The User's Sense of Control in Word Processing Applications: The User's Experience

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ATTESTATION OF AUTHORSHIP

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the qualification of any other degree or diploma of a university or other institution of higher learning.”

Yours sincerely,

(Alton Chen)

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ABSTRACT

This dissertational research focused on the user's sense of control while interacting with a word processing application, namely Microsoft Word. The topic was initially motivated by the researcher's interest in Csiksentmihalyi's construct of flow which has sense of control as an important dimension and contributing factor. This study used a usability-focused methodology in order to ground the investigation and analysis in users' actual experiences, perceptions, and preferences.

Analysis of the six usability tests generated some insights into users' sense of control in word processing applications. The degrees of confidence, the importance of the tasks the word application was being used for, and the different learning stages the users were in relation to the word application all impacted on the users' experiences of control. Animated software agents and interruptions were also identified as repeated themes in the data. Methodology-wise, some refinements of usability testing were proposed which could benefit those conducting usability tests.

Chapter 1: Introduction

1.1 Motivation

During a readings paper we focused on Csiksentmihalyi's (1998) flow theory which gives sense of control as one of the significant elements involved in the flow experience. This caught my interest. This is something common that most of us have encountered in our life experience, hopefully! A motivation for further investigation arose: what happens when the sense of control collides with computing applications? With this thought, instantly word processing applications came into my mind because once again, word processing applications were one of the most common applications. My initial interest was to find out what role does 'sense of control' play within the interaction between users and software? Is the sense of control still an important element in the user's experience of using word processing application as it is in the flow experience? This research work focused on users' sense of control of while using word processing applications.

1.2 Background

Sense of control is an important construct in both Csiksentmihalyi's (1998) theory of flow and in usability. Sense of control is one of the key nine elements or characteristics that Csiksentmihalyi has identified that occurs during an experience of flow. Flow has been successfully used to evaluate user's experience of websites (Pace, 2004). In the field of usability, two of the leading theorists and practitioners - Jacob Nielson (1994) and Ben Shneiderman (1998) - both explicitly state the importance of controllability within applications.

Neilson (1994) gives 'user control and feedback' as one of the key heuristics for evaluating computer-based applications. In Shneiderman's (1998) famous 8 Golden Rules of interface design, internal locus of control refers to the user's sense of control. They give some explanatory descriptions and examples. For example, Neilson gives an example of user control and feedback as how much control users have when they mistakenly select an unintended function and can't leave it without having to go through an extended dialogue. However, it appears that these constructs are not described in precise detail. Don Norman (2005), another leading figure in usability, does not relate to controllability in his design principles.

From these initial literature-based investigations, three initial questions for investigation were generated:

1) How important is 'sense of control' to the user?

2) How can we identify 'sense of control'?

3) How can we measure 'sense of control'?

The beginning intent of this dissertational research was to study users' sense of control in word processing application by adopting approaches that could directly inquire into user experiences. The premise was that these three questions could be investigated from the perspective of the users' actual experiences when using computer applications. The analysis of that data would provide some initial indications. However, further investigation of what existing research and theoretical work had been done in these areas was required.

1.3 Structure of dissertation

The dissertation is presented in the following order: Chapter 2 covers some prior research that is relevant to control and user experience; Chapter 3 outlines the methodology and explains the rationale behind the selection of the research method; Chapter 4 details the six usability tests; Chapter 5 presents analysis and discussion on the main findings; and Chapter 6 concludes the dissertation and indicates possible future research areas.

Chapter 2: Literature Review

In this chapter previous relevant literature is introduced on sense of control. Since there appears to be a certain gap on prior literature in terms of the sense of control in word processing applications, in order to present a fuller picture of the scene, literature of different aspects are gathered and discussed. This chapter introduces sense of control, control from a usability point of view, bloat, errors, and software animated software agents.

2.1 What is control?

Peterson and Stunkard (1989) defined one's control as an "individual's belief about the degree that he or she can bring about good events and avoid bad events". Notice the word 'belief' does not reflect one's actual ability to bring good events and avoid bad events. The definition indicates 'perceived control' rather than actual 'personal control'. Peterson and Stunkard's (1989) definition would be more suitable for defining an individual's own sense of control. A more precise definition regarding an individual's actual ability in control would be 'an individual's actual ability to change environmental contingencies' (Shapiro, Schwartz & Astin, 1996).

After understanding what control is and the difference between one's perceived and actual control, a next question could be: How does one gain a sense of control? Watson and Tharp (1993) suggested that there are two self-directed pathways by which individuals can gain and maintain a sense of control: either by controlling oneself, or exerting control over the environment. However, would these always result in gaining one's sense of control? Wouldn't there be circumstances that are beyond one's control?

One way an individual's sense of control can be measured or observed is by looking the two different dimensions of personal mastery and perceived constraints. Personal mastery refers to one's sense of efficacy or effectiveness in carrying out goals. Perceived constraints indicate to what extent one believes there are obstacles or factors beyond one's control that interfere with reaching goals (Lachman & Weaver, 1998). However, over the years there are more researchers advocating the adoption of domain-specific measures of control to maximize the validity of potential relationships in a given domain (Bandura, 1997). Thus, the measurements of one's sense of control could involve very different constructs depending on the research.

2.2 User Control in Jacob Neilson's Heuristics

Jacob Neilson (2004), a leading figure in usability, gives a specific item that is to be used as a heuristic for software usability evaluation:

> *User control and freedom: Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Thus the support of undo and redo would be crucial so that users can be rescued from the unwanted states.*

The following is an example that illustrates this type of user control in Microsoft Word:"What I normally do with these auto-format features is just turn them off, so that I don't have to worry about them and I can hence type whatever I feel like", quoted from a 26 year-old experienced user who has more than 10 years of experience of using Microsoft Word. A question then arises, by turning off the auto-format

features certainly gets rid off the unwanted actions triggered by the application itself but does it also prevent the users from some 'wanted' actions, for instance, the auto-capitalization of the first letter of the sentences. Thus a tradeoff exists between the 'ultimate application automation' and 'maximum user control'. Shouldn't there be a balance between these two elements so that users can have desired automation as well as user control concurrently? In this case, the user is gaining some sense of control by exerting control over the environment (Watson & Tharp, 1993), i.e. shutting down the auto-format feature.

"I realized that I can configure it under the tools menu in Microsoft Word in order to receive more customization but to be honest, I just can't really be bothered", quoted from the same user. Looking at the tabular form under the AutoCorrect Options, it contains five tabs. Within each tab, there are also a lot of options that users can decide whether or not they want to enhance the specific features. With no doubt such designs are precise and detailed, but how about the ease of use? The complexity of tuning the auto format features of Microsoft Word instantly creates a burden for users who want more customization, from some users' point of view, tuning the auto-format features may not be an efficient alternative. "I would have used the AutoCorrect Options more if they are not that complicated, but the way they are now, I would just turn the entire auto-format features off" quoted from the user. Thus the question now has come to the complexity of the design for the AutoFormat Options, according to the users, with a more comprehensive and less complicated interface design would have at least encouraged them to pursue more user control, by doing so, a more desirable blend of automation and user control could thus be delivered.

2.3 Bloat

Along with the evolution of software over the years, more features are typically introduced with each new version released. This can complicate things for the user and decrease their sense of control. Even when the new features appear to increase the user's control, some researchers argue that having maximum controllability can lead to distraction and inefficiency (Kay 2001). “Bloat” is a commonly used term that refers to the result of adding new features to a program or system to the point where the benefit of the new features is outweighed by the impact on the technical resources and the complexity of use (McGrenere & Moore, 2000). In other words the ‘bloat’ phenomenon often occurs when there are a lot of unused or unnecessary features within an application. However, there appears to be a gap in literature regarding with the user experiences in bloated applications. Jameson and Schwarzkopf's (2002) claim that the lack of systematically collected evidence of user perceptions towards system controllability and adaptation means it is too early to objectively comment on system controllability and its impacts.

Looking at Microsoft Word, the full set of toolbar provides many different features which are useful. However, some users can also be overwhelmed by the toolbar. Automatically adaptive design appears to be one suggestion, in which case the application/program will monitor the users’ behaviors and moderate the interface (i.e. menu, toolbar…etc.) accordingly. Considering the overall negative opinions of users towards the machine-initiated agents or assistants, a more predicable and controllable interface seemed to be preferred by users.

A potential alternative to solve the problem appears to be the multi-layer interface

design, which gives user control over the set of features. The novice user can start from layer 1 with the more advanced features hidden. As the users improve and require more complicated features, they can move onto high layers which of course, have more complex menus and functions.

This approach has had some success for search engines. More advanced users can use advanced searching techniques to refine the search. Novice users can just type in a keyword. Even with substantial experiences of using search engines, many users are just happy to simply type in a keyword to perform their search.

2.4 Errors

End users can be easily frustrated by errors. Thus preventing users from errors is an important aspect in terms of delivering or enhancing a healthy and positive user experience. One common and effective way of preventing errors is by limiting user actions, in other words, minimize unnecessary features for users. (Schneiderman 2003) As a result, better learning and more satisfaction are derived.

In addition, error messages appear to be crucial for user experiences; users would be frustrated by overloaded error messages. Thus to block or prohibit unwanted actions from users appears to be a better solution as opposed to the use of error messages.

2.5 Animated Software Agents

In the area of software agents or assistants, Maes (1997) has illustrated some clear differentiations from some commonly understood concepts of software agents. Firstly, software agents and direct manipulation interface should be complementary rather than substitution. Secondly, some people think that software agents must be

personified; in fact, the most successful and well-adapted software agents are not personified. Thirdly, software agents nowadays are heavily relied on machine learning and user programming, not Artificial Intelligence. Maes (1997) outlines three reasons for the need of software agents:

1. The users of computer today are very different from the users 20 years ago. To use a computer 20 years ago, you would most likely to be a professional user, nowadays, computer users are so diversified in many aspects. To accommodate such a mode audience or users, solely relying on information visualization and direct manipulation interface is perhaps not enough. We are not expecting the software agents to make an exact prediction about our upcoming actions, but wouldn't it be good if a software agent can make some suggestions to our actions? For example, if a software agent is constantly learning your interests by systematically analyzing your Internet using behavior, it will then be able to retrieve or search for the information that you may have missed out. Especially for users who are not that familiar with computers, software agents can provide great assistance.
2. The number of tasks to take care of is continuously increasing, as the tasks increase and eventually reach beyond a user's ability to handle then delegation is in need. It does not necessarily mean that we couldn't accomplish the task ourselves, it is because there are too many tasks and some of them can be passed down to software agents. For example, most of the anti-virus software has to constantly retrieve updates in order to maximize the protection of our system, all of the updating process can be done by a software agent rather than having us to manually do it ourselves. In this instance, software agents act on our behalf as we would want to

update the anti-virus constantly, we are just lazy enough and happy to have it done by someone else.

3. The way how information is presented on the Internet is highly unstructured today. Considering the way computers were used before the launch of Internet, information is basically stored in one's own computer, where in nowadays, the majority of information that we have access to is accessible from the Internet. Under such an unstructured environment, it is almost impossible to visualize the content efficiently, for many users, Internet Browser is the sole interface they are dealing with, where we do not have a complete user control, and thus software agents appear to be complementary.

These motivations have increased the design and use of software agents. However, are they benefiting the end user or irritating them by taking controls off them? This question can not be answered with a simple yes or no. As opposed to Mae (1997), Ben Shneiderman (1997) gives a different viewpoint regarding software agents.

Shneiderman (1997) states that as long as the intelligent and autonomous part of application is not interfering with predictability and control, users can be benefiting from user agents. An interesting metaphor is given by Maes (1997): when there is a problem with my car, I take it to the garage and have the specialists fix it. I may have missed out the chance of learning how to fix a car by passing my control to others but maybe we are just not interested in fixing cars as we would like to devote our time somewhere else. Software agents in a

way are like the specialists who fix cars: it helps us or at least provides us with suggestions. Shneiderman claims that from the end user's point of view, the sense of accomplishment is vital. When the tasks are accomplished by automated agents or any third parties, the sense of accomplishment degrades. This is probably a valid point when one is so familiar with what he does with what tools under a certain environment, but considering the situation when a user is so miserable and lost about what he does under a rather unfamiliar environment, wouldn't he expect some form of help?

From Schneiderman's point of view, help should come from a well designed user interface, so that users can directly manipulate his or her own actions easily. The view point of Schneiderman was criticized by Maes as only focusing on a particular group of users: those well trained and experienced professionals, while there appears to be other groups who do not place sense of accomplishment as their top priority.

Gillies and Ballin (2004) state the importance of including user control while maintaining the reduced workload associated with an autonomous system. To sum up these different viewpoints about agents versus direct manipulation interface, I think the challenge of delivering an ultimate user experience lays in finding the balance between self-accomplishment and system intelligence.

From Maes (1997) research work relating to software agents, two fundamental aspects are raised: understanding and control. Understanding means that for a successful software agent, users must understand and trust what the software

agent does. Control means that users must be able to turn over control of tasks to agent but users must not feel out of control. Maes work could be enhanced by stressing the end users points of view and having designers understand what end users demand precisely, such as when do users need extra help on doing what tasks.

2.6 Summary

So far we have come across a number of 'sense of control' related elements from previous research. The basic idea of one's sense of control is to do with the individual's belief in their ability to change the environmental contingencies. An important control-related concept in the field of usability, in the context of software application, is to find a balance between application automation and user control. Along with these concepts there is also relevant phenomenon such as the issue of over-complication in software. One of the potential solutions to the over-complication issue is sought to be animated software agent, which appears to be an interesting and related area as the initial goal of animated software agent is to provide help to users so that a better workflow can be achieved. However, there seemed to be issues of user acceptance in terms of the forms of help provided by animated software agents.

Amongst the very limited existing literature regarding user experience in word processing applications, post-experience methods such as survey and interview have been predominantly adopted as in McGrenere and Moore (2000). Using logging software to record participant usage is another common way of data collection as in Linton and Joy (1999). One of the drawbacks that

post-experience methods can induce comes from the participants' memory reflection process; the reflected memory can sometimes differ from the real experience, thus a potential bias can occur. In this paper, it is intended to differentiate from previous research methodologically. Rather than solely relying on secondary data, a usability testing method will be used that can more directly inquire into user experience so that insights from another angle can be provided.

As well as the main themes that the data throws up, there will also be some reflection and analysis of the initial three questions:

1) How important is 'sense of control' to the user?

2) How can we identify 'sense of control'?

3) How can we measure 'sense of control'?

Chapter 3: Methodology

In this chapter, the methodology adopted is introduced as well as the reason of choosing this particular methodology. How the data collection medium was decided from pilot testing is described, and the tasks assigned to participants are outlined.

3.1 Selection of Methodology

The core idea of this research is to find out how the sense of control is related to using Microsoft Word. Thus the methodology adopted must be able to truly reflect users' experiences while using the artifact, Microsoft Word. There are many methods that can be used to inquire into user experience with an artifact and each has its strengthes and weaknesses. In usability, these methods commonly include: questionnaires, interviewing, heuristic evaluations, cognitive walk-throughs, and usability testing. Out of these options, usability testing stands out as it offers the best directness to inquire into the users' experience at the time of using the artifact, as well as their reflections and impressions after the software's use (Carter, 2007).

This dissertation is an initial exploratory study of user's actual and perceived sense of control when using word processing applications. Two areas were targeted:

1. During-experience usability testing: Users will be observed using and interacting with a word processing application. Some inquiry into their experience may occur.
2. Post-experience interviewing: Users will be interviewed about their perceptions and reflections relating to their sense of control. The interview will be unstructured with open-ended type of questions, it is designed to find out more information about participant's perceptions where could be missed

out from the usability.

This research is qualitative in nature as it is investigating the participants' experiences and perceptions. It may also be classified as a series of case studies. It is also similar to an ethnographic approach except it is not in the participants' place of use, nor does it undertake an extensive and detail study into the social contexts.

A pilot study was conducted to refine the implementation of the above proposed methods. For example, what will be a successful mix of assigned tasks and self-selected tasks? Both have advantages in terms of coverage of features and contextual situations. The nature of any possible inquiry during the 'during-experience' method was also investigated in the pilot test.

Due to the constraints of this dissertation, users were initially seen as coming from students who are undertaking the MCIS course in AUT. This would give some representativeness in terms of gender, age and culture. However, there would be limited coverage such as in computer competency. Thus it was decided to have participants coming from different backgrounds so that we both experienced and inexperienced users of Microsoft Word were included.

3.2 Pilot testing

Two pilot tests were conducted using slightly different techniques and tools. The first pilot test was conducted by only using a pen recorder to record the conversation taking place during the observation and interview. The second pilot test was conducted by using a screen capture application – Camtasia Studio. It was found that

when all the screen movements and sound were recorded and integrated into one video clip, it was of great help when analyzing the recorded information. By watching the video clip, memories were refreshed and also some previously unnoticed traces were identified.

The comparison of capturing user's facial expression by attaching a web cam was also made. However, not much more information was gathered and so a decision was made that capture of screen movements and the recording of the ongoing conversations were sufficient. The usefulness of attaching a camera to capture user's facial expressions could be carried out in an extended study.

3.3 Task selection

Initially a standard set of tasks were considered to be applied to all the participants so that we would have had one more factor staying in control. However participants in the pilot tests tended to be more focusing on accomplishing the tasks and constantly seeking for more detailed instructions from the moderator.

There is a trade-off between the two different types of task selections: fixed and freely chosen tasks. One of the advantages of adopting fixed tasks is so that comparisons can be made easier. One disadvantage is that everyone uses Microsoft Word differently, and having someone to perform a fixed and standard task would not necessarily reflect the way they use Microsoft Word in reality. Observing participants performing self-selected tasks should give us a better view of studying user experience in reality. Thus in this particular study, in order to have fuller understanding across different user types, user behaviors and user experiences, we decided to have participants to

freely select their tasks so that more natural usage could be investigated.

One challenge of this approach of having participants freely select their intended tasks is that participants may have no specific thing to do at that time. One specific participant even asked that if he could just retype a copy of a lecture handout. Thus an ideal task would be a task that is also demanded by participants to fulfill in reality. For example, if one needs to write up a covering letter for a job application, it would then be ideal an ideal task for that particular participant. Although doing so may incur extra work for the usability test, the data that is collected would have less artificiality and hence the reliability and quality of data may be enhanced.

3.4 Summary

In this dissertation, six usability tests were conducted. Participants with different backgrounds were selected in order to cover different types of users. The information sheets (Appendix A) and consent forms (Appendix B) given to a participant are appended to this dissertation. Tasks assigned to each participant were according to his or her usual context of use of Microsoft Word. Details of each usability test and interview are presented in the next chapter. Table one gives an overview of the participants.

Table 1: Participants' background

Participant	**A**	**B**	**C**	**D**	**E**	**F**
Age	63	27	26	31	58	49
Gender	M	M	M	M	F	F
Occupation	Musician	Helpdesk	Application Support	Student	Retired	Housewife
Experience in using computer	40 years	15 years	13 years	15 years	4 years	7 years
Personal traits	Confident, active, outgoing	Conservative, subtle, generous	Open-minded, active	Careful, quiet, conservative	Persistent, keen learner	Active, outgoing, impatient

Chapter 4: Usability Tests

This chapter describes the usability tests for each participant. Every usability test is presented from three different aspects: participant's behavior, participant's perception, and researcher's perception. Participant's behavior is obtained by observation during the test. Participant's perception is obtained from the interview. And the researcher's perception is to form an analysis from both the participant's behaviors and perceptions. This is intended to present different layers of observation and interpretation.

4.1 Participant A

Participant's Background

A has an engineering background. He has been using computers for more than 40 years and right now he is still a heavy user. A is a positive optimist who looks at the bright side of life. However, he also appears to be very impatient and has a low tolerance towards distractions.

The task assigned to A is to use Microsoft Word to write part of a chapter of a book he is writing.

Participant's Behaviors

- Frequent typing errors: The participant frequently makes typing errors and rarely uses the grammar check. When the typing or grammatical error occurs, the participant tends to correct it manually and only used the spelling and grammar check once during the entire observation.
- The indication of incorrect spelling or grammatical errors is helpful in terms of identifying the mistakes made within the document.

- Even when there is no indication of incorrect spelling or grammatical errors, the participant still reads through the sentences and checks for mistakes.
- When the participant claims that he considers himself as in control using Microsoft Word, a lack of sureness during his response is identified. Regarding with the observed lack of sureness, there seemed to be two interpretations that could be drawn: (a) A person's perception and admittance of control may be different from their actual experience of control, or (b) The sense of control in using Microsoft Word perhaps is a construct that does not match well with actual reality.

Participant's Perceptions

- The participant perceives that the spelling and grammar check feature of Microsoft Word is helpful in terms of identifying errors; however, he rarely uses the automatic correction feature but rather makes the corrections himself. The participant states "Sometimes they (Microsoft Word) don't spell the way you want the words to be spelled, so I much rather just do it myself, when you know what you are trying to say, why select it from a list of guesses?"
- The participant perceives that he is in total control using Microsoft Word in terms of what he uses it for. However, he mentions that he would feel that he is in better control when using other programs such as Corel. He states "Due to the types of work that I do, which normally involves quite a bit of graphical work or picture editing. I found Microsoft Word frequently makes wrong guesses on my intended actions; where in Corel, I can basically just do whatever I want to do!"
- The participant holds a strong perception against the animated assistants/agents, as he states "Oh, they are just so annoying, they always came from nowhere and

every time I just switch it off and won't even bother to find out if they are of any help!"

Researcher's Perceptions

From this particular observation and interview, two major points are identified in relation to sense of control:

- Attitudes towards unexpected events

  The unexpected events degrade the user experience especially at the point of time when the event occurs. As during the entire observation, the participant is being closed observed. When the first spelling mistake was identified by Microsoft Word and noticed by the participant, an immediate change in his facial expression is captured, which indicates an unpleasant experience as this mistake is 'unexpected'. The participant appeared to be irritated by the unexpected interruption. The same type of responses has been observed several times during the observation. According to the observation, the frustration appears to fade out very shortly after the issues encountered are solved, i.e. the participant corrects the typing or grammatical errors.

- The gap between what user knows and what user needs to know.

  From this observation and interview, the gap between what the user knows and what the user needs to know is directly related with user's sense of control. As described earlier the participant states "I know what I need to know in terms of getting my work done in Microsoft Words, of course I am in control". According to the participant's argument, he considers himself in control because he believes that he has the required knowledge and skill to fulfill his intended task by using Microsoft Word. However, is this gap between what the user knows and what the

user needs to know really relating to user's sense of control? Or is this just an individual opinion? Further studies will need to be carried out in order to clarify this.

4.2 Participant B

Participant's Background

B is a 27 year old male who has been working as helpdesk support for an Internet service provider for more than 3 years full time. B has been using computers for more than 15 years and has experience in both the Windows and Linux platforms. B has been a heavy Internet user and a regular user of Microsoft Word. B appears to have a conservative personality who does not like to exaggerate his feeling. He also has a subtle and gentle temperament.

The task assigned to B is to write up the kind of report he commonly writes at work.

Participant's behavior

- A fluent work flow of using Microsoft Word is shown by the participant. He appears to be very familiar with what he does in terms of completing his report. The whole report is completed in less than 15 minutes and with only 3 typing errors which are corrected as soon as the errors are identified by Microsoft Word.
- A number of applications are used by B during the testing including Internet Browser and Calculator. The Calculator is used to facilitate his task as it involves adding figures. Two web pages were browsed by B, one for email and the other for watching online video clips.
- Spelling and grammar checks and Table tools are used

Participant's Perception

- The participant thinks that he only knows half of the functions in Microsoft Word; he realizes there is so much that he doesn't know about Microsoft Word. However, he considers himself having decent control in terms of controlling what he is doing with Microsoft Word. He states "I know what I am doing, if I did something wrong, I know where to correct it" With further inquiry, it is found that the participant has had this sense of control no longer than one year after he started using Microsoft Word. He stated "After I got used to the application by using it to complete a few assignments, I've learnt most of the basics to keep me going."
- For those functions that he doesn't know, he is not interested in exploring them. As long as by ignoring these unknown functions does not pose a negative impact on his work when using Microsoft Word. The question was then asked: how would he know that there isn't a negative impact? The participant then further explained "If I found that people are using some features of Microsoft Word that I never know, and these features would improve work efficiency. There would then be a negative impact on my work because I don't know how to use these features to improve my efficiency."
- The participant considers that Microsoft Word has a lengthy start-up time, he states "well, sometimes I just want to use the spell check in Microsoft Word, and considering what I want to be done, to me the start-up time is too long"
- The participant considers that Microsoft Word is over-complicated for the way he uses it, especially the design of interface is unnecessarily complicated, he states "they are making it too fancy, I don't have to see all these function buttons,

it'd be good if I can switch user mode." He also mentions that it would be a great idea of there is an option for switching user mode as basic, moderate and advanced.

- The gap between what he knows and what he needs to know is small. For example, the participant perceives that with his existing knowledge and skill of Microsoft Word, he can easily fulfill his task during work.
- The participant does not consider himself as in control when using Microsoft Word. "When I see all these buttons that I have never used and I don't know what they are, I know I am not in control, knowing how to use it to get my work done is one thing, to me, it is different from having full control of the program" The statement appears in contrast to a preceding statement where the participant thinks he is in control. With his further explanation, it then becomes clear that he feels that he has sufficient knowledge and skill to use Microsoft Word to fulfill his tasks during work; however, there are still features and functions that he is not familiar with in Microsoft word, which could make him feel not in control.
- The participant holds a strong opinion against the animated agents/assistants as he states "They are annoying, I always turn them off, I don't like them showing up when I start up the program, I would like them when I needed helps or came across problems." Besides, he also mentions that he dislikes the animated agents due to the sacrifice of screen space.

Researcher's Perception

- The over-complication issue of Microsoft Word has been mentioned by the participant a number of times. There appears to be a relationship to participant's perception of control in Microsoft Word. It is not clear yet about this relationship,

further analysis of following participants hopefully will bring more clarity.

- The form of assistance provided by Microsoft Word perhaps requires reconsideration. The two main reasons of the negative impressions towards the software agents provided by the participant in this experiment are:
  - The sacrifice of screen space
  - The unexpected showing-up of animated software agents.
- Comparing this particular observation and interview with the previous one, the first thing that comes into my mind is that "The more you know, the more you realize that there are so much that you still don't know". B appears to be a much more experienced user in Microsoft Word, which is indicated by his fluency of usage and the contents of points raised in the interview; however, when it comes to the sense of control, the two participants seemed to be holding entirely different views, where the experienced user considers himself is not in control and the less experienced user considers himself in great control.

4.3 Participant C

Participant's Background Introduction

C is a 26 year old male who has been working as an application support for a software company for 2 years. C has been using computers for more than 13 years, predominantly on the Windows platform. He has also been a heavy Internet user for more than 10 years. He would spend no less than 5 hours a day on the Internet and his major Internet usage includes browsing, chatting, gaming and information retrieving. As an application support, C has to provide both off-site and on-site support for any application issues. C only uses Microsoft Word occasionally to type up some odd documentation and reports. However, he has experience in using Microsoft Word for

more than 10 years.

C appears to be an open minded person as well as a fast self-learner with good problem solving skills. He is friendly and humorous.

The task assigned to C is to write up a covering letter for his new job application, as he is currently considering changing his job.

Participant's behavior

- A fluent work flow of using Microsoft Word is shown by the participant. He appears to be very familiar with what he does in terms of completing his covering letter. The whole covering letter is completed within 20 minutes with 6 spelling errors and one grammatical error. Spelling mistakes are corrected soon as they are detected by Microsoft Word. The grammatical error was ignored by C as he believes there is no grammatical problem within the sentence.
- The only application that is running concurrently during the observation is the Internet Explorer; C uses Internet Explorer to browse a particular website searching for a job that he is looking at applying.
- Spelling and grammar checks and formatting tools are used. Instead of using the "Styles and Formatting" feature, C manually adjust the appropriate font site according to his own preference of font size.

Participant's Perception

- The participant thinks that he only uses less than 30% of the features in Microsoft Word and it is enough for him to complete almost all the tasks that he

needs to accomplish. “I don’t use all the features, just use it to type, maybe use bullet points and spell check. I used to know more of these features! I’ve done a paper on it, but after I learnt, I just forgot.”

- The participant does not have an explicit preference about Microsoft Word; he does not consider preference towards Microsoft Word is important as long as the application gets the work done. “Everyone uses it, so I have to use it. There are not many choices around in terms of word processing applications.”
- The participant appreciates the spelling check feature the most; however, he does not consider the grammar check is as useful as the spelling check feature. “Sometimes when it says the grammar is wrong but I don’t believe it.”
- The participant considers that Microsoft Word does not have enough fonts and it can be annoying sometimes. “It hasn’t got enough fonts and sometimes you have to download it, it could be a hassle. Maybe selecting a particular font from a list is not a best way because you can’t preview it at the same time.”
- The participant does not consider the sense of control while using Microsoft Word is an important aspect. “I don’t think it is important, as long as I can use it for I want to use it for.”
- The gap between what he knows and what he needs to know is small
- The participant considers himself as in control when using Microsoft Word. "If you ask me about some specific features of Microsoft Word now, maybe I wouldn’t be able to tell you correctly, but if I need to use it, I am confident to figure it out, even if means going through the help menu.”
- The participant holds a strong opinion against the animated agents/assistants as he states "I always disable them. Sometimes when you are trying to do some work and they pop up and you can’t keep typing, you have to disable them

before you can keep typing." He considers that animated agent requires an immediate action which can be a frustrating interruption at times.

Researcher's Perception

- C appears to be a confident user, although he considers himself only knowing about 30% of the features of Microsoft Word, it is enough for him use it to complete his intended task. Even when he is in doubt, he has confidence to find out how to use a specific feature through the help menu or even try and error.
- The form of assistance provided by Microsoft Word perhaps requires reconsideration. The main reason of the negative impression towards the software agents provided by the participant in this test is interruption. The interruption caused the software agents requires immediate actions in order to carry on what users has been doing. As opposed to an interruption that caused by other currently running applications which does not require immediate attention, the interruptions caused by the software agents tend to be more frustrating according to the participant.

Through the observation and interview C does not consider sense of control as an important factor as an end user and nor does he hold any preference towards this particular application. He mainly uses it facilitate a small portion of his job and mostly for typing up a short letter or brief document. To C it is only a tool that he uses, thus in his view, as long as the tool does the job that is all it matters. With further investigation of his perception towards the word processing application, he stated “If it is something I really like, for example, online gaming, I would then consider the sense of control and all other aspects in a better weight, but as you know, the way I

am using Word, I just don't care that much about how it is, as long as it gets the job done"

From this observation, a possible hypothesis can be formed as: **the perception towards the sense of control when using word processing applications is correlated to the context of use and the importance of the task to the user.** For users who are using word processing application to conduct important, valuable or worthy outcomes, the sense of control tends to weigh more as opposed to those who are using word processing application to conduct daily, routine tasks.

4.4 Participant D

Participant's Background Introduction

D is a 31 year old male who has just recently completed his Masters degree in Computing and Information Science. D is an immigrant originally from China and he has been to New Zealand for 6 years. D has been using computers for more than 15 years and predominantly on the Windows platform, he is also quite familiar with Linux platform. D is interested in small computer games rather than online games. He has been a heavy Internet user for more than 10 years. He would spend no less than 4 hours a day on the Internet and his major Internet usage includes browsing, chatting and information retrieving. As a student, D has had to use Microsoft Word a lot. He has spent the last 8 month to complete his dissertational thesis and he uses Microsoft Word to write up his thesis. He has more than 10 years of experience of using Microsoft Word.

D appears to be a conservative type of person. He does not consider himself as a risk

taker. He is always happy to lend out a helping hand when needed.

The task assigned to D is to write up a CV as he is looking for a job.

Participant's behavior

- A fluent work flow of using Microsoft Word is shown by the participant. He appears to be very familiar with what he does in terms of completing his CV. The whole CV is completed within 30 minutes with five spelling errors and three grammatical mistakes. Spelling and grammatical mistakes are corrected soon as detected by Microsoft Word.
- There was no other application running concurrently. He stated that normally if he is doing something unimportant he would have had his Instant Messenger running at the same time, but if he is doing something more important, he would then intend to just focus on one application so there would be less interruption.
- Spelling and grammar checks and formatting features were used by D. He used the "Styles and Formatting" to edit and format his CV.

Participant's Perception

- The participant thinks that he knows about 60% of the features of Microsoft Word, but he only uses about 20%. He mainly used Microsoft word to complete his school work.
- The participant does not have an explicit preference about Microsoft Word; he does not consider preference towards Microsoft Word is important as long as the application gets the work done. "I only use it to get my report done, there are not many options available anyways especially for PC users. I don't particular like it

nor dislike it, I use it because it is available and other people use it too." He also mentioned that when everyone else is using the same application, there would be less compatibility issues.

- The participant thinks that Microsoft Word does not have a strong edge on page editing, especially when there are diagrams within the document. "When there are diagrams say on page 2 and I want that diagram at the bottom of page 2, and if I added something on page 1, it often shifts the diagram to page 3 which I need to edit it again, and when I have a huge document to manage, this can be very frustrating."
- The participant considers that spelling and grammar check is a useful feature and he uses it all the time to make sure there is no major spelling and grammatical mistakes in his writing. D stated "I use the spelling and grammar check all the time, although sometime it does not pick up some grammatical mistakes, but overall I quite like and I think it is useful."
- The participant considers that the auto-format feature of Microsoft Word can be frustrating; it sometimes wrongly guesses the users' intended actions. As D mentioned "Sometimes when I use bullet point or auto-numbering, I have to reformat the layout, which is something I think Microsoft Word should be improved at."
- The participant does not consider he has much sense of control while using Microsoft Word. He stated "I felt I was controlled by the application rather than controlling the application, I can only use it the way that Microsoft Word is designed for. There are many features that I do not use, and for those ones that I use frequently enough, some of them are just not good enough such as the auto-format."

- The participant holds a strong opinion against the animated agents/assistants as he states "Probably 9 out of 10 times I just turn them off because they pop up when I don't need help, if it is that 1 out of 10 times which I do need help, maybe I will see what these software agents have got to offer." He considers that animated agent sometimes wrongly guesses users' actual needs.

Researcher's Perception

- D appears to have a decent understanding in Microsoft Word, and as he mentioned that he would consider himself having more knowledge in using Microsoft Word than average users. When it comes to the sense of control in using Microsoft Word, D perceives that he is actually controlled by the application rather than controlling the application. Perhaps this particular description of "being controlled" is a little exaggerating, with further discussion with D, the situation would probably be better described as: There are certain constraints or limitations in Microsoft Word which degrades D's sense of control in Microsoft Word, i.e. the auto-format features sometimes wrongly guess users' intended actions.
- D has the same negative opinion against the software agents as previous participants. However, unlike most of the previous participants who dislike software agents due to the interruptions caused; D dislikes software agents because he rarely needs any help in using Microsoft Word, and most of the times software agents pop up when he does not need any help.

Through the observation and interview with D, it is found that D does not consider sense of control as an important factor when it comes to using Microsoft Word. To D,

it is just a piece of software that he uses to complete his reports, essays and thesis, he uses it because there are not many other alternatives around and using what is the most commonly used word processing application minimizes the compatibility issues.

The difficulty in graphical editing within Microsoft Word has been mentioned more than once including other participants. It is of common sense that if we insert a rather long paragraph before a particular diagram, the diagram would be automatically shifted downward, and this automatic shifting of diagrams often causes users extra amount of work in terms of page editing. When this opinion of mine was suggested to D, he responded "A difficulty that can not be overcome by the existing technology does not mean the difficulty does not exist, of course, as an end user, the only thing we can do is to be adaptive and get used to the inefficiency." The response from D did get me thinking, if we compare Microsoft Word with our traditional writing method – using a pen to write on a piece of paper. When we want to add a paragraph right before a particular diagram, it is certain that the diagram would not be automatically shifted to the next page. Thus from this point of view, I am tend to agree with D's argument that most of us just got used to the application, or to be more specific, we got used to the limitations and constraints of the application, to a point that we even stop thinking there is a problem. But actually the problem remains.

4.5 Participant E

Participant's Background Introduction

E is a 58 years old female who is a retired teacher. E started using computers 4 years ago. Her main activities of using computer include email and internet surfing.

E is quite unfamiliar using computers. She has used Word a few times to type up

simple documents, but the last time she used it was more than one year ago when she used it to type up her contact list. E considers herself still has a long way to go in terms of learning how to use a computer. She would rate herself only knowing about 5% of the features of Microsoft Word.

E is humble. She has a very high motivation in learning new things. She is open-minded and has a lot of friends. Amongst her friends she has the reputation of being the best listener. When it come to learning, she considers herself as a slow but very solid learner; one example was given by her "When I was still in high school, many of my classmates including me were very interested in this ancient Chinese Instrument, Gu-zheng. Thus a lot of us were crazing about it and we practice it all the time, back then I was not one of the best or even close to it. However, I appeared to be the only one amongst the group who is persistent enough and kept on practicing, finally, I achieved certain level. To be honest, it is never about how well I can play, it has always been about I accept the fact that I am not the smart type but I never stop trying."

The task assigned to E is to use Microsoft Word to type up a contact list of her friends. E has been thinking about doing so for quite some time, however, she does not feel confident about completing it herself, thus with my assistance from the side would actually make her feel more confident.

Participant's behavior

- E is a slow typist as she is not used to using the keyboard quite as yet, the entire contact list consists 29 names and phone numbers and some email addresses. It

took her 47 minutes to complete the task and she has made about 7 typing mistakes, the typing mistakes are identified by the automatic spelling check. However, since E has to constantly focusing on the keyboard while typing, she was usually aware of these typing mistakes a few seconds after she can finally focus on the screen.

- There were no other applications running concurrently at the background while E was completing her tasks, and as she stated herself "I can only focus on one application at one time, I am not used to multi-tasking."
- E has very little understanding of computers. She did not even know that she is supposed to hit the 'enter' key if she wants to start a new line.
- E appeared to be nervous and very careful about what she does. It is noticed that her frustration is most obvious between steps. For example, when she had finally finished typing and wanted to save it, she was not sure about what to do exactly; she appeared to be nervous and frustrated. Her frustration and nervousness appeared to be eased tremendously when she knows what exactly she is doing, i.e. during the process of typing.
- While typing the contact list, there are times where two different people share the same phone number (husband and wife). E did not know that instead of re-typing the same phone number, she could have just used the 'copy and paste' feature which is one of the mostly used featured for frequent Microsoft Word users. When it is noticed that E is not aware of the existence of such feature, I explained and illustrated the feature to E. She was excited and quickly learnt how to use the feature, "See! I just don't even know there are such handy features; I just need someone to be patient enough to walk me through." It also seemed like E had gained more confidence and was more interested in using Microsoft Word.

Participant's Perception

- The participant thinks that she knows 5% or less of the features of Microsoft Word. She had only one prior experience of using Microsoft Word. She thinks the very limited knowledge of computer is the main obstacle for her to progress. She said "I think my main problem comes from that I am just not used to the pattern of using a computer, thus it stops me from being able to learn efficiently when it comes to an unfamiliar application."
- The participant does not consider herself having much control in Microsoft Word and she would expect the sense of control is important in terms of building up her confidence in using Microsoft Word. E said "I do not feel that I am in control at all while using Microsoft Word, in fact, I do not feel I am in much control using the computer. Only for those applications that I have used so many times, I got used to it and I know by doing what will make the application do certain things." When E is asked to provide some examples to illustrate her perceptions of the lack of sense of control, she said "A lot of times, I am just completely lost, and I don't know what I am doing. What is even worse is that the frustration gets to me and I just don't know what to do, I remember the first time I was told to save the document, I just do not know that I have to even save a document that I have just typed!"
- When E tried to type from a new line, she did not realize that by hitting the 'enter' key, the curser will move down to a new line. At that specific point, she leaned her head forward and frowned at the same time.
- The participant perceives that there is a linkage between sense of control and confidence. As E mentioned "One of the problem is that I am just not confident

enough, sometimes I am just afraid that if I try something out and it will do some damage to whatever I am doing or even to the computer. If I know well enough that by experimenting such and such I would not do any harm, then I will probably be more confident exploring the features in Microsoft Word."

- The participant thinks that Microsoft Word is over-complicated especially which does not cater for her needs efficiently. E said "I only want to do simple things like making a list, a table with computer and be able to print it out. Look at all the list of icons; it just makes me even more unconfident about using Microsoft Word."
- The participant considers that spelling and grammar check is a useful feature. She said "I did not know there's such a feature, I must have come across it before but I guess I just didn't pay enough attention. But yeah, it would be a very useful feature I suppose."
- The participant considers that animated agents are helpful. E has the experience of being helped by the animated software agents before she mentioned "I like them because the help is step by step, I remember I was given two or three options by the agents, and it was helpful to me, you know…for someone who doesn't really know that much."

Researcher's Perception

- E appears to be a novice user of Microsoft Word who has a very limited understanding in computing. From the observation and interview with E, one key factor is identified as a major obstacle for her to use computer comfortably – confidence. It seems to be the lack of confidence that stops her from learning effectively as she had mentioned several times during the interview, it is also the

lack of confidence that makes her felt miserable and lost when using Microsoft Word, or in a greater scope, using a computer. Therefore there appears to be a correlation between confidence and sense of control. This confidence is also impacted on by a perceived threat of damaging the computer if she experiments and does something wrong.

- The over-complication issue appears to have a greater impact on novice users as opposed to more advanced users. While E was looking for the correct button to click in order to save the document, the facial expression sufficiently indicates her frustration caused by the over-complicated design of Microsoft Word.
- A potential relationship between typing skill and error recognition and correction was found. As E has very limited typing skill so that while she is typing, she has her visual focus on the keyboard instead of the monitor. Thus it is for several times that when she finished typing and looked at the screen, she has made a few typing mistakes.

4.6 Participant F

Participant's Background Introduction

F is a 49 years old female who is currently a housewife but has been a salesperson in the past. F has been using computers for the past 7 years with her main activities being reading news on the Internet and email.

When F was still at work, she rarely had chances to use a computer as she had an assistant to take care of that part of work for her. However, she does understand the basic computing and she learnt typing in her early years. F had only used Microsoft Word for a couple of times to type up letters thus she is a beginning user. F considers

herself as a novice in using computers, although she almost uses Internet on a daily bases. She thinks there are still a lot of areas that she does not understand.

F is an active and outgoing lady; she enjoys spending time with her friends. Amongst her friends, she has a great sense of humor and often being considered as a friend to be fun with as she is always highly participative. At home, F is a supportive house wife; her sons and daughter are her main focus in life. When it comes to learning, F considers herself as a fast learner who can pick up new stuff quickly.

The task assigned to F is to use Microsoft Word to type a letter to her daughter in overseas. Similar to the previous E, F does not feel confident doing it just on her own. However, with my assistance alongside providing help, she is more confident.

Participant's behavior

- It took F 15 minutes to complete the letter. Four typing mistakes were made while typing up the letter. Since F had learnt typing before she could keep her eyes on the monitor while typing. Thus when the typing mistakes were identified by Microsoft Word, she was aware of it and able to correct it as soon as the mistake was made. However, instead of using the auto correct feature by doing a right click, F manually changed it.
- One Instant Messenger application was running concurrently while F was typing her letter. F is an experienced Instant Messenger user. She chats with her friends and family by using Instant Messenger on a daily basis. She said, "I always turn my MSN messenger service on when I am using the computer, I quite enjoy it, and it has become one of my habits now."

- When F tried to list a number of things in the letter, she did not use the auto-numbering feature. When I demonstrated her that how the feature can be used, she seemed to be amazed about it.
- While F was typing the letter, there were times she could have used the automatic word/phrase completion feature, she did not know it can be done simply by hitting the enter key instead of typing the entire word. For instance, she was typing the day 'Wednesday', before she finished typing the word 'Wednesday', the word 'Wednesday' was prompted on the top-right corner of the cursor, the word 'Wednesday' could be automatically completed by hitting the enter key. However, since F is a fast typist, perhaps it would be just as easy for her to complete the entire word. With further inquiry, it was found that F did not know there was such feature.
- When F completed the letter, she closed the application without saving the document, thus a dialogue popped out asking her whether or not she wants to save the document. She was confused and didn't know what to do. Thus I explained to her how and why she needs to save a document.

Participant's Perception

- F considers herself to know only about 10% of the feature of Microsoft Word. She thinks that her prior work experience may have advantaged her a little in terms of being able to type adequately. However, she has not been seriously interested in learning how to use Microsoft Word. She stated, "I do not need to use it at all on my daily life, thus I am never interested in learning it! Although it would be handy when I do have to use and know how to."
- F considers having sense of control would be an important factor for her to use

Microsoft Word effectively, and the sense of control is mainly generated from the knowledge of computing. She stated “I think I don’t feel in control at all because I don’t know how these things work (computing knowledge).”

- F considers that she is only using computer in her leisure time to entertain herself, she predominantly use for Email, reading online news and Instant Messaging. She stated ”To me I use computer to fill up my time as there are other alternatives that can substitute a computer, when I don’t have a computer available, I can read papers and talk on the phone instead and it is just as convenient to me.”
- F considers that software agents are not of much use to her. According to her experience she did not enjoy the help provided by the animated software agents. She stated “When I see the agents pop up, I just close it almost instantly because it stops me from doing what I was doing and I don’t know what they are for.”
- F considers that Microsoft Word is overcomplicated for a beginner user like her. She stated, “For a start, the menu and tool boxes on the top to me is complicated enough, I would have to try very hard to remember which icon represents what feature!”
- F considers that spelling and grammar check is a useful feature. She said, “I know there is such feature although I am not exactly sure how to use it. I suppose it will save users some effort. At least you can make sure there’s no typing error when you are utilizing the feature.”

Researcher's Perception

- It appears that F does not perceive using computer as an activity of great importance; it is a leisure activity of her daily life. She considers that there are

other mediums which can substitute computer, such as newspaper, television and telephone. The perception of how a computer could enrich her life seems to make her less motivated to learn about a computer. She said "I suppose I need to use a computer to complete some important tasks of my life, I would have been keener to learn. But right now, I am quite satisfied with the way I use a computer. This is not to say that I would refuse to learn more, however, in a way, I just do not have such need to push me." There is no desire for sense of control in using Microsoft Word, to be more precise, there is just no desire for F to even use Microsoft Word.

- Being able to type efficiently seems to make F slightly confident in using Microsoft Word as it is observed that, while F is typing, she can actually have her visual focus on the screen rather than on the keyboard thus she would be aware of what is happening concurrently. However, when the animated software agents pop up, F just hides them straight away without finding out what the agents are there for. Thus further study would be required to bring a clear picture of the relationship between typing ability and the confidence of using Microsoft Word.
- F holds a negative opinion against animated software agents. She does not consider it can provide much help, "sometimes they even show up when I don't need help. To me it is annoying."

4.7 Summary of Major Themes

Table 2 summarizes some of the main themes found in the six usability tests.

Table 2: Major themes identified in the usability tests and interviews

Participant	Major findings
A	• Residual frustration caused by interruption • The gap between what user knows and what users need to know • The correlation between sense of control and the importance of task • Deficiency of Word's graphic editing feature
B	• Application over-complication issue • Negative impression towards animated software agent
C	• Lack of the choices of word processing applications • The correlation between sense of control and the importance of task • Negative impression towards animated software agent
D	• Deficiency of Word's graphic editing feature • Lack of the choices of word processing applications
E	• Potential correlation between one's confidence and sense of control • Application over-complication issue • Typing skills affect the use of computer
F	• The perception of importance in using a computer • Application over-complication issue • Typing skills affect the use of computer

Chapter 5: Discussion

In this chapter, different thoughts and analyses of users' sense of control when using Microsoft Word is presented based on the usability tests and interviews. These include: the importance of using Microsoft Word, choices versus control, learning versus control, software animated agents, spelling and grammar check, confidence versus control, interruption, refinement of usability test techniques, and lastly some important things when investigating control.

5.1 The Importance of Using Microsoft Word

Looking at the different usage of Microsoft Word amongst the group of participants, the importance of using the particular application is not of equal portion. A only uses Microsoft Work during work and yet it is only a small portion of his work. Thus we can probably assume that his user experience in using Microsoft Word is not of the same extent of impact comparing with someone who is using Microsoft Word to complete a more influential task. If we look at another participant who is using Microsoft word to write a book of his own, the user experience engaged with Microsoft Word becomes more influential to him. A recommendation for usability consultants is to be alert to the importance of linking the use of Word to the user's context of work and values.

It appears that for experienced users, the perception towards the sense of control when using word processing applications is correlated to the context of use and the importance of the task to the user. For users who are using word processing application to conduct important, valuable or worthy outcomes, the sense of control tends to weigh more as opposed to those who are using word processing application to conduct daily, routine tasks. However, for less experienced and confident users, the

reverse could be the case. This would be a useful area for further investigation.

5.2 Choice versus Control

The relationship between choice and control is an interesting area to look at. In this study, two participants raised the point that due to the limitation of available word processing applications for PC users, they have no options for using Microsoft Word. In many circumstances in life, lack of control is equivalent, occurs at the same time, as lack of choice. Choice occurred as a phenomenon in the study as the choice of what application to use. For example, two of our participants considered they didn't have a choice "It is not the matter of preference, but more of a matter of choice, there appears to be not many options for PC users when it comes to word processing applications, Microsoft Word seemed to be the most commonly used application." So in this study there was not choice. However, this does not seem to have influenced their perception of their control one way or the other; they were neutral in their perception of control. Why is that? It is found that for these participants who do not value control of any importance, they perceive Microsoft Word as just a tool. It is not being used to do anything of any great importance and word is perceived to get the job done. "I just want to get my job done without having too much trouble, and if I am using something that is so different from everyone else, the compatibility issue can somehow be unavoidable at times." Thus it is found from the study that for certain users, mostly happens to be experienced and advanced computer users, the neutral perception of control is possibly derived from two factors, lack of choice and the perception of seeing word processing application as just a tool to facilitate certain tasks.

5.3 Learning versus Control

Another interesting aspect to look at is the relation between stage of learning and

sense of control. It seemed like for beginning learners of Microsoft Word require more sense of control and it appears to be an important factor or element to deliver a confident, efficient user. For more advanced users the sense of control of Microsoft Word is perceived as less important as opposed to beginning learners. From the observational study two participants when asked if it is important to have control in using Microsoft Word, they replied "I don't really care about it and had never really thought about it. I just want to get the job done." If we may assume the reflection on sense of control in Microsoft Word is true based on the data collected, then a learning curve can be hypothesized as illustrated in the following diagram (Figure 5.1), i.e. perceived importance of the sense of control as opposed to the stage of learning. As a user is going over different learning stage in using Microsoft Word, i.e. from beginner to advanced users, the perceived importance of the sense of control diminishes. However, due to the scope of this dissertation there are only two inexperienced users thus the above finding could be tentative and further extensive study would be required to validate the relationship.

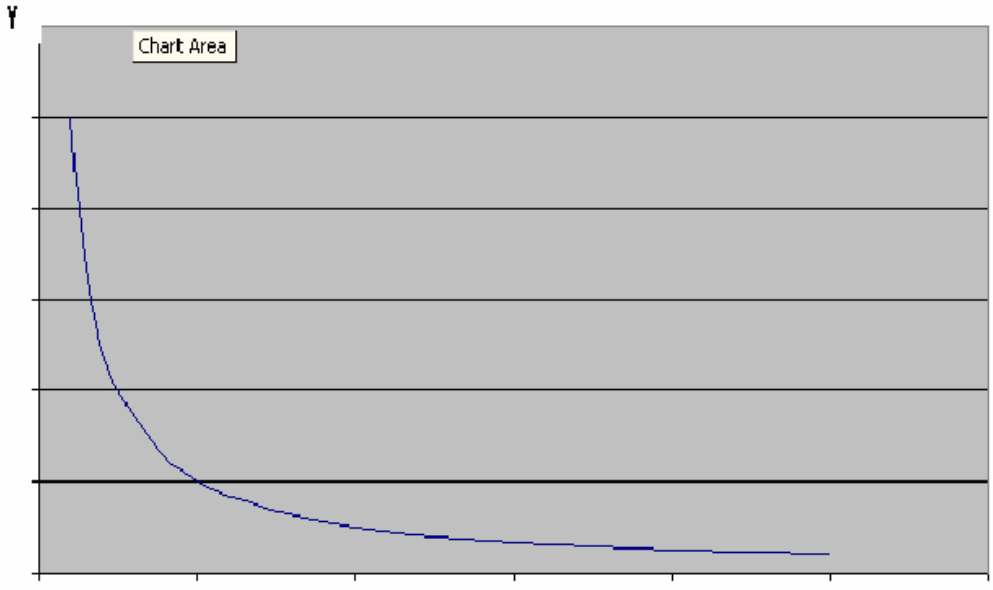

Fig 5.1:
Importance of Control Across Different Learning Stages
X: Learning Stage
Y: Perceived Importance of Control

By definition, a beginning learner of Word or anything has more unknowns than someone who has already learnt some things. Different people have different responses to the states of unknowns that occur with learning. Some are apprehensive, some dread, some enjoy. Learning computer skills appears to accentuate uneasiness. Perhaps, this is because there are so many things to learn, so many things that can impact on the running of a computer, including hardware and software components.

It is quite interesting that this hypothesized model is quite common in many fields as we may have all come across at some stages. Imagine when we just had mobile phones two decades ago, the excitement and perceived usefulness of this technology was high. As the mobile phone technology has become more and more popular and so as the technology evolves over time, we had just got used to the technology and it just becomes part of our life for many of us, we are using it as a tool just to facilitate our

tasks or social side of life and the excitement as well as the perceived usefulness of this technology has starting to fade away, because it is just part of our life. Until when one is in desperate need of a mobile phone while he has not got one in his hands, the realization of the significance of the technology awakes. The use of Microsoft Word in a way is similar to the use of cell phones for some users. Microsoft Word has become such a common application that has been around for more than 10 years. Thus for some users Microsoft Word is a 'daily' application. Users are used to the application to a point where they perceive less significance of such an artifact.

When people begin to learn something new, then there are more unknowns as opposed to the experienced users. Their need for control in the environment can be great or greater than later on. Across different learning stages, perceptions towards the importance of control in using Microsoft Word shifts, the participant who is a novice user of computer stated "I felt I am not in control when using Microsoft Word as well as most of other applications, I always feel that I am lost and don't know what to do next." Beginners require a more indicative and less complicated interface design which enhances their learning of the application. Advanced users require better manipulation in some specific features such as graphic editing. Having a more indicative and less complicated features will engage them with a stronger sense of control.

Thus an all rounded, well-designed word processing application in an ideal world should be capable of catering to the array of different needs coming from different types of users. The consideration shall then be made from a range of aspects, such as the context of use, users' different backgrounds…etc. Thus an application may

hopefully become more than just a tool to orient or facilitate users' tasks; it is well blended in users and their intended tasks, perhaps in a way just like a well-tuned piano to a piano player or a nicely-balanced cue to a snooker player. In that case, I believe we would be more likely to see more satisfied users.

5.4 Animated agents

One of the common perceptions towards Microsoft Word would be the perception of the helpfulness of the animated agents. It appears that all of the participants dislike the sudden appearance of the animated agents, and most of the participants choose to ignore the agents by hiding it without even looking at the contents that the agents are providing. The main common reason for the dislike of animated agents basically comes from perceived feeling of unexpected interruption during the use of Microsoft Word. There appears to be an underlying relationship between the unexpected events and the degree of user control, as stated in (Shapiro et al., 1996), when the resultant outcome is not within the expected range, there would be a degrade of sense of control. To precisely locate and address the correlation, further investigations are required in the future.

However, one of the inexperienced participants did find the animated agent useful. There does not appear to be a clear correlation between user's preference of software agents and their experience; however, it is an interesting area for future researchers to look at, to see whether or not one's experience in computing would pose an impact on his or her preference on software agents.

Another aspect to look at animated software agents would be the shift or change of

control. When an animated software agent pops up, users' tend to have less control, or would be in a less dominant position in terms deciding what actions to take, as software agents frequently provide limited options for users to choose from. In Shapiro's (1996) study in sense of control, one's sense of control can be gained by believing that someone else is in control. However, when individuals do not require a control derived from a third party, i.e. software agent, it may induce negative results.

5.5 Spelling and Grammar Check

The other consistency in user perception towards Microsoft Word would be the common appreciation of the spelling and grammar checking function. This is one of the common features that all the participants found helpful and generally improved their efficiency during the work process, "I like the spelling and grammar check feature as I would have less focus on my spelling and grammar because I know for these types of mistakes they will be identified by Word." Linking this with the sense of control, a potential hypothesis would be that when users are using the spelling and grammar check feature, it is expected that such feature would perform effectively in terms of correcting unintentional typing or grammar mistakes. While the anticipation and outcome aligns, users would then be in the position of control.

5.6 Confidence (Challenges versus Skills)

The major inconsistency that was found from both the observation and interview is the difference in perceptions towards the importance of sense of control when using Microsoft Word. For those who claimed that the sense of control is not important amongst the participants, they are the ones who have over 8 years experience of using Microsoft Word, in other words, they are the ones who have control on the application although they claimed themselves the opposite. In Csiksentmihalyi's flow theory, one

essential element for flow to occur is the balance between skill and challenge; if the skill is greater than challenge then boredom would be derived. In this observation, the unbalance between skill and challenge is found within most of the experienced users of Microsoft Word. It found that most of the experienced users know more than their actual context of use of Microsoft Word, so in other words, there is no challenge to them using Microsoft Word.

The last two participants have very limited understanding in computing. They apparently hold a different view as opposed to experienced users. One of them perceives the major obstacle of her being able use Microsoft Word efficiently is the lack of confidence, which could be caused from the lack of sense of control or the other way around, thus there appears to be an underlying linkage between the sense of control and confidence. From the observation and interview with her, she is uncertain about how or when and if her operation or experimentation would adversely affect the computer; the perceived potential harm and damage on the computer impacts on her confidence and her control.

5.7 Interruption

As mentioned in the earlier paragraph, one simple way to categorize interruptions can be made by users' expectation towards interruption; thus there would be expected and unexpected interruption. An example for expected interruption would be a message sent via Instant Messenger. Since users are normally aware of the existence of Instant Messenger running at the background, thus we can assume that users are expecting to be in touch with the outer world in a way. Thus when a message pops in, it is within expectation. An example for unexpected interruption would be a typing error

identified by the word processing application, or a pop-up software agent.

Based on this study's findings, users tend to be less frustrated with expected interruption, in other words, the recovery time is shorter for users to switch back onto their task. For unexpected interruptions, it seems that users are consuming a longer period of time for recovery.

The degree of interruption varies from user to user, and even with the same user, the time taken to recover from the interruption differs. For instance, it is found that when the interruption is generated from a typing error, the time taken for users to recover from interruption is generally short, i.e. less than five seconds. When the interruption is generated from other concurrently running applications, i.e. instant messenger, users seemed to consume a longer period of time to recover from this type of interruption.

One interesting point that I discovered by closely observing the participants is the residual emotions from previous interruptions. For example, when one participant recovered from an interruption generated from a typing mistake, the residual frustration seemed to be taking effect which made him became impatient and less focusing on the task. The residual frustration also appeared to build up thus when he had correct his third typing mistake he even swore! If it is true that the residual frustration can be compounding and thus forms a resultant negative impact onto user experiences in using word processing applications, can we assume that a pleasant and comfortable user experience could also be compounded under the same assumption? If so, it would then be a valuable potential research field in the future. Of course,

before the research focus to be taken this far, more investigation is required in order to validate the above immature hypothesis.

5.8 Reflections on the Initial Questions Raised

How important is the sense of control?

From this study, it is found that users with different knowledge and experiences tend to have different perception towards the importance of the sense of control in using Microsoft Word. For inexperienced users, the lack of knowledge in terms of computer operation appears to have an impact on their confidence in using Microsoft Word. Thus a potential degrade in their sense of control occurs. For experienced and advanced users who had actual control in Microsoft Word as well as other computing operations, they do not value the sense of control as important. Looking at it from another perspective, for users who are equipped with if not tremendous but some understanding of computer operations, it is not such a challenge for them to learn how to use Microsoft Word, but for beginning users of computers, the lack of understanding and experience on computers, it could be one step beyond their capability.

How do we identify and measure sense of control?

In this study a few elements are identified as having possible correlations with sense of control in using Microsoft Word namely: (a) Fluency in work process; (b) Number of errors; (c) Error recovery; (d) Amount of knowledge; and (e) self confidence.

Fluency in work process:

Participants who demonstrated a better fluency in using Microsoft Word appear to

perceive a stronger sense of control. As this element was obtained by observations further studies could look for ways to validate and operationalise this particular element.

Number of errors

Participants who had greater control of Microsoft Word tended to make fewer errors during use. However, for those who have better actual control in Microsoft Word does not necessarily reflect that they perceive the same degree or amount of control. For example, one of the participants who has more than 10 years of experiences of using Microsoft Word as well as computers, did not perceive a good sense of control in using Microsoft Word although he has actual and good control in his context of use. From this particular participant it is also found that depending on the different contexts of use, the complexity or difficulty of tasks could vary, thus impact on one's perceived sense of control. For instance, this participant only uses Microsoft Word to type up his supervisor report at work which does not involve great complexity, thus although his capability may be sufficient or even beyond the job requirements, he still does not perceive having a good sense of control in using Microsoft Word.

Error recovery

From this study it appears that for those participants who perceive a higher sense of control tend to have better error recovery abilities. Error recovery could be measured in time. It is found for those inexperienced users in this study, they tend to have very poor ability to recover errors occurred during the use of Microsoft Word. One of the participants was completely confused and lost about what actions to take when an error showed up on the monitor. This particular finding is sought to be partially in line

with an early description of control as the "actual ability to change environmental contingencies" (Shapiro et. al., 1996). It would be odd or even inappropriate if we classify 'errors occurred when using an artifact' under the umbrella of 'environmental contingencies', however; every and each one of us makes mistakes, thus wouldn't that been seen as a kind of contingency?

Amount of knowledge

The amount of knowledge in terms of using Microsoft Word or knowledge of computing in general seemed to affect participant's perceived sense of control in using Microsoft Word. It appears that inexperienced users suffer from their lack of understanding and knowledge and hence a low level of confidence and sense of control was resulted when it comes to most of the computer operations. The amount of knowledge or understanding of a particular application could be measured by how many features one knows over the features that is required in order to fulfill a certain task, in other words, it is depending on one's context of use of an artifact.

Self confidence

The study reveal that one's level of confidence seemed to affect one's perceived sense of control. Three out the four experienced users in the study all appeared to have high level of confidence in terms of their context of use in Microsoft Word. The relationship between confidence and sense of control appeared to be aligned with the earlier research conducted by Lachman et al, (1994), in which work she stated that "Individuals with a high sense of control *believe* what they do make a difference." However, it is also found that one's confidence does not solely depend on their personality traits, but also relates to their skill and knowledge.

In summary, some possible correlational factors were found in relation to identifying and measuring sense of control. More fine grained, precise descriptions of actual behaviors relating to sense of control could be usefully explored in further studies. If we look closely at these elements identified and compare with prior control-related literature, most elements can be categorized under two main categories: personal mastery and perceived constraints, which is aligned with Lachman & Weaver's (1998) findings in control. However, some of the factors that are identified as potentially correlated elements to the sense of control in word processing applications such as 'error recovery', which is not stated in prior literature and it is believed that such element could be domain-specific. In other words, as suggested by Bandura (1997), to effectively investigate sense of control it is recommended to adopt specific set of measurements rather than applying one general set of measurements.

5.9 Refinements for Usability Tests

Being relatively new to the field of usability and usability testing and an inquisitive person, I had many reflections on conducting the usability tests and interviews and made modifications and refinements as I went along. I hope some of these reflections will be useful to the usability field and particularly researchers beginning to take this type of approach.

Friendliness

I noticed that a sincere friendliness to participants greatly helped the generation of a smooth flow. During the pilot test, the very first mistake that was made is the underestimation of the importance of socializing with the participant. The atmosphere was intensive and perhaps too task-focused. For example, it is found the conversation

between the researcher and the participants was short and brief, answers unclear and not investigated, and also the participant seemed to be overwhelmed by the series of 'why' questions and appeared to be irritated. At the end an 'I don't know' was often the final answer from the participant. With this interesting finding and reflection, more attention was placed on building a friendly interaction between the participants and the researcher.

Interactions in the second pilot test became more fluent. Both the participant and the researcher were more relaxed which led to a smoother rhythm. Some traces of potentially useful information emerged and it also made the researcher easier to reach a certain depth in terms of understanding participant's perceptions. For example, the conversation became like a discussion rather than one where the researcher was constantly asking questions and the other just constantly simply replies to the question.

The techniques that were used to improve the friendliness in the pilot test included: a warm and clear welcome as an opening which showed the appreciation on participants co-operation, as well as to explain briefly what is this testing about, a soft tone of speaking so that the researcher can politely expresses his intended question, and patience to be a good listener yet still being a sensitive observer who is carefully looking for useful information that is relevant to the research focus.

Task selection

As mentioned in the methodology chapter, the task selection is important when it comes to usability tests. Failing to select appropriate tasks often leads to data with

poor quality; the whole usability test becomes too artificial, which is driving the test away from its intended essence – to find out how an artifact is actually used.

Initially it was decided to have participants to freely select their task. However, it was found in one of the pilot study that the particular participant just did not know what should he choose, he even asked if he could just retype one of his old letter. Retyping something in Microsoft Word is not what he would normally use Microsoft Word for, thus in a way he is only trying to cope with the participation, and that would be very difficult to reflect his true behavior of using Microsoft Word as opposed to how he would have used Microsoft Word in reality. Therefore the significance of task selection was realized. From the observational study, it seemed it would be ideal to assign participants with tasks that are matching with their actual needs in reality, and then being alongside makes a good sense as a moderator would be demonstrated by the participants about how an artifact is used by someone in reality.

However, one major drawback would be that it can be difficult to arrange such tasks for participants and it could sometimes be quite time-consuming. Also the idea of task selection can sometimes be hard to implement, as not everyone needs to use Microsoft Word everyday, a well organized pre-usability test discussion with the participants would be needed.

Inquiry technique

Pause

Quite often during the usability testing participants would perform a series of actions which contained different intentions. To clarify the way of thinking behind each

action, ‘pause’ would be an important technique to adopt during usability tests. This technique can be useful during the usability test or interview, particularly when the participant has a tendency of acting or moving fast. I had found this technique very useful in terms of breaking down participants thinking into smaller fragments so it also helps both parties to communicate efficiently.

However, the drawback for such technique found in this study is that by using ‘pause’ sometimes it is almost unavoidable to cause distractions. To offset this drawback the moderator (the facilitator running the usability test – in this study, the researcher) often has to lead the participant back to the break point where ‘pause’ was used, so that participants would not be affected by the distraction tremendously. It does take quite some practices for a moderator before he or she could use ‘pause’ efficiently.

Look for sureness

While interacting with participants, it is often important for the moderator to clarify and be sure that the information received from participants is accurately reflecting participants’ intended meanings. Part of the human nature is to react upon or cope with others, thus it is commonly found that a hesitating ‘well…umm…yeah’ normally does not mean the same thing as a firm ‘yes’ with sufficient degree of sureness. Thus it is the moderator’s responsibility to ensure the alignment between participants’ responses and actual behaviors.

Always having the extra attentions on participants’ sureness makes a moderator easier to see what is actually happening, and quite often while a moderator is doing so, the underlying traces emerges. It also reduces the bias hidden with the collected data that

was caused by participants' nature to cope or to react instead of their real ways of thinking.

5.10 Investigating control

Some participants had trouble linking the sense of control with the use of Microsoft Word. When the question of "Do you feel you are in control?" was asked, some participants seemed to be confused and did not understand the question. Thus the strength of running a usability test kicks in; a moderator can be alongside and observe the user behavior. A lot of useful information can be discovered by closely observing how a user interacts with an artifact, For example, observable behaviors included facial expressions, body languages, tones of speaking…etc. Some of this information would not be mined easily with other methodologies, as users may not even notice or realize themselves. After finding these traces and information from observing users, further inquiry could be made to clarify with participants.

It was discovered that most of the participants were not familiar with the linkage between sense of control and using Microsoft Word, regardless whether or not they had control using Microsoft Word. Under this circumstance, the observation becomes crucial as it provides a basic picture about how a user uses Microsoft Word, and then based on the observed user behaviors the inquiry and discussion gets deeper. The inquiry or probe of a particular user behavior is as important as the observation part, instead of asking participants "What would you think of your sense of control when using Microsoft Word?" questions such as "Wow, That was very fluent the way you use Word, wasn't it?" would normally result in a richer conversation hence more likely to lead to more fruitful findings. As the "Wow, that was very fluent the way you

use Word, wasn't it?" is more of an invitation to engage in an equal conversation rather than a hard, emotionless question.

While conducting the usability tests and interviews with inexperienced users of Microsoft Word, difficulties were experienced as this particular type of users only had a very limited knowledge of computing and there were few times they seemed so confused about what to do between steps. As a moderator of the usability test, I had to provide some kind of guidance so that they can resume what they were not able to. However, it is found that if I provide too much help the participants may become too dependent. Thus my aim was to provide the minimal help that is required to make them carry on completing the tasks. In my point of view, this would be a grey area to grasp as too little help would not be enough for the inexperienced participants to resume their task, also one of the drawbacks would be the sacrifice of a friendly atmosphere of a usability test. Similar situations also occur during the interview phase, for some participants who are not used to such form of interviews, it could be difficult for them to respond to certain questions precisely, and requesting participants to provide examples or describe their previous experiences would often help.

It takes a lot of practice for one to be able to conduct a successful and efficient usability test. Thorough and detailed observation can pick up important signs and assist inquiry with a participant precisely on the thing that is intended to be clarified.

Chapter 6: Conclusion

6.1 Future Work

This study was only very initial pilot research but hopefully it has indicated some fruitful areas for further research. These areas include:

- Looking for correlations between users' confidence and their sense of control.
- Identifying different user types and their specific needs in word processing applications. Different user types can be categorized by either the context of use or by the degree of expertise in using word processing applications. A longitudinal study focusing on users over a period of time, following their motivations, goals, and behaviors could be interesting and useful.
- Is a person's sense and perception of control of a computer application similar to other artifacts?
- What is the desired form of assistance word processing applications could provide? A future study could build on the insights gained in this study concerning people's responses to and requirements of software agents. This might result in useful alternatives to software agents been conceptualized
- Re-design of the interface for Word might be initiated and inspired by coming from a fundamental focus on users' level of experience.

6.2 Reflection on Usability Testing

The type of usability test used in this study inquired into users experience while they were interacting with an artifact. This appears straightforward but quickly complexities arise. The inquiry during experience often creates an interruption. It is important to minimize the negative impact caused by an interruption. For example,

after using ‘pause’ and inquiring into users’ experiences, it is useful and necessary for the moderator to help the participant resume his or her task. Therefore the moderator must keep in mind what the participant is doing prior to the pause.

Unlike other methodologies such as surveys, we do not have a big enough sample size to conclude on the generalisability and representativeness of the findings. Thus the findings can be lack of validity although they are drawn from actual user behaviors and perceptions. However, as this study is posited as an initial exploratory study which can be followed by more detailed and extensive studies.

A moderator’s understanding and experience in usability testing is important in terms of delivering the insights and uncovering the underlying scenes. As I was a novice in usability testing, some of the usability techniques were not so familiar to me. For example, I failed to inquire with users when some significant traces were presented, such as a participant frowning while making a typing mistake. This is a fruitful capability if more precise investigations into the actual presence and experience of sense of control in a person are wanted.

6.3 Conclusion

In this study, six usability tests and interviews were conducted in order to investigate users’ sense of control in word processing applications. Control was found to be a complex concept with many associated variables and factors, such as; the degrees of confidence, the importance of the tasks the word application was being used for. Animated software agents and interruptions were also identified as repeated themes in the data. Methodology-wise, some refinements of usability testing were proposed

which could benefit those conducting usability tests.

As a novice of usability testing myself, I am truly amazed about how rich the information that can be mined through skillful use of this method. It appears I have only come across a fraction of what this powerful tool can do. On completion of this study, I find I have a strong motivation to devote more effort exploring relevant techniques of usability testing, perhaps in the field of human computer interaction.

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Appendix A:

Participant Information Sheet

The User's Sense of Control in Word Processing Applications: The User's Experience

You have been invited to take part in research that I am conducting as the final part of my degree in Masters of Computer and Information Science at the Auckland University of Technology.

What is the purpose of this research?

This research will investigate user's experience while using word processing applications.

The final results will be written up as a dissertation and submitted to the Auckland University of Technology.

How was I chosen for this invitation?

You have been chosen because you have used a word processing application.

What will happen in this research?

You will be asked to use a word processing application in the way that you typically use it. You may also be requested to complete some given tasks. The researcher will observe the way you interact with the application and may also ask you some questions.

An interview will also be conducted after your use of the application. Questions regarding your experience in word processing applications will be asked. The researcher will take notes and the session will be recorded by a pen recorder. The whole session will take about one hour to 90 minutes of your time.

You shall be under no pressure through out the entire session as this research is focusing on your experience, not your individual performance. All data collected will be only accessible for the researcher and his supervisor. Your identity will be anonymous in the written report.

Participation is fully voluntary. You may withdraw yourself at any time during data collection and all data will be destroyed.

What are the benefits?

It is anticipated that the results from this research will assist the understanding towards user's experience when using word processing applications.

How will my privacy be protected?

The researcher and supervisor will assure the confidentiality of the participants. When writing up the dissertation, real names will not be used. All the data collected will be securely stored and is only accessible for the researcher and his supervisor.

How do I agree to participate in this research?

Please complete the consent form and return it within a week.

Will I receive feedback on the results of this research?

The results and discussion sections will be sent to you either electronically or by post upon request.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, *Philip Carter, phil.carter@aut.ac.nz,* 921 9999 ext 5300.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, Madeline Banda, *madeline.banda@aut.ac.nz* , 921 9999 ext 8044.

Whom do I contact for further information about this research?

Researcher: Alton Chen	Supervisor: Phil Carter
yuxcheb9@aut.ac.nz	phil.carter@aut.ac.nz (921 999 ext 5300)

Appendix B:

Consent to Participation in Research

Title of project: The User's Sense of Control in Word Processing Applications: The User's Experience

Project Supervisor: Dr Philip Carter

Researcher: Alton Chen

- I have read and understood the information provided about this research project as outlined in the information sheet.
- I have had an opportunity to ask questions and to have them answered.
- I understand and agree that the interview will be audio taped.
- I understand and agree I will be asked to use a word processing application in the way that I typically use it. I may also be requested to complete some given tasks. The researcher will observe the way I interact with the application and may also ask me some questions.
- 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. If I withdraw, I understand that all relevant transcripts, or parts thereof, will be destroyed.
- I grant permission for any information collected to be used for purposes as outlined in the information sheet.

- 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 signature: .....

Participant name: .....

Participant's contact details (if appropriate):……....

…….

Date: .....

Approved by the Auckland University of Technology Ethics Committee on

<click here and type the date ethics approval was granted> **AUTEC Reference number**