understand how managers make decisions. Participants are
asked to make four managerial decisions, based on every-day business scenarios provided
in the form of in-basket exercises. Each decision scenario is set in a different context that
may influence a decision-maker when selecting between different options. Participants
are provided with four scenarios, as well as training to support their decision-making
process. A selection of answers will be provided (multiple-choice). Your role is to decide
which option is the most appropriate within the given context. Your decisions will
remain anonymous.

How you can join the study
We would be grateful for your contribution to this study and delighted to have your input.
Contact us at decisionresearch@aut.ac.nz and state: I WANT TO JOIN in the subject line
of your e-mail. We will provide any additional information you may require. Closing date
to submit your registration at this decisionresearch@aut.ac.nz is 27 February 2012.

INFORMATION SHEET	

Project title: Management Decisions
Project Supervisors: Professor Arch Woodside, Professor Roger Marshall
Researcher: PhD Candidate Rouxelle de Villiers, rdevilli@aut.ac.nz

An Invitation

You are invited to participate in a research study that will ideally involve 160 post-graduate and MBA students at AUT University, Auckland over the next six months. If you have postgraduate training in management, marketing or business administration, we invite you to participate in this 2-hour study. Please note that your participation is voluntary and you can withdraw any time during the research without any adverse consequences.

What is the purpose of this research?

The aim of this study is to understand how managers make decisions. Participants will be asked to make four managerial decisions, based on every-day business scenarios provided in the form of in-basket exercises. Each scenario is set in a different context that may influence a decision-maker when selecting between different options. Participants will be provided with four scenarios, as well as training to support their decision-making process. A selection of answers will be provided (multiple-choice). Your role is to decide which option is the most appropriate within the given context. Your decision will remain anonymous. All decisions will be collated, analyzed and then interpreted in order to learn how different business contexts may influence management decision processes.

Can I join the study?

We would be grateful for your contribution to this study and delighted to have your input. You do not require any special knowledge or prior training to participate in the survey. Anyone who can read and write English, is over the age of 21 and has postgraduate training in any business degree may participate in the study. You join the study by nominating yourself on the form below. You will be invited via e-mail to join the study at one of the time-slots convenient to yourself. You will be able to select from six possible dates and times. If you wish to withdraw at this point, you can simply return an e-mail stating your withdrawal. If you wish to proceed, you will receive a set of four in-basket exercises upon arrival at the AUT lecture hall or classroom. You will be asked to read the four scenarios and the support material provided. You will then be given time to select from the multiple choice answers provided and to indicate your choice on the Decision Form. You can withdraw at any point during the process. A provision for confidential withdrawal from the survey appears on the Decision Form.

What do I have to do?

You will be asked to envisage yourself as a consultant to four different business clients: Mr Pizza, ABConsulting, EventsRUs and Mr Price. You will be provided with four short (1-page) scenarios about four different management decisions. You will also receive a random selection of training support materials to assist you in your thinking. After reading the materials, you are asked to select

from the answers provided. Once you have selected your preferred answer, you are asked to make a brief comment on why you made that decision, and include basic generic demographic information (not your name or surname). You will remain anonymous throughout the process. Please note that all information obtained from individual participants in the survey will be treated in the strictest confidence.

What will happen in this research?

After reading the four Decision Scenarios you proceed to respond to ten questions. For each scenario, there will be one question on the management issue, one question per scenario to explain why you selected a specific option and once you have completed the set of four scenario questions, you will be asked to complete five questions about personal demographics (neither your name nor your surname). After completing the Decision Form you drop it in the lock box and are free to take leave from the study.

What are the discomforts and risks?

We do not anticipate any discomfort or risk to you when you participate in this study for the following reasons. The study is no longer than an average class period. Although a fairly lengthy process, you can leave the study at any time to make use of the facilities, drink water or stretch your legs. The decision scenarios call for decisions managers often encounter in their daily work. Lastly, the exercise does not require you to provide any proprietary information about your organization or sensitive or private information about yourself. Although you will sign a consent form to use your complete decision form in the study, all effort will be made to keep In the section on discomforts and risks provision of No participant in the study will either be advantaged or disadvantaged in any way.

How might any discomfort and risk be alleviated?

In order to reduce the risk of undue pressure to participate, and to ensure anonymity as far as possible, supervisors are not involved in the recruitment, consent and data collection processes of any of their own students. In addition, you can withdraw from the study at any point in time, before and during the exercise. Should you experience any discomfort, you can confidentially opt to withdraw from the study up to the point of submitting the Decision Form. All information collected up to the point of withdrawal will be destroyed. Important: All information collected from all participants will be kept anonymous throughout the process.

How will my privacy be protected?

The researchers have no interest in matching individual participants with the decision or comments they make. All information obtained from individual participants in the survey is strictly confidential. This is a voluntary study and any participant can confidentially withdraw from the study. Once you have submitted your Decision Form, the researchers have no way to identify which survey is yours, so you will be unable to withdraw after turning in your Form.

What are the benefits?

Participating in the research should contribute to your knowledge and understanding of managerial decisions and should provide you with experience in in-basket exercises often used in recruitment centers and management assessment centers. The research results should contribute to students', educators' and practitioners' understanding of how various business contexts influence managerial decision-making. The research informs a thesis of doctoral studies, ultimately leading to a PhD degree at AUT University, Auckland, New Zealand.

What are the costs of participating in this research?

The cost to you is approximately 2 hours of your time in total. There are no other costs. To thank you for this investment in time, you will be entered into the draw to win one of two iPad personal computers.

How is the winner determined?

The names of all participants, typed on a small card, will be placed in a hat. Andrew Parsons (Department Head for Marketing at AUT University) will, as an independent party, draw a name from the hat, wearing a blind-fold. Peh Hoon Lim, certified barrister and lecturer in law, will monitor the procedure to certify the procedures are unbiased and fair. We will notify you of the outcome of the lucky draw on the completion of the final study, which will be held in the week of 12 April 2012.

What opportunity do I have to consider this invitation?

Once you have received the survey form, you may confidentially withdraw before submitting the Decision Form by simply checking the 'I choose to withdraw' box at the bottom of the Decision Form.

How do I agree to participate in this research?

You can nominate to participate by completing the Nomination Form below. The researchers will contact you with a list of dates and times to choose from. You will respond via e-mail to indicate your continued interest and to nominate the date convenient to yourself. If you wish to withdraw at this point, you can simply return an e-mail stating your withdrawal. Your responses to the study will be confidential and you need to complete a Consent Form. You may opt to withdraw from the research even after starting to participate in the study.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified to the Project Supervisor, Professor Roger Marshall, roger.marshall@aut.ac.nz, (649) 921 9999 ext. 5478. Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, Dr Rosemary Godbold, rosemary.godbold@aut.ac.nz , 921 9999 ext 6902.

Whom do I contact for further information about this research?

Researcher Contact Details:

The Researcher is Rouxelle de Villiers, PhD Candidate at AUT. You can contact her at rdevilli@aut.ac.nz, (649) 921 9999 ext. 5047

Project Supervisor Contact Details:

Project Supervisor, Professor Roger Marshall, roger.marshall@aut.ac.nz, (649) 921 9999 ext. 5478

Approved by: the Auckland University of Technology Ethics Committee
Date: 20 October 2011. AUTEC Reference number: 11/257.

	Consent Form	AUT U N I V E R S I T Y TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

Project title: **Management Decision-making**
Project Supervisor: **Professor Roger Marshall**
Researcher: **Rouxelle de Villiers**

○ I have read and understood the information provided about this research project in the Information Sheet.

○ I have had an opportunity to ask questions and to have them answered.

○ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.

○ I have some experience or training in management decision-making and am currently a student at AUT University OR employed in a managerial role in a business in New Zealand.

○ I agree to take part in this research.

○ I wish to receive a copy of the report from the research (please tick one):

　　　Yes ○　　　　No ○

○

Participant's signature: ....……………………………………………………

Participant's name: ....……………………………………………………

Participant's e-mail address : …………………………………………………………………………………….

Date: ……

Yes, I am willing to participate in this study. Please provide possible dates and times by sending a text to my cell phone or e-mailing me at the address provided below.		
TEXT me at cell number:		
E-mail me at this address:		
The following times will suit me: (Tick as many as possible)		
Monday: 9.00 -11.00 am	Tuesday: 9.00 -11.00 am	Wednesday: 9.00 -11.00 am
Thursday: 9.00 -11.00 am	Friday: 9.00 -11.00 am	Saturday: 10.00 -12.00 am
Monday: 4.00 – 6.00 **pm**	Wednesday: 3 – 5 pm	Other:
I wish to be part of the lucky draw to win an iPad personal computer		
(Please tick your option) ☞	**YES,** *please enter me into the lucky draw*	**No,** *do not enter me into the lucky draw*

Approved by the Auckland University of Technology Ethics Committee on 20 October 2011 AUTEC Reference number **11/257.**

1

<table>
<tr><td></td><td rowspan="3" style="text-align:center">**Debriefing**</td><td>AUT
U N I V E R S I T Y
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU</td></tr>
</table>

Project title: **Management Decision-making**
Project Supervisor: **Professor Roger Marshall**
Researcher: **Rouxelle de Villiers** (doing the debriefing)

○ Thank you for your participation in this study. Your contribution is greatly appreciated.

○ In order to get your uninfluenced decisions, neither the researcher Rouxelle de Villiers, nor your facilitator could provide you will full details or disclose the full purpose of the study.

○ The purpose is to study how different contexts affect management decisions and what the effect of different support aids are on the decisions made by individuals and by groups. Unbeknown to you, you randomly allocated to either complete the Decision Form as an individual or as part of a group at the beginning of the experimental study today. Neither the researcher nor you had a choice in the matter. You simply received your decision pack which was already in collated with a selection of materials and in random order, as you arrived. Also, each pack contained slightly different contextual information about the scenario which may or may not have affected your decision. We could not inform you of these slight variations at the outset of this study, since the purpose is to see if and how those contextual differences affect or does not affect the decisions you made. Giving you this background about slight variations in context might have coloured your decisions, and thus we could not be totally upfront with you about the intent of the study or about the influence contextual information might have on your decision or decisions. Informing you about the importance of contextual information or different decision aids would have had an effect on your decisions or judgments and would have rendered the data useless.

○ As you know, your Decision Forms and the demographic information you have provided cannot be linked to your personal information such as your name and surname. This ensures your anonymity. All consent forms will be kept separate from all Decision Forms so that no link can be made by me, the researcher, or the project supervisors. PLEASE record your personal secret code somewhere safe.

○ Please do not discuss this information of the scenarios with any of your MBA peers or colleagues to ensure that they provide unprompted and uninfluenced personal decisions.

○ We will notify you of the outcome of the lucky draw on the completion of the final study which is likely to be towards the end of May 2012.

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Approved by the Auckland University of Technology Ethics Committee on 20 October 2012 AUTEC Reference number 11/257

APPENDIX C:

IN-BASKET SIMULATION INSTRUCTION SHEETS

DEMOGRAPHICS RECORD SHEETS

OBJECTIVES AND GROUP INSTRUCTIONS

OBJECTIVES AND INDIVIDUAL INSTRUCTIONS

IN-BASKET SIMULATION SHEETS

COMPETENCY AND INCOMPETENCY DECISION AIDS

INSTRUCTION SHEET- Individuals

Project title: ***Management Decisions – Individuals (Note GBS Briefing)***
Project Supervisors: ***Professor Arch Woodside, Professor Roger Marshall***
Researcher: ***Rouxelle de Villiers***

What do I have to do?

Your pack contains four in–basket exercises based on four diverse business scenarios and a range of decision support aids. Envisage yourself as full-time management consultant.

Step one: Read the Briefing Document.

Step two: Please complete the eight basic demographic information questions and create a unique, personal code.

Step three: Label all documents with your personal code. Please make sure that you label EACH of your answer sheets with your unique code. Record this unique code for later reference.

Step four: You have 2 hours to consider the four scenarios and your decision and suggest one answer for each of the four scenarios. A selection of answers is (multiple-choice) provided for each scenario. These options may not reflect your ideal answer, but please pick the one that most closely express the decision you wish to make.

Step five: Please think for a couple of minutes: How might we apply the information on making a decision appearing in the decision aids in making the decision? Also ask: Should I apply the information on making a decision that appears on the decision aid(s)?

Step six: Please make a brief comment on why you made that decision and how confident you are in the decision.

Step seven: After completing all four Decision forms, please re-check your coding and labeling and hand your full pack to the facilitator. Please stay for the debriefing.

What will happen in this research?

All participants receive Decision Forms with multiple-choice answers to select from. After reading the four in-basket scenarios, participants proceed to record their decisions by checking their choice off on the Decision Form and indicating their confidence in the answers. After completing the Decision Form, you hand you full pack with all labeled elements to the facilitator and you are free to take leave from the study. There is no minimum time limit, but you have maximum time allocation of two hours.

Please feel free to ask questions.

The facilitator will answer questions at any time during this survey.

Do you want the results of this survey? You may access this URL:

http://www.surveymethods.com/EndUser.aspx?ASDFGFHIJKLMNOP12345X
Please allow eight weeks for us to enter the data following your response today.

Approved by the Auckland University of Technology Ethics Committee on 20 October 2011. AUTEC Reference number 11/257

INSTRUCTION SHEET - Groups	AUT UNIVERSITY TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

Project title: **Management Decisions – GROUPS (Note GBS Briefing)**
Project Supervisors: **Professor Arch Woodside, Professor Roger Marshall**
Researcher: **Rouxelle de Villiers**

What do I have to do?

Your pack contains four in–basket exercises based on four diverse business scenarios and a range of decision support aids. Envisage yourself as full-time management consultant.

Step one: Read the Briefing Document.

Step two: Please complete the eight basic demographic information questions and create a unique, personal code.

Step three: Label all documents with your personal code. Please make sure that you label EACH of your answer sheets with your unique code. Record this unique code for later reference.

Step four: You have *30 minutes* to read the four scenarios and consider you own answer for each.

Step five: You join a team of four other randomly selected participants to deliberate and confer possible decisions, based on the limited information and limited options provided. Each group member is assigned one of five roles: Customer Service Manager; Marketing Manager; HR Manager; Financial Manager and Operations Manager. You are the …XXX….. Manager. Your group has *15 minutes* to discuss each scenario and gather relevant information and insights to assist in making the decision. *There is no need to reach group consensus.*

Step six: Return to your individual deliberation and record your option. You have *5 minutes* to complete the Decision form for each scenario – after which step five, six and seven will be repeated. A selection of answers is (multiple-choice) provided for each scenario. These options may not reflect your ideal answer, but please pick the one that most closely express the decision you wish to make.

Step seven: Please make a brief comment on why you made that decision and how confident you are in the decision.

Step eight: After completing all four Decision forms, please re-check your coding and labeling and hand your full pack to the facilitator. Please stay for the debriefing.

NOTE: The facilitator will indicate when the group needs to disperse to complete the Decision Forms and when they will regroup to consider the next scenario. Each scenario will have its own dedicated time.

What will happen in this research?

Each participant receives a randomly selected In-basket Pack. Each participant is given fifteen minutes to consider the four scenarios and the four support sheets. All participants receive Decision Forms with four multiple-choice answers to select from. After reading the four in-basket scenarios, participants proceed to record their decisions by checking off one of three options provided on the Decision Form.

After completing the Decision Form, you place it in the lock box and are free to take leave from the study.

What opportunity do I have to consider this invitation?

Once you have received the survey form, you may confidentially withdraw before submitting the Decision Form by simply checking the, 'I choose to withdraw' box at the bottom of the Decision Form.

Please feel free to ask questions.

The facilitator will answer questions at any time during this survey.

Do you want the results of this survey? You may access this URL:
http://www.surveymethods.com/ EndUser.aspx?ASDFGFHIJKLMNOP12345X
Please allow eight weeks for us to enter the data following your response today.

Approved by the Auckland University of Technology Ethics Committee;
Date: 20 October 2011; AUTEC Reference number: **11/257**

DEMOGRAPHICS & PERSONAL CODE	AUT UNIVERSITY TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

GBF1

A: PERSONAL CODE:

Each participant receives a randomly selected *In-basket Pack* with a unique combination of questions. In order to match your answers to the demographic information provided, please create a unique five-digit code. The code need to consist of two numbers and three letters. We suggest that you pick numbers and a short three-letter word that is easy to remember. Please ensure that you label every one of your decision sheets with this unique, confidential personal code. Please compose the code below. Please note that no attempt will be made to indentify the respondent by name or in any other way. Your responses will remain anonymous.

Example of a Code:

01ABC *(Please do NOT use this code; write your unique code in white spaces below)*

Number	Number	Letter	Letter	Letter

B: DEMOGRAPHICS SECTION:

3. The most **influential book or electronic source on business or management** I have read to date is:

Title:
Author/web-address:

4. Please tick **your highest level of education** related to management decision making:

Please tick the relevant option.	✔
No formal management decision-making education	
Bachelor's degree	
Post-graduate education	
Post Master's degree education	
Master's degree	
Other:	

5. Please tick **your highest level of experience** related to management decision making.

Please tick the relevant option.	✔
No management decision-making experience: 0 years	
One to five years experience: 1-5 years	
Six to ten years experience: 6 -10 years	
More than ten years experience: $\geq$10 years	

6. Please tick the first language you learned:

Please tick the relevant option.	✔
English	
A language other than English Please specify here:	……………………………………..

7. What is your nationality:

8. What is your age:

Please tick (✔) the relevant option.
21-25	
26-30	
31-35	
36-40	
41-45	
46-50	
50+	

9. Please tick that world region which best describes your domicile from birth to age 15.

Please tick ✔ the relevant continent below and write the country in the right hand box		
	Please tick ✔ in this column	Please write the name of your domicile up to age 15
Asia		
Africa		
Australasia		
Europe		
North America		
South America		
United Kingdom		

10. Please indicate your gender. *(Please tick ✔ the relevant option):*

Male	
Female	

This concludes the instruction and demographic section. Please proceed to the in-baskets.

I choose to withdraw my input from this survey.

Your tick mark here will result in withdrawal and destruction of your input and your decision and comments will not be a part of this study	

INSTRUCTIONS (Cont.) INDIVIDUALS: RULES FOR EFFECTIVE IDEA GENERATION _{IBD1}	AUT UNIVERSITY TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

Start:
You can start making decisions as soon as you feel you are ready.

Stay Focused on the Task:
Concentrate on the problem at hand and avoid engaging in irrelevant thought processes.
Remember to stay focused on the task.

Ask yourself:
Please think for a couple of minutes:
How might I apply the information on making a decision appearing in the decision aids in making the decision?
Also ask:
Should I apply the information on making a decision that appears on the decision aid(s)?

Do not explain idea at length:
We are interested in your ideas and explanations. Provide arguments or evidence to support the choice, suggestion or idea. Expand on why suggestions or ideas are good or bad, but DO NOT digress into long-winded stories about your experiences or highly descriptive examples. Select one of the provided options, even if not a perfect match to your ideal answer.
Consider all options carefully.

Keep the process going:
When you run out of ideas, go back to options or suggestions that you have already considered mentioned and try to build on these previous ideas. If there are no further ideas, ask yourself something like:
"Do I have the necessary information to make the decision? Am I ready to complete the decision form?"
If you are ready, complete the decision form relating to the specific in-basket scenario, before you move onto the next scenario.

INSTRUCTIONS (Cont.) **GROUP RULES FOR EFFECTIVE IDEA GENERATION** GBF1	AUT UNIVERSITY TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

Start:
Let the group interaction begin with whomever starts it. No specific "leader" is required.

Stay Focused on the Task:
Concentrate on the problem at hand and avoid engaging in irrelevant thought processes or discussions. When it is necessary to interrupt a group member,
say something like:
"Remember that we need to stay focused on our task."

Ask:
Please think for a couple of minutes:
How might we apply the information on making a decision appearing in the decision aids in making the decision?
Also ask:
Should we apply the information on making a decision that appears on the decision aid(s)?

Do not tell stories or digress into long explanations by one group member:
The group is interested in your ideas and explanations. The group wants logical arguments or evidence to support the choice, suggestion or idea. Allow expansion on why suggestions or ideas are good or bad, but DO NOT allow group members to digress into long-winded stories about their experiences or highly descriptive examples. Say something like:
"**We understand your point of view. Can we give someone else a chance to contribute**?"

Keep the group interaction going:
During a lapse (of more than 4-5 seconds) when no one is talking, someone in the group should say something like:
"Let's see what other ideas we can come up with for (restate the problem). If there is still no further comment, someone should say something like:
"**We have not fully discussed option …X… Any ideas about …XYZ?**

Return to Previous Categories:
When the group members are not talking very much, go back to options or suggestions that have already been considered and try to build on these previous ideas. For example, say "Does anyone have any more ideas related to (restate an idea already suggested)?"
If there are no further ideas, ask something like:
"**Do you have the necessary information to make the decision? Is everyone ready to complete the decision form?**"
If all members agree, disperse to complete the decision form relating to the specific in-basket scenario. If you cannot agree, keep on deliberating until the facilitator indicates the end of the discussion (after 15 minutes).

There is NO need to achieve CONSENSUS neither is MAJORITY VOTING required.

Select one of the provided options, even if there is no a perfect match to your ideal answer.

BRIEFING DOCUMENT:

OBJECTIVES & HATS YOU NEED TO WEAR (INDIVIDUALS *GBS)

IBD1

The Objectives:

The objective of the in-basket exercise is to assist students to learn how to:

1. analyze available information in order to assess the impact of the context on the business decision.

2. appraise the available information and determine which information to use and which to omit in making an effective business decision.

3. conclude by advising the client of the preferred course of action within the complex business environment.

4. justify or explain why the suggested course of action is the preferred or most effective option.

The decisions in your in-basket are the type of decisions you will come across in your future career and will therefore give you excellent insight into general management decision-making scenarios or will assist in preparing you as a professional management consultant.

Your Brief:

You are a member of a team of four full-time, independent, strategic management consultants. A new client (Mr Right) is considering hiring your services full-time for six months to train the firm's executives in increasing their effectiveness in strategic and tactical decision-making.

Before the final decision on whether or not to hire your team, this new client asks you to complete four executive-decision tasks. The tasks take the form of in-basket simulated problems that need solving today.

The senior executives of the new client firm plans on reviewing your answers tomorrow and you will receive a formal review of your answers and their decision on hiring you before 5pm tomorrow. Should your firm get this contract, it could be worth $1.2m over the next two years.

Your other five team members are not available today. The report is due before they will be back in office, so it is important to consider the perspectives they might have had on the decision. Also remember the perspective of the devil's advocate.

You need to consider your answers, but reviewing the information from four different perspectives:

HR Consultants' perspective: Their excellent track records, long-standing experience in management and highly-regarded formal qualifications make HR consultant's perspectives valuable as Human Resource (HR) consultant on the team. This type of executive is often referred to as *Vice-President: Talent Development* or Vice-President in charge of human resource acquisition, development and retention. They are known for your outspoken opinions on the importance of hiring and warnings against wrongful firings. HR consultants believe that all employees have great potential, given the right job, the right training and the right motivation, appropriate for the specific individual.

Marketing Consultant's perspective: Their excellent track record, long-standing experience in marketing management and highly-regarded formal qualifications make marketing consultant's perspectives valuable as the Marketing and Sales consultant on the team. This type of executive is often referred to as *Vice-President: Marketing & Sales* or Vice-President in charge of client acquisition, development and retention. They are known for your outspoken opinions on the importance of getting and keeping key clients and building customer life-time value.

Financial Consultant's perspective: Their excellent track record, long-standing experience as chief financial officer and highly-regarded formal qualifications make financial consultant's perspectives valuable as the Financial Consultant on the team. They are often referred to as *Vice-President: Accounting and Finance* or Vice-President in charge of cash-flow, profit and budgets. They are known for your outspoken opinion that "the business of business is to stay in business"; directly translated that the first goal of any business must be to make profit.

<u>Customer Services Consultant's perspective:</u> Their excellent track record, long-standing experience in customer services and your highly-regarded formal qualifications make them valuable as the Customer Service Excellence consultant on the team. This type of executive is often referred to as *Vice-President: Customer Care* or Vice-President in charge of client care, customer relationships and customer service. They are known for your outspoken opinions on the importance of providing excellent services and recovering from any form of poor service delivery in order to keep clients happy and building long-term customer equity.

BRIEFING DOCUMENT (GROUPS & GBS ONLY):	
OBJECTIVES & YOUR ROLE AS <mark>VICE-PRESIDENT: XXX</mark>	

The Objectives:

The objective of the in-basket exercise is to assist students to learn how to:

1. analyze available information in order to assess the impact of the context on the business decision.

2. appraise the available information and determine which information to use and which to omit in making an effective business decision.

3. conclude by advising the client of the preferred course of action within the complex business environment.

4. justify or explain why the suggested course of action is the preferred or most effective option.

Your Brief:

You are a team of three full-time, independent, strategic management consultants. A new client (Mr Right) is considering hiring your services full-time for six months to train the firm's executives in increasing their effectiveness in strategic and tactical decision-making.

Before the final decision on whether or not to hire your team, this new client asks you to complete four executive-decision tasks. The tasks take the form of in-basket simulated problems that need solving today.

The senior executives of the new client firm plans on reviewing your answers tomorrow and you will receive a formal review of your answers and their decision on hiring you before 5pm tomorrow. Should your firm get this contract, it could be worth $1.2m over the next two years.

The decisions in your in-basket are the type of decisions you will come across in your future career and will therefore give you excellent insight into general management decision-making scenarios or will assist in preparing you as a professional management consultant.

Your role in this team: <mark>(EACH STUDENT ONLY GETS ONE OF THESE)</mark>

<mark>Please wear the hat and button provided with your pack.</mark>

HR Consultant: Your excellent track record, long-standing experience in management and highly-regarded formal qualifications make you the ideal candidate to be the Human Resource (HR) consultant on the team. You are often referred to as *Vice-President: Talent Development* or Vice-President in charge of human resource acquisition, development and retention. You are known for your outspoken opinions on the importance of hiring and warnings against wrongful firings. Your belief is that all employees have great potential, given the right job, the right training and the right motivation, appropriate for the specific individual.

Marketing Consultant: Your excellent track record, long-standing experience in marketing management and highly-regarded formal qualifications make you the ideal candidate to be the Marketing and Sales consultant on the team. You are often referred to as *Vice-President: Marketing & Sales* or Vice-President in charge of client acquisition, development and retention. You are known for your outspoken opinions on the importance of getting and keeping key clients and building customer life-time value.

Financial Consultant: Your excellent track record, long-standing experience as chief financial officer and highly-regarded formal qualifications make you the ideal candidate to be the Financial Consultant on the team. You are often referred to as *Vice-President: Accounting and Finance* or Vice-President in charge of cash-flow, profit and budgets. You are known for your outspoken opinion that "the business of business is to stay in business"; directly translated that the first goal of any business must be to make profit.

Customer Services Consultant: Your excellent track record, long-standing experience in customer services and your highly-regarded formal qualifications make you the ideal candidate to be the Customer Service Excellence consultant on the team. You are often referred to as *Vice-President: Customer Care* or Vice-President in charge of client care, customer relationships and

customer service. You are known for your outspoken opinions on the importance of providing excellent services and recovering from any form of poor service delivery in order to keep clients happy and building long-term customer equity.

Replace with DA if in the configuration: OTHERWISE use OPS below:

<u>Operations Manager:</u> Your excellent track record, long-standing experience in business management and highly-regarded formal qualifications make you the ideal candidate to be the Operations Consultant on the team. You are often referred to as *Vice-President: Operations and Processes* or Vice-President in charge of performance and processes. You are known for your outspoken opinions on the importance of effective and efficient processes, quality control and your high performance orientation.

THE OBJECTIVES: (INDIVIDUALS * ~GBS)

AUT
UNIVERSITY
TE WĀNANGA ARONUI O TĀMAKI MAKAU RAU

The objective of the in-basket exercise is to assist students to learn how to:

1. analyze available information to make a sound business decision.

2. appraise the available information and determine which information to use and which to omit in making an effective business decision

3. conclude by advising the client of the preferred course of action within the complex business environment.

4. justify or explain why the suggested course of action is the preferred or most effective option.

The decisions in your in-basket are the type of decisions you will come across in your future career and will therefore give you excellent insight into general management decision-making scenarios or will assist in preparing you as a professional management consultant.

Process & Procedures:

You have 2-hours to complete all four in-basket scenarios. Please provide complete answers to each problem in the in-basket. Please take the time that you find the exercises require in answering. After selecting your preferred option, please complete the two questions to justify your decision and to indicate your confidence in the decision. After completing the **last** Decision Form, please complete the section on Demographic Information and thereafter the final sheet. All answers and personal information is anonymous and will treated as such throughout the data gathering, data analysis and data reporting stages of this study.

<div style="border:1px solid black;">

THE OBJECTIVES (GROUP * ~GBS)

AUT
UNIVERSITY
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

</div>

GND1

The objective of the in-basket exercise is to assist students to learn how to:

1. analyze available information in order to make a sound business decision.

2. appraise the available information and determine which information to use and which to omit in making an effective business decision.

3. conclude by advising the client of the preferred course of action within the complex business environment.

4. justify or explain why the suggested course of action is the preferred or most effective option.

The decisions in your in-basket are the type of decisions you will come across in your future career and will therefore give you excellent insight into general management decision-making scenarios or will assist in preparing you as a professional management consultant.

Process & Procedures:

You have 2-hours to complete all four in-basket scenarios. Please use eighteen (*18) minutes* to discuss a scenario and seven (7) minutes after each discussion to complete the Decision Form for each scenario. Please complete the relevant Decision Form before moving to the next in-basket scenario. After the group discussion, each group member completes his/her own Decision Form by providing/indicating the group decision. After selecting the group option, please complete the two questions to justify the decision and to indicate your confidence in the decision. After completing the **last** Decision Form, please complete the section on Demographic Information and thereafter the final sheet. All answers and information provided is anonymous and will treated as such throughout the data gathering, data analysis and data reporting stages of this study. The researchers will not attempt to link answers with individual respondents at any point throughout the study.

An excellent track record and long-standing experiences in a variety of management roles and highly-regarded formal qualifications make a manager the ideal candidate to be the devil's advocate on any team.

Colleagues often refer to this type of person as The Devil's Advocate or *Vice-President: Caution.* According to creative thinking guru Edward de Bono, **Black Hat Thinking** explores ways that an idea may not fit the situation, problems we may need to overcome, faults, or why something or a line of thinking may not work. During *Black Hat Thinking* we consider obstacles, existing or potential downsides, and concerns. The single word that best describes the nature of the Black Hat is "caution." If we are not cautious, we risk damage, danger, and disaster both for ourselves, our organization and for others. The *Black Thinking Hat* protects us from harm. Black Hat Thinking can discover potential problems that might arise. The Black Hat helps us improve on an idea by drawing attention to the faults in the idea.

Black Hat
Difficulties, potential issues. Why a solution may not work

During your deliberations and decision-making processes, please consider the role and perspectives of a devil's advocate. Please wear the black hat provided by the facilitator when considering the black hat perspective.

Source: http://www.debonoonline.com/black-hat-thinking.asp

In-Basket Task #1: Advertising Media Decision @ Mr. Pizza

President **Pete Smith** is going to increase advertising for the firm's brand, **MrPizza** that consists of franchises of 27 pizza restaurants in St. Louis. President Smith is going to double promotion expenditures.

Fran Jones, the firm's advertising manager, favors placing 80% of the additional funds in television and Facebook advertising because of the sales jump experienced in the firm's restaurants when the brand's TV commercials appear—sales increase 20 to 30 percent among the stores and profits jump as well.

Tom Hendricks, head of marketing, points out that the firm's pizza restaurant locations only cover 30% of the metro area--a lot of television advertising will be wasted. Tom favors using sponsoring events (rock bands and concerts) with the additional promotional funds as a way of increasing brand awareness and acceptance of the firm's brand. Fran disagrees; she views sponsorships as delivering little direct impact on sales.

President Smith is going to decide this week on spending the additional advertising funds.

Your consulting report to President Smith:

Your personal secret code:

Number:	Number:	Letter:	Letter:	Letter

(1) Based on the information available in the case, select **<u>one of the two options</u>** in the case to recommend to President Smith, Fran, and Tom. Your choice:

Please tick **ONLY ONE** preferred option here below:

Option	Place your ✔ in this column:
Option A: Place 80% of the additional funds in television and Facebook advertising	
Option B: Use sponsoring events (rock bands and concerts)	

(2) Provide between one and three reasons to support your recommendation to this firm on deciding on spending the additional advertising funds. (Use the back of this sheet if you require more space.) Your reasons:

Reason 1:
Reason 2:
Reason 3:

(3)

Please indicate how confident you are that your answer is the correct answer. Please tick your level of confidence.

1	Not very confident	2	Somewhat confident	3	Confident	4	Very confident

(4) Please indicate how likely you are to stick with your decisions, should you be asked to review them in two weeks time. Please tick your option

1	Very likely to change my decision	2	Somewhat likely to change my decision	3	I am unlikely to change my decision. I will stick with my current decision	4	I will not change my decision at all. I will definitely stick with my current decision.

Exhibit 1A: Evidence on the Relationship between a ROI and effectiveness of advertising campaigns

_{GNF1}

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the decision. Also ask yourself: should you apply the information on making a decision that appears on this page?

Return on Investment (ROI) is used to measure the effectiveness of advertising campaigns. ROI is determined by comparing the cost of advertising to either sales or inquiries generated from the advertising effort.

The worst ROI occurs for situations where costs are high and response is low. Television and to some extent radio are the worst ROI advertising options. These are high cost with usually low response. You are reaching a large number of people that are not qualified prospects - in other words, they probably do not want your product or service. It is difficult to provide a clear and effective call for action. This is largely because of the short time you have the prospects' attention. The best advertising ROI is when the cost of the advertising is low and the sales or inquires are high.

One of the cheapest advertising activities, and therefore likely to be one of the best advertising ROI efforts, for any business is networking. The key for successful networking is to follow up with prospects. Networking efforts likely to result in a high ROI would be a vendor or business booth at a networking event you would be attending anyway. Inexpensive advertising efforts can have good ROI. Being creative when it comes to handing out information and tracking the response from any given effort will show you what works best for your market. You do not have to invest many dollars in advertising to be effective

http://www.essortment.com/small-business-tips-worst-roi-advertising-opportunities-23656.html

Exhibit 1(i): Advertising Media Selection
GND2

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the decision. Also ask yourself: should you apply the information on making a decision that appears on this page?

 Advertising media selection is the process of choosing the most cost-effective media for advertising, to achieve the required coverage and number of exposures in a target audience.

5 Steps for Better Advertising Return

If you think that, because your business is small, you can advertise without having a defined marketing strategy, Ed Yeaker disagrees with you."In the acting business, there are no small parts, only small actors, and there is no small advertising plan, either," says Yeaker, president of Ed Yeaker Associates, Inc. Advertising and Marketing Services in White Plains, N.Y. "No matter the size of the business, ad budget or extent of activity, the advertising investment is always huge."

Yeaker, a former adjunct marketing instructor at Pace University, offers five tips for businesses that want to get more *ka-ching* out of their advertising.

1. Have a Clear Marketing Direction -- and Stick to It. "Advertising helter skelter just because of aggressive media sales reps, friends' suggestions, status and emotional appeals usually has little or no value, or even hurts the business," Yeaker says. "Every business, no matter the size, needs a planned approach to marketing-directed advertising that supports the company's goals and allows it to prosper." The key elements of a solid plan should include:

> *** Situation analysis,** including market data, consumer profiles and attitudes, plus competitive appraisal;
> ***Assessment of problems and weaknesses** along with opportunities and strengths;
> * Review of the overall business and its financial goals; and
> * **Objectives**, strategies and rationale for the money you're spending on advertising.

2. Distinctive Positioning. You must separate your business from competitors selling the same thing in a way that is meaningful, memorable and believable. Then you have to apply that identity consistently and visibly in every facet of your business and operation. Strong positioning is at the heart of effective creative strategy for advertising, but only if it is meaningful and memorable. Being believable is at the heart of advertising success. "The stronger the assertion, the greater the disbelief," Yeaker notes.

3. It's All About Customer Benefits. It's not what you have to sell, but what customers need that's important, even if the customer doesn't know (yet) that she needs it. And your advertising's focus doesn't end when you produce the commercial, print ad or Internet campaign. That's just the beginning. Understanding how customers use and experience your product should drive your ongoing promotion. Yeaker notes, for example, that some bedroom furniture manufacturers advertise the benefit of their materials and construction, emphasizing durability. But when he designed a campaign for a client in this space, the consumer promise

was "sweet dreams," because research showed a good night's sleep was the key emotional benefit of the product. "Sure, they want a good product and a fair price, but first things first when you're trying to get their attention," he says.

4. Integrate All Promotional Activity. Yeaker suggests you take a top-down approach to your advertising strategy so you get results greater than the sum of the parts. Rather than initially focusing on the individual components of an ad campaign -- the media where the ad will run, the creative content, the price you'll pay, the number of customers you will convert, and fitting together all the different types of ads and promotions -- think first about the problem you are solving for your business. This is a typical "forest and trees" issue: if you center your attention on the mechanics of advertising and promotion and how well they look and sound individually, you may miss the opportunity (which is really a necessity) of making sure they all add up to a well-integrated whole that delivers new profits for your business. Taking a top-down approach assures "a cohesive look and attitude so that each of your ads is instantly recognized as being uniquely yours in every application, from print media advertising to TV and radio, from mailings to telemarketing, plus sales literature and especially, Internet marketing," Yeaker says.

5. Accountable Performance. At its heart, advertising is an experiment. You can't have perfect knowledge of what will work, so it's critical to test your assumptions. There are a couple of key ways to measure and analyze advertising to make it accountable:

> * Creative development, with some preliminary research to confirm viable appeals and offers, followed by testing of different messages and executions;
> * Testing different messages within each media you use;
> * Testing the demographics and psychographics of the lists you use for direct mail and telemarketing; and
> * Testing media in print and broadcast -- each with virtually infinite variations and combinations.

While all this testing and preparation may sound complex and expensive to do, it's actually much cheaper than doing what most small businesses do: winging it!

SOURCE:

5 Steps to a Better Return on Your Advertising Investment
By Mitchell York, About.com Guide
http://entrepreneurs.about.com/od/salesmarketing/a/AdvertisingTips.htm; Retrieved 13 October 2011

Exhibit 1(ii): A guide to Managing Media and Public Relations
GND2

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the decision. Also ask yourself: should you apply the information on making a decision that appears on this page?

1.   *Have a strategy.*

Tailor your strategy for each public relations opportunity. Think about the audience you want to reach and how to create excitement. An effective part of your strategy should be to enforce your organization's core messages in all news releases.

2.   *Have a good story.*

A news story must have a compelling beginning, middle, and end. Journalists recognize a strong story within seconds, so tell your story quickly and succinctly.

3.   *Know your audience.*

You wouldn't follow up on a potential business opportunity without knowing something about their business, so don't call the news media blindly. Before you pitch to any media outlet, study their work. Read the publication, watch the show, and listen to the radio broadcast. Get familiar with the characteristics of the media outlet you are targeting. Find out about their main audience and their likes and dislikes. (Internet message boards are good for this.)

4.   *Invest in relationships.*

The more you know about the media organization and your target editor, the better and more confidently you can pitch to them. Building relationships *now* means editors will be more likely to take your call when you've got an important story to tell. Best of all, even if they can't offer you coverage on this particular story, they may refer you to another reporter who can. As with any relationship, building trust is critical. Keep your promises, and be on time. Be upfront about what you can and can't do. You might not be able to do everything, but reporters will appreciate your honesty.

5.   *Think before you speak.*

A word of caution: *everything* you say to a reporter is on the record, regardless of disclaimers. You are representing your organization at all times. The impression that you give has a definite impact on how the media views your organization.

6.   *Monitor your media coverage.*

Media coverage shows your success. As a media relations expert, the end goal is always positive media coverage for your organization. When your organization is spotlighted in major media outlets, you bring attention and respect to your business

SOURCE:
http://tldp.org/LDP/Linux-Media-Guide/html/howto_maximize.html; Retrieved 13 October 2011

Exhibit 1(iii): Advertising that expands consumption
GND2

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the decision. Also ask yourself: should you apply the information on making a decision that appears on this page?

Advertising Adstock is a term coined by Simon Broadbent[1] to describe the prolonged or lagged effect of advertising on consumer purchase behavior. It is also known as 'advertising carry-over'. Adstock is an important component of marketing-mix models. Adstock is a model of how response to advertising builds and decays in consumer markets.

Advertising tries to expand consumption in two ways; it both reminds and teaches. It reminds in-the-market consumers in order to influence their immediate brand choice and teaches to increase brand awareness and salience, which makes it easier for future advertising to influence brand choice. Adstock is the mathematical manifestation of this behavioral process.

The Adstock theory hinges on the assumption that exposure to television advertising builds awareness in the minds of the consumers, influencing their purchase decision. Each new exposure to advertising builds awareness and this awareness will be higher if there have been recent exposures and lower if there have not been. In the absence of further exposures adstock eventually decays to negligible levels. Measuring and determining adstock, especially when developing a marketing-mix model, is a key component of determining marketing effectiveness.

The lagged or decay component of Advertising Adstock can be mathematically modelled and is usually expressed in terms of the 'half-life' of the ad copy, modeled using TV Gross Rating Point (GRP). A 'two-week half-life' means that it takes two weeks for the awareness of a copy to decay to half its present level. Every Ad copy is assumed to have a unique half-life. Some academic studies have suggested half-life range around 7–12 weeks,[2] Other academic studies find shorter half-lives of approximately four weeks,[3] and industry practitioners typically report half-lives between 2–5 weeks, with the average for Fast Moving Consumer Goods (FMCG) Brands at 2.5 weeks.[4]
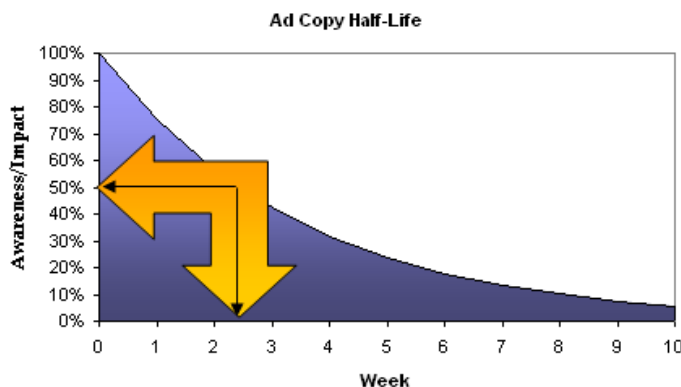
The copy in the above graph has a half-life of 2.5 weeks

References

Broadbent, S. (1979) "One Way TV Advertisements Work", Journal of the Market Research Society Vol. 23 no.3.

Leone, R.P. (1995) "Generalizing what is known about temporal aggregation and advertising carry-over", Marketing Science, 14, G141-G150.

Newstead, K., Taylor, J., Kennedy, R. and Sharp, B., 2009. Single source data: how do findings from individual-level analysis converge with aggregate level advertising experiments? Journal of Advertising Research 49 (2).

In-Basket Task #2: Pricing Decision
GND2

You are the marketing manager of a manufacturing firm known as L-Guys, Inc. As the company's marketing manager, you are responsible for all marketing decisions and strategies, including the pricing structure of the firm's products.

Recently your company introduced a new highly technical product, and you have been asked to set the pricing strategy for this product. You calculate the present value of the total profits expected for your firm over the next ten years.

You are aware that your main competitor, T-Guys, Inc., intends to introduce a product that is very similar to the one that your firm has just introduced. You should assume that the competitor's product is as good as yours in every way that is important to the market, and the market is the same for both products. Therefore, the pricing strategy which you formulate for your product might take into account this competitor's decisions. You estimate the following results for each strategy:

Expected Profits and Market Shares over Ten Years

Outcomes	L-Guys' Low-Price Strategy	L-Guys' High-Price Strategy
L-Guys:	$10.2 million profits 56.7% market share	$20.4 million profits 48.6% market share
T-Guys:	Profits? 43.3% market share	Profits? 51.4% market share

Note. ? = unknown, profit information on T-Guys' product are unavailable to L-Guys' executives

Your consulting report to L-Guys:
GND2

1. Which pricing strategy do you select for L-Guys, please tick (√) one choice:

Option	Place your ✔ in this column:
Option A: The low price Strategy	
Option B: The High price strategy	

2. Please provide between one and three reasons for your choice:

Reason 1:

Reason 2:

Reason 3:

3. Please indicate how confident you are that your answer is the correct answer. Please tick ✓ your level of confidence:

1	Not very confident	2	Somewhat confident	3	Confident	4	Very confident

(4) Please indicate how likely you are to stick with your decisions, should you be asked to review them in two weeks time. Please tick ✓ your option below:

1	Very likely to change my decision	2	Somewhat likely to change my decision	3	I am unlikely to change my decision. I will stick with my current decision	4	I will not change my decision at all. I will definitely stick with my current decision.

Exhibit 2A: Evidence on the Relationship between
_{GBF1} **Market Share and Profitability, Market Share and Firm Survival**

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the Pricing Decision for L-Guys. Also ask yourself: should you apply the information on making a decision that appears on this page?

- Economists frown on competitor-oriented objectives (Mueller 1992). They consider the proper objective of business to be profits, not market share.

- Anterasian and Graham (1989) examined the performance of a sample of 42 businesses drawn from a federal trade commission report. There eight manufacturing industries had experienced a boom-bust cycle from 1974 to 1977. Those firms that sought stability in sales by giving up market share during the 1974 boom in their industry achieved higher profits during the subsequent downturn.

- Studies that have used a longitudinal rather than a cross sectional approach, find a negative relationship between market share and profits. Anterasian and Graham (1989) analyzed data on 42 firms in industries that had cycles; companies that lost market share during growth periods tended to be more profitable over the cycle than firms in the same industry that gained market share.

- Tschoegl and Yu (1990), in a study of the liquor market, found that a higher market share did not help in gaining further share and did not produce stability in the firm's sales.

- Montgomery and Wernerfelt (1991) examine the performance of six large U.S. Brewers from a 1969 to 1979, a period characterized by large changes in market share; using returns on stocks, they concluded (p. 958) that gains in market share were associated with "the destruction, rather than the creation, of firm value."

- In Armstrong and Collopy (1996) follow-up study using data on firm survival rate relating to the firm objectives of the 200 firms in Lancillotti (1958) study, all for profit-oriented firms survived, while four of the six competitor-oriented companies failed. Thus, competitor-oriented firms were less likely to survive ($p = .07$ by the Fisher Exact Test).

Reference List:

Anterasian, C., & Graham, J. L. (1989). When it is good management to sacrifice market share. *Journal of Business Research, 19*(3), 187-213

Armstrong, J., & Collopy, F. (1996). Competitor orientation: Effects of objectives and information on managerial   decisions and profitability. *Journal of Marketing Research, 33*(2), 188-199

Montgomery, C. A., & Wernerfelt, B. (1991). Sources of Superior Performance: Market Share versus Industry Effects in the U.S. Brewing Industry. *Management Science, 37*(8), 954-959

Mueller, D. C. (1992). The corporation and the economist. *International Journal of Industrial Organization, 10*(2), 147-170.

Tschoegl, A. E., & Yu, C.-M. J. (1990). Gibrat's law in marketing: The case of liquor brand sales. *International Journal of Research in Marketing, 7*(4), 249-262.

Exhibit 2B
Information on Setting Price

- One of the most difficult, yet important, issues you must decide as an entrepreneur is how much to charge for your product or service. While there is no one single right way to determine your pricing strategy, fortunately there are guidelines that will help you with your decision. Here are some of the factors that you might consider.

- **Positioning**-How do you positioning your product in the market? Is pricing going to be a key part of that positioning? If you are running a discount store, you are always going to be trying to keep your prices as low as possible as (or at least lower than your competitors). On the other hand, if you are positioning your product as an exclusive luxury product, a price that is too low may actually hurt your image. The pricing has to be consistent with the positioning. People really do hold strongly to the idea that you get what you pay for.

- **Demand curves** -How will your pricing affect demand? You are going to have to do some good basic market research to find this out, even if it's informal. Get 10 people to answer a simple questionnaire, asking them, "Would you buy this product/service at X price? Y price?" For a larger venture, you will want to do something more formal, of course -- perhaps hire a market research firm. But even a sole practitioner can chart a basic curve that says that at X price, X' percentage will buy, at Y price, Y' will buy, and at Z price, Z' will buy.

- **Cost** - Calculate the fixed and variable costs associated with your product or service. How much is the "cost of goods", i.e., a cost associated with each item sold or service delivered, and how much is "fixed overhead", that is, it doesn't change unless your company changes dramatically in size? Remember that your gross margin (price minus cost of goods) has to amply cover your fixed overhead in order for you to turn a profit. Many entrepreneurs under-estimate this and it gets them into trouble.

- **Environmental factors -** Are there any legal or other constraints on pricing? For example, in some cities, towing fees from auto accidents are set at a fixed price by law. Doctors, insurance companies and Medicare will only reimburse a certain price. What possible actions might your competitors take? Will too low a price from you trigger a price war? Find out what extra factors may affect your pricing. (Allen, 2010)

Exhibit Reference

Allen, S. (2010). How much should you charge for your product or service? Retrieved from http://entrepreneurs.about.com/od/salesmarketing/a/pricingstrategy.htm

Exhibit 2(i)

Boston Consulting Group (BCG) Growth Share Matrix

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the L-Guys Pricing Decision. Also ask yourself: should you apply the information on making a decision that appears on this page?
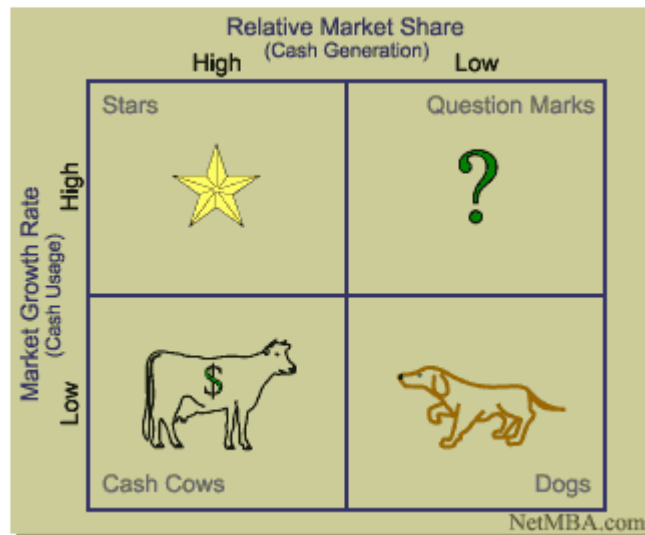
BCG Growth-Share Matrix is a portfolio-planning model developed by Bruce Henderson of the Boston consulting group in the early 1970's. It is based on the observation that a company's business units can be classified into four categories based on combinations of market growth and market share relative to the largest competitor, hence the name "growth-share". Market growth serves as a proxy for industry attractiveness, and relative market share serves as a proxy for competitive advantage. The growth-share matrix thus maps the business unit positions within these two important determinants of profitability. This framework assumes that an increase in relative market share will result in an increase in the generation of cash. (http://www.netmba.com/strategy/matrix/bcg/)

Exhibit 2(ii):   The Experience Curve
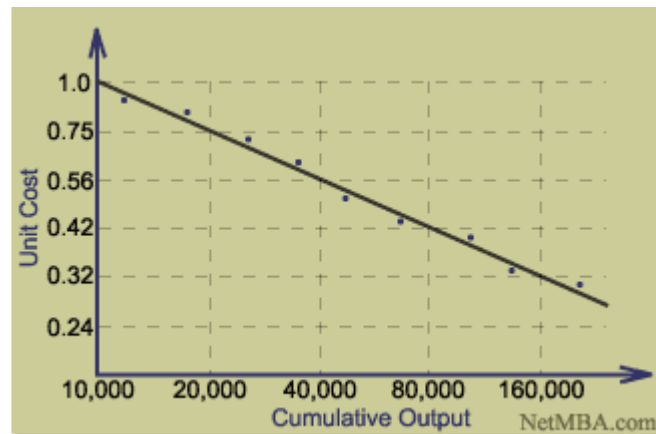
The experience curve has important strategic implications. If a firm is able to gain market share over its competitors, it can develop a cost advantage. Penetration pricing strategies and a significant investment in advertising, sales personnel, production capacity, etc. can be justified to increase market share and gain a competitive advantage.

When evaluating strategies based on the experience curve, a firm must consider the reaction of competitors who also understand the concept. Some potential pitfalls include:

- The fallacy of composition holds: if all other firms equally pursue the strategy, then none will increase market share and will suffer losses from over-capacity and low prices. The more competitors that pursue the strategy, the higher the cost of gaining a given market share and the lower the return on investment.
- Competing firms may be able to discover the leading firm's proprietary methods and replicate the cost reductions without having made the large investment to gain experience.
- New technologies may create a new experience curve. Entrants building new plants may be able to take advantage of the latest technologies that offer a cost advantage over the older plants of the leading firm.

(http://www.netmba.com/strategy/experience-curve/).

In-Basket Task #3: RISC selection of a hotel

Sam, a highly successful International Sales Manager for RED, a chain of hair dressing stores in New Zealand and Australia, has approached you for advice. The firm RED has its annual international sales conference in three months' time. At this international sales conference which normally runs over 3 days, the Australasian top achieving sales representatives are rewarded and new products are launched. The annual RED International Sales Conference (RISC) is highly prestigious and there is already much excitement amongst the sales representatives to see who will make it through to RISC this year. This year it is planned for a venue in the Pacific Islands. RED's international sales management team organizes many functions every year. Several members of Sam's event planning team have taken business trips to assess a large number of possible hotels. The enclosed list of nine hotels are those pre-screened hotels that meet the minimum requirements to host a conference of this caliber for this number of people.

RED's president, Joe White always takes personal interest in the RISC function. Since the key focus of the coming sales year is on customer care and nurturing existing clients, she has asked Sam's team to find a venue that will demonstrate these qualities. The team has done some preliminary research and has found nine possible hotels RED have used in the past, to host the upcoming RISC function.

Sam needs to make the final decision today since many of the hotels have a minimum lead time and RED's president wishes to announce the venue and key speakers at the director meeting which is tomorrow. Once you have made your recommendation, Sam will have full authority and control over the all-inclusive budget of $1.7m to make the decision. His decision will be final.

Sam's event planning team has, over the years of organizing the RISC function, developed a checklist of key attributes to consider. This ranked attribute list was compiled from past top achievers and RISC conference attendees' feedback forms. The factors, issues and attributes of the event and the priority weighting of each factor appear in the second column, labeled *Importance (scored out of 10 by sales staff who attended conferences in the past)* in Table 1.

Your Consulting Report to the RED international sales manager

You wish to develop a short-list of one or two hotels to consider. Second, you wish to generate one strength and one weakness for each alternative action. Finally, you want to select one of the alternatives to recommend to Sam and tell why this action is the best one for RED to take.

Your Consulting Report to the RED international sales manager of RISC
GBF1

1. One to two hotels to consider on the final short-list?

Hotel 1:	Hotel 2:

2. One strength and one weakness for each course of action?

Hotel 1:	Hotel 2:
Strength Hotel 1:	Strength Hotel 2:
Weakness Hotel 1:	Weakness Hotel 2:

3. Final choice of action and why it's best for RED and the RISC function?

Final choice of Hotel: (Write name of Hotel here):
Why it is the best for RED:

2. Please indicate how confident you are that your answer is the best venue for the event.
   Please tick ✓ your level of confidence:

1	Not very confident	2	Somewhat confident	3	Confident	4	Very confident

3. Please indicate how likely you are to stick with your decisions, should you be asked to review them in two weeks time. Please tick ✓ your option

1	I am very likely to change my decision.	2	Somewhat likely to change my decision	3	I am unlikely to change my decision. I will stick with my current decision	4	I will not change my decision at all. I will definitely stick with my current decision.

TABLE 1: Nine Short-listed Hotels for the RED International Sales Conference (RISC)
Quality of availability of the listed attribute: Yes/ ✓ = acceptable; No/✗ = unacceptable

Attribute	Importance Out of 10	Hotel A	Hotel B	Hotel C	Hotel D	Hotel E	Hotel F	Hotel G	Hotel H	Hotel I
Good food and great entertainment and break-away areas	9	No ✗	Yes ✓	No ✗	Yes ✓	No ✗	Yes ✓	No ✗	Yes ✓	Yes ✓
Interesting sights and entertainment in close proximity to the hotel	7	No ✗	Yes ✓	No ✗	No ✗	No ✗	Yes ✓	No ✗	No ✗	No ✗
Excellent, secure conference facilities	10	Yes ✓	No ✗	Yes ✓	No ✗	No ✗	Yes ✓	Yes ✓	Yes ✓	Yes ✓
Easy access to trains, busses, parking and transport	6	Yes ✓	Yes ✓	Yes ✓	No ✗	Yes ✓	Yes ✓	No ✗	Yes ✓	No ✗
Free, fast internet and business support services, to access messages and e-mail(s).	5	No ✗	No ✗	Yes ✓	Yes ✓	Yes ✓	Yes ✓	No ✗	Yes ✓	Yes ✓
Friendly concierge service with good knowledge of the local sites, events and attractions; friendly local services and vendors.	3	No ✗	Yes ✓	Yes ✓	Yes ✓	No ✗	No ✗	No ✗	Yes ✓	No ✗
Good IT support for the conference facilities	2	Yes ✓	Yes ✓	Yes ✓	Yes ✓	No ✗	No ✗	Yes ✓	No ✗	Yes ✓
Comfortable rooms with *en suite* bathrooms and television.	8	Yes ✓	Yes ✓	Yes ✓	No ✗	Yes ✓	Yes ✓	Yes ✓	No ✗	No ✗
Speedy, friendly front desk and good overall service quality.	4	No ✗	No ✗	Yes ✓	Yes ✓	No ✗	No ✗	Yes ✓	No ✗	No ✗
Overall affordability of food and lodging.	1	No ✗	Yes ✓	Yes ✓	Yes ✓	Yes ✓	No ✗	No ✗	Yes ✓	Yes ✓

Exhibit 3A:

_{GBF1} **Decision about Conference Facility Attributes – Studies over a decade**

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the hotel decision. Also ask yourself: should you apply the information on making a decision that appears on this page?

The event industry is experiencing impressive growth. To facilitate the destination selection process, the planner and host organization should first establish the goals and objectives for the event. With that knowledge, destination selection criteria are easier to establish.(Rompf, Breiter, & Severt, 2008) Upchurch, Jeong, Clements, and Jung (1999) note that the organization should create a short list of two or three priorities for site selection. Furthermore, the selection of location also depends significantly on the size and budget of the organization producing the event (Crouch & Ritchie, 1998). According to Churchill (1993, p.56), "During a recession companies cannot afford to waste time and resources, therefore companies are giving more emphasis to setting clear objectives and high quality standards for their conferences", he later adds that "valued-added is increasingly the name of the game for management conferences".

Crouch and Louviere (2004)interviewed 500 meeting planners from the Meetings Industry Association of Australia. Each respondent was asked to make discrete choices on a number of designed scenarios recounting hypothetical convention sites described by site selection attributes. The study reports that participant proximity to the convention site, quality of conference and exhibition space, plenary rooms, break-out rooms, and perceived food quality were important antecedents to site selection. In terms of the convention destination setting, opportunities for entertainment, shopping, sightseeing, recreation and organized tours were found as significant advantages for destinations.

An Australian study by Comas and Moscardo (2005) collect data on the attributes or selection criteria that association planners look for when choosing a host destination for association conferences and meetings. They discovered six key themes among a variety of destination attributes: meeting venue (including size, location, and access), accommodation venue (size of the property, location, and cost of room nights), convenience (preference of one venue covering a range of facilities including meeting space, accommodations, and conference dinners), quality of technology, price of meeting and accommodation facilities, and overall city atmosphere, including the hospitality of the local residents, safety, and the availability of additional activities, Crouch and Ritchie (1998) identify four major site selection factors to consider when choosing a site: accessibility, local support, extra-conference opportunities, and accommodation facilities, keeping in mind that variations in these dimensions are dependent upon the size and budget of the particular group.

Accessibility refers to the expense of transportation and access, the duration/distance of travel involved, the frequency of connections to the site, the convenience of these connections, and any existing barriers, such as passports or customs procedures, that may hinder the travel experience.

Local support refers to the amount of assistance or backing offered by any local chapters or branches of the group, the amount of CVB/convention center support, and the availability of any subsidies or rebates offered by the destination. *Extra-conference opportunities* refer to activities event participants can take advantage of while visiting the destination, such as entertainment, shopping, sightseeing, recreation, and professional opportunities. *Accommodation* facilities are of particular importance to meeting planners in that they need to know the capacity of facilities, the cost of the accommodations, the perceptions towards standards of service at particular lodging establishments, the assurance

of a safe and secure environment, and the availability of the facilities when required (Crouch & Ritchie, 1998).

Both the competitive environment and external forces appear to drive new factors in conference facilities and destination selection, referred to as "Key Event Success Factors." Those factors/criteria are "overall cost," "perceived value for money," "reputation for hosting events," "image as a desirable place to visit," "support services for events," "safety and security," and "accessibility."

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EXHIBIT 3B: SATISFICING as Decision Strategy

USEFUL RULES FOR EVALUATING HOTEL SCENARIOS

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the hotel decision.
Also ask yourself: should you apply the information on making a decision that appears on this page?

This information sheet is about fast and frugal heuristics for making decisions—how they work, and when they succeed. Humans and animals make inferences about their world with limited time, knowledge, and computational power. Gigerezer and Todd argue that models of much of human reasoning and decision making involve the use of fast and frugal heuristics that make inferences with limited time and knowledge. These heuristics do not involve much computation, and do not compute probabilities and utilities; using such heuristics results in more accurate decisions than fully rational models.

Fast and frugal heuristics: Example from the medical industry

A man is rushed to a hospital in the throes of a heart attack. The doctor needs to decide quickly whether the victim should be treated as a low risk or a high risk patient. He is at highrisk if his life is truly threatened, and should receive the most expensive and detailed care. The doctor does not have the luxury of extensive deliberation: She must decide under time pressure using only the available cues, each of which is, at best, merely an uncertain predictor of the patient's risk level. At the University of California, San Diego Medical Center, as many as 19 such cues, including blood pressure and age, are measured as soon as a heart attack patient is admitted. Common sense dictates that the best way to make the decision is to look at the results of each of those measurements, rank them according to their importance, and

2

combine them somehow into a final conclusion. Consider in contrast the simple decision tree in

Figure 1-1, which was designed by Breiman and colleagues (Breiman et al., 1993) to classify

heart attack patients according to risk using only three variables. If a patient has a systolic

blood pressure of less than 91, he is immediately classified as high risk—no further

information is gathered. If not, then the decision is left to the second cue, age. If the patient is

under 62.5 years old, he is classified as low risk; if he is older, then one more cue (sinus

tachycardia) is considered to classify him as high or low risk. The tree requires the doctor to

answer a maximum of three yes-no questions to reach a decision rather than to measure and

consider 19 predictors, letting her proceed to life-saving treatment all the sooner. And it works!

Figure 1-1: A simple decision tree for classifying incoming heart attack patients into high risk

and low risk patients (adapted from Breiman et al., 1993).
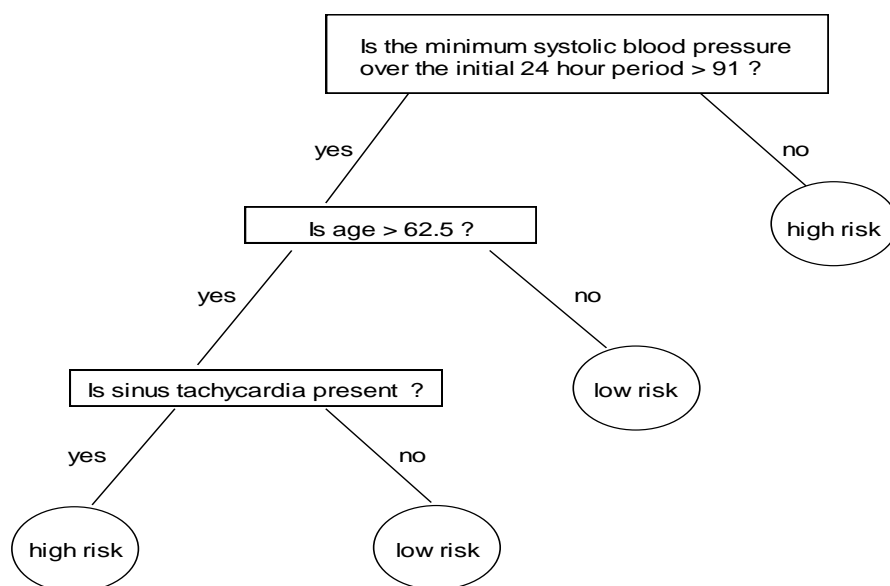
This decision strategy is simple in several respects. First, the heuristic ignores the great majority of possible measured predictors. Second, the heuristic ignores quantitative information by using only yes/no answers to the three questions.

Deciding Under Constraints

Satisficing is a method for making a choice from a set of alternatives encountered sequentially when one does not know much about the possibilities ahead of time. Satisficing takes the shortcut of setting an aspiration level and ending the search for alternatives as soon as one is encountered that exceeds the aspiration level (Simon, 1956a, 1990). Satisficing is a way of making a decision about a set of alternatives that respects the limitations of human time and knowledge: it does not require finding out or guessing about all the options and consequences the future may hold, as constrained optimization does. However, some forms of satisficing can still require a large amount of deliberation on the part of the decision maker, for instance to set an appropriate aspiration level in the first place, or to calculate how a current option compares to the aspiration level (Simon, 1956b). Satisficing limit the search of objects or information using easily-computable stopping rules, and they make their choices with easily-computable decision rules.

Heuristic principles for guiding search. Decisions must be made between alternatives, and based on information about those alternatives. In different situations, may need to be found through active search. The heuristic principles for guiding search for those alternatives are what give search its direction (if it has one). For instance, search for cues can be simply random, or in order of some precomputed criterion related to their usefulness; or based on a

recollection about which cues worked previously when making the same decision . The search for alternatives can similarly be random or ordered.

Heuristic principles for stopping search. In our conception of bounded rationality, the temporal limitations of the human mind (or that of any realistic decision-making agent) must be respected as much as any other constraints. This implies in particular that search for alternatives or information must be terminated at some point.

Heuristic principles for decision making. Once search has been guided to find the appropriate alternatives or information and then been stopped, a final set of heuristic principles can be called upon to make the decision or inference based on the results of the search. These principles can also be very simple and computationally bounded. For instance, a decision or inference can be based on only one or two cues or reasons, whatever the total number of cues found during search. A one-reason decision making does not need to weight or combine cues, and so no common currency between cues need be determined. Decisions can also be made through a simple elimination process, in which alternatives are thrown out by successive cues until only one final choice remains.

One of the surprising results reported in empirical studies by Gigerenzer and Todd (1999), is that simple heuristics need not always make tradeoffs in accuracy or quality. These studies show that, when compared to some standard benchmark strategies, fast and frugal heuristics can be faster, more frugal, and more accurate at the same time.

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IBDC **Exhibit 3C: Steps in Using the Take-the-Best Decision Rule**

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the hotel decision.
Also ask yourself: should you apply the information on making a decision that appears on this page?

- Heuristics are efficient cognitive processes that ignore information. In contrast to the widely held view that less processing reduces accuracy, the study of heuristics shows that less information, computation, and time can in fact improve accuracy. Research shows that the take-the-best heuristic provides more accurate solutions in some contexts than more complex thinking processes.

- Take-the-best consists of three building blocks:
1. Search rule: Search through cues in order of their validity.
2. Stopping rule: Stop on finding the first cue that discriminates between the subjects (i.e., cue. values are 0.0 to 1.0)
3. Decision rule: Infer that the object with a positive cue value (1) has a higher criterion value.

- Take-the-best is a member of the one-good-reason family of heuristics because of its stopping rule: Stop searching after finding the first cue that enables an inference to be made. Take-the-best simplifies decision-making by both stopping after the first cue and by ordering cues unconditionally by validity.

- Example: Jane is deciding on which of two Americans to hire as a project manager to work in her firm's headquarters in Germany: Linda or Tom. She wants to hire the best person for the job - the one that is going to perform the job to the highest level. Linda can read German, but has poor language speaking ability in the German language. Linda graduated from Cambridge University with honors in humanities. Linda's current job is a senior project manager at a small firm in Chicago. Tom is fluent in both reading and speaking German. Tom graduated from the University of Kentucky in the U.S. with a Masters in Business Administration. Tom's current job is as a junior project manager in a large firm in Chicago.

- Jane assigns a high cue value (1.0) to one cue only: job experience. Jane concludes that Linda has more job experience than Tom. Jane selects Linda for the project manager job in Germany.

  The take-the-best decision rule may be applicable to the pricing strategy decision to help you in deciding which price to select.

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Exhibit 3(i)

_{GBD2} **Steps in Rational Decision-Making/ Weighted Priority Matrix**

- When facing two or more alternatives in solving a problem, transform the information on relative information available on each alternative to standard scores. For example, standard scores might range from 0.0 to 1.0.

- Weight the importance of each piece (cue) of information. For example, assume that you used a constant sum of ten points to apply to three cues. You can assign the ten points evenly or weigh the importance of one cue much more (e.g., 8) than the other two cues; you might assign each of the other two cues a value of 1 each - or weigh the importance of one cue as 2 other cue as zero.

- For each alternative, multiply each cue's standard score by the cues weight and sum across all the weighted cues.

- Select the alternative with the highest sum as your answer.

- **Example**: Jane is deciding on which of two Americans to hire as a project manager to work in her firm's headquarters in Germany: Linda or Tom. She wants to hire the best person for the job - the one that is going to perform the job to the highest level. Linda can read German, but has poor language speaking ability in the German language. Linda graduated from Cambridge University with honors in humanities. Linda's current job is a senior project manager at a small firm in Chicago. Tom is fluent in both reading and speaking German. Tom graduated from the University of Kentucky in the U. S. with a Masters in Business Administration. Tom's current job is a junior project manager in a large firm in Chicago. Jane selected the following cues to evaluating Linda and Tom (and assign the following importance weights to each cue: German language ability (2), University quality (1), relevancy of training to the job (3), job experience (4), and gender (0). (Jane prefers to hire a male but believes that gender is not relevant to the job.)

- Jane uses a 0.0 to 1.0 score to standardize her evaluations of Linda and Tom across the four cues (multiplies each score for each cue by the cues importance weight and sums).

Cue	Cue Weight	Evaluation of Linda		Evaluation of Tom	
German language ability	2	.3	[.06]	1.0	[2.0]
University quality	1	1.0	[1.0]	0.3	[0.3]
Relevancy of training to job	3	.5	[1.5]	0.7	[2.1]
Job experience	4	.8	[3.2]	0.4	[1.6]
Gender	0	.2	[0.0]	0.8	[0.0]
Σ TOTAL			[6.3]		[6.0]

The sum of scores for Linda and Tom are close (6.3 versus 6.0); Linda has the highest summed score. Jane selects Linda for the job.

These steps in rational decision-making may be applicable to the pricing strategy problem to help you in deciding which price to set.

TASK #3: HOTEL SELECTION
Attributes ranked by past participants of RISC Conferences
GBD2

Attribute	Rated Out of 10	Hotel A Arturo Yes/No	Arturo Weighted	Hotel B Bianca Yes/No	Bianca Weighted	Hotel C Clover Yes/No	Clover Weighted	Hotel D Domino Yes/No	Domino Weighted	Hotel E Enterprise Yes/No	Enterprise Weighted	Hotel F Fargo Yes/No	Fargo Weighted	Hotel G Gladiator Yes/No	Gladiator Weighted	Hotel H Hilltop Yes/No	Hilltop Weighted	Hotel I Imperial Yes/No	Imperial Weighted
Good food, great entertainment and break-away areas	9	-1	-9	1	9	-1	-9	1	9	-1	-9	1	9	-1	-9	1	9	1	9
Interesting sights and entertainment in close proximity to the hotel	7	-1	-7	1	7	-1	-7	-1	-7	-1	-7	1	7	-1	-9	-1	-7	-1	-7
Excellent, secure conference facilities	10	1	10	-1	-10	1	10	-1	-10	-1	-10	1	10	1	10	1	10	1	10
Easy access to trains, busses, parking and transport	6	1	6	1	6	1	6	-1	-6	1	6	1	6	-1	-6	1	6	-1	-6
Free, fast internet and business support services to access messages and e-mail(s)	5	-1	-5	-1	-5	1	5	1	5	1	5	1	5	-1	-5	1	5	1	5
Friendly concierge service with good knowledge of local sites and events; friendly local services and vendors.	3	-1	3	-1	-3	1	3	1	3	1	3	-1	-3	-1	-3	1	3	-1	-3
Good IT support for the conference facilities	2	1	2	1	2	1	2	1	2	-1	-2	-1	-2	1	2	-1	-2	1	2
Comfortable rooms with *en suite* bathrooms and television.	8	1	8	1	8	1	8	-1	8	1	8	1	8	1	8	-1	-8	-1	-8
Speedy, friendly front desk and good overall service quality	4	-1	-4	1	4	1	4	1	4	-1	-4	-1	-4	1	4	-1	-4	-1	-4
Overall affordability of food and lodging	1	-1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	-1	1	1	1	1
Total weighted score	55		3		19		23		9		-9		35		-9		13		-1

Yes = 1
No = -1

In-Basket Task #4: Performance Management at ABConsulting

You client is **Abe Connor, CEO of ABConsulting**, a business consulting service with 57 consultants and 135 support and administrative staff. **Mary Smith**, National Promotions & Events Manager is normally a star performer in Abe's team at ABConsulting. She is highly competent at running multiple promotional campaigns and projects and although she is not very well liked, is well regarded by her twelve subordinates as a hard-working and strict manager. She is seen by her colleagues as a perfectionist with a keen focus on task and delivering high quality output within tight deadlines. She is responsible for the national promotions and sponsorships of ABConsulting services business, which amounts to approximately 24 projects with a total budget of $850 000.

Mary was recently asked to not only organize the National Awards for Media Innovation function which is part of her normal function, but in addition present a cheque on the gala evening of the Awards function, of which the firm is the main sponsor. This presentation and executive liaison role would normally be allocated to someone more senior than Mary in ABConsulting. Abe wanted to give her a chance to shine in the limelight and offer her a chance to demonstrate her ability to move up the ranks - one she often expresses a desire for. (In two of her previous bi-annual performance review meetings, the most recent of which was last month, she expressed a need to be promoted into higher paying and more responsible positions).

 The Awards function ran smoothly and impressively as per all the promotional campaigns her team executes, but her interface with the top achievers, prize winners, and executives left much to be desired. Abe has first-hand information from a trusted friend that she was rude to the president of Media Inc., the owners and organizers of the event - and one of your most important and most valuable clients - on more than one occasion on the day of the function. She was sulking throughout the evening event function, made harsh, inappropriate remarks to clients and colleagues and was inappropriately dressed for such a glamorous function. In the words of Abe's trusted friend, "She looked like she came straight off the ladder where she was hanging the 'congratulations banner' to present the award, rather than dressed in smart evening attire, as was specified on the invitations she wrote and printed herself". Even one of her team members said, "I don't think I have ever seen her in such a foul and unaccommodating mood."

It has previously come to Abe's attention that she is first in the office in the mornings and that she never leaves the office before 7 pm and is very often the last

person to leave the building. Although she has gained quite a bit of weight, she makes no time for tea or lunch and a senior colleague still sees her running at 6am every morning on his daily jogs. During her performance review she stated that she is having some personal problems at home and that a promotion "would be just the thing to make me feel valued and appreciated." Abe is concerned about the impact Mary's behavior might have on the reputation and image of ABConsulting. There is some rumor that Media Inc. is considering taking their substantial business to your main competitor. Which of the following actions should Abe take?

A. Call Mary and her team in immediately to express his discontent with Mary's type of behavior and warn them all that a repeat performance will lead to a reduction in status or bonus/pay or both and that such behavior at corporate events will not be tolerated. Express the importance of key clients such as Media Inc. to the survival of ABConsulting and how one event like this might cost you years of good work and hundreds of dollars in real consulting work.

B. Wait for the next performance review, which is only two months away, to address the matter on a formal basis. Ensure that Abe build new criteria into the performance review document for all members of the national promotions business unit. Suggest that Abe phone the president of Media Inc. immediately to apologize and to smooth over any feathers that may have been ruffled. Advise Abe to go out of his way to rebuild the relationship and retain this key client.

C. Suggest to Abe to find Mary immediately and ask her for her version of the story so that Abe can give her a warning about future non-conformance actions he will take. Give her a formal warning so that he has followed procedure in case there is a repeat performance and he wishes to fire her after the next infringement. Advise Abe to call Media Inc. to resolve any residual unhappiness.

D. Suggest that Abe call his Media Inc. client to gather more information and to select one of two options. If the president of Media Inc. is seriously considering taking their consulting business away from ABConsulting, offer to fire Mary in order to retain the business of this key client. If the Media Inc. client is not too mad, suggest that Abe offers his personal apologies and let the issue rest. Suggest that Abe does nothing further after dealing with Media Inc.

E. You advise Abe to use positive reinforcement. You suggest to Abe to call Mary into his office, congratulate her on another successful event, but explain why she needs to call your Media Inc. to apologize for her behavior. Abe should explain that he relies on her and trust her to follow up with Media Inc.'s president and smooth over any problems. Give her a few pointers on how to deal with irate clients and difficult staff. Ask for feedback after the call.

Your consulting report to Abe at ABConsulting:
GBF1

Your personal secret code:

Number;	Number;	Letter;	Letter;	Letter

1. Which course of action to you suggest do Abe take, please tick (√) one choice:

Option	Suggestion to Abe of ABConsulting	Tick your selection
A	Take immediate action and express your discontent to the whole team.	
B	Wait to address the issue with the team. Call the client immediately and rebuild the relationship with the key client	
C	Call Mary in to address the non-conformance immediately. Call the client immediately and rebuild the relationship with the key client.	
D	Call Media Inc and either fire Mary or let the issue rest if the client is not all that upset.	
E	Congratulate Mary on a successful function. Direct her to call Media Inc. Give her some pointers. Ask for feedback	

2. Please provide one to three reasons for your choice here: (Use the back of the sheet if necessary)

Reason 1:

Reason 2:

Reason 3:

3. Please indicate how confident you are that your answer is the correct answer. Please tick
✓ your level of confidence:

1	Not very confident	2	Somewhat confident	3	Confident	4	Very confident

4. Please indicate how likely you are to stick with your decisions, should you be asked to
review them in two weeks time. Please tick ✓ your option:

1	Very likely to change my decision	2	Somewhat likely to change my decision	3	I am unlikely to change my decision. I will stick with my current decision	4	I will not change my decision at all. I will definitely stick with my current decision.

Exhibit 4A
Decision Aid: Information on Retaining Key Clients & Key Staff
GBF1

Please think for a minute or two to yourself on how you might apply the information appearing on this page in making the ABConsulting decision.
Also ask yourself: should you apply the information on making a decision that appears on this page?

- In the service industry, an average of 95% of business comes from 15% of clients. Retaining key clients should be the focus of every manager in the business. Most industries quote the Pareto principle, i.e. 80% of business comes from 20% of clients. This 20% of clients are called key clients.

- Key clients of service organizations periodically review and change their advertising; marketing and corporate communications services business models and supplier relationships. If service organizations are unable to remain competitive or retain key clients, their business and financial results may be materially adversely affected.

- The success of acquiring and retaining clients depends largely on organizations' ability to manage client relationships and retention of key personnel to manage those relationships.

- Organizations' ability to attract and retain key personnel is an important aspect of their competitiveness since employees and key clients are the two most important assets of any business. If unable to attract and retain key personnel, the organization's ability to provide services in the manner customers expect may be adversely affected, which could harm their reputation and result in a loss of clients, which could have a material adverse effect on results of operations and the overall financial condition.

- To develop strong business relationships, key service personnel need to have the interpersonal and relationship-building skills to attract and retain key clients. This is an example of a valuable relational asset as well as a potential source of competitive advantage. Organizations should invest time and money to develop these competencies.

- In many organizations, the most prominent and expensive resource is their employees. As a result, a lot of time is spent on (a) creating processes and conditions that drive and motivate employees; and (b) developing employee competencies and skills to perform effectively and productively in the workplace.

- Starting with the issue of motivation, it is fair to say that this is not an easy task since different drivers motivate different people. The reason: motivation develops internally from a personal desire to achieve goals that are important both to the individual and to the organization. Motivation is the force that prompts them to take action. If a leader or manager is having trouble getting someone to achieve the organization's goals, they are probably failing to understand what the employee's personal goals are.

- Frederick Herzberg, research psychologist and author of "One More Time, How Do You Motivate Employees?" found that rather than working purely for external rewards such as money, people are motivated by challenges, stimulating work and increasing responsibility. In other words, people become frustrated when their work offers little or no opportunity for growth and achievement. While pay, fringe benefits, and working conditions are important, research has shown that absence of these factors produces a lack of motivation, but their presence has no long-range motivational effects. Long-range motivational factors are recognition of a job well done, sense of achievement, growth, participation, challenge, and identification with the company's goals and vision.

- Compassion is caring and empathy in action. It is the ability and willingness to act on feelings of care and empathy for others' feelings and experiences. According to leadership guru Richard Boyatzis, leading with compassion can favorably affect the bottom line. Important organizational results are achieved through compassion: "development of more people as leaders' higher commitment, responsiveness to customers, and a sense of share community and social responsibility" (Resonant Leadership, p.185)

- They also argue that CRM is particularly concerned with singling out customers who are of strategic importance to the company, having the greatest customer lifetime value. It is with these customers that the company should build strong, interactive and collaborative relationships in order to be able to provide them with personalized offerings, thus enhancing company profitability. p.14

- Just as in literature concerning CRM, people are seen as a key success factor in Key Account Management (KAM). In Zupancic's (2008) framework on the operational KAM level, it is of importance to determine the competencies needed to best serve each key account and to nominate the people in the key account team, as well as analyze the individual needs of the people already involved in a particular relationship. Meanwhile, on the corporate KAM level it is crucial to acknowledge the pivotal role of outstanding staff in the success of KAM and continuously analyze their competencies, as well as provide the staff involved in KAM with training and development programmes. It is also within the realm of corporate KAM to appoint key account managers from within the organization. (Zupancic, 2008). p/31

- The findings of Brady (2004) and Nätti et al. (2006) highlight the importance of capable staff as a key success factor in KAM.

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e=1.

INSTRUCTIONS – THE FINAL STEP

GBF2

AUT
UNIVERSITY
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

Process & Procedures:

Please take the time that you find the exercises require in answering. Please provide complete answers to each problem in the in-basket. Please check that you have labeled all sheets with your unique personal code. Do not encode or label this sheet and please hand it in separately from the Decision Forms.

Please check that you have completed every part of the Demographic Form.

After completing the rest of this sheet, please hand the full pack to the facilitator.

Please tell me what you think this study seeks to learn?   Please guess even if you are uncertain.
Answer:

For this exercise in decision-making, your name will **not** be included with your answers in the data file. However, if you wish to have a review sent to you, please tick the box below and provide your name and e-mail address to receive a review of your answers.

Name and Surname:	
E-mail address:	
Mobile phone number:	
Please tick ☑ the relevant option below	
Yes, I wish to receive a review.	No, I do not wish to receive a review.

About the LUCKY PRIZE DRAW:

To thank you for this investment in time, you will be entered into the draw to win one of two iPad personal computers.

How is the winner determined?

The names of ***all participants,*** typed on a small card, will be placed in a hat. Andrew Parsons (Department Head for Marketing at AUT University) will, as an independent party, draw a name from the hat, wearing a blind-fold. A certified barrister will monitor the procedure to certify the procedures are unbiased and fair. We will notify you (at the e-mail address provided above) of the outcome of the lucky draw on the completion of the final study, which will be held upon conclusion of the laboratories; but no later than 24 April 2012.

This concludes the study. Thank you for participating today!

APPENDIX D:

RAW DATA SPREADSHEETS

FsQCA ANALYSIS OUTPUT

Allocated Case #	STUDENT Unique CODE	Configurations of conditions encoded			IN-BASKET Task #1			IN-BASKET Task #2			IN-BASKET Task #3		
		Group/Indv GBS/No G=1, ~G=0 B=1N=0	DEVIL's D/~D=F	Training type COMPT = 1; incmpt	Decisic 1INB1	Confidence 1/2/3/4	Confidence Change 1/2/3/4	Decision 2INBB	Confidence 1/2/3/4	Confidence Change 1/2/3/4	3INBC	Confidence 1/2/3/4	Confidence Change 1/2/3/4
1	75CG6L	1 1	0	0	1	4	3	1	2	2	1	3	3
2	76RHY	1 1	0	0	1	4	3	0	3	3	1	4	4
3	06SIM	1 1	0	0	0	4	3	0	4	3	1	4	4
4	KAV12	1 1	0	0	1	3	4	1	4	4	1	3	3
5	78PKM	1 1	0	0	1	4	4	1	4	3	1	4	4
6	11BEE	1 1	0	0	1	4	4	1	3	3	1	4	4
7	51MBS	1 1	0	0	1	4	4	0	4	4	0	3	3
8	07BEH	1 1	0	0	1	4	4	0	4	4	1	4	4
9	88RUN	1 1	0	0	1	3	3	0	3	2	1	4	4
10	AM666	1 1	0	0	1	3	2	1	4	4	0	4	3
11	67DAR	1 1	0	0	1	3	3	1	3	3	0	3	3
12	34MAT	1 1	0	0	1	3	3	1	2	2	0	3	3
13	11TAJ	1 1	0	0	1	3	3	1	3	2	0	3	3
14	58MDG	1 0	0	1	0	3	3	1	4	4	0	3	3
15	99MAN	1 0	0	1	1	4	4	1	4	4	0	3	4
16	NH611	1 0	0	1	0	4	4	1	4	4	0	4	4
17	12BAT	1 0	0	1	0	3	3	1	4	4	1	3	3
18	19ARG	1 0	0	1	1	4	3	1	4	4	0	3	3
19	31SPA	1 0	0	1	1	4	4	1	4	4	0	4	4
20	07CHR	1 0	0	1	1	4	4	1	3	3	0	4	3
21	99HIT	1 0	0	1	1	3	4	1	4	4	0	3	3
22	39KIM	1 0	0	1	0	3	4	0	3	3	0	3	3
23	78AKM	1 0	0	0	1	4	3	1	4	3	1	3	3
24	01DEL	1 0	0	0	1	3	4	1	4	4	1	4	4
25	16TUF	1 0	0	0	1	4	4	1	3	3	0	3	3
26	86NBM	1 0	0	0	1	3	3	0	3	3	1	4	4
27	66LAR	1 0	0	0	1	4	2	1	4	3	1	2	1
28	55XYZ	1 0	0	0	1	2	3	0	3	3	0	2	2
29	35SMR	1 0	0	0	1	3	3	1	2	3	0	3	3
30	12MME	1 0	0	0	1	4	3	1	3	3	1	3	3

#	ID													
31	10BET	1	0	0	0	1	4	3	1	3	2	3	3	1
32	02SAR	1	0	0	0	1	3	2	1	4	3	4	4	0
33	29APR	1	0	0	0	1	3	3	1	3	3	3	3	0
34	14AEW	1	0	0	0	1	4	3	1	4	3	2	2	1
35	31SHR	1	1	1	1	1	4	4	1	4	4	4	4	0
36	92ONM	1	1	1	1	1	3	4	0	3	3	2	3	1
37	12JAS	1	1	1	1	0	3	3	1	3	3	3	3	0
38	29JAP	1	1	1	1	1	4	4	1	4	4	3	3	0
39	78CAT	1	1	1	1	1	4	4	1	4	4	4	4	1
40	06BBM	1	1	1	1	1	4	4	1	1	2	4	4	1
41	26FEI	1	1	1	1	1	3	3	1	4	4	4	4	1
42	22BOB	1	1	1	1	0	3	4	1	4	4	3	3	1
43	02LUC	1	1	1	1	0	3	3	1	4	4	3	3	1
44	00GIK	1	1	1	1	0	3	2	1	4	4	4	4	1
45	03FEB	1	1	1	1	0	3	3	1	4	3	3	3	1
46	48 FOX	1	1	1	1	0	3	3	1	3	3	2	2	1
47	23GNF	1	0	0	1	0	4	4	1	3	3	3	3	0
48	26WHU	1	0	0	1	0	4	3	1	4	3	3	4	0
49	17UNI	1	0	0	1	0	3	3	1	3	2	3	3	0
50	72TUA	1	0	0	1	0	3	3	1	3	3	3	3	1
51	55JAN	1	0	0	1	1	3	3	1	3	3	3	3	0
52	01BCA	1	0	0	1	0	3	3	1	4	4	4	4	0
53	BD126	1	0	0	1	1	4	3	1	4	4	4	4	0
54	16MKA	1	0	0	1	1	3	4	1	3	3	4	4	0
55	72HAN	1	0	0	1	1	4	4	1	4	3	3	3	0
56	12ANN	1	0	0	1	1	3	3	1	3	3	3	3	1
57	18FLY	1	0	0	1	1	4	4	0	3	2	3	4	0
58	57123	1	0	0	1	1	4	4	1	4	3	3	3	1
59	03OTM	1	0	0	1	0	3	3	1	3	3	3	3	1
60	56AJL	1	0	0	1	1	4	4	1	3	3	2	2	0
61	BC247	1	0	0	1	0	3	4	0	4	3	2	3	1
62	72MNG	1	0	0	1	1	4	4	1	4	3	3	3	0
63	70ARB	1	0	0	1	1	4	4	1	2	2	3	4	0
64	4SIWS	0	0	1	0	1	4	3	0	4	3	3	3	0

		Blue			Purple			Green			Yellow			
65	01AJB	3	3	1	3	4	1	3	3	1	0	0	1	0
66	48HSA	2	2	1	3	3	1	3	3	1	0	0	1	0
67	12CAR	3	4	0	3	3	0	4	4	1	0	0	1	0
68	71OWL	3	4	0	3	4	1	3	2	1	0	0	1	0
69	11SBH	3	3	0	3	3	1	3	3	1	0	0	1	0
70	08SOS	3	3	1	4	3	1	4	4	1	0	0	1	0
71	15AMF	4	4	1	3	3	0	3	3	0	0	0	1	0
72	01JET	4	4	0	3	3	1	2	1	1	0	0	1	0
73	10-May	3	3	0	3	3	0	3	3	0	0	0	1	0
74	15ZHJ	3	4	0	2	2	0	3	4	1	0	0	1	0
75	19BTE	4	3	0	2	2	1	3	3	1	0	0	1	0
76	13AME	3	4	0	3	3	1	3	3	1	0	0	1	0
77	12GPM	3	4	1	3	3	1	4	4	1	0	0	1	0
78	39EUG	4	4	1	3	3	1	3	4	0	0	0	1	0
79	99ARH	4	4	0	3	3	1	4	4	1	0	0	1	0
80	02BAL	4	3	0	3	3	1	4	4	1	0	0	1	0
81	84TOM	3	3	0	4	4	1	4	4	1	0	0	1	0
82	12MEN	3	3	1	2	3	1	3	4	1	0	0	1	0
83	13LIN	3	3	0	3	3	1	3	3	1	0	0	0	0
84	89CJB	3	4	0	4	4	1	3	3	1	0	0	0	0
85	36MVP	4	4	0	3	3	1	4	4	1	0	0	0	0
86	JC638	3	3	0	4	4	0	3	3	1	0	0	0	0
87	99TIN	3	1	0	2	3	1	2	2	1	0	0	0	0
88	24TAN	3	3	0	3	2	1	3	4	1	0	0	0	0
89	30CFT	3	3	0	3	3	1	3	3	1	0	0	0	0
90	22MMS	3	2	0	2	2	1	3	3	1	0	0	0	0
91	12PRI	3	3	1	3	3	1	3	3	1	0	0	0	0
92	77SUK	3	4	0	2	2	1	2	3	1	0	0	0	0
93	11 ANG	4	4	0	3	3	1	3	3	1	0	0	0	0
94	10CAT	3	4	0	3	3	1	2	3	0	0	0	0	0
95	99ZAC	3	3	0	3	3	1	2	2	0	0	0	0	0
96	01NZS	3	3	0	3	3	1	3	4	1	0	0	0	0
97	24MYL	4	3	0	2	2	1	4	3	1	0	0	0	0
98	29EJF	4	4	0	3	2	0	3	3	1	0	0	0	0

#	Label														
99	78JOL	0	0	0	0	3	3	1	4	4	1	0	4	4
100	12AIB	0	0	0	0	3	4	1	3	3	1	1	4	3
101	03PAR	0	0	0	0	2	3	1	4	4	1	1	4	4
102	62NOR	0	0	0	0	3	3	1	3	3	1	0	4	4
103	00PMJ	0	0	0	0	3	4	1	3	4	1	0	4	3
104	11VLF	0	0	0	0	3	3	1	3	3	1	1	3	3
105	02STA	0	0	0	0	2	2	0	2	2	1	0	2	2
106	05LEO	0	0	0	0	3	3	1	3	3	0	1	3	3
107	29IRA	0	0	0	0	3	4	1	3	4	0	1	4	4
108	23RER	0	1	0	1	3	3	0	3	4	1	0	3	3
109	71CRM	0	1	0	1	4	4	1	2	2	1	0	2	3
110	61DBD	0	1	0	1	4	4	1	3	3	1	0	3	3
111	9-Apr	0	1	0	1	3	3	1	3	3	1	0	4	3
112	5-Dec	0	1	0	1	3	3	1	3	3	0	0	3	3
113	34SDN	0	1	0	1	3	3	1	3	3	1	0	3	3
114	74ANC	0	1	0	1	2	4	1	3	3	1	1	3	4
115	83ASB	0	1	0	1	3	3	1	4	4	1	0	4	4
116	07VVI	0	1	0	1	4	4	1	4	4	1	0	4	3
117	83ABC	0	1	0	1	3	2	1	3	3	1	1	2	2
118	AB767	0	1	0	1	3	3	1	3	3	1	0	4	4
119	21BAS	0	1	0	1	3	1	0	4	3	1	1	3	3
120	07SEV	0	1	0	1	3	3	1	3	2	0	0	3	3
121	20TMM	0	1	0	1	3	4	1	3	3	1	0	2	2
122	09UFC	0	1	0	1	3	3	1	3	2	1	0	4	4
123	28MSH	0	1	0	1	3	4	1	2	3	1	1	4	3
124	89KYL	0	1	0	1	3	3	1	2	2	0	0	4	3
125	52WJH	0	1	0	1	2	3	1	3	3	1	0	3	4
126	12VIC	0	1	0	1	4	4	1	3	3	1	0	3	3
127	52GAL	0	1	0	1	3	2	0	3	2	1	0	3	3
128	01CRF	0	1	0	1	4	4	1	3	3	1	0	4	4
129	56SOS	0	1	0	1	2	3	1	3	3	1	0	4	3
130	25DLP	0	0	0	1	4	3	1	4	3	1	0	4	4
131	25YOG	0	0	0	1	3	3	1	2	2	0	0	3	1
132	08STK	0	0	0	1	4	4	1	3	4	1	0	4	3

#	Code													
133	00RUK	0	0	0	1	0	4	4	1	3	3	0	2	2
134	09TIM	0	0	0	1	1	3	3	1	3	3	0	4	4
135	23BOB	0	0	0	1	1	3	3	0	1	2	0	2	2
136	24CDA	0	0	0	1	1	4	4	1	4	4	0	2	2
137	44HOT	0	0	0	1	0	4	2	1	4	4	0	4	3
138	37WAC	0	0	0	1	0	3	4	1	4	4	1	4	3
139	64CRA	0	0	0	1	1	4	3	1	4	4	0	4	4
140	00LTL	0	0	0	1	0	3	2	1	3	3	0	3	3
141	62DEB	0	0	0	1	0	4	4	1	4	4	0	4	4
142	69GDG	0	0	0	1	1	4	3	1	4	4	0	3	3
143	33JPR	0	0	0	1	0	2	3	1	4	3	0	3	3
144	46DCR	0	0	0	1	0	4	4	0	3	3	0	4	4
145	10RKG	0	0	0	1	1	1	2	1	4	4	0	4	4
146	23KVD	0	0	0	1	0	4	4	0	4	4	0	3	3
147	80LUA	0	0	0	1	1	2	2	0	3	2	0	2	2
148	82LTC	0	0	0	1	1	4	4	0	2	1	0	4	4
149	19RSP	0	0	0	1	1	3	3	1	3	3	0	3	3
150	70WLZ	0	0	0	1	1	3	3	1	3	3	0	4	4

IN-BASKET Task #4

Decision 4INBE	Confidence 1/2/3/4	Change 1/2/3/4	Age AGE	Education EDUC	Experience MANEXP	M=1, F=0 GENDER	Language LANGU	Nationality NATION	Domicile DOMIC
1	3	3		4	5	1	Spanish	Chilean	South American
0	4	4		3	1	1	Eng	NZ	Aus & NZ
0	4	4		4	1	1	Afr	RSA	RSA
0	3	4		2	5	1	Hindi	Indian	INDIA
0	4	4		3	4	1	Hindi	Indian	INDIA
0	4	4		3	1	0	Hindi	NZ	Fiji
0	4	4		7	1	1	Eng	NZ	Aus
0	4	4		4	4	1	Eng	NZ	NZ
0	3	3		2	2	1	Eng	NZ	NZ
1	4	4		3	3	1	Eng	NZ	NZ
1	3	3		5	3	1	Eng	NZ	NZ
1	4	4		3	3	0	Eng	NZ	NZ
1	3	3		3	5	1	Eng	NZ	NZ
1	4	4		7	6	1	Eng	Indian	INDIA
0	3	4		2	5	0	Eng	NZ	NZ
1	4	3		2	5	1	Eng	NZ	NZ
1	4	4		2	2	1	Spanish	Argentiniar South American	South American
1	3	4		2	5	0	Eng	NZ	NZ
1	4	4		3	5	1	Eng	Indian	INDIA
1	4	4		2	1	1	Eng	Indian	INDIA
1	4	3		5	3	1	Eng	NZ	NZ
1	4	4		3	5	1	Eng	Malaysian Asia, Malaysia	Asia, Malaysia
0	4	4		4	5	0	Eng	NZ	NZ
0	3	4		5	4	1	Samoan	Samoan	Aus
0	4	4		2	1	1	Eng	Indian	INDIA
0	3	4		2	3	1	mandarin C Taiwan	Taiwan	Asia, Taiwan
1	4	3		5	3	1	Eng	Indian	Asian, Indian
1	3	4		7	4	1	Hindi	NZ	Aus
0	4	3		4	3	1	German	Swiss	Europe;Switserland

0	4	4	3	5	3	1 Eng	NZ	NZ
1	2	3	2	2	2	1 Eng	Indian	INDIA
0	3	3	3	2	3	0 Russian	Russian	Europe;Ukraine
0	4	4	3	5	3	0 Mandarin	NZ	Asia:Taiwan
1	3	3	4	5	1	0 Eng	NZ	INDIA
1	4	4	2	5	2	0 Eng	RSA	RSA
1	3	3	4	5	3	0 Eng	Fiji Indian	NZ
0	3	3	3	5	4	0 Eng	NZ	NZ
1	3	3	7	3	4	0 Eng	NZ	NZ
1	3	3	3	5	2	1 Chinese Ca	NZ	Asia, Hong Kong
0	4	4	2	5	2	0 Chinese	Chinese	Asia
1	4	4	6	2	3	1 Eng	NZ	Aus
1	4	4	5	6	4	1 Eng	NZ	NZ
0	2	1	2	3	2	1 Eng	NZ	NZ
1	4	3	6	3	4	1 Eng	NZ	NZ
1	3	3	6	6	4	0 Eng	NZ	NZ
1	2	2	6	1	3	1 Eng	NZ	NZ
1	4	4	6	5	4	1 Eng	NZ	NZ
0	4	4	3	3	3	0 Eng	NZ Maori	NZ
0	3	3	4	1	3	0 Eng	NZ Maori	NZ
0	4	4	7	3	4	0 Eng	NZ	NZ
0	4	4	7	5	4	0 Eng	NZ	NZ
0	4	3	7	3	4	1 Eng	NZ	NZ
0	4	4	2	5	2	0 Eng	NZ	NZ
1	4	4	4	3	3	1 Eng	NZ	NZ
1	3	3	7	5	4	0 Eng	NZ	NZ
1	2	3	2	5	3	1 Chinese	Chinese	China
1	4	4	7	5	3	1 Eng	NZ	NZ
0	3	3	4	5	2	1 Chisona	Zimbab	Africa
0	3	3	7	5	4	1 Finnish	Finnish	Finland
0	4	4	2	5	2	1 Eng	Sri Lanka	Sri Lanka
1	3	3	4	5	4	1 Eng	British	UK
1	3	3	5	5	2	1 Eng	German	RSA
0	4	3	5	6	3	1 Eng	NZ	NZ

0	3	3	2	1	3	1 Eng	NZ	UK
0	3	3	6	1	4	1 Eng	NZ	NZ
0	3	3	4	1	3	1 Eng	NZ	NZ
0	4	4	4	1	4	1 Eng	English	UK
1	3	3	3	1	2	1 Eng	NZ	NZ
0	3	3	5	2	3	0 Eng	NZ	NZ
0	4	4	6	2	2	1 Tagalog	Filipino	Asia
0	4	4	5	1	4	1 Samoan	NZ	NZ
1	4	4	4	1	4	1 Zulu	Zimbab	Zimbab
1	3	3	4	2	2	0 Arabic	iraq	Iraq
0	4	4	4	6	3	1 Eng	NZ	NZ
0	2	3	7	5	2	0 Eng	NZ	NZ
0	3	3	5	3	2	1 Eng	NZ	NZ
1	3	3	6	4	2	1 Eng	NZ	NZ
1	4	4	6	3	4	1 Eng	NZ	UK
1	4	4	5	3	2	0 Eng	British	UK
0	4	4	6	5	4	1 Eng	Indian	INDIA
0	4	4	5	3	2	1 Eng	NZ	NZ
1	4	4	6	6	3	1 Chinese	NZ	China
0	4	3	6	5	4	1 Eng	NZ	NZ
1	4	4	4	2	2	0 Filipino	Filipino	Asia, Philpi
0	4	4	6	6	4	1 AFr	RSA	RSA
0	2	4	5	1	4	0 Eng	NZ	Aus
0	3	3	5	1	3	0 Eng	NZ	NZ
1	3	3	2	3	3	1 Eng	NZ	NZ
1	3	3	3	3	3	0 Eng	NZ Maori	NZ
0	3	3	5	2	3	1 Shona	Zimbab	ZIMB
1	3	3	6	5	4	1 Eng	Indian	INDIA
1	3	3	4	2	4	0 Eng	NZ	NZ
1	4	3	4	2	3	1 Eng	NZ	NZ
1	3	3	4	6	2	1 Eng	NZ	NZ
0	3	4	4	6	2	1 Afr	RSA	RSA
1	4	3	4	3	2	0 Eng	RSA	RSA
1	3	3	2	2	2	0 Eng	NZ	NZ

1	4	4	2	2	2	1 Chinese	Chinese	China
1	4	4	4	5	4	0 Eng	Aus	Aus
1	4	4	2	2	2	1 Eng	Indian	INDIA
1	2	2	6	5	4	1 Eng	NZ	RSA
0	4	3	7	1	4	1 Eng	NZ	UK
1	4	4	3	5	1	0 Eng	Indian	INDIA
1	2	2	2	5	2	0 Eng	NZ	Aus
0	3	3	3	3	2	1 Arabic	NZ	Iraq
1	3	3	3	5	2	1 Marath	Indian	INDIA
1	3	2	3	3	3	1 Eng	Maori	NZ
0	3	3	4	3	3	1 Eng	NZ Maori	NZ
0	4	3	7	5	4	1 Eng	NZ	NZ
D	4	4	5	5	4	1 Eng	NZ	NZ
0	2	3	6	1	4	1 Eng	NZ	NZ
1	3	3	3	1	3	1 Eng	NZ	NZ
0	3	4	4	6	2	1 Eng	NZ	NZ
1	3	2	2	2	2	1 Mandarin	Chinese	China
1	4	4	5	6	4	1 Russian	Russian	Russia
0	3	3	6	2	4	1 Eng	NZ	NZ
0	3	3	5	2	4	1 Eng	NZ	NZ
1	3	4	2	3	2	1 Eng	Indian	INDIA
0	3	3	3	1	3	0 Eng	Maori	NZ
0	3	2	5	2	2	1 Eng	Zimbab	ZIMB
1	2	3	2	1	2	1 Eng	NZ	NZ
0	3	3	5	6	3	1 Eng	NZ Maori	NZ
1	4	4	3	1	2	1 Eng	NZ	NZ
0	3	2	7	1	4	1 Eng	NZ	NZ
0	4	3	3	5	2	1 Chinese	China	China
1	4	4	4	3	4	1 Eng	UK	UK
1	4	4	7	1	2	0 Eng	NZ	NZ
0	3	3	6	3	2	0 Eng	NZ	NZ
0	4	4	5	6	4	0 Eng	NZ Maori	NZ
1	3	3	3	3	2	0 Gujerati	Fiji Indian	Fiji
0	2	3	6	1	3	1 Eng	NZ	NZ

0	3	3	7	6	4	1 Eng	NZ Maori	NZ
1	3	3	4	1	4	1 Eng	NZ	NZ
1	3	3	4	3	3	0 Eng	Eng	UK
1	3	3	6	1	2	1 Afr	NZ	RSA
1	3	3	5	2	4	1 Eng	NZ	NZ
1	4	3	4	2	4	1 Afr	RSA	RSA
1	4	4	6	1	4	1 Eng	Aus	AUS
1	4	4	7	2	3	0 Eng	NZ Maori	NZ
0	2	4	6	5	3	1 Eng	NZ	Africa
0	3	2	4	1	3	1 Eng	NZ	NZ
1	4	4	3	5	3	1 Eng	NZ	NZ
1	3	4	4	5	2	1 Eng	NZ	INDIA
1	4	3	3	2	2	0 Hindi	Indian	INDIA
0	4	4	6	1	4	0 Afr	RSA	RSA
0	2	3	2	5	2	0 Chinese	Chinese	China
1	4	2	2	5	3	0 Mandarin	Chinese	China
1	3	4	5	5	4	1 Hujarati	NZ	INDIA
1	3	3	5	5	2	1 Chinese	Chinese	China

fsQCA Analysis for In-basket 1 (bask1 and conf1_c)

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask1 = f(group, gbs, devil, comp, conf1_c)

 Rows: 15

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.763285

	raw coverage	unique coverage	consistency
~gbs*~devil*~comp	0.291322	0.060951	0.896186
~group*gbs*~devil	0.299759	0.066804	0.855528
~devil*~comp*conf1_c	0.419421	0.084711	0.897568
~group*~devil*conf1_c	0.478650	0.110020	0.845756
group*~gbs*~comp*conf1_c	0.150999	0.056302	0.930011

solution coverage: 0.829201
solution consistency: 0.857397

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf1_c = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.883548

	raw coverage	unique coverage	consistency
~man_exp_c	0.584346	0.111292	0.844062
age_c	0.634645	0.163986	0.885216
educ_c	0.514970	0.044055	0.909915

solution coverage: 0.911720
solution consistency: 0.832787

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.883548

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: conf1_c = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows: 50

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000

consistency cutoff: 0.803279

	raw coverage	unique coverage	consistency
~group*~devil*gender*age_c*man_exp_c	0.212233	0.033790	0.849658
~group*~gbs*~devil*~gender*~age_c*~man_exp_c	0.059709	0.010949	0.764513
~group*~gbs*~devil*~comp*~age_c*~man_exp_c	0.082036	0.031223	0.853963
group*gbs*~devil*~comp*~age_c*~man_exp_c	0.063730	0.040034	0.957584
~group*gbs*~devil*comp*~educ_c*~man_exp_c	0.078871	0.013687	0.861682
group*~gbs*~devil*gender*~age_c*~man_exp_c	0.071600	0.044055	0.876440
~group*gbs*~devil*gender*~educ_c*~man_exp_c	0.103679	0.012746	0.878898
~group*~gbs*~devil*age_c*~educ_c*man_exp_c	0.132763	0.030197	0.955077
~group*~gbs*~devil*comp*gender*age_c	0.090590	0.024893	0.972452
gbs*~devil*gender*age_c*~educ_c*man_exp_c	0.132763	0.013772	0.846238
group*~gbs*devil*age_c*educ_c*man_exp_c	0.064158	0.037382	0.961539
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c	0.033362	0.017622	0.962963
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c	0.047904	0.020445	0.967185
group*gbs*~devil*comp*~gender*~age_c*educ_c	0.039008	0.022241	0.938270
group*~gbs*devil*~comp*gender*educ_c*~man_exp_c	0.044312	0.020445	0.945256
group*~gbs*~devil*comp*gender*~age_c*educ_c	0.036869	0.009324	1.000000
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c	0.046450	0.014371	0.917230
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c	0.040975	0.009495	0.928294

solution coverage: 0.722755
solution consistency: 0.870313

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.803279

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf1_c = f(group, gbs, devil, comp)

 Rows: 10

Algorithm: Quine-McCluskey
   True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.739231

	raw coverage	unique coverage	consistency
~devil	0.879384	0.720788	0.779733
group*~gbs	0.279212	0.120616	0.842540

solution coverage: 1.000000
solution consistency: 0.787205

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

Algorithm: Quine-McCluskey
   True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.739231

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask1 = f(group, gbs, devil, comp)

 Rows: 10

Algorithm: Quine-McCluskey
   True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.810078

	raw coverage	unique coverage	consistency
~devil*~comp	0.527548	0.278410	0.886572
group*~gbs*~comp	0.173210	0.059056	0.911232
~group*gbs*devil	0.299759	0.151859	0.855528

solution coverage: 0.738465
solution consistency: 0.870687

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask1 = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.810078

	raw coverage	unique coverage	consistency
~comp	0.586606	0.438706	0.874263
~group*gbs	0.299759	0.151859	0.855528

solution coverage: 0.738465
solution consistency: 0.870687

****

TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask1 = f(comp, devil, gbs, group)

 Rows: 8

 Algorithm: Quine-McCluskey
    True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.810078
Assumptions:

	raw coverage	unique coverage	consistency
~comp*~devil	0.527548	0.278410	0.886572
~devil*gbs*~group	0.299759	0.151859	0.855528
~comp*~gbs*group	0.173210	0.059056	0.911232

solution coverage: 0.738465
solution consistency: 0.870687

fsQCA Analysis for In-basket 2 (bask2 and conf2_c)

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J an 13.csv
Model: bask2 = f(group, gbs, devil, comp, conf2_c)

 Rows: 18

 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.756025

	raw coverage	unique coverage	consistency
group*~gbs*~comp	0.151233	0.026815	0.822464
group*~gbs*conf2_c	0.236176	0.051965	0.886804
~devil*~comp*~conf2_c	0.130746	-0.000000	0.801839
~group*~devil*~comp	0.298134	0.074617	0.802330
gbs*~devil*~conf2_c	0.128415	-0.000000	0.813291
~group*~devil*conf2_c	0.419720	-0.000000	0.818979
gbs*~devil*comp	0.249167	0.045303	0.884162
~devil*comp*conf2_c	0.356096	-0.000000	0.872653

solution coverage: 0.919054
solution consistency: 0.840774

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J an 13.csv
Model: bask2 = f(conf2_c, chg2_c, group, gbs, devil, comp)

 Rows: 28

Algorithm: Quine-McCluskey
          True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.714789

	raw coverage	unique coverage	consistency
conf2_c*~group*~devil	0.419720	0.052631	0.818979
conf2_c*~chg2_c*~devil*~comp	0.152232	0.008328	0.802458
chg2_c*~gbs*~devil*~comp	0.176549	0.030813	0.832025
~conf2_c*~chg2_c*gbs*~devil	0.111926	0.011159	0.791520
~group*gbs*~devil*comp	0.159394	0.048468	0.866848
conf2_c*group*~gbs*devil	0.108095	0.076948	0.887825
conf2_c*chg2_c*~devil*comp	0.342605	0.130912	0.880565
~chg2_c*group*~gbs*devil*~comp	0.033977	0.002831	0.806321
~group*~gbs*~devil*~comp	0.183878	0.045303	0.849231
~chg2_c*~group*~devil*~comp	0.112259	0.000000	0.822955

solution coverage: 0.849933
solution consistency: 0.843053

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask2 = f(conf2_c, chg2_c, gender, age_c, educ_c, man_exp_c, group, gbs, devil, comp)

 Rows: 53

Algorithm: Quine-McCluskey
          True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.718009

	raw coverage	unique coverage	consistency
conf2_c*chg2_c*gender*age_c*man_exp_c*~group*~devil	0.176466	0.075700	0.843551
conf2_c*chg2_c*gender*~age_c*~man_exp_c*group*~gbs*~devil	0.056962	0.015073	0.821129
conf2_c*chg2_c*gender*age_c*~group*~gbs*~devil*comp	0.079114	0.017822	0.950951
conf2_c*chg2_c*age_c*educ_c*man_exp_c*group*~gbs*devil	0.059960	0.039224	0.979592
conf2_c*chg2_c*gender*~age_c*~educ_c*~man_exp_c*~group*~devil*~comp	0.062125	0.025483	0.838202
conf2_c*chg2_c*~age_c*educ_c*~man_exp_c*~group*~gbs*~devil*~comp	0.041472	0.002832	0.785489
~conf2_c*chg2_c*~age_c*~educ_c*~man_exp_c*~group*gbs*~devil*comp	0.040973	0.003331	0.959064
~conf2_c*gender*~age_c*~educ_c*~man_exp_c*~group*gbs*~devil*comp	0.039724	0.004247	0.957831
conf2_c*chg2_c*gender*~age_c*educ_c*~man_exp_c*group*~devil*~comp	0.045803	0.015573	0.792508
conf2_c*chg2_c*gender*~age_c*educ_c*~man_exp_c*group*~gbs*~comp	0.040140	0.001416	0.741539
conf2_c*chg2_c*age_c*~educ_c*man_exp_c*~group*~gbs*~devil*comp	0.064041	0.009244	0.878857
conf2_c*chg2_c*~gender*~age_c*educ_c*~man_exp_c*group*~gbs*comp	0.031063	0.015740	1.000000
conf2_c*chg2_c*gender*~age_c*~man_exp_c*~group*gbs*~devil*comp	0.054047	0.016572	0.968657
conf2_c*chg2_c*age_c*~educ_c*~man_exp_c*~group*gbs*~devil*comp	0.042222	0.005496	0.872633
conf2_c*chg2_c*gender*age_c*educ_c*~group*gbs*~devil*~comp	0.038058	0.009077	0.928862
conf2_c*chg2_c*gender*~age_c*educ_c*group*~gbs*~devil*comp	0.033228	0.009077	0.959134
conf2_c*chg2_c*~gender*~age_c*educ_c*group*gbs*~devil*comp	0.033728	0.017738	0.859870
conf2_c*chg2_c*age_c*~educ_c*man_exp_c*group*gbs*~devil*comp	0.040473	0.024484	0.991837
~conf2_c*chg2_c*~gender*~age_c*~educ_c*~man_exp_c*~group*~gbs*~devil*~comp	0.025733	0.001249	0.824000
~conf2_c*~chg2_c*~gender*~age_c*educ_c*~man_exp_c*~group*~gbs*~devil*~comp	0.030147	0.004247	0.955145
conf2_c*~chg2_c*~gender*age_c*~educ_c*man_exp_c*~group*~gbs*~devil*~comp	0.027898		

0.009827   0.988201

conf2_c*chg2_c*~gender*~age_c*~educ_c*~man_exp_c*~group*~gbs*~devil*comp   0.019154

0.005663   0.812721

conf2_c*~chg2_c*~gender*age_c*educ_c*~man_exp_c*~group*gbs*~devil*~comp   0.020653

0.008161   0.935849

conf2_c*chg2_c*~gender*~age_c*~educ_c*~man_exp_c*group*gbs*~devil*~comp   0.019404

0.005163   1.000000

conf2_c*~chg2_c*~gender*~age_c*educ_c*~man_exp_c*group*gbs*~devil*~comp   0.018321

0.004081   1.000000

~conf2_c*~chg2_c*gender*age_c*educ_c*~man_exp_c*group*~gbs*devil*~comp   0.020986

0.004081   0.958175

~conf2_c*~chg2_c*gender*~age_c*educ_c*~man_exp_c*group*gbs*~devil*comp   0.017988

0.005496   1.000000

solution coverage: 0.545053

solution consistency: 0.841476

****

TRUTH TABLE ANALYSIS

****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv

Model: bask2 = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows: 50

 Algorithm: Quine-McCluskey

    True: 1

--- COMPLEX SOLUTION ---

frequency cutoff: 1.000000

consistency cutoff: 0.707943

	raw coverage	unique coverage	consistency
~group*~devil*gender*age_c*man_exp_c	0.205780	0.089857	0.846233
~group*~gbs*~devil*~comp*~age_c*~man_exp_c	0.073951	0.023318	0.790739
~group*gbs*~devil*comp*~educ_c*~man_exp_c	0.081696	0.021319	0.916822
group*~gbs*~devil*gender*~age_c*~man_exp_c	0.063625	0.019071	0.800001

```
~group*~gbs*~devil*comp*gender*age_c                    0.086609   0.021735   0.955005
group*~gbs*devil*age_c*educ_c*man_exp_c                 0.063708   0.028731   0.980769
group*gbs*~devil*~comp*~gender*~age_c*~man_exp_c         0.024484   0.005663   1.000000
~group*~gbs*~devil*~comp*age_c*~educ_c*man_exp_c         0.058544   0.013908   0.875467
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c         0.033728   0.018404   1.000000
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c          0.043888   0.025067   0.910190
group*gbs*~devil*comp*~gender*~age_c*educ_c             0.033728   0.004580   0.833330
group*~gbs*~devil*comp*gender*~age_c*educ_c             0.034477   0.009077   0.960556
group*~gbs*devil*~comp*gender*age_c*educ_c             0.044970   0.012825   0.960854
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c           0.042638   0.024983   0.992248
group*gbs*~devil*~age_c*educ_c*~man_exp_c               0.064374   0.000000   0.832974
group*~devil*gender*~age_c*educ_c*~man_exp_c            0.074534   0.000000   0.835668
~group*~devil*~comp*gender*~age_c*~educ_c*~man_exp_c     0.064041   0.000000   0.842278
~group*gbs*~devil*gender*~age_c*~educ_c*~man_exp_c       0.076366   0.000000   0.906126
~group*gbs*~devil*comp*gender*~age_c*~man_exp_c          0.065623   0.003664   0.974042
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c          0.047552   0.000000   0.964527
solution coverage: 0.621669
solution consistency: 0.862308
```

```
***********************
*TRUTH TABLE ANALYSIS*
***********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask2 = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
   True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.758319

```
            raw       unique
          coverage  coverage  consistency
          --------- --------- ---------
~man_exp_c    0.521902   0.133994   0.774373
```

```
age_c      0.584610   0.168388   0.837609
educ_c     0.461109   0.042721   0.836910
solution coverage: 0.861176
solution consistency: 0.808017
```

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

```
 Algorithm: Quine-McCluskey
    True: 1-L
```

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.758319

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask2 = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.745013

```
              raw       unique
            coverage   coverage   consistency
          ---------- ---------- ----------
~group*~devil   0.575617   0.285643   0.796681
group*~gbs      0.281811   0.204030   0.873515
~devil*comp     0.445037   0.089773   0.832139
solution coverage: 0.934710
solution consistency: 0.826753
```

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask2 = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.745013

	raw coverage	unique coverage	consistency
~gbs	0.583777	0.138741	0.826651
~group	0.575617	0.114257	0.796681
comp	0.510327	0.089773	0.850403

solution coverage: 0.934710
solution consistency: 0.826753

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: bask2 = f(comp, devil, gbs, group)

 Rows: 12

 Algorithm: Quine-McCluskey

    True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.745013
Assumptions:

	raw coverage	unique coverage	consistency
~devil*~group	0.575617	0.285643	0.796681
comp*~devil	0.445037	0.089773	0.832139
~gbs*group	0.281811	0.204030	0.873515

solution coverage: 0.934710
solution consistency: 0.826753

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf2_c = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.838710

	raw coverage	unique coverage	consistency
~man_exp_c	0.572273	0.101917	0.789571
age_c	0.644367	0.179383	0.858489

educ_c   0.514240   0.039405   0.867896
solution coverage: 0.913129
solution consistency: 0.796687

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.838710

fsQCA Analysis for In-basket3 (bask3 and conf3_c)

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J an 13.csv
Model: bask3 = f(group, gbs, devil, comp, conf3_c)

 Rows: 17

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.706170

	raw coverage	unique coverage	consistency
group*gbs*~devil*comp	0.208401	0.039176	0.778281
group*gbs*~devil*conf3_c	0.314621	0.145396	0.724652

solution coverage: 0.353798
solution consistency: 0.727575

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J an 13.csv
Model: bask3 = f(group, gbs, devil, comp, conf3_c)

 Rows: 17

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---

427

frequency cutoff: 1.000000
consistency cutoff: 0.706170

	raw coverage	unique coverage	consistency
group*gbs	0.366722	0.366722	0.698462

solution coverage: 0.366722
solution consistency: 0.698462

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask3 = f(conf3_c, comp, devil, gbs, group)

 Rows: 4

 Algorithm: Quine-McCluskey
     True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.706170
Assumptions:

	raw coverage	unique coverage	consistency
conf3_c*~devil*gbs*group	0.314621	0.145396	0.724652
comp*~devil*gbs*group	0.208401	0.039176	0.778281

solution coverage: 0.353798
solution consistency: 0.727575

*** ERROR(Quine-McCluskey): The 1 Matrix is Empty. ***

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 1.000000

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask3 = f(group, gbs, devil, comp)

 Rows: 10

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

	raw	unique	
	coverage	coverage	consistency
	----------	----------	----------
group*gbs*~devil*comp	0.208401	0.208401	0.778281

solution coverage: 0.208401
solution consistency: 0.778281

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask3 = f(group, gbs, devil, comp)

 Rows: 10

429

Algorithm: Quine-McCluskey
   True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

             raw   unique
          coverage   coverage consistency
          ---------- ---------- ----------
group*gbs*comp   0.208401   0.208401   0.778281
solution coverage: 0.208401
solution consistency: 0.778281

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask3 = f(comp, devil, gbs, group)

 Rows: 1

 Algorithm: Quine-McCluskey
    True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281
Assumptions:

             raw   unique
          coverage   coverage consistency
          ---------- ---------- ----------
comp*~devil*gbs*group   0.208401   0.208401   0.778281

solution coverage: 0.208401
solution consistency: 0.778281

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask3 = f(group, gbs, devil, comp, conf3_c, chg3_c)

 Rows: 22

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.725001

	raw coverage	unique coverage	consistency
group*gbs*~devil*comp*~chg3_c	0.089257	0.013732	0.818517
group*gbs*~devil*conf3_c*chg3_c	0.294831	0.219306	0.735147
group*~gbs*~devil*~comp*~conf3_c*~chg3_c	0.076333	0.046042	0.744091
group*~gbs*devil*~comp*conf3_c*~chg3_c	0.069467	0.039176	0.728811

solution coverage: 0.393781
solution consistency: 0.704480

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J

an 13.csv
Model: conf3_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.705883

              raw   unique
           coverage   coverage   consistency
          ---------- ---------- ----------
~devil   0.889541   0.749223   0.781857
group*~gbs   0.250777   0.110459   0.750132
solution coverage: 1.000000
solution consistency: 0.780336

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
      True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.705883

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: conf3_c = f(group, gbs, devil, comp)

 Rows: 10

Algorithm: Quine-McCluskey
　　True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.705883

	raw coverage	unique coverage	consistency
~devil	0.889541	0.749223	0.781857
group*~gbs	0.250777	0.110459	0.750132

solution coverage: 1.000000
solution consistency: 0.780336

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

Algorithm: Quine-McCluskey
　　True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.705883

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: conf3_c = f(gender, age_c, educ_c, man_exp_c)

　Rows:　　14

Algorithm: Quine-McCluskey
　　True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.844178

	raw coverage	unique coverage	consistency
~man_exp_c	0.610460	0.135226	0.874089
age_c	0.613825	0.145409	0.848705
educ_c	0.511737	0.032965	0.896312

solution coverage: 0.907749
solution consistency: 0.821925

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.844178

fsQCA Analysis for In-basket 4 (bask4 and conf4_c)

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

	raw coverage	unique coverage	consistency
group*~devil*comp	0.233000	0.233000	0.822464

solution coverage: 0.233000
solution consistency: 0.822464

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000

consistency cutoff: 0.778281

```
                raw       unique
            coverage   coverage   consistency
           ---------- ---------- ----------
group*~devil*comp   0.233000   0.233000   0.822464
solution coverage: 0.233000
solution consistency: 0.822464
```

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: bask4 = f(comp, devil, gbs, group)

 Rows: 2

 Algorithm: Quine-McCluskey
     True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281
Assumptions:

```
                raw       unique
            coverage   coverage   consistency
           ---------- ---------- ----------
comp*~devil*group   0.233000   0.233000   0.822464
solution coverage: 0.233000
solution consistency: 0.822464
```

****

TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(gender, age_c, educ_c, man_exp_c, conf4_c, chg4_c)

 Rows: 22

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656

	raw coverage	unique coverage	consistency
~gender*~age_c*educ_c*~man_exp_c*~conf4_c*~chg4_c	0.057737	0.004362	0.789473
~gender*age_c*educ_c*~man_exp_c*conf4_c*~chg4_c	0.048627	0.001026	0.737353
~gender*~age_c*educ_c*~man_exp_c*conf4_c*chg4_c	0.123429	0.070054	0.700656

solution coverage: 0.128817
solution consistency: 0.662707

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(gender, age_c, educ_c, man_exp_c, conf4_c, chg4_c)

 Rows: 22

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---

frequency cutoff: 1.000000
consistency cutoff: 0.700656

	raw coverage	unique coverage	consistency
~gender*educ_c*~man_exp_c	0.145882	0.145882	0.644924

solution coverage: 0.145882
solution consistency: 0.644924

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(chg4_c, conf4_c, man_exp_c, educ_c, age_c, gender)

 Rows: 3

 Algorithm: Quine-McCluskey
    True: 1
 0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656
Assumptions:

	raw coverage	unique coverage	consistency
~chg4_c*~conf4_c*~man_exp_c*educ_c*~age_c*~gender	0.057737	0.004362	0.789473
chg4_c*conf4_c*~man_exp_c*educ_c*~age_c*~gender	0.123429	0.070054	0.700656
~chg4_c*conf4_c*~man_exp_c*educ_c*age_c*~gender	0.048627	0.001026	0.737353

solution coverage: 0.128817
solution consistency: 0.662707

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(group, gbs, devil, comp, conf4_c, chg4_c, age_c, educ_c, man_exp_c, gender)

  Rows: 57

  Algorithm: Quine-McCluskey
       True: 1

  --- COMPLEX SOLUTION ---
  frequency cutoff: 1.000000
  consistency cutoff: 0.719864

	raw coverage	unique coverage	consistency
~group*~gbs*~devil*~comp*conf4_c*chg4_c*~age_c*~man_exp_c 5	0.112138	0.05106	0.844445
group*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*~man_exp_c 0	0.084039	0.02348	0.830165
~group*~gbs*~devil*comp*conf4_c*chg4_c*age_c*gender	0.087375	0.049397	0.791861
~group*~gbs*~devil*~conf4_c*~chg4_c*~age_c*educ_c*~man_exp_c*~gender 04362	0.042725	0.0	0.818182
~group*~gbs*~devil*conf4_c*chg4_c*~age_c*~educ_c*~man_exp_c*~gender 15781	0.075956	0.0	0.922118
~group*gbs*~devil*comp*conf4_c*~age_c*~educ_c*~man_exp_c*gender 543	0.060944	0.006	0.742188
~group*gbs*~devil*comp*chg4_c*~age_c*~educ_c*~man_exp_c*gender 362	0.058763	0.004	0.735153
group*gbs*~devil*conf4_c*chg4_c*~age_c*educ_c*~man_exp_c*~gender 468	0.051193	0.008	0.817619
group*~gbs*~devil*comp*conf4_c*chg4_c*~age_c*~man_exp_c*gender 525	0.050552	0.015	0.889389
group*gbs*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*~gender 0	0.042725	-0.00000	0.693747
group*~gbs*~devil*comp*conf4_c*chg4_c*~age_c*educ_c*gender	0.042982	0.007955	0.835411
~group*~gbs*~devil*conf4_c*chg4_c*age_c*educ_c*man_exp_c*gender	0.057480	0.0051	

... 6

32   0.742952
group*gbs*~devil*comp*conf4_c*chg4_c*age_c*~educ_c*man_exp_c   0.060175   0.0356
68   0.957142
group*~gbs*~devil*~comp*conf4_c*~chg4_c*~age_c*~educ_c*~man_exp_c*gender   0.029895
0.010649   0.784512
~group*~gbs*~devil*~comp*~conf4_c*~chg4_c*age_c*educ_c*man_exp_c*gender   0.035925   0
.004362   0.918033
~group*gbs*~devil*comp*conf4_c*chg4_c*age_c*~educ_c*~man_exp_c*~gender   0.031306   0.
012061   0.903704
group*~gbs*devil*~comp*conf4_c*chg4_c*age_c*educ_c*man_exp_c*~gender   0.027714   0.0
08468   1.000000
group*~gbs*devil*comp*conf4_c*chg4_c*age_c*educ_c*man_exp_c*gender   0.030151   0.01
0906   0.827465
solution coverage: 0.445856
solution consistency: 0.774633

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: chg4_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.751539

	raw coverage	unique coverage	consistency
~devil*~comp	0.485159	0.130880	0.808736
~gbs*~devil	0.456692	0.139385	0.772233
group*~devil	0.334316	0.074119	0.826963
group*~gbs	0.274432	0.113696	0.816214

solution coverage: 0.874849
solution consistency: 0.787993

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv
Model: chg4_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.751539

            raw   unique
          coverage   coverage   consistency
        ---------- ---------- ----------
~comp   0.542093   0.130880   0.801384
~gbs   0.570387   0.139385   0.775000
group   0.448012   0.074119   0.816255
solution coverage: 0.874849
solution consistency: 0.787993

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv
Model: chg4_c = f(comp, devil, gbs, group)

 Rows: 20

Algorithm: Quine-McCluskey
    True: 1
 0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.751539
Assumptions:

	raw coverage	unique coverage	consistency
~devil*~gbs	0.456692	0.139385	0.772233
~comp*~devil	0.485159	0.130880	0.808736
~gbs*group	0.274432	0.113696	0.816214
~devil*group	0.334316	0.074119	0.826963

solution coverage: 0.874849
solution consistency: 0.787993

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J an 13.csv
Model: conf4_c = f(group, gbs, devil, comp)

 Rows: 10

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.766305

```
              raw       unique
           coverage   coverage  consistency
           ---------- ---------- ----------
~devil       0.887550   0.729752   0.804611
group*~gbs   0.270248   0.112450   0.833766
solution coverage: 1.000000
solution consistency: 0.804848
```

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.766305

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: conf4_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.766305

```
              raw       unique
           coverage   coverage  consistency
           ---------- ---------- ----------
~devil       0.887550   0.729752   0.804611
group*~gbs   0.270248   0.112450   0.833766
solution coverage: 1.000000
solution consistency: 0.804848
```

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.766305

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: conf4_c = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.929587

              raw   unique
            coverage   coverage   consistency
          ---------- ---------- ----------
~man_exp_c   0.586178   0.121402   0.865686
age_c   0.618642   0.168842   0.882234
educ_c   0.498411   0.037149   0.900393
solution coverage: 0.904786
solution consistency: 0.844976

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.929587

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(gender, age_c, educ_c, man_exp_c, conf4_c)

 Rows: 18

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656

	raw coverage	unique coverage	consistency
~gender*~age_c*educ_c*~man_exp_c	0.130485	0.130485	0.688558

solution coverage: 0.130485
solution consistency: 0.688558

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(gender, age_c, educ_c, man_exp_c, conf4_c)

 Rows: 18

Algorithm: Quine-McCluskey
   True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656

	raw coverage	unique coverage	consistency
~gender*~age_c*educ_c*~man_exp_c	0.130485	0.130485	0.688558

solution coverage: 0.130485
solution consistency: 0.688558

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 J
an 13.csv
Model: bask4 = f(conf4_c, man_exp_c, educ_c, age_c, gender)

 Rows: 2

 Algorithm: Quine-McCluskey
   True: 1
 0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700656
Assumptions:

	raw coverage	unique coverage	consistency
~man_exp_c*educ_c*~age_c*~gender	0.130485	0.130485	0.688558

solution coverage: 0.130485

solution consistency: 0.688558

fsQCA Analysis for agregate of all In-baskets (succes_c) and conf_tot_c

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: success_c = f(gender, age_c, educ_c, man_exp_c, conf_tot_c, chgn_tot_c)

Rows: 24

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.724466

	raw coverage	unique coverage	consistency
gender*~age_c*~man_exp_c*~chgn_tot_c	0.277747	0.012612	0.776646
age_c*man_exp_c*~conf_tot_c*~chgn_tot_c	0.298066	0.046384	0.736241
gender*~age_c*~man_exp_c*conf_tot_c	0.314742	0.035874	0.793921
~educ_c*~man_exp_c*conf_tot_c*chgn_tot_c	0.350056	0.038397	0.803991
age_c*man_exp_c*conf_tot_c*chgn_tot_c	0.345852	0.035454	0.687849
gender*~educ_c*~man_exp_c*~conf_tot_c*~chgn_tot_c	0.219731	-0.000000	0.805756
~gender*educ_c*~man_exp_c*~conf_tot_c*~chgn_tot_c	0.110006	0.022702	0.717550
~gender*~age_c*educ_c*conf_tot_c*chgn_tot_c	0.120376	0.029008	0.760850
gender*age_c*~educ_c*man_exp_c*~chgn_tot_c	0.224356	-0.000000	0.679542
gender*age_c*~educ_c*man_exp_c*conf_tot_c	0.254484	-0.000000	0.711599

solution coverage: 0.824131
solution consistency: 0.651851

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/CALIBRATED DATA_20 Jan 13.csv
Model: success_c = f(gender, age_c, educ_c, man_exp_c, conf_tot_c, group, gbs, devil, comp)

Rows: 49

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720701

	raw coverage	unique coverage	consistency
~gender*~age_c*~man_exp_c*~conf_tot_c*~group*~gbs*~devil*~comp 0.770959	0.052831	0.021861	
gender*~age_c*~man_exp_c*conf_tot_c*~group*~gbs*~devil*~comp 0.947811	0.078896	0.044703	
gender*~age_c*~educ_c*~man_exp_c*~conf_tot_c*~group*gbs*~devil 0.866750	0.097534	0.014013	
gender*~age_c*~educ_c*~man_exp_c*conf_tot_c*group*~gbs*~devil 0.903172	0.075813	0.034753	
gender*~educ_c*~man_exp_c*~conf_tot_c*~group*gbs*~devil*comp 0.789392	0.070908	0.000000	
gender*~age_c*~man_exp_c*conf_tot_c*~group*gbs*~devil*comp 0.808696	0.065163	0.012892	
gender*age_c*educ_c*conf_tot_c*~group*gbs*~devil*~comp 0.782441	0.057455	0.014994	0.7
age_c*educ_c*man_exp_c*~conf_tot_c*group*~gbs*devil*~comp 0.859155	0.042741	0.017937	
gender*~age_c*educ_c*conf_tot_c*group*~gbs*~devil*comp 0.788234	0.046945	0.008688	0.7
~gender*~age_c*educ_c*conf_tot_c*group*gbs*~devil*comp 0.798143	0.048206	0.000000	0.7
gender*age_c*~educ_c*man_exp_c*conf_tot_c*gbs*~devil*comp 0.851695	0.084501	0.021300	
~gender*age_c*~educ_c*man_exp_c*~conf_tot_c*~group*~gbs*~devil*~comp 0.778667	0.040919	0.009950	
gender*~age_c*educ_c*~man_exp_c*~conf_tot_c*group*~gbs*~devil*~comp 0.848765	0.038537	0.005746	
~gender*age_c*educ_c*~man_exp_c*~conf_tot_c*~group*gbs*~devil*~comp 0.780769	0.028447	0.007427	
~gender*~age_c*educ_c*~man_exp_c*~conf_tot_c*group*gbs*~devil*~comp 0.973451	0.030830	0.006867	
~gender*~age_c*~educ_c*~man_exp_c*conf_tot_c*group*gbs*~devil*~comp 0.974895	0.032651	0.008688	

                                                                                        ... 3

gender*age_c*~educ_c*man_exp_c*~conf_tot_c*~group*gbs*~devil*~comp 56 0.795237	0.046805	0.0162
~gender*age_c*~educ_c*~man_exp_c*conf_tot_c*~group*gbs*~devil*comp 49 0.892562	0.030269	0.0092
gender*~age_c*educ_c*~man_exp_c*conf_tot_c*group*gbs*~devil*~comp 1 0.933333	0.052971	0.03195
gender*~age_c*educ_c*~man_exp_c*conf_tot_c*group*~gbs*devil*~comp 6 0.784574	0.041340	0.01653
gender*~age_c*educ_c*~man_exp_c*~conf_tot_c*group*gbs*~devil*comp 3 0.939929	0.037276	0.01345
~gender*age_c*~educ_c*~man_exp_c*~conf_tot_c*group*gbs*~devil*comp 9 0.865724	0.034333	0.00924
gender*age_c*educ_c*man_exp_c*conf_tot_c*group*~gbs*devil*comp 0.767606	0.030549	0.009529
gender*age_c*educ_c*man_exp_c*~group*~gbs*~devil*~comp .816870	0.055633	0.002382 0
gender*age_c*educ_c*man_exp_c*~conf_tot_c*~group*~gbs*~devil 0.905950	0.066143	0.000000
gender*age_c*man_exp_c*conf_tot_c*~group*~gbs*~devil*~comp 0.674603	0.059557	0.000000
gender*age_c*~educ_c*man_exp_c*conf_tot_c*~group*~gbs*~devil 0.705761	0.096132	0.000000
gender*age_c*man_exp_c*~conf_tot_c*~group*~gbs*~devil*comp 0.777517	0.046525	0.000000
gender*age_c*~educ_c*man_exp_c*~group*~gbs*~devil*comp .694940	0.065443	0.000000 0
~age_c*educ_c*~man_exp_c*conf_tot_c*group*~gbs*~devil*comp 0.848969	0.051990	0.000000
~gender*~age_c*educ_c*~man_exp_c*conf_tot_c*group*~devil*comp 0.913221	0.061940	0.000000
gender*age_c*educ_c*man_exp_c*conf_tot_c*~group*gbs*~devil .727692	0.066284	0.000000 0
gender*age_c*man_exp_c*conf_tot_c*~group*gbs*~devil*comp 710324	0.064602	0.000000 0.

solution coverage: 0.642376
solution consistency: 0.705991

Analysis of Necessary Conditions

Outcome variable: bask1

Conditions tested:
           Consistency   Coverage

group+gbs+devil+comp 0.822831   0.770806

Analysis of Necessary Conditions

Outcome variable: bask4

Conditions tested:
                  Consistency   Coverage
group+gbs+comp+conf4_c0.954324   0.518906

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(group, gbs, devil, comp, conf_tot_c)

 Rows: 20

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720001

                        raw   unique
                     coverage   coverage   consistency
                     ---------- ---------- ----------
group*~devil*~conf_tot_c   0.173347   0.012472   0.782416
group*~gbs*~comp   0.181334   0.066284   0.586051
gbs*~devil*~comp*~conf_tot_c 0.129064   0.057175   0.782498
~gbs*~devil*~comp*conf_tot_c 0.235847   0.133267   0.773793
group*gbs*~devil*comp   0.131446   0.061659   0.707391
solution coverage: 0.545542
solution consistency: 0.662074

****
TRUTH TABLE ANALYSIS

****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(group, gbs, devil, comp, conf_tot_c)

 Rows: 20

 Algorithm: Quine-McCluskey
      True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720001

	raw coverage	unique coverage	consistency
group*~devil*~conf_tot_c	0.173347	0.012472	0.782416
gbs*~comp*~conf_tot_c	0.129064	0.057175	0.782498
~gbs*~comp*conf_tot_c	0.289518	0.133267	0.759559
group*gbs*comp	0.131446	0.061659	0.707391
devil*~comp	0.084922	0.000000	0.587210
group*~comp*~conf_tot_c	0.142517	0.000000	0.762941
group*~gbs*~comp	0.181334	0.002382	0.586051

solution coverage: 0.545542
solution consistency: 0.662074

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(conf_tot_c, comp, devil, gbs, group)

 Rows: 14

 Algorithm: Quine-McCluskey

```
    True: 1
  0 Matrix: 0L
Don't Care: -
```

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720001
Assumptions:

	raw coverage	unique coverage	consistency
~comp*~gbs*group	0.181334	0.066284	0.586051
~conf_tot_c*~devil*group	0.173347	0.012472	0.782416
conf_tot_c*~comp*~devil*~gbs	0.235847	0.133267	0.773793
~conf_tot_c*~comp*~devil*gbs	0.129064	0.057175	0.782498
comp*~devil*gbs*group	0.131446	0.061659	0.707391

solution coverage: 0.545542
solution consistency: 0.662074

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf_tot_c = f(group, age_c, educ_c, man_exp_c)

 Rows: 12

 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.715043

	raw coverage	unique coverage	consistency

```
~age_c*~man_exp_c    0.434357   0.041598   0.734189
group*educ_c         0.326841   0.063387   0.794121
age_c*man_exp_c      0.462969   0.044349   0.742761
~group*~man_exp_c    0.328051   0.019808   0.642180
~group*age_c         0.427094   0.015957   0.715392
solution coverage: 0.916144
solution consistency: 0.681595
```

```
*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.715043


compute: grp_ntgbs = fuzzyand(group,not_gbs)
**********************
*TRUTH TABLE ANALYSIS*
**********************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp)

 Rows:     10




 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

              raw        unique
           coverage   coverage   consistency
           ----------  ----------  ----------
~devil       0.890134   0.732437   0.903368
group*~gbs   0.267563   0.109866   0.924109
solution coverage: 1.000000
```

solution consistency: 0.901010

*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)

 Rows: 2

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946

	raw coverage	unique coverage	consistency
ntman_nteduc	0.452569	0.452569	0.714946

solution coverage: 0.452569
solution consistency: 0.714946

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)

 Rows:　　2

 Algorithm: Quine-McCluskey
　　　True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946

　　　　　　　raw　　　unique
　　　　　　coverage　　coverage　　consistency
　　　　　---------- ---------- ----------
ntman_nteduc　　0.452569　　0.452569　　0.714946
solution coverage: 0.452569
solution consistency: 0.714946

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)

 Rows:　　1

 Algorithm: Quine-McCluskey
　　　True: 1
　0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946

Assumptions:

```
                raw       unique
             coverage   coverage   consistency
            ---------- ---------- ----------
ntman_nteduc   0.452569   0.452569   0.714946
solution coverage: 0.452569
solution consistency: 0.714946
```

compute: conf_chg_cal = fuzzyand(conf_tot_c,chgn_tot_c)
****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf_chg_cal = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720890

```
                raw       unique
             coverage   coverage   consistency
            ---------- ---------- ----------
age_c*~man_exp_c   0.437818   0.173091   0.707736
~gender*age_c      0.223128   0.032873   0.635723
educ_c*man_exp_c   0.356654   0.140946   0.700372
solution coverage: 0.652509
solution consistency: 0.653460
```

****

TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv
Model: conf_chg_cal = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720890

	raw coverage	unique coverage	consistency
age_c*~man_exp_c	0.437818	0.173091	0.707736
educ_c*man_exp_c	0.356654	0.121891	0.700372
~gender*age_c	0.223128	-0.000000	0.635723
~gender*man_exp_c	0.165964	-0.000000	0.616091

solution coverage: 0.652509
solution consistency: 0.642233

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv
Model: conf_chg_cal = f(man_exp_c, educ_c, age_c, gender)

 Rows: 12

 Algorithm: Quine-McCluskey
    True: 1
 0 Matrix: 0L

Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.720890
Assumptions:

	raw coverage	unique coverage	consistency
age_c*~gender	0.223128	0.032873	0.635723
~man_exp_c*age_c	0.437818	0.173091	0.707736
man_exp_c*educ_c	0.356654	0.140946	0.700372

solution coverage: 0.652509
solution consistency: 0.653460

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J an PLUSss22.csv
Model: conf_tot_c = f(gender, age_c, educ_c, man_exp_c)

 Rows: 14

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.762843

	raw coverage	unique coverage	consistency
age_c	0.665346	0.243205	0.721394
gender*~man_exp_c	0.429294	0.129856	0.724420
educ_c*man_exp_c	0.322438	0.036756	0.836904

solution coverage: 0.858809

solution consistency: 0.697409

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf_tot_c = f(gender, age_c, educ_c, man_exp_c)

Rows: 14

Algorithm: Quine-McCluskey
True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.762843

	raw coverage	unique coverage	consistency
gender	0.733576	0.167052	0.638506
age_c	0.665346	0.067679	0.721394
man_exp_c	0.558710	0.024430	0.735051

solution coverage: 0.928139
solution consistency: 0.646036

****
TRUTH TABLE ANALYSIS
****

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: conf_tot_c = f(man_exp_c, educ_c, age_c, gender)

Rows: 16

Algorithm: Quine-McCluskey
    True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.762843
Assumptions:

	raw coverage	unique coverage	consistency
age_c	0.665346	0.243205	0.721394
~man_exp_c*gender	0.429294	0.129856	0.724420
man_exp_c*educ_c	0.322438	0.036756	0.836904

solution coverage: 0.858809
solution consistency: 0.697409

```
*********************
*TRUTH TABLE ANALYSIS*
*********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(group, gbs, devil, comp, conf_tot_c)

 Rows: 20

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.753590

	raw coverage	unique coverage	consistency

```
                   ----------  ----------  ----------
~gbs*~devil*~comp*conf_tot_c    0.235847   0.214825   0.773793
group*gbs*~devil*~conf_tot_c    0.120656   0.050868   0.895942
group*~gbs*devil*~comp          0.084922   0.063900   0.587210
group*gbs*~devil*comp           0.131446   0.061658   0.707391
solution coverage: 0.461042
solution consistency: 0.709817
```

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(group, gbs, devil, comp, conf_tot_c)

 Rows: 20

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.753590

```
                   raw       unique
                 coverage   coverage   consistency
                 ----------  ----------  ----------
devil*~comp              0.084922   0.010229   0.587210
~gbs*~comp*conf_tot_c    0.289518   0.214825   0.759559
group*gbs*~conf_tot_c    0.120656   0.050868   0.895942
group*gbs*comp           0.131446   0.061658   0.707391
solution coverage: 0.461042
solution consistency: 0.709817
```

```
**********************
*TRUTH TABLE ANALYSIS*
**********************
```

File: F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 J
an PLUSss22.csv
Model: success_c = f(conf_tot_c, comp, devil, gbs, group)

 Rows: 8

 Algorithm: Quine-McCluskey
     True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.753590
Assumptions:

	raw coverage	unique coverage	consistency
conf_tot_c*~comp*~devil*~gbs	0.235847	0.214825	0.773793
~comp*devil*~gbs*group	0.084922	0.063900	0.587210
~conf_tot_c*~devil*gbs*group	0.120656	0.050868	0.895942
comp*~devil*gbs*group	0.131446	0.061658	0.707391

solution coverage: 0.461042
solution consistency: 0.709817

fsQCA Analysis for agregate of all In-baskets (~succes_c) and Decision Doubt (DD)

```
compute: grp_ntgbs = fuzzyand(group,not_gbs)
***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  F:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De
Villiers 17 Jan PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp)

 Rows:     10




 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281

            raw      unique
         coverage   coverage  consistency
        ---------- ---------- ----------
~devil       0.890134   0.732437   0.903368
group*~gbs   0.267563   0.109866   0.924109
solution coverage: 1.000000
solution consistency: 0.901010




*** ERROR(Quine-McCluskey): The 1 Matrix Contains All Configurations. ***

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.778281


***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De
Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)
```

... 2

Rows: 2

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946

	raw coverage	unique coverage	consistency
ntman_nteduc	0.452569	0.452569	0.714946

solution coverage: 0.452569
solution consistency: 0.714946

```
***********************
*TRUTH TABLE ANALYSIS*
***********************
```

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)

Rows: 2

Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946

	raw coverage	unique coverage	consistency
ntman_nteduc	0.452569	0.452569	0.714946

solution coverage: 0.452569
solution consistency: 0.714946

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(ntman_nteduc)

 Rows: 1

 Algorithm: Quine-McCluskey
     True: 1
 0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 23.000000
consistency cutoff: 0.714946
Assumptions:

	raw coverage	unique coverage	consistency
ntman_nteduc	0.452569	0.452569	0.714946

solution coverage: 0.452569
solution consistency: 0.714946

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/FINAL DATA f or fsQCA analysis/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(group, gbs, devil, comp, conf_tot_c, gender, age_c, educ_c, man _exp_c)

 Rows: 49

Algorithm: Quine-McCluskey
   True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.705882

	raw coverage	unique coverage	consistency
~group*~devil*comp*gender*age_c*~educ_c*man_exp_c	0.142040	0.020600	0.818915
~group*~gbs*~devil*~comp*~conf_tot_c*~gender*~age_c*~man_exp_c	0.049847	0.006231	0.801634
~group*~gbs*~devil*~conf_tot_c*~gender*~age_c*educ_c*~man_exp_c	0.070575	0.024415	0.867187
~group*gbs*~devil*comp*~conf_tot_c*~age_c*~educ_c*~man_exp_c	0.061038	0.007757	0.738462
~group*gbs*~devil*~conf_tot_c*gender*~age_c*~educ_c*~man_exp_c	0.072737	0.003433	0.712329
group*~gbs*~devil*conf_tot_c*gender*~age_c*~educ_c*~man_exp_c	0.053154	0.016658	0.697827
~group*gbs*~devil*comp*conf_tot_c*gender*~age_c*~man_exp_c	0.059385	0.013861	0.812174
~group*gbs*~devil*~comp*conf_tot_c*gender*age_c*~man_exp_c	0.072610	0.035351	0.837244
group*~gbs*comp*conf_tot_c*~gender*~age_c*educ_c*~man_exp_c	0.044507	0.021109	0.864197
~group*~gbs*~devil*comp*conf_tot_c*age_c*~educ_c*man_exp_c	0.089140	0.023398	0.816065
~group*gbs*~devil*~conf_tot_c*gender*age_c*~educ_c*man_exp_c	0.104273	0.014751	0.870488
~group*~gbs*~devil*~comp*conf_tot_c*gender*age_c*man_exp_c	0.064090	0.027594	0.800000
~group*~gbs*~devil*~conf_tot_c*gender*age_c*educ_c*man_exp_c	0.052136	0.003815	0.786948
group*gbs*~devil*comp*conf_tot_c*~gender*~age_c*educ_c	0.044252	0.019329	0.807423
group*~gbs*~devil*comp*conf_tot_c*gender*~age_c*educ_c	0.039674	0.011699	0.734117
group*~gbs*devil*~comp*~conf_tot_c*age_c*educ_c*man_exp_c	0.036623	0.014115	0.811267
~group*gbs*~devil*conf_tot_c*gender*age_c*educ_c*man_exp_c	0.073245	0.023906	0.886154
group*~gbs*devil*comp*conf_tot_c*age_c*educ_c*man_exp_c	0.055061	0.031663	0.966517
~group*~gbs*~devil*~comp*~conf_tot_c*~gender*age_c*~educ_c*man_exp_c	0.045270	0.017675	0.949333
group*gbs*~devil*~comp*conf_tot_c*~gender*~age_c*~educ_c*~man_exp_c	0.0253		

05   0.003561   0.832636
group*gbs*~devil*~comp*~conf_tot_c*~gender*~age_c*educ_c*~man_exp_c   0.0236
52   0.001907   0.823009
group*~gbs*devil*~comp*~conf_tot_c*gender*~age_c*educ_c*~man_exp_c   0.0371
31   0.009537   0.901235
~group*~gbs*~devil*~comp*conf_tot_c*gender*~age_c*educ_c*~man_exp_c   0.0415
82   0.012208   0.807407
~group*gbs*~devil*~comp*~conf_tot_c*~gender*age_c*educ_c*~man_exp_c   0.0322
99   0.013225   0.976923
~group*gbs*~devil*comp*conf_tot_c*~gender*age_c*~educ_c*~man_exp_c   0.02454
2   0.004069   0.797521
group*gbs*~devil*comp*~conf_tot_c*gender*~age_c*educ_c*~man_exp_c   0.02632
2   0.007248   0.731449
group*gbs*~devil*~comp*conf_tot_c*gender*~age_c*educ_c*~man_exp_c   0.04094
6   0.016404   0.795062
group*~gbs*devil*~comp*conf_tot_c*gender*~age_c*educ_c*~man_exp_c   0.03942
0   0.016913   0.824468
group*gbs*~devil*comp*~conf_tot_c*gender*age_c*~educ_c*man_exp_c   0.02848
4   0.003561   0.791519
group*gbs*~devil*~comp*conf_tot_c*gender*age_c*~educ_c*man_exp_c   0.050610
    0.026068   0.959035
~group*gbs*~devil*comp*~conf_tot_c*gender*~educ_c*~man_exp_c   0.059893
 0.000000   0.734790
~group*gbs*~devil*comp*~conf_tot_c*gender*age_c*~educ_c   0.090285   0.0
00000   0.891960
solution coverage: 0.697610
solution consistency: 0.721368

****
TRUTH TABLE ANALYSIS
****

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/FINAL DATA f
or fsQCA analysis/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
      True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.794433

```
                    raw      unique
                 coverage  coverage  consistency
                ---------- ---------- ----------
group*~gbs*devil*comp    0.094354    0.094354    0.794433
solution coverage: 0.094354
solution consistency: 0.794433
```

```
************************
*TRUTH TABLE ANALYSIS*
************************
```

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/FINAL DATA f
or fsQCA analysis/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(group, gbs, devil, comp)

 Rows: 10

 Algorithm: Quine-McCluskey
      True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.794433

```
                 raw      unique
              coverage  coverage  consistency
             ---------- ---------- ----------
devil*comp    0.094354    0.094354    0.794433
solution coverage: 0.094354
solution consistency: 0.794433
```

```
************************
*TRUTH TABLE ANALYSIS*
************************
```

File: E:/PhD from D9_2011/DATA for PHD/ARCH IN BOSTON Jan 2013/FINAL DATA f
or fsQCA analysis/AAARCH_De Villiers 17 Jan PLUSss22.csv
Model: ~success_c = f(comp, devil, gbs, group)

 Rows: 1

... 7

Algorithm: Quine-McCluskey
     True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 8.000000
consistency cutoff: 0.794433
Assumptions:

```
                    raw        unique
                 coverage    coverage   consistency
                 ----------  ----------  ----------
comp*devil*~gbs*group   0.094354    0.094354    0.794433
solution coverage: 0.094354
solution consistency: 0.794433
```

```
************************
*TRUTH TABLE ANALYSIS*
************************
```

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(group, gbs, devil, comp, man_exp_c)

 Rows: 19

Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.791154

```
                     raw        unique
                  coverage    coverage   consistency
                  ----------  ----------  ----------
group*~gbs*devil*comp*~man_exp_c   0.054456    0.054456    0.791154
```

solution coverage: 0.054456
solution consistency: 0.791154

****
TRUTH TABLE ANALYSIS
****

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(group, gbs, devil, comp, man_exp_c)

 Rows: 19

 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.791154

                      raw   unique
                   coverage   coverage   consistency
                   ---------- ---------- ----------
devil*comp*~man_exp_c   0.054456   0.054456   0.791154
solution coverage: 0.054456
solution consistency: 0.791154

****
TRUTH TABLE ANALYSIS
****

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(man_exp_c, comp, devil, gbs, group)

 Rows: 1

 Algorithm: Quine-McCluskey

                                                              ... 9

```
   True: 1
 0 Matrix: 0L
Don't Care: -
```

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.791154
Assumptions:

	raw coverage	unique coverage	consistency
~man_exp_c*comp*devil*~gbs*group	0.054456	0.054456	0.791154

solution coverage: 0.054456
solution consistency: 0.791154


```
***********************
*TRUTH TABLE ANALYSIS*
***********************
```

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(gender, age_c, educ_c, man_exp_c)

  Rows: 14

 Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.712547

	raw coverage	unique coverage	consistency
~gender*age_c	0.232370	0.056655	0.569416
~gender*~educ_c*~man_exp_c	0.201590	0.040250	0.725502
age_c*educ_c*~man_exp_c	0.332150	0.100964	0.714442
~age_c*educ_c*man_exp_c	0.238796	0.044478	0.701093

solution coverage: 0.528158
solution consistency: 0.590359

```
***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(gender, age_c, educ_c, man_exp_c)

 Rows:    14




 Algorithm: Quine-McCluskey
     True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.712547

                    raw       unique
                 coverage   coverage   consistency
                 ----------  ----------  ----------
~gender*~educ_c          0.264333   0.044140   0.652337
~age_c*man_exp_c         0.307797   0.089464   0.654913
age_c*educ_c*~man_exp_c   0.332150   0.100964   0.714442
~gender*age_c            0.232370   0.000000   0.569416
~gender*man_exp_c        0.186369   0.000000   0.595033
solution coverage: 0.583122
solution consistency: 0.561472




***********************
*TRUTH TABLE ANALYSIS*
***********************

File:  C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(man_exp_c, educ_c, age_c, gender)

 Rows:    10




 Algorithm: Quine-McCluskey
```

... 11

    True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.712547
Assumptions:

	raw coverage	unique coverage	consistency
age_c*~gender	0.232370	0.056655	0.569416
~man_exp_c*~educ_c*~gender	0.201590	0.040250	0.725502
man_exp_c*educ_c*~age_c	0.238796	0.044478	0.701093
~man_exp_c*educ_c*age_c	0.332150	0.100964	0.714442

solution coverage: 0.528158
solution consistency: 0.590359

****
TRUTH TABLE ANALYSIS
****

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: not_bool_succ = f(group, gbs, devil, comp, gender, age_c, educ_c, man_exp_c)

 Rows: 50

 Algorithm: Quine-McCluskey
     True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.731449

	raw coverage	unique coverage	consistency
~group*~devil*gender*age_c*man_exp_c	0.206353	0.038341	0.945548
~group*~gbs*~devil*~gender*~age_c*~man_exp_c	0.062556	0.019208	0.916758
~group*~gbs*~devil*~comp*~age_c*~man_exp_c	0.071450	0.025934	0.8512

91

group*gbs*~devil*~comp*~age_c*~man_exp_c8	0.054485	0.035052	0.93701
~group*gbs*~devil*comp*~educ_c*~man_exp_c5	0.069283	0.014051	0.86635
group*~gbs*~devil*gender*~age_c*~man_exp_c1	0.064873	0.040807	0.90890
~group*gbs*~devil*gender*~educ_c*~man_exp_c1	0.092078	0.014350	0.89340
~group*~gbs*~devil*age_c*~educ_c*man_exp_c7	0.109193	0.027653	0.89907
~group*~gbs*~devil*comp*gender*age_c	0.074365	0.022870	0.913682
gbs*~devil*gender*age_c*~educ_c*man_exp_c	0.130942	0.012033	0.955289
group*~gbs*devil*age_c*educ_c*man_exp_c	0.050972	0.034903	0.874359
group*~gbs*comp*~gender*~age_c*educ_c*~man_exp_c	0.030269	0.016517	1.000000
~group*gbs*~devil*~comp*age_c*educ_c*~man_exp_c	0.036248	0.012257	0.837651
group*gbs*~devil*comp*~gender*~age_c*educ_c	0.036323	0.021674	1.000000
group*~gbs*devil*~comp*gender*educ_c*~man_exp_c	0.033632	0.020105	0.821167
group*~gbs*~devil*comp*gender*~age_c*educ_c	0.032212	0.008146	1.000000
gbs*~devil*comp*gender*~age_c*educ_c*~man_exp_c	0.034604	0.007474	0.782095
group*gbs*~devil*comp*age_c*~educ_c*man_exp_c	0.030942	0.006278	0.802322

solution coverage: 0.653812
solution consistency: 0.901113

Rows: 12

Algorithm: Quine-McCluskey
    True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.705989

	raw coverage	unique coverage	consistency
devil*group*~gender	0.069846	0.069846	0.559619

solution coverage: 0.069846
solution consistency: 0.559619

```
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```
TRUTH TABLE ANALYSIS
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```

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_
De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(devil, group, gender, man_exp_c)

Rows: 12

Algorithm: Quine-McCluskey
    True: 1-L

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.705989

	raw coverage	unique coverage	consistency
devil*~gender	0.069846	0.069846	0.559619

solution coverage: 0.069846
solution consistency: 0.559619

****
TRUTH TABLE ANALYSIS
****

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_ De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(man_exp_c, gender, group, devil)

 Rows: 2

 Algorithm: Quine-McCluskey
     True: 1
  0 Matrix: 0L
Don't Care: -

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.705989
Assumptions:

	raw coverage	unique coverage	consistency
~gender*group*devil	0.069846	0.069846	0.559619

solution coverage: 0.069846
solution consistency: 0.559619

****
TRUTH TABLE ANALYSIS
****

File: C:/Users/rouxelle/Desktop/DATA for PHD/ARCH IN BOSTON Jan 2013/AAARCH_ De Villiers 17 Jan PLUSss22.csv
Model: ~conf_tot_c = f(group, gbs, devil, comp, man_exp_c, educ_c, gender)

 Rows: 49

 Algorithm: Quine-McCluskey

True: 1

--- COMPLEX SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.700549

	raw coverage	unique coverage	consistency
~group*~gbs*~devil*~comp*man_exp_c	0.130729	0.061559	0.625405
~gbs*~devil*~man_exp_c*educ_c*gender	0.151531	0.043125	0.662233
~group*gbs*~devil*comp*gender	0.190597	0.082192	0.560139
~devil*comp*~man_exp_c*educ_c*gender	0.143075	0.024691	0.741454
~gbs*~devil*comp*educ_c*gender	0.090986	0.014713	0.571124
gbs*~devil*~comp*~man_exp_c*educ_c*~gender	0.056824	0.012853	0.842105
group*~gbs*devil*comp*educ_c*~gender	0.046169	0.002199	0.659420
group*~gbs*devil*man_exp_c*educ_c*~gender	0.056147	0.012177	0.794258
group*gbs*~devil*comp*man_exp_c*~educ_c*~gender	0.047861	0.022493	0.860182
~group*~devil*~man_exp_c*~educ_c*~gender	0.155590	-0.000000	0.761590
~group*~devil*~comp*~man_exp_c*~gender	0.122611	-0.000000	0.680751
~group*~gbs*~devil*~man_exp_c*~gender	0.151869	-0.000000	0.709882
~group*~devil*comp*~man_exp_c*~educ_c	0.195840	-0.000000	0.692170
~group*~gbs*~devil*comp*~man_exp_c	0.130898	-0.000000	0.654269
~group*~gbs*~devil*~man_exp_c*educ_c	0.178590	-0.000000	0.769679

solution coverage: 0.673262
solution consistency: 0.574956

Additional tables available upon request.