Product Personality: An investigation into how congruent personalities
identified in a target market can intentionally
be assigned to a wireless speaker.

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Abstract

Consumer's show a preference for products that communicate a personality congruent to their own. When a user perceives a product to share similar personality attributes to their own, they respond through 'approach' behaviour. Using an action research methodology, the project investigated how product semantic knowledge and cognitive response to form can be used to intentionally assign personality attributes to a wireless speaker. Through an assessment of existing products for specific personality attributes, and by identifying the visual dimensions that define these products, a list of visual parameters was generated for the wireless speaker design. The results from the existing product analysis, supported by knowledge gained from literature on embodiment in design and user perception of implicit design cues, were used to guide a design research process through testing and making of an artisanal nature. The results from the project support the concept that product aesthetics can be designed to intentionally express specific personality attributes guided by a designer's intuition.

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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 (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning."

Contexts

Introduction

With every new product, designers are confronted with the same problem: to create a product that meets a need and strikes an emotional chord within its user.

A human-centred design methodology shifts the focus from the product to the *impact* it has on the intended user. This masters project has sought to develop a beautiful, tangible, hand-crafted object that connects with the user in a meaningful way.

Consumers identify and assign personalities to products with a preference for those that share a similar personality to their own (Jordan, 2002; Mugge, 2004). For example, I am a designer who desires order over chaos and quality over quantity. Therefore I have a preference for the minimalistic, geometric forms and clean lines associated with Scandinavian aesthetics in my own design practice.

This project specifically focused on developing a wireless speaker to illustrate how design might assist target users to perceive a product as sharing a similar personality to their own. Through a process of discovery, this research investigated the concepts of embodiment in design and implicit design cues. Knowledge gained on these concepts during the discovery process was then used to perform an existing product analysis to define what attributes gives the products personality. As a result, congruent personalities identified using personas have been intentionally and successfully assigned to a wireless speaker to encourage 'approach' behaviour from the user.

Positioning Statement

As a New Zealander with a background in refrigeration engineering and a passion for order and clarity, I appreciate the functionality, precision, and purity associated with German engineering and Scandinavian design.

I admire how Scandinavian designers influenced the New Zealand mid-century furniture industry, such as at J. W. Backhouse Ltd, where original Scandinavian designs were produced under license (MR. BIGGLESWORTHY). This approach to design was not limited to furniture, but also influenced technology companies such as Akrad Radio (Figure 1).

I approached this research project from the position of a designer/maker with a passion for the simplicity and elegance of mid-century Scandinavian design aesthetics (Figure 2). I combined this with the precision and functionality of German design and expressed them through a New Zealand perspective to hand-crafted artisanal design.

Figure 1. [Vintage Akrad Table Clock Radio]. (n.d.). Retrieved from http://trademe.tmcdn.co.nz/photoserver/tq/400208778.jpg

Figure 2. Maunsell-Wybrants, H. (2013). DARK Lamp

Literature Review

This literature review analysed significant texts on product personality, form, and semantics. A model of product character was also included to illustrate how these concepts relate to each other.

Product Personalities

In an effort to investigate and establish connections between the aesthetic qualities of products and their personalities, Jordan (2002) carried out a study using a technique known as Product Personality Assignment (PPA). Product personality is defined as "the set of human personality characteristics used to describe a specific product variant" (Govers & Mugge, 2004, p. 2). According to Jordan (2002), "looking at products as personalities is one of the ways in which we can understand products as 'living objects' rather than merely as functional tools" (p. 43). As a result, Jordan was able to confirm the concept that assigning products a personality was meaningful in product design. The findings also demonstrated that there was no connection between the participant's personality and the preference for products that share the same personality, also known as the 'theory of self-congruity' (Mugge, 2004). This is most likely due to the lack of depth and focus on this concept within Jordan's study. A study carried out by Mugge (2004) revealed markedly "that people become more attached to products with a personality that is similar (high product-personality congruence), than to products with a personality that is dissimilar (low product-personality congruence) to their own personality" (p. 8). Wider research convincingly supports the theory that self-congruity is an important concept to consider when designing products with personality (Govers & Mugge, 2004; Bloch, 1995; Govers & Schoormans, 2005; Mugge, Govers, & Schoormans, 2009; Dumitrescu, 2010; Arora & Stoner, 2009).

This research project took the position that self-congruity is a valid method that can be used to generate positive emotions within a user. I took this position because it was strongly supported by a number of other researchers including Govers & Mugge (2004); Govers & Schoormans (2005); Mugge, Govers, & Schoormans (2009); Dumitrescu (2010); and Arora & Stoner (2009).

The work of Govers, Jordan, Brunel and Kumar (as cited in Mugge, 2008) suggest "the appearance of a product is a major determinant in the perception of product personality" (p. 288). Reeves and Nass explained how "we unconsciously perceive and interpret emotional expression in things and then form relationships with them based on the personalities we've given them" (as cited in van Gorp & Adams, 2012, p. 13). Therefore, according to Donald Norman (2004), a designer must achieve correspondence between the relevant product attributes to develop a product with a consistent personality (as cited in Mugge, 2004). When designers refuse to pay attention to the personality they are designing for, the resulting product is inconsistent destroying the users trust, leaving them feeling betrayed (van Gorp & Adams, 2012).

Product Form

There are many elements that influence product form in the product development process. Bloch (1995) illustrates this in a model titled *'Model of Consumer Responses to Product Form'* (Figure 3). The model shows how a product form is influenced by user preferences, technical aspects, goals and constraints placed on the product through the design process. The model also illustrates how users respond to the product form, ultimately resulting in either an 'approach' or an 'avoidance' behavioural response.

Nussbaum proposed that product design influences a consumer by its ability to communicate information to the consumer through its exterior appearance (as cited in Bloch, 1995). Berkowitz (1987) supports this idea by noting that

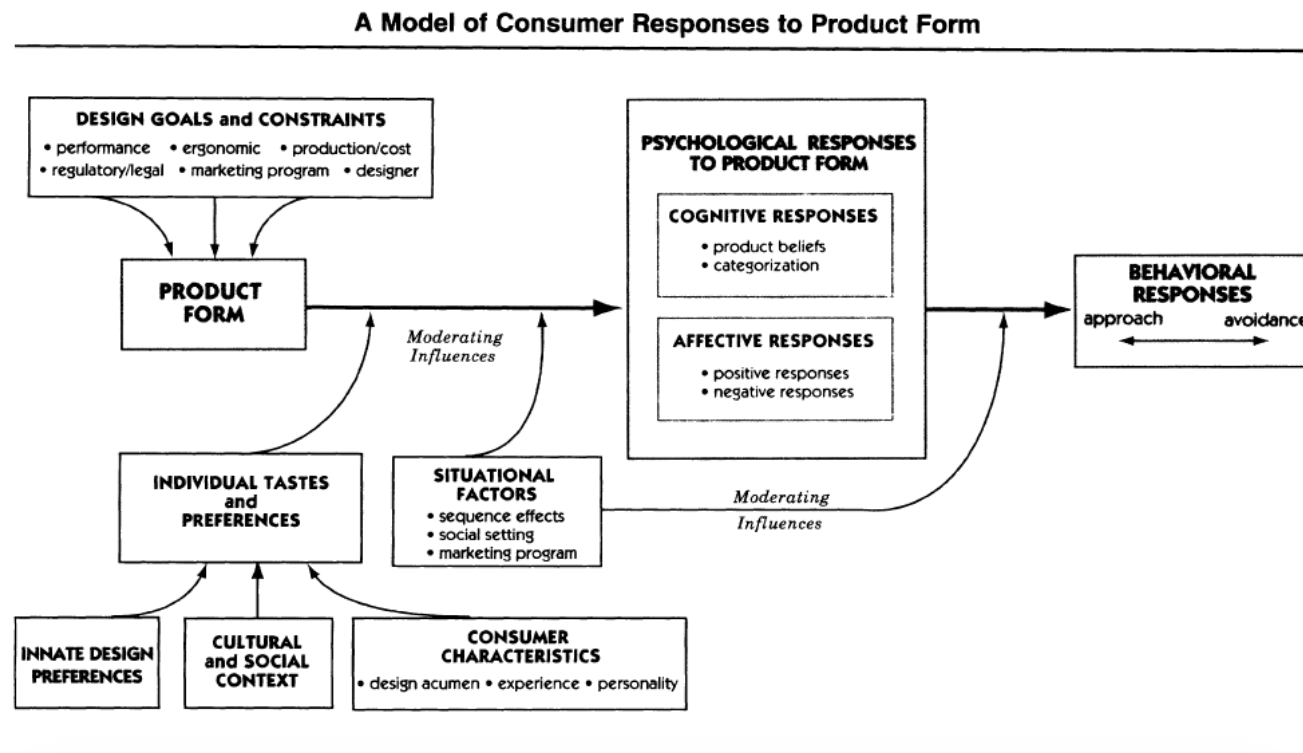**A Model of Consumer Responses to Product Form**

Figure 3. Bloch, P. H. (1995). A Model of Consumer Responses to Product Form.

In Bloch, P. H. (1995). Seeking the Ideal Form: Product Design and Consumer

Response. *Journal Of Marketing, 59*(3), 16. http://doi.org/10.2307/1252116

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prospective buyers translate a product appearance "into an inference about a reality not yet expressed" (p. 276).

Figure 3 highlights design goals and constraints as two primary determinants of product form. Design goals and constraints consist of both those that can be modified as the product develops (such as material selection) and those that must not change (for example regulatory constraints). Regulatory constraints include elements such as fire safety, electrical regulations, and structural properties (Lawson, 1990).

Naussbaum argued that "product form may also be developed with the constraint that it shares certain characteristics with previous projects from the designer or the design house" (as cited in Bloch, 1995, p. 19). Evidence from the product personality assignment study carried out by Jordan (2002) supports this and the study concluded that Braun products shared a common perceived brand personality amongst consumers, a concept strongly supported by Karjalainen (2007).

Ultimately, a product's form is going to elicit a variety of psychological responses from consumers (Bloch, 1995). It is therefore the designer's job to anticipate, plan, and design for these consumer responses. When successful this will most often result an 'approach' behaviour encouraging extended viewing, listening, and touching from the consumer (Bloch, 1995).

Product Semantics

Krippendorff and Butter (1984) define product semantics as knowledge about the symbolic qualities of human created forms in their context applied to industrial design. 'Knowledge' in this instance refers to either a designer's tacit knowledge based on experience, or knowledge learned more systematically through study and research

"which has been shown to improve the clarity of student's designs" (Crilly, Moultrie, & Clarkson, 2004, p. 15).

How knowledge can be applied is best explained by quoting Krippendorff & Butter (1984) directly:

> Just as a journalist creates informative messages from a vocabulary of terms, so could a designer be thought of as having a repertoire of forms at his [sic] disposal with which he [sic] creates arrangements that can be understood as a whole in their essential parts and that are usable by a receiver because of this communicated understanding (p. 5).

According to Crilly et al (2004) "it is the designer's job to decode the common values and opinions that exist in the culture, and reproduce them into forms that embody the appropriate symbolic meaning" (p. 17), in this case personality attributes. Butter (1989, p. 53) provides a comprehensive 8-step sequence to help designers achieve this by combining product semantics into the design process:

1. Establish general objectives and constraints for the product
2. Identify the product's projected context of use including user groups and performance
3. Generate a list of desired attributes that express the projected semantic performance characteristics
4. Generate a list of undesired attributes that express semantic characteristics to be avoided
5. Analyse, group, and rank attributes
6. Search for concrete manifestations to support desired attributes and contrast undesired attributes
7. Assess, select, and integrate semantically feasible manifestations into expressive wholes
8. Evaluate compatibilities and technical feasibilities of ideas

The 8-step process outlined above focuses on the use of 'manifestations' as a method to link desired attributes to a product. Crilly (2004, p. 19) calls these 'visual references' - points of reference external to the object.

Understanding methods of embedding meaning into a product using product semantics, and learning how certain attributes obtain these meanings is an important aspect of this research project.

Product semantics focus on giving elusive product attributes tangible qualities such as form, shape, material, texture, and colour (Butter, 1989). These tangible qualities were chosen based on their ability to communicate the desired attribute within a specific context by referencing other products or concepts already associated with the attribute. For this reason it is important for designers to understand basic design elements such as form, shape, texture, colour, line, and the meanings associated with them.
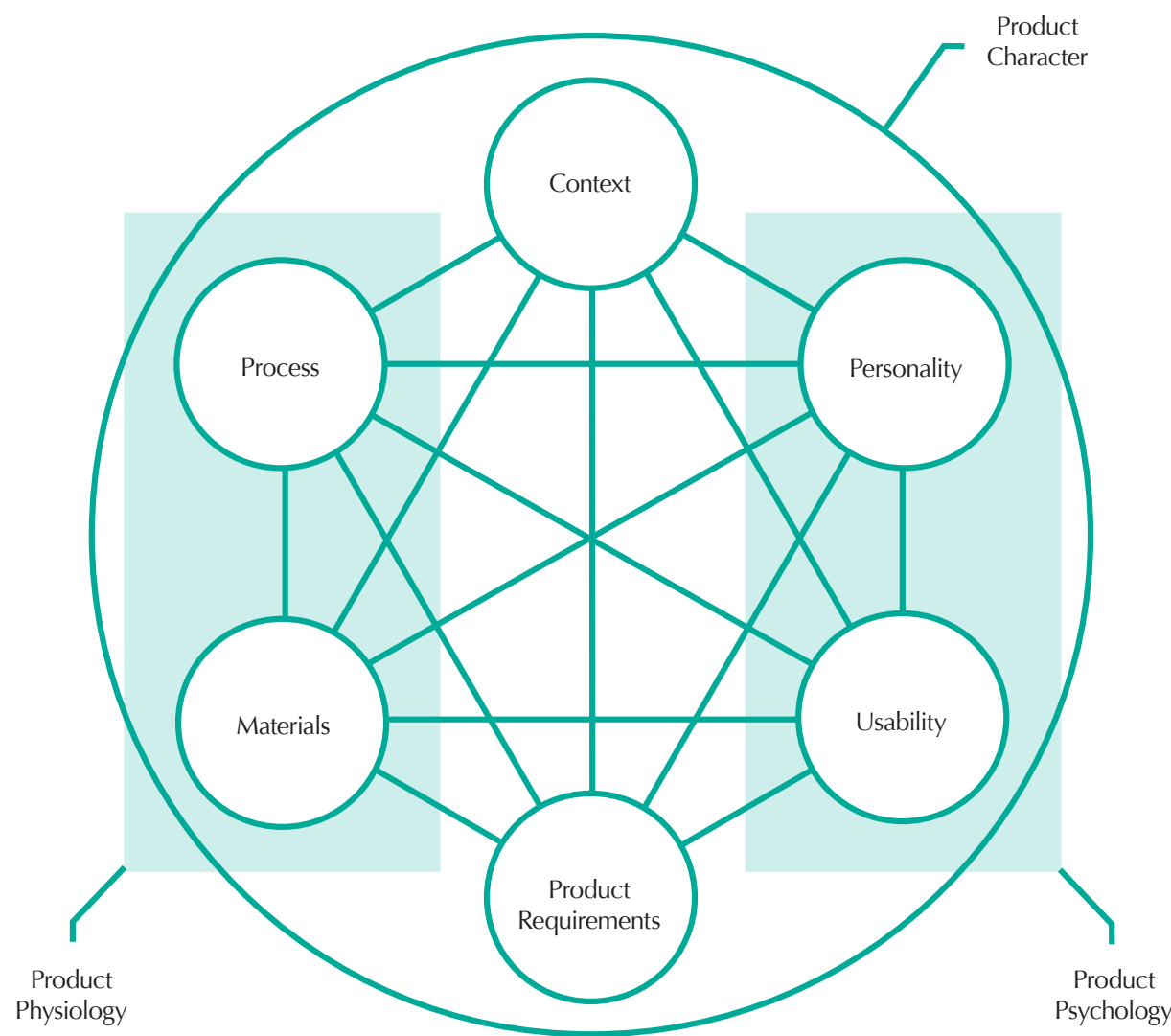
Product Character

Figure 4. Ashby, M., & Johnson, K. (2003). *The dissection of product character.*
In Ashby, M., & Johnson, K. (2003). The art of materials selection. *Materials
Today, 6*(12), 24–35. http://doi.org/10.1016/s1369-7021(03)01223-9

Six product dimensions combine and interact to generate product character. The dimensions are illustrated in Figure 4. The six dimensions are described:

Context - refers to the who? where? when? and why? questions associated with the wireless speaker.

Personality - this has been dissected further in Figure 5 and broken down into three categories; aesthetics, associations, and perceptions.

Usability - focuses on how the wireless speaker communicates with the user. Is it understandable and easy to operate?

Product Requirements - refer to the technical parameters and considerations of the project, the required functions the product must satisfy and the features of the wireless speaker.

Materials & Processes - these are the physical, tangible dimensions that are used to express the personality of the product, in accordance with the product requirements as defined by the context dimension.
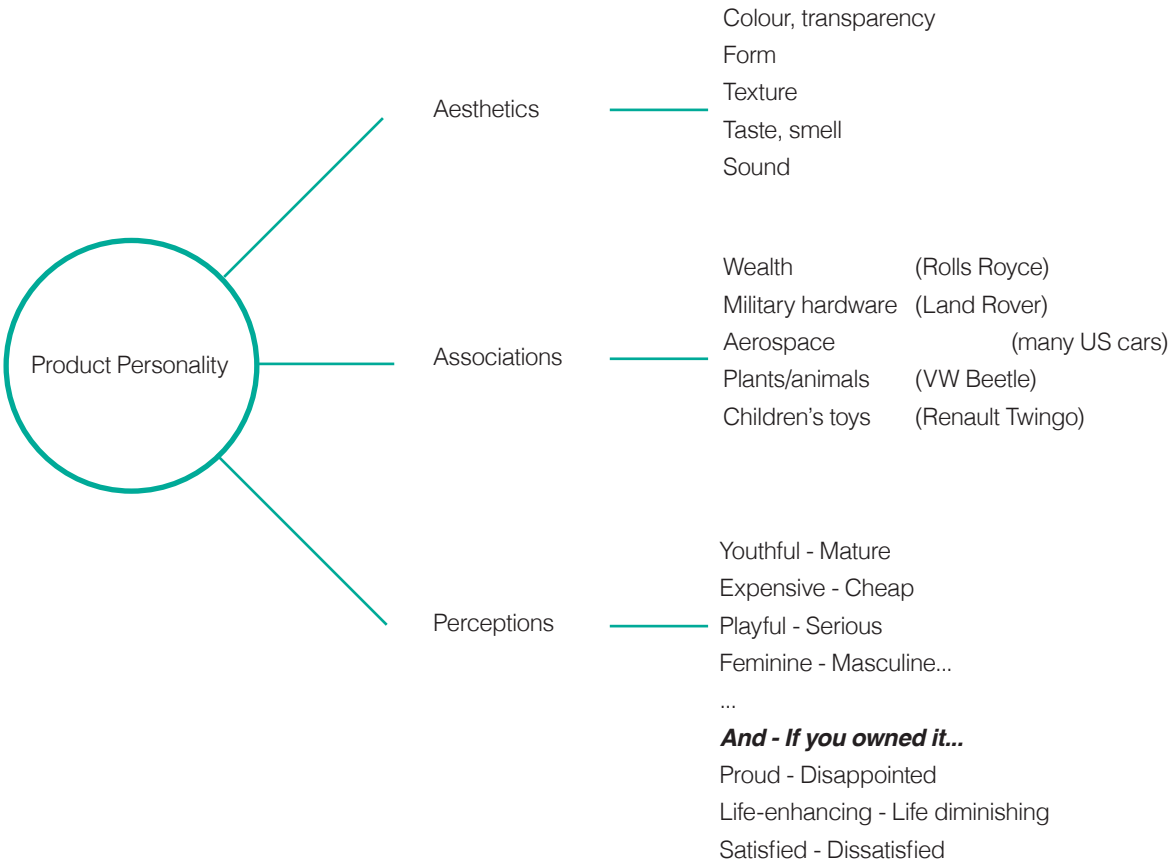
Product Personality

Aesthetics
Colour, transparency
Form
Texture
Taste, smell
Sound

Associations
Wealth   (Rolls Royce)
Military hardware (Land Rover)
Aerospace   (many US cars)
Plants/animals   (VW Beetle)
Children's toys   (Renault Twingo)

Perceptions
Youthful - Mature
Expensive - Cheap
Playful - Serious
Feminine - Masculine...
...
And - If you owned it...
Proud - Disappointed
Life-enhancing - Life diminishing
Satisfied - Dissatisfied

Figure 5. Ashby, M., & Johnson, K. (2003). *Product Personality Model.*
In Ashby, M., & Johnson, K. (2003). The art of materials selection.
 Materials Today, 6(12), 24–35. http://doi.org/10.1016/s1369-
 7021(03)01223-9

Insights Derived from Literature

- According to Jordan (2002), assigning personalities to products is meaningful.
- Research convincingly supports the theory that self-congruency is an important concept to consider when designing products with personality.
- Product appearance is a major determinant of product personality.
- A designer should aim to achieve concinnity among all product characteristics to communicate a consistent personality (as seen across the Braun product range).
- User's respond to products with either an 'approach' or 'avoidance' behaviour.
- Symbolic qualities, such as product personality, can be expressed through the tangible aspects of product form by incorporating Butter's (1989) 8 - step product semantics sequence into the design process.

As a result of the literature review and consequent insights, I intend to explore product semantics in an effort to gain knowledge that can be applied to a design process that closely resembles Butter's 8-step sequence. I will do this in an attempt to explore ways to embed specific personality attributes into a wireless speaker to achieve self-congruity within a defined target market.

Figure 6. Philips. (1985). *Roller Radio*. Retrieved from http://digitalwellbeing
   labs.com/dwb/wp-content/uploads/2009/03/roller01scaled.jpg

Case Study

I positioned this case study early in the document to contextualise, illustrate, and substantiate how product semantics were used successfully to connect with a target audience.

The Philips Roller Radio (D 8700) is a portable music player designed for Philips in 1985. Robert Blaich states that the radio was designed with a primary focus on product semantics with the visual metaphor of mobility (as cited in Boess & Kanis 2008).

Objective
The objective was to create a product that would "improve Philips' image among the youth market" (Boess & Kanis, 2008, p. 307).

Methods
The Roller Radio was designed with a focus on product semantics. The visual language communicated through the product's attributes was an attempt to appeal to the youth of the time (Blaich, cited in Boess & Kanis, 2008) and included the fixed handle that afforded portability (and says "Carry me") and a round ball at the end of the antenna, described by

Brown (as cited in Boess & Kanis, 2008), as reminiscent of a sports car's aerial. A battery compartment on the back of the radio supported the idea of portability, and the speaker grill details signify movement and active sound waves.

As most portable 'Boomboxes' were associated with the archetypal youths of the time, the Roller Radio directed its attention to a different niche market. The bright colours attempted to cater to the sector of the market that didn't necessarily want to adhere to the 'street' image.

Results
Sales of the Roller Radio were an indication of its success as a product. Blaich believed the success was also seen in the number of products that borrowed visual cues from the Roller Radio after its success in the marketplace became evident (as cited by Boess & Kanis, 2008).

Research Question

How can personality attributes, congruent with those of the intended user, be intentionally and successfully assigned to a wireless speaker design to encourage 'approach' behaviour?

Methodology & Frameworks

Design Methodology

In the book *Thinking Objects,* Parsons (2009) defined a design methodology as an "organisational structure within which creative acts occur" (p. 158). Parsons suggests that a design methodology is a means of visualising the process, making the relevant connections, and determining the order in which to carry out the design process where a degree of rationality is used to help avoid getting lost in the complexity of the project.

This research project involved a high degree of complexity in constructing a tangible object (wireless speaker) based on intangible concepts (product personality assignment). A combination of hermeneutics and empiricism was used to ensure the characteristics of the target audience were addressed in the product.

An action research approach utilising human-centered and artisan design frameworks formed the basis of the project methodology. Qualitative and quantitative methods were used to carry out research both 'for design', and 'by design'.

Overarching

Action Research

Frameworks

— Human-centred Design

— Artisan

Mixed Methods Research

— Qualitative Research

— Quantitative Research

Methods For Design

— Literature Review

— Case Study

— Design Brief

Methods By Design

— Sketching
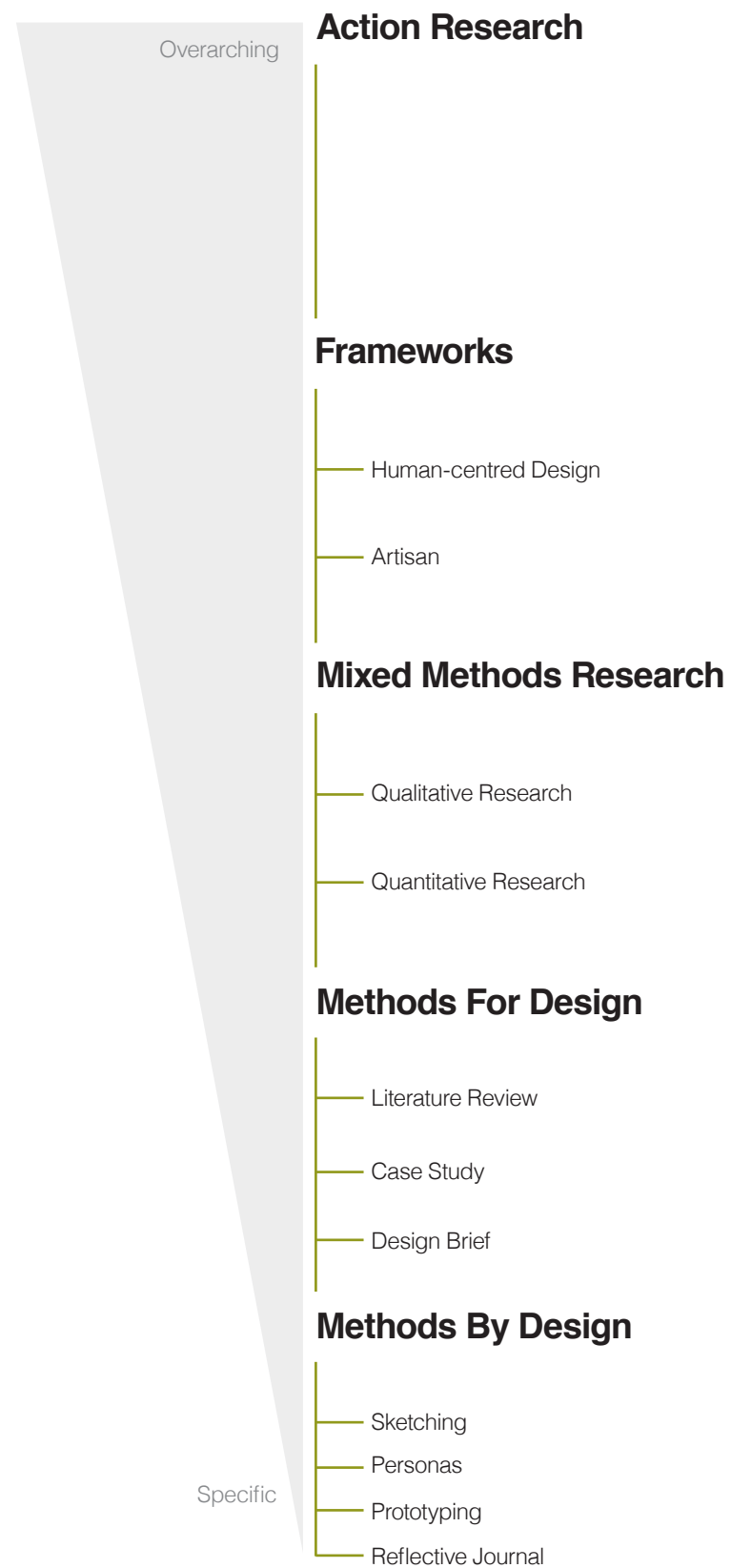— Personas
— Prototyping

Specific

— Reflective Journal

Figure 7. Maunsell-Wybrants, H. (2015). Design methodology image

Action Research

Action research is an experiential approach to research using a cyclical process that develops as knowledge emerges. It is guided by the philosophy that "a piece of research should be followed by some form of action" (Kumar, 2005, p. 159). Action research involves a variety of research and design methods both 'for design' (literature review, case study, and design brief) and 'by design' (personas, prototyping, and reflective journal). Each cycle/rotation of the action research process involves a variation on observation, reflection, planning, and action (O'leary, 2004). Action research is supported by the human-centred design framework which utilises the iterations focused on the user through an action based process.
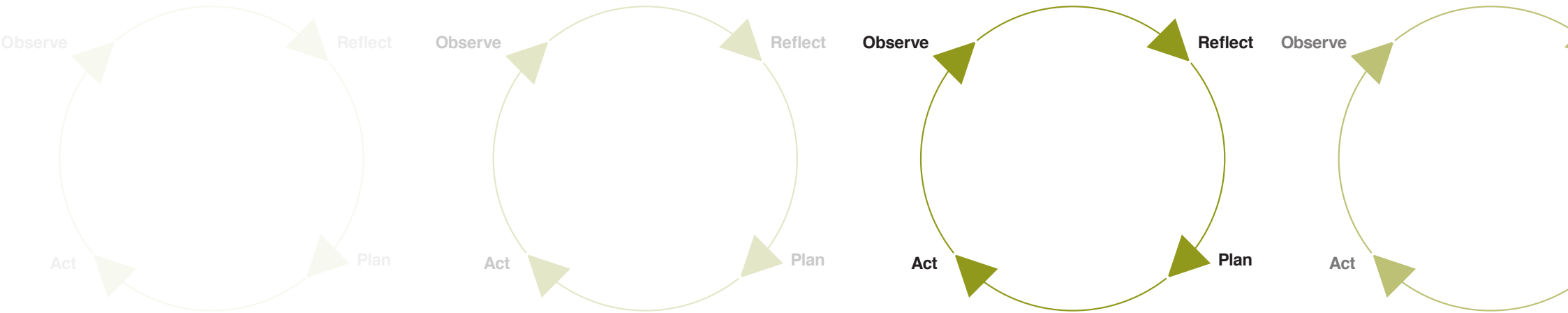
Figure 8. Maunsell-Wybrants, H. (2015). Action research iterative process image

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Frameworks

Human-centred design (HCD)

HCD is a framework based on action and iteration. Many design research methods are involved in each of iteration which results in a pattern of divergence and convergence. HCD encourages designers to look broadly (diverge) and refine (converge) through connecting ideas in each phase to maximise the chance of success (Design Council, 2015). The research project does this by looking at the big ideas, for example methods of embodiment in design, and then converging down to a specific concept such as embodiment through association.

HCD is built on empathy. The ability to step into the target audience's shoes to view the situation from their perspective is important for successfully understanding all that the problem entails (IDEO, 2015). By defining the target market using personas, this study relied heavily on the ability to empathise with the user by anticipating how each design decision will be interpreted.

A main focus of HCD is on prototyping and gaining feedback. Results from prototyping are then fed back into the iterative process making reflections a critical process in developing a solution to the design problem being solved. Reflections in response to design iterations were included throughout the project document.
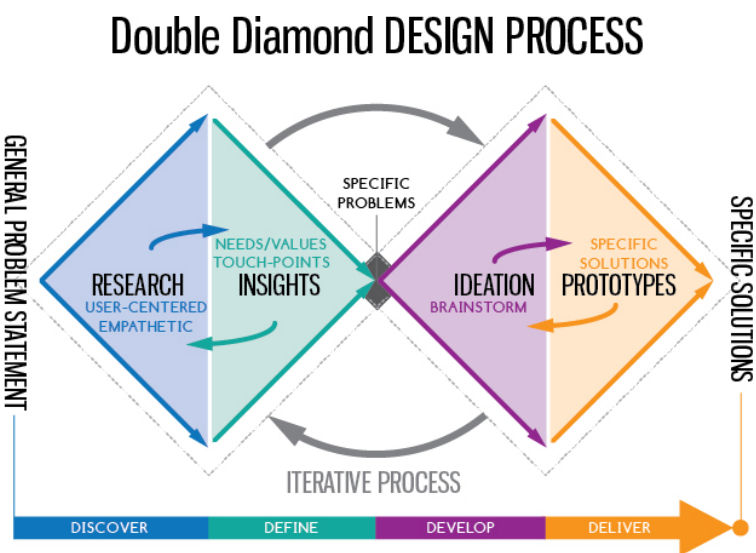

Figure 9. Chu, K. (2014). *Double Diamond Design Process* [Digital visualisation]. Retrieved from http://kaishinchu.com/

Artisan

The Merriam-Webster online dictionary defines an artisan as "a person who is skilled in making things by hand" (2015). UNESCO (2007) states "the nature of artisanal products derive from their distinctive features which can be utilitarian, aesthetic, artistic, creative, culturally attached, decorative, functional, traditional, religiously and socially symbolic and significant".

New Zealand has a strong artisanal heritage with visual connections to Scandinavian design which is evident in New Zealand furniture and homeware design. A lot of timber is used to create simple, clean, geometric forms. This is evident in the work of New Zealand design company *Douglas and Bec.*

The artisan framework explains and substantiates the design decisions made throughout the project by giving context to the material selections, product forms, and hand-crafted construction methods used.

Mixed Methods Research

Qualitative Research

Qualitative research is a method of enquiry originally employed in the social sciences, anthropology and psychology. It has become a common methodology used in art and design as it has the ability to be less specific than quantitative research and "does not consist of the same structural depth" (Kumar, 2005, p. 132) as quantitative research methods. The qualitative methods for this research project were chosen as they were able to provide insight when the information collected could not be measured or offer any statistical validation (Kumar, 2005; Gillham, 2000; O'Leary, 2004) such as when dealing with perception and behaviour.

This project focused on the cognitive processing of product semantics therefore a qualitative research methodology was utilised.

Quantitative Research

Quantitative research lends its focus to the facts and statistics within a research project meaning the research is more data-led, systematic and logical (Kumar, 2005; Gillham, 2000).

Quantitative research methods apply to the technical parameters of this research project, and the implementation of an existing product analysis.

Research Methods for Design

Literature review

The literature review was an effective way to discover the project's position in the world of product semantics and to contextualise the research problem within the area of product personality.

The literature review revealed a lack of evidence about how product attributes can be designed and arranged to communicate specific personalities. This study contributes to this particular aspect of design knowledge.

Case Study

A product case study is typically an in-depth evaluation or review of a particular object or product in a specific context to gain a holistic understanding (Kumar, 2005). The qualitative evidence revealed in the Roller Radio case study offered an insight into how product semantics can be designed to connect with a target market (human-centred design).

The product case study contextualised the research project and substantiated the value of product semantic design.

Design Brief

A design brief defines the parameters of a design project in terms of end user specifications and overall requirements.

The design brief for this research project was used to test ideas, concepts and theories. It has been referred to throughout the document in annotations and reflections to evaluate the success of design explorations.

Research Methods by Design

Sketching

Sketching is a design method that utilises the most basic of tools (pen and paper) to visually define, evaluate, and store ideas for later discussion, sharing or development (Milton & Rodgers, 2013).

Sketching in the context of this research project was used to evaluate how intangible concepts could be made tactile, for example the Gestalt law of totality expressed in a speaker box. Sketching was also fundamental in the initial development of ideas and visualising the application of the ideas to the wireless speaker.

Persona

A persona is an archetype based on early research facts and observations of real life users that expresses characteristics (Milton & Rodgers, 2013) creating a realistic and reliable representation of the intended target market (U.S. Department of Health, 2015). It is important to limit the number of personas to the maximum required to generate relevant critical information.

This research project utilised personas to assist with developing the design brief. For this project three basic personas were generated to express the major needs of the most important users group.

Prototyping

The role of the prototype is to quickly and inexpensively express, visually communicate, and test concepts and ideas for validity against design specifications outlined in the design brief.

The research methods utilised in this project included mock-ups, paper prototyping, and rapid prototyping (analogue methods) and Photoshop (digital methods).

Mock-ups for this research project focused on testing functionality, defining technical parameters, and exploring construction techniques and design details. They were predominantly made of medium density fiberboard (MDF) or inexpensive macrocarpa to a 1:1 scale. Paper prototyping, however, was used to test the visual design elements - proportion, form, colour, and composition, at smaller scales. There was no set order or hierarchy to the prototyping methods used for the project due to the iterative nature of action research. Instead, the prototyping methods were utilised when they best suited the area of investigation.

Reflective Journal

A reflective journal involves keeping a log of your important thoughts, conversations, and reflections whenever you have them (Kumar, 2005; Gillham, 2000) using sketches, text, and photographs.

The reflective journal was used in combination with other design and research methods, such as material testing (Kumar, 2005), that started on the first day of the project. The journal mostly included sketches, calculations (for the bass-reflex port), and anecdotal evidence including observations of reactions to the wireless speaker prototypes (Gillham, 2000).

Other Methods

The study also used mind-mapping, material testing and existing product analysis.

The Process Explained

Making the Process Clear

Action research carried out through many iterations is a messy process that can be difficult to communicate through a written document. The approach taken here divided the design process into four chapters based on the four design phases associated with the double-diamond framework - discover, define, develop, and deliver.

The discover chapter is where research is introduced. Exploration and initial testing that occurs in the project is described in this chapter alongside early design methods 'by' design such as a mind-map and the development of personas.

The define chapter is where data generation methods used to analyse existing products is explained. The definition phase establishes the technical boundaries of the research project.
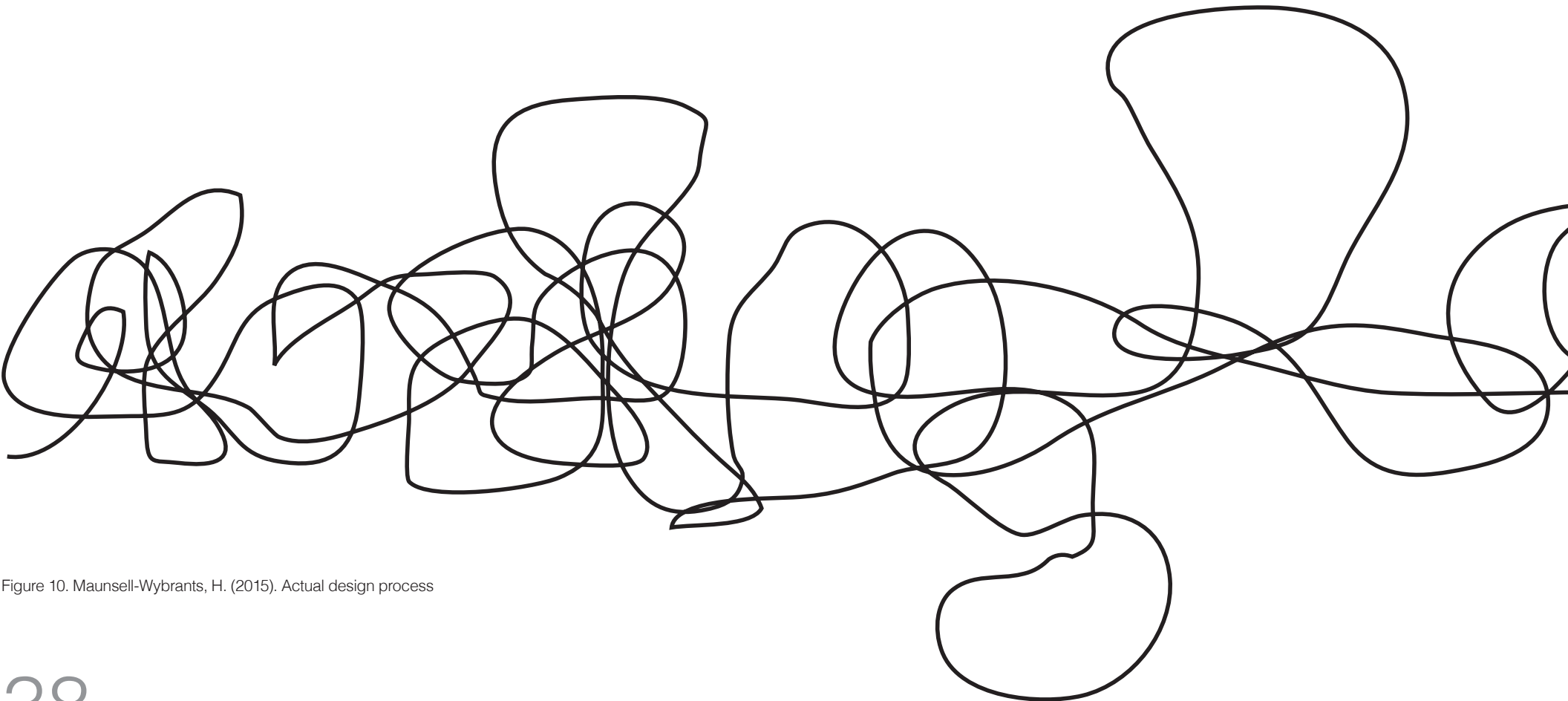
Figure 10. Maunsell-Wybrants, H. (2015). Actual design process

The develop chapter presents the practical application of the research and technical information that is gathered throughout the project. It is in the develop phase chapter that the iterations of design making are explained as each iterations works towards fulfilling the requirements of the brief.

The deliver chapter concludes the project with relections of the projects success, discussions, and areas for further enquiry.
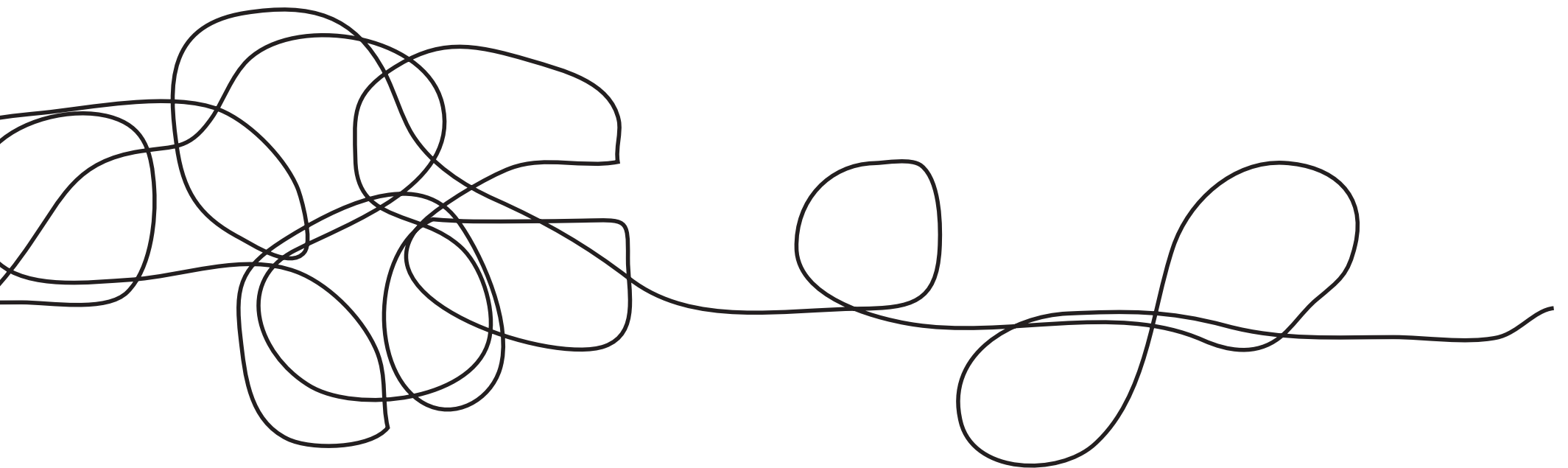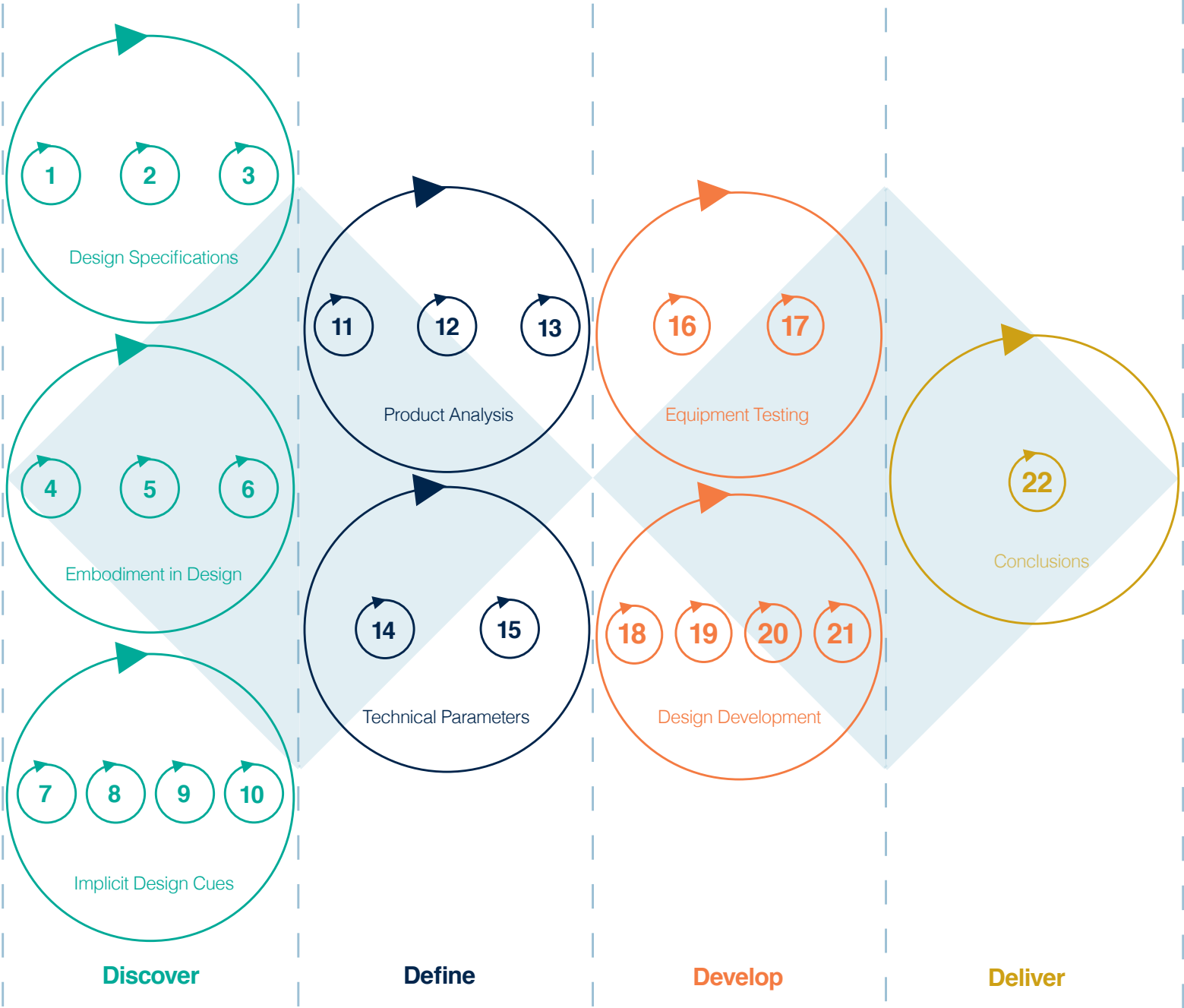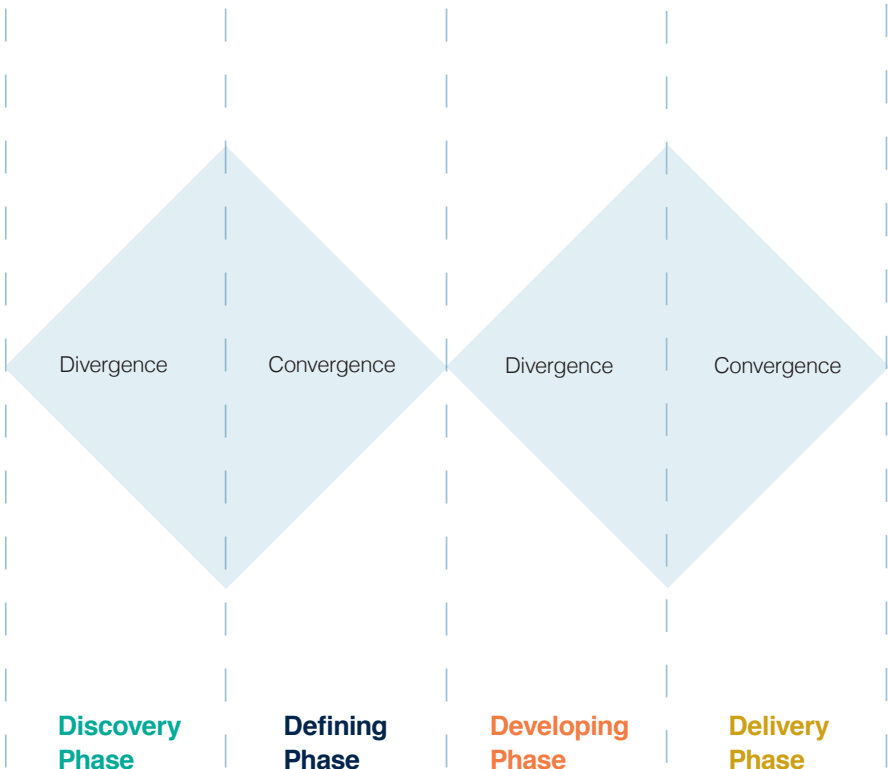
Following the Process

Figure 11. Maunsell-Wybrants, H. (2015). Project map showing design cycles

Divergence   Convergence   Divergence   Convergence

Discovery Phase   **Defining Phase**   **Developing Phase**   **Delivery Phase**

Double-diamond framework

The double-diamond framework is a linear representation of the divergent/convergent design process from start to finish within which numerous iterative cycles are carried out. The double-diamond framework also provides a visual reference to help with navigating the document by colour coding each phase to the corrosponding cycles that were carried out.

Embodiment in Design
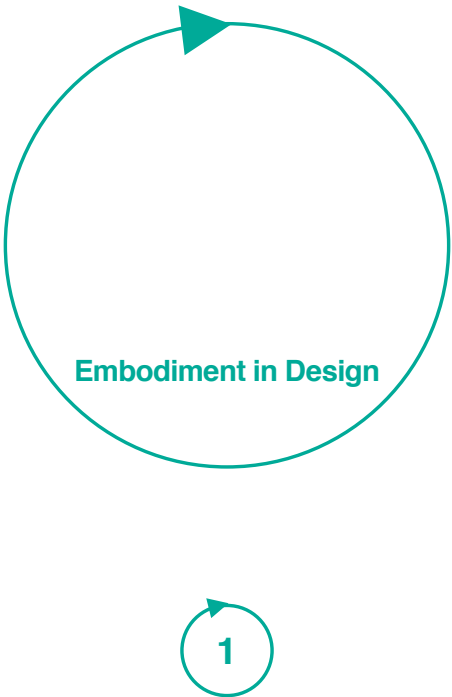
Area of exploration

The investigation of a broad concept results in a large exploration cycle that is built on a number of smaller, more specific iterative cycles. Each large cycle represents an action research approach to design and consists of the plan. act, observe and reflect stages that define action research.

1

Design iteration cycle number

This represents a cycle of specific idea exploration through research, action or testing that concludes with reflection notes highlighting the outcome and relevance of the findings. A smaller iteration may not necessarily utilise all four stages of the action research cycle. Instead a more practical approach may be taken using only the steps necessary to generate the information required to proceed.

Figure 12. Maunsell-Wybrants, H. (2015). Project map key
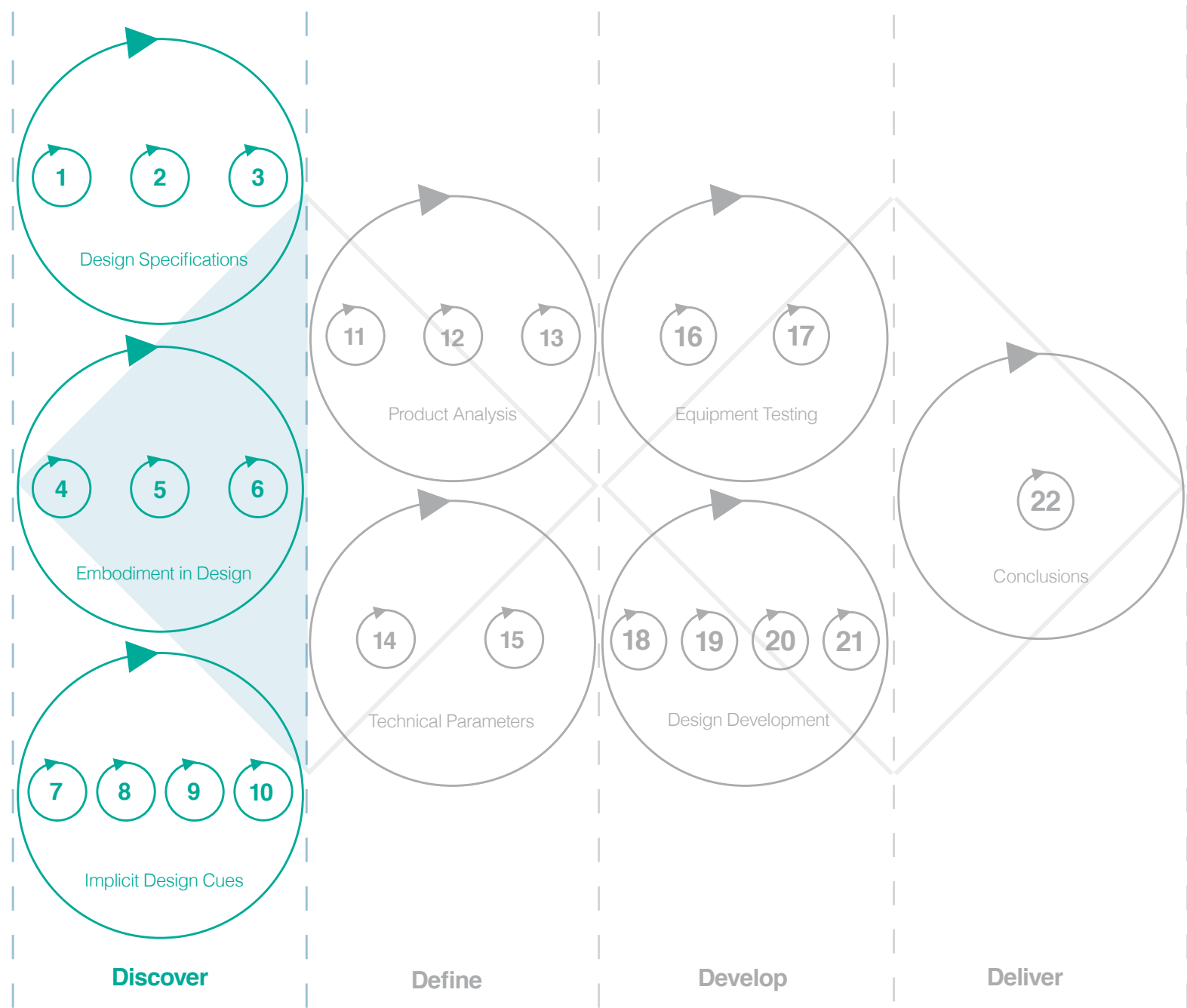
The Design Process Carried Out

Discover Phase

Figure 13. Maunsell-Wybrants, H. (2015). Project map highlighting 'discover' phase

Discover

1 Design brief

Establishing the Design Specifications

2 Personas

3 Mind-map

4 Anthropomorphism

5 Gestalt psychology

Exploring Methods of Embidiment in Design

6 Association

7 Shapes and their meanings

8 Proportion

Investigating Implicit Design Cues

9 Colour theory

10 The personality of lines

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Design Brief

Purpose

To design a minimalistic wireless speaker that communicates the personality traits of the target market personas as defined by Patrick Jordan's Product Personality Assignment test:

- Kind
- Honest
- Moderate
- Simple
- Stable

The emphasis of the wireless speaker should be on aesthetic design over sound quality.

Performance

The speaker unit should be able to fill a small-medium sized room with sound of a good quality for the average person with an untrained ear (non-audiophile).

The research project does not focus on the audio aspect of the speaker unit beyond what would be considered a functional, normal performance from a speaker unit of small to medium size.

Features

Components - The electrical components will consist of readily available parts such as speaker drivers, amplifier, wireless receiver, and power supply. These components will determine many of the design and technical parameters, for example: speaker cabinet size, materials, and form.

Connectivity - The user must be able to play audio through the speaker via wireless or an auxiliary input 3.5mm jack in order to support non wireless devices. The wireless connection should extend to a minimum distance of 10m line of sight.

Control - A power on/off switch and volume control only.

Perceived quality

The quality of the finished product must be to a very high standard that will only come from a handmade process. The electronic componentry will be provided from a supplier and must perform to a satisfactory standard.

Size

The speaker unit is to be a small, one piece unit (all componentry and drivers housed in one cabinet) designed to suitably sit on a side table, desk or shelf. There is to be no emphasis or concern for portability as the unit will be run from a mains powered 230v AC -12v DC powerpack.

Product requirements outlined by Attribute Analysis:

- Horizontal
- Square / Box shaped
- Not Cylindrical
- Not Tapered
- Not Curved - lines or surfaces
- Not Dominant

2

Persona

Critical information generated using personas was selected to develop the design brief. The personas summary defines the demographic (age, gender, and class) and psychographic (needs, tastes, values, and expectations) information as shown below:

A summary of the personas

- Wide age bracket of 28 - 68 years old
- To appeal to both male and female
- Aimed at the professional
- Simple, elegant, honest, subtle, refined, clean aesthetic - German design precision, Scandinavian materials and form
- The wireless speaker is to portray quality, attention to detail, precision, and functionality
- Produce a low - medium loudness volume
- Physically small - medium sized
- The wireless speaker must communicate the personality attributes kind, honest, simple, moderate, and stable according to Jordan's Product Personality Assignment test.

Mark Dolan

Age: 42

Gender: Male

Occupation: Architect - 14 years experience (6 years in own practice)

Education: Master of Architecture (MArch)

Ethnicity: New Zealand European

Relationship status: Married, father of 2

Reason for buying a speaker: Buying for the office as a functional design object providing background music throughout the work day

Technological ability: Moderately computer literate, good with using his smartphone

Social life: Busy family life, doesn't work weekends, often out with wife and friends

Figure 14. Hope, J. (2013). *[Untitled portrait of Russ]*. Retrieved from http://www.johnhopephotography.com/nikki-russ-lincolnshire-wedding/. Reprinted with permission.

Samantha Arnott

Age: 28

Gender: Female

Occupation: Graphic Designer (freelance)

Education: Bachelor of Fine Arts (BFA)

Ethnicity: New Zealand Citizen (British Parents)

Relationship status: Long term relationship, not married, no children

Reason for buying a speaker: To use in her studio/office attached to her home

Technological ability: Very competent with Apple computers, iPad, and iPhone

Social life: Busy social life out with friends on weekends

Figure 15. Dornan-Smith, A. (2014). Self-portrait in studio. Retrieved from https://www.flickr.com/photos/anniepancake/15138616439/ Reprinted with permission.

Philipp Armbruster

Age: 68

Gender: Male

Occupation: Business owner - Tailor

Education: No formal education, Tailor apprenticeship

Ethnicity: New Zealand Resident (German)

Relationship status: Married

Reason for buying a speaker: To play music at home while cooking

Technological ability: Not good with technology, owns a tablet and iMac, Wife is much better

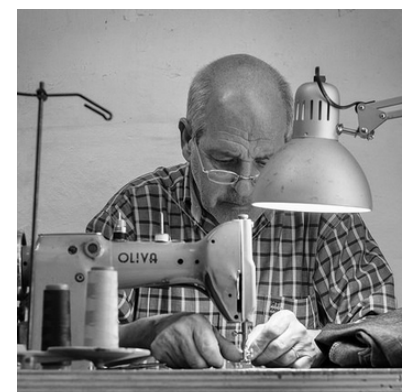Social life: Leads a quiet life, takes wife out a lot

Figure 16. Lopes, R. (2014). Tailor 2. Retrieved from https://www.flickr.com/photos/125138668@N05/14436949670/in/photolist-nZK9am Reprinted with permission.
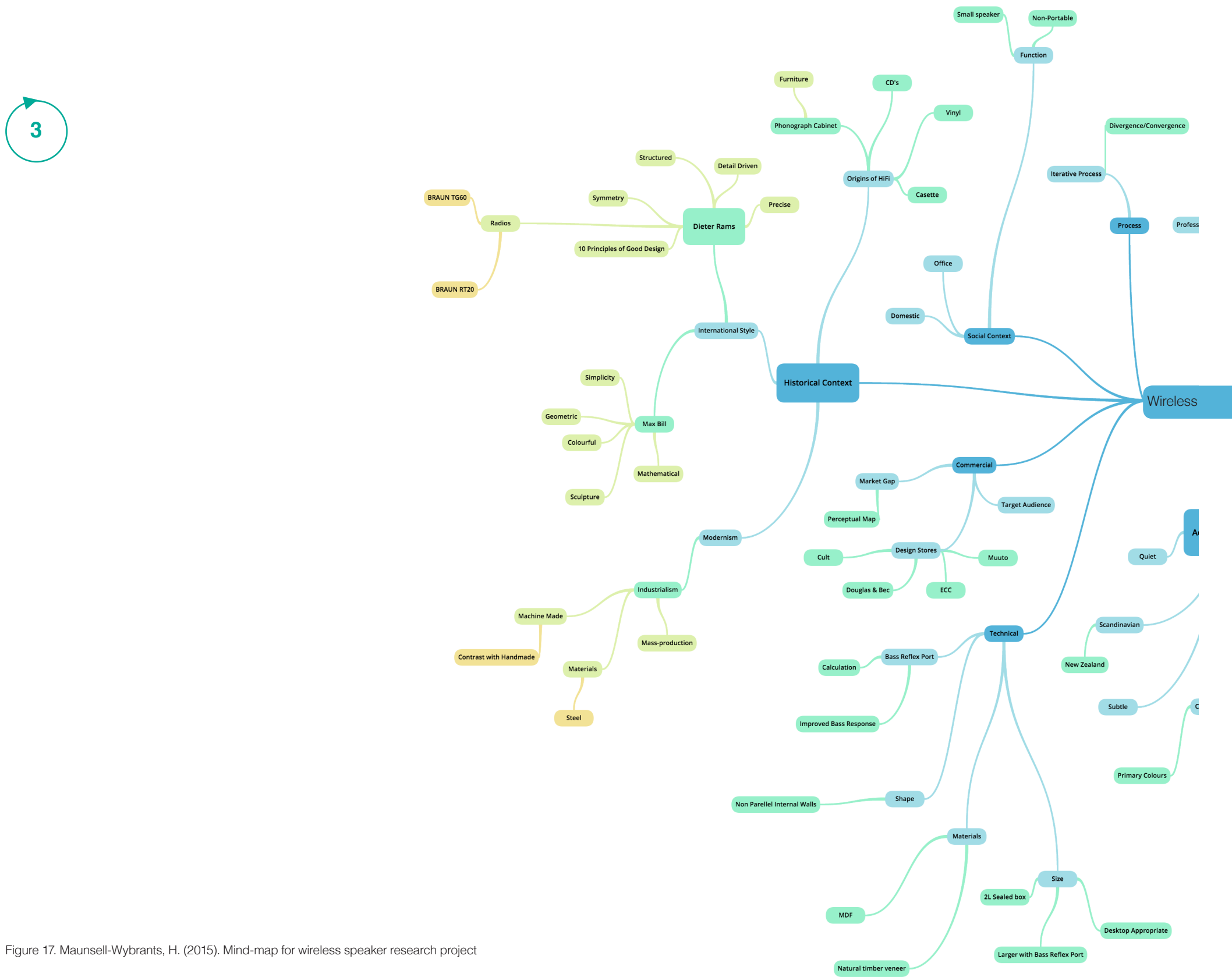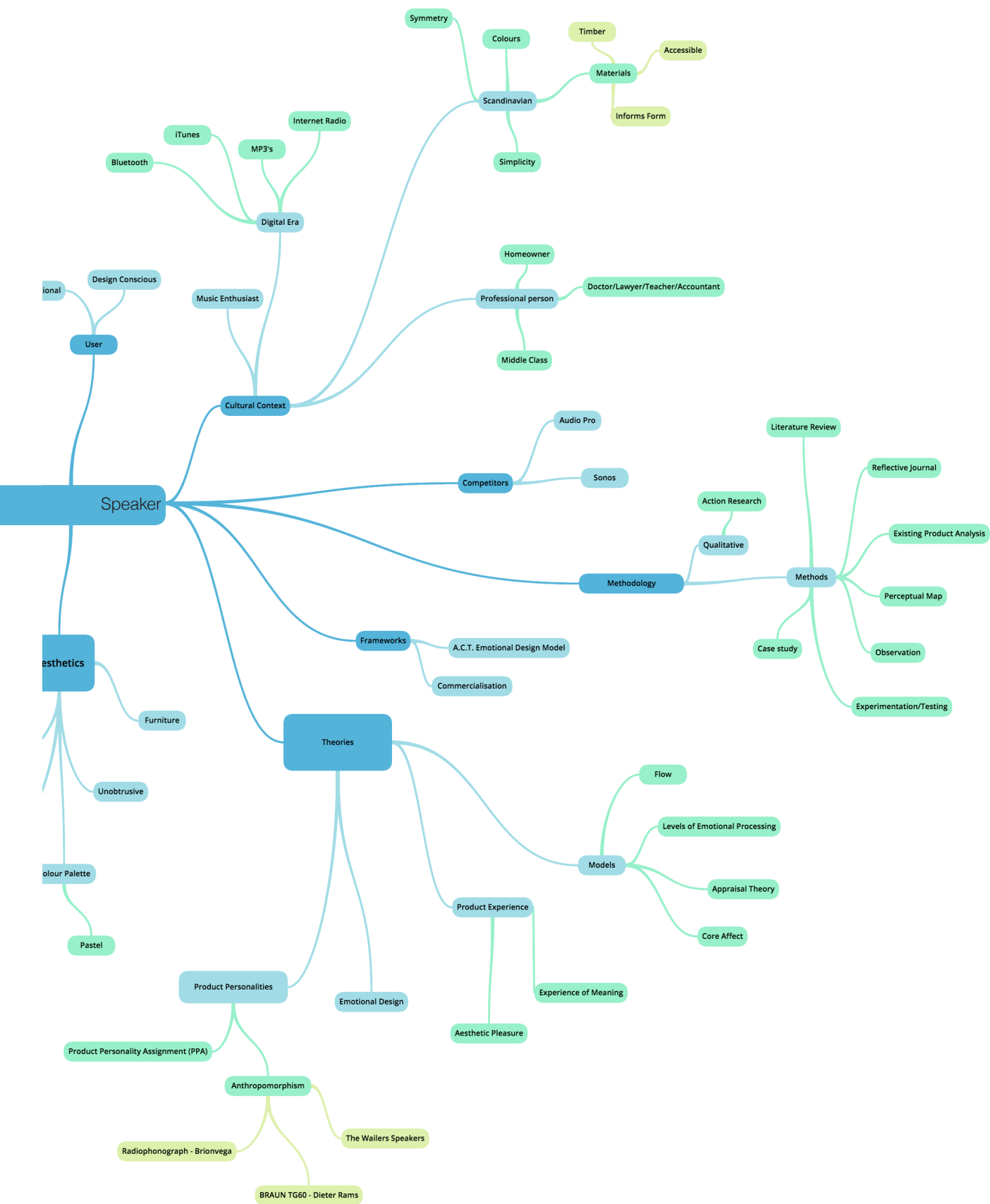
Figure 17. Maunsell-Wybrants, H. (2015). Mind-map for wireless speaker research project

Generating a mind-map early into the project visually organised thoughts, ideas, and relationships between project elements. It helped to contextualise the research project and establish a hierarchy between the overarching and specific concepts within the area of investigation.

By this stage of the project I realised that my understanding on how to design products for personality using product semantics was limited. To resolve this, I explored research into methods of *embodiment in design* and the psychology behind *implicit design cues.*

Exploration of Embodiment in Design

Embodiment design is a term given to a design practice that embeds specific meaning into a product through physical attributes (Van Rompay & Ludden, 2015). A user then generates perceptions and associations through visual analysis of the product's characteristics.

This project explored three ways meaning can be embedded into a product, especially how personality can be intentionally embedded into a product expressed through form. The methodologies included:

Anthropomorphism
Gestalt Psychology
Association

Anthropomorphism

Anthropomorphism can be defined as the application of human characteristics to non-human objects (Merriam-Webster, 2015; DiSalvo & Gemperle, 2003).

An example of anthropomorphism can be seen in the posture of the Grasshoppa lamp (Figure 18) or more literally in the faces perceived in the stapler (Figure 19), binoculars (Figure 20), heater controls (Figure 21), or the skull speakers (Figure 22).

The anthropomorphic explorations carried out for the wireless speaker focus on facial recognition and posture.

Figure 18. Grossman, G. (1947). *Grässhoppa floor lamp.* Retrieved from http://www.gubi.dk/en/products/lighting/ floor-lamps/graeshoppa/gm-1/grossman-graeshoppa-floor-lamp_005-01104/

Figure 19. bluebin. (2006). *Stapler.* Retrieved from https://www.flickr.com/photos/findingfaces/289481322/

Figure 20. Kamalakanthan, P. (2010). *[Smiling binoculars]*. Retrieved from http://inanimateobjectswithfaces.tumblr.com/day/2010/05/20/
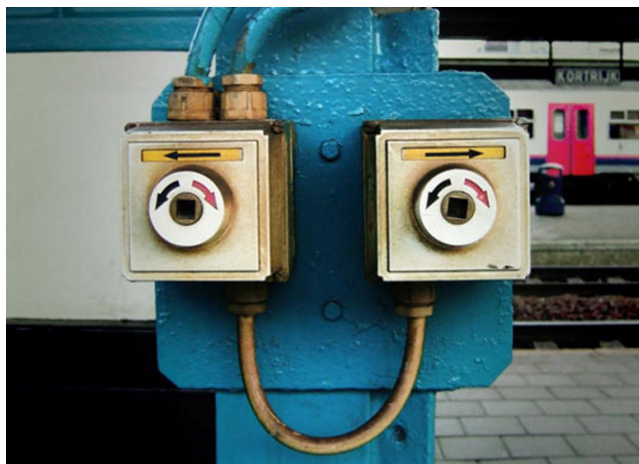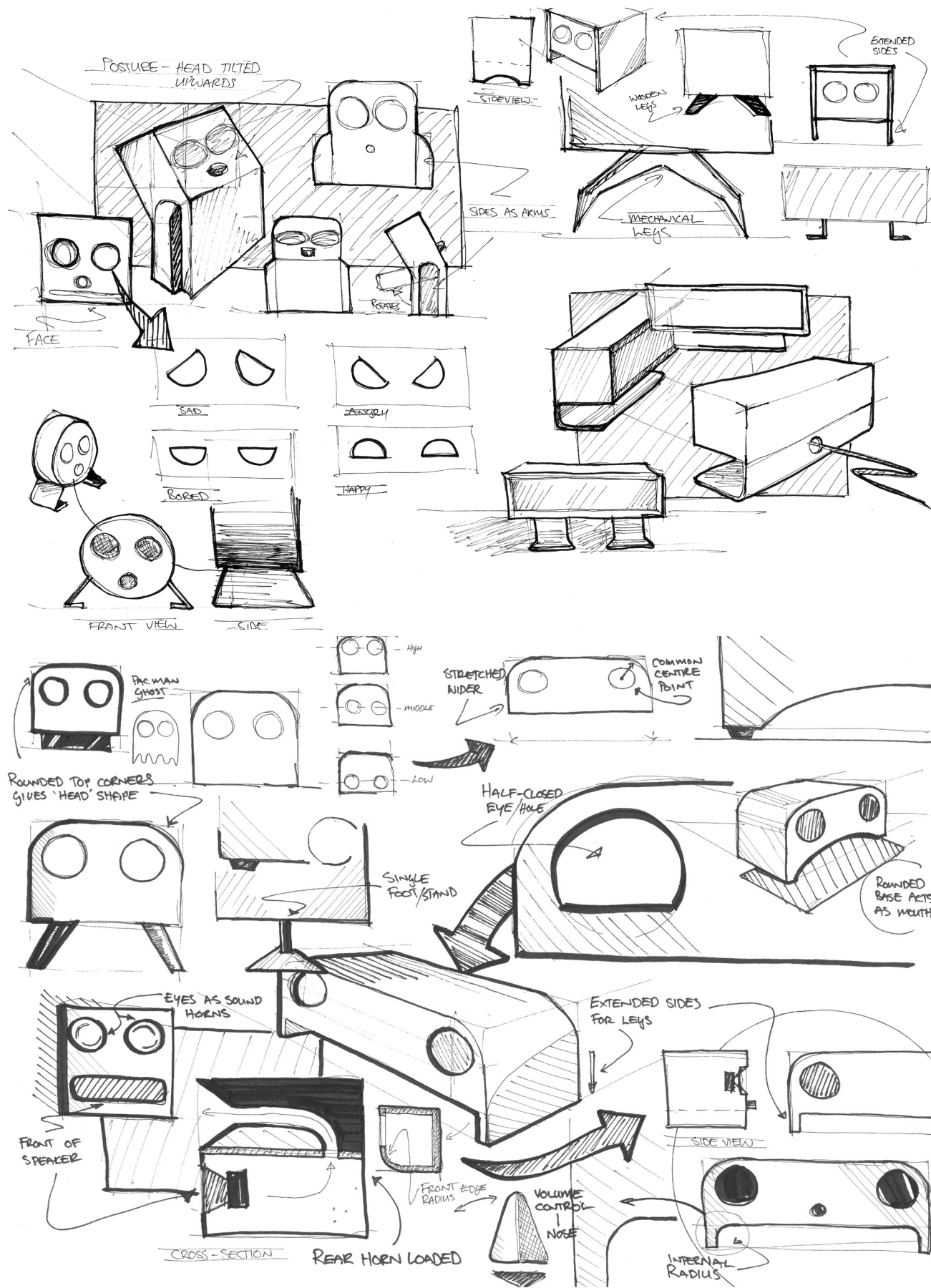

Figure 21. [Untitled image of heater controls]. (n.d.). Retrieved from http://www.nydailynews.com/life-style/hidden-faces-everyday-objects-gallery-1.1248057?pmSlide=1.1248049

Figure 22. Kuntzel + Deygas. (2011). *Minuskull.* Retrieved from http://randommization.com/2011/12/06/minuskull-speakers-have-a-simple-wooden-skull-look/

These sketches explore the idea of applying legs or facial features such as eyes and/or a mouth to the speaker, or giving it a body that expresses human-like posture.

Figure 23. Maunsell-Wybrants, H. (2015). Sketches exploring anthropomorphic speaker designs

Prototype

Prototypes were constructed to test the concept developed through sketching.

Figure 24. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker prototype without stand

Figure 25. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker prototype with stand
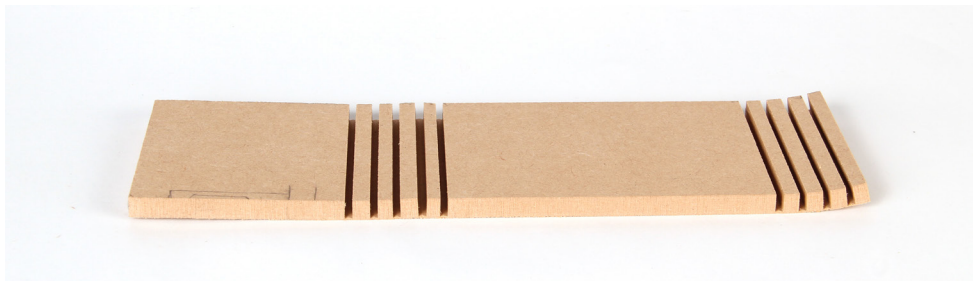
Figure 26. Maunsell-Wybrants, H. (2015). Material testing: *Kerfing cut experiments*

Experimenting with the kerfing method to achieve the large radius bends at 1:1 scale.
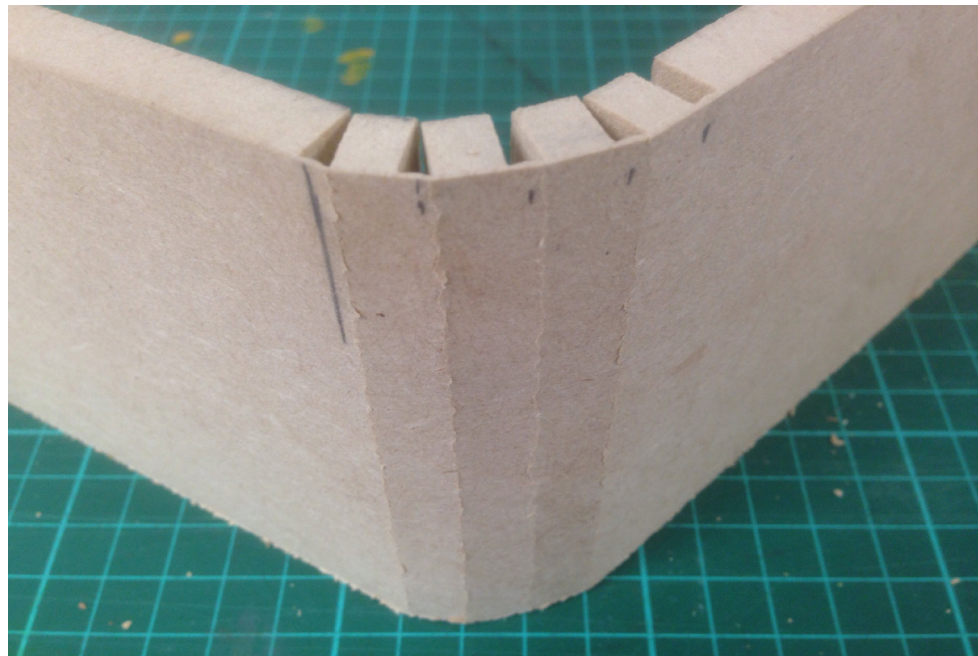

Figure 27. Maunsell-Wybrants, H. (2015). Material testing: *Kerfing 12mm MDF*

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Prototype

A quick and rough mock-up was used to test the logistics of constructing a box using kerfed corners.

Figure 28. Maunsell-Wybrants, H. (2015). Using kerfing technique to construct a box
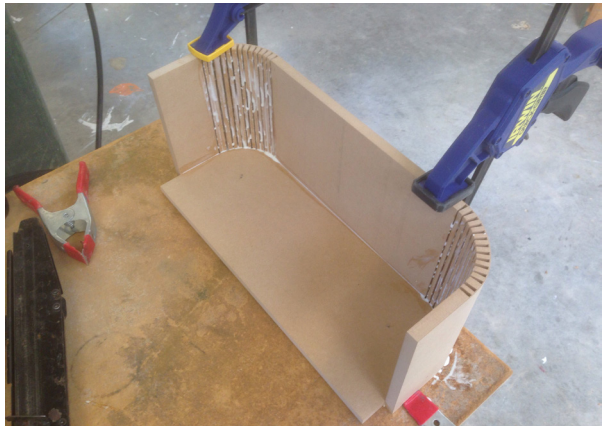
Figure 29. Maunsell-Wybrants, H. (2015). Gluing anthropomorphic speaker prototype back, top, and sides with kerfed corners together
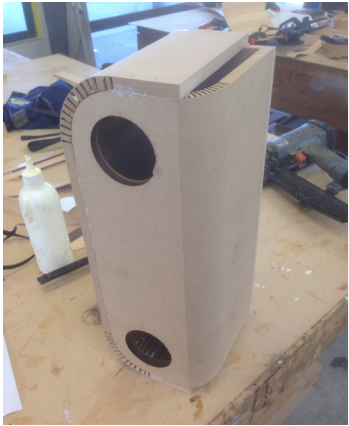

Figure 30. Maunsell-Wybrants, H. (2015). Gluing anthropomorphic speaker prototype front and base to top, back, and sides

Figure 31. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker prototype showing short sides
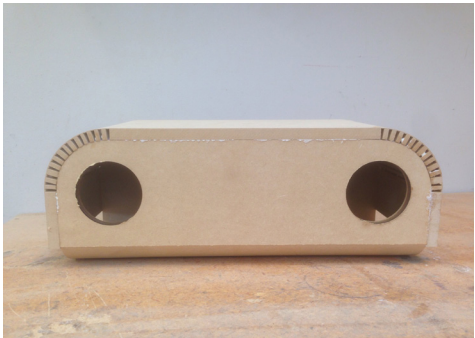
Figure 32. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker showing cracked front

Figure 33. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with square front edge: *Perspective angle*

Figure 34. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with square front edge: *Front view*

Construction of a 1:1 scale mock-up illustrated that kerfing, as a method of creating an anthropomorphic form with 'kind' edges had limited success.
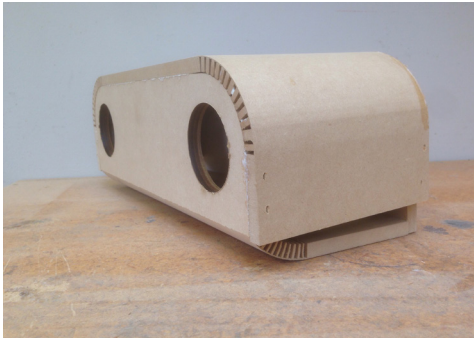
59

Results

The prototype expresses friendliness and surprise when the kerfing detail interpreted as eyebrows.

Figure 35. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with stand: *Front view*

The posture generated by the angle of the stand gives the design inferences of vulnerability. This helped to establish the speaker as an object that is submissive to the owner like an obedient pet.

Figure 36. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with stand: *Side view*

Adding a cover to the front of the speaker and replacing the stand with round tube helps reduce the literal connection to a face and to feet. Harmony is created between the 'head' and the 'feet' through the consistent use of materials linking the components purposefully.
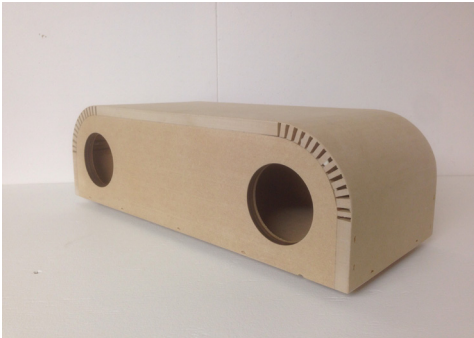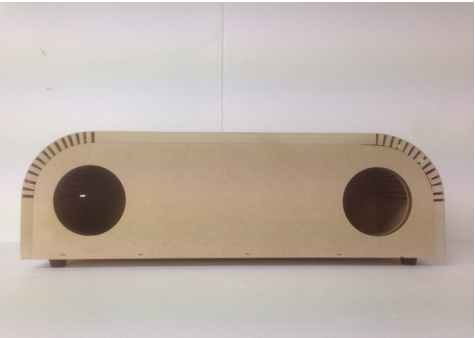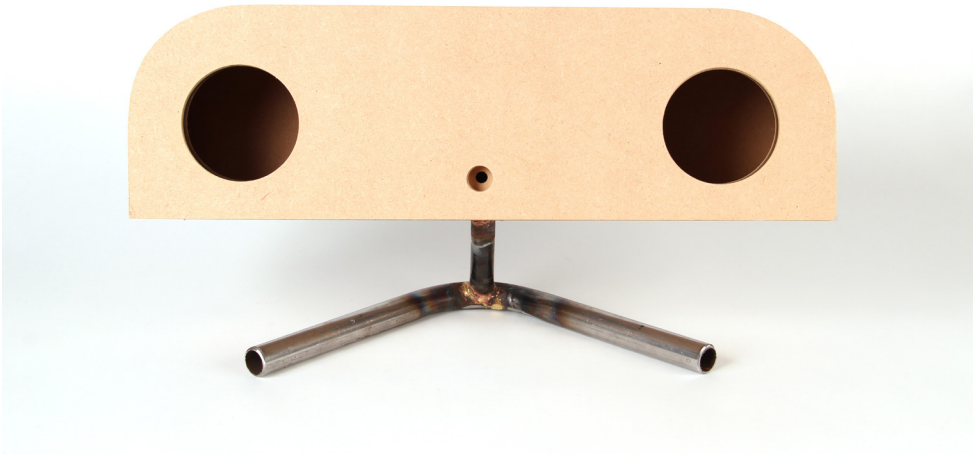

Figure 37. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with steel tube stand: *Front view*

Figure 38. Maunsell-Wybrants, H. (2015). Anthropomorphic speaker with steel tube stand: *Side view*

Reflections

- Anthropomorphism successfully embedded personality into the speaker in the form of a 'living object'.
- Designing a speaker to reference a living character using physical attributes like eyes and feet is very literal and in this instance appears child-like.
- Developing a speaker to look 'alive' where the viewer assumes it must have personality is relatively straightforward. But further investigation into how attributes can express *specific* personality through embodiment is required.

Gestalt Psychology

Gestalt psychology is the study of perception and organisation of visual data in one's mind (Tuck, 2010) in an attempt to achieve "objective concinnity" (Crilly et al, 2004, p. 12). Koffka summed Gestalt psychology up when he famously stated "The whole is different than the sum of its parts" (as cited in Tuck, 2010). An example of gestalt psychology that applies to this project can be seen in the dalmatian image (Figure 39) showing a dog sniffing the ground under a tree. Before any details within the picture are noticed, the image is taken in by the viewer as a whole to reveal the subject matter. This concept is known as the 'law of totality' (Tuck, 2010).

Gestalt psychology applies to the organisation of forms and elements that combine to make the wireless speaker. The law of totality illustrates how every component must work in harmony to successfully communicate the personality traits as defined by the personas.

Law of Totality

A product will be more successful at communicating a specific personality when all of the visual data is in agreement. A simple design will display its personality more easily as there are fewer elements for the viewer to make sense of.

If the speaker's elements are carelessly arranged without an appreciation for how they relate, the personality of the speaker will be lost.

Figure 39. [Untitled image of dog]. (n.d.). Retrieved from http://sixrevisions.com/web_design/gestalt-principles-applied-in-design/
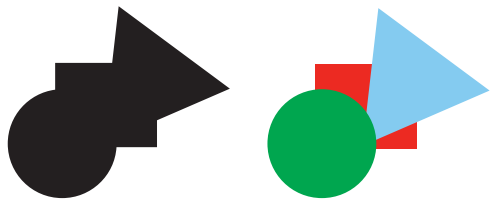
Law of Pragnanz - shapes are organised into their simplest and most understandable forms. The Pragnanz principle underpins most other gestalt laws.

Figure 40 illustrates five Gestalt laws that have been explored during the design of the wireless speaker. The laws are referenced throughout the design process in the annotations.

Law of Closure

Law of Symmetry and Order
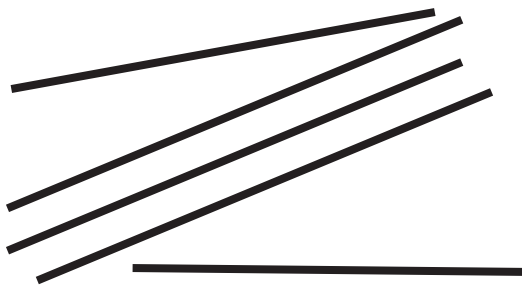
Law of Parallelism
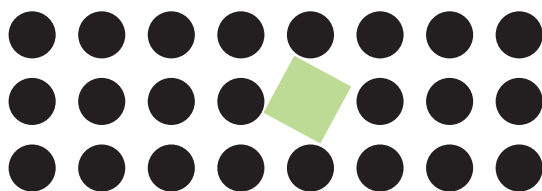
Law of Focal Point

Figure 40. Maunsell-Wybrants, H. (2015). Examples of gestalt principles

These sketches explored ways Gestalt psychology could
be applied to a wireless speaker.
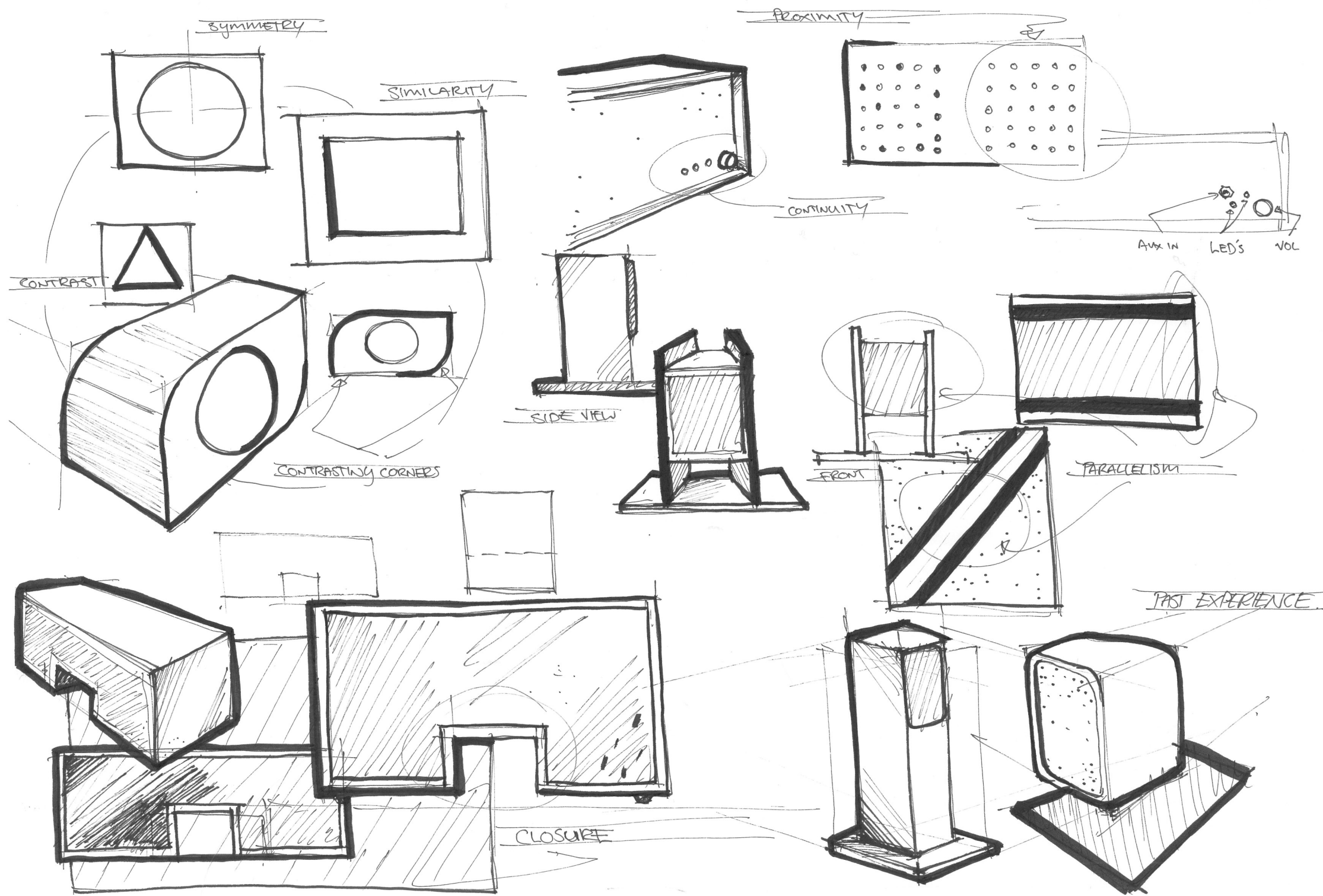
Figure 41. Maunsell-Wybrants, H. (2015). Sketches exploring gestalt theory through speaker design

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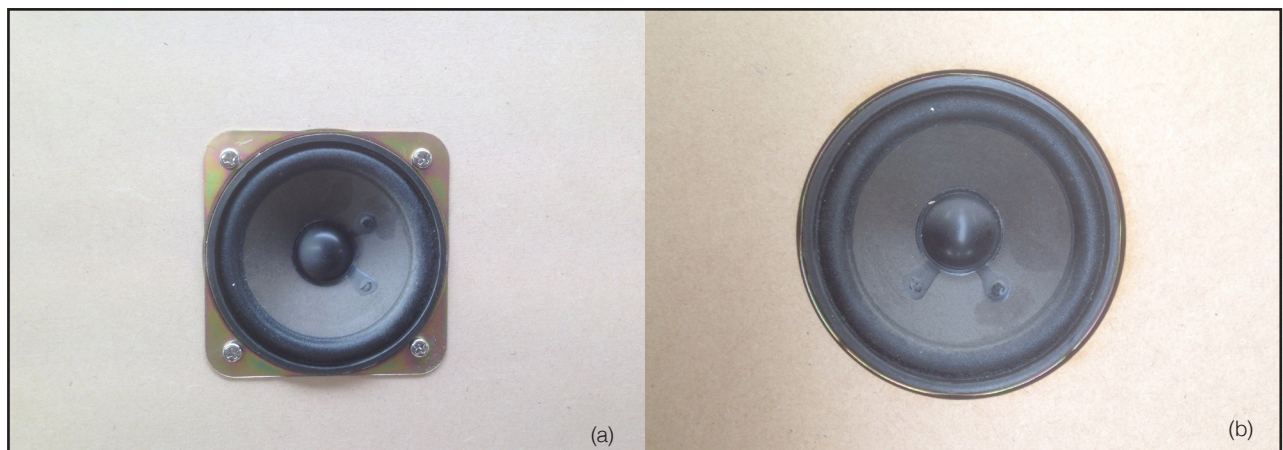
Figure 42. Maunsell-Wybrants, H. (2015). Driver mountings illustrating Gestalt principles

Figure 42 shows how driver mounting can illustrate the law of pragnanz.

Driver (a) appears far more complex than driver (b) because the contrasting shapes and materials generates more visual information to take in.

Figure 43. Maunsell-Wybrants, H. (2015). Model illustrating the gestalt law of closure and understandability

The model in Figure 43 explores the law of closure as an approach to embed meaning (simplicity and understandability) into an object. According to Gestalt theory (Bradley, 2014) the viewers mind completes the form in the most understandable way.

With this particular form that could be as either one large rectangle or broken down into several rectangles.

Reflections

- The Gestalt *law of totality* outlines how this project must be approached - as a collection of parts coming together to create a 'whole' with a consistant personality.
- An awareness of Gestalt psychology throughout the development process will help to ensure the final product is understandable and cohesive.
- Gestalt psychology was more useful to analyse design decisions during the testing phase than to generate new ideas during the concepting phase.
- Gestalt law knowledge strengthens the product analysis process by revealing product attribute relationships that might otherwise be missed.
- Further exploration into how products embody meaning and personality is required to understand how to approach a new design with the intention of embedding personality.

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Association

Association is a method used to embed meaning into objects to generate a connection with the viewer. Crilly et al (2004) have labelled these associations *visual references* and explain that comparisons can be made between the product and other entities or styles that help the viewer to better understand the product. They say "products that use design cues from other products, or exhibit a good degree of commonality with existing designs are often easy to comprehend" (2004, P. 12).

An example of association can be seen in the popularity of 'space-age' design that developed after the moon landing. The JVC Video Sphere (Figure 44) is an example of association used to connect with the target market.

Sketching was used to explore the use of implicit design cues generated through line, form and composition to associated with a mid-century, Scandinavian credenza.

Figure 44. JVC. (1973). *VideoSphere*. Retrieved from http://antiqueradio.org/jvc01.htm

Figure 45. Wilkins, V. (1964). *G-Plan Scandinavian Range Sideboard*. Retrieved from http://www.mrbigglesworthy.co.nz/index.php?a=gallery&c=2&p=2144

These sketches explored ways Gestalt psychology could be applied to a wireless speaker.

Reflections

- Association makes a new product easier to comprehend by embedding a user's pre-defined perception of an existing product into the new product.
- Associations are a good point of reference for starting a new design. They can help to accurately design for the target market by associating with a product already familiar to the intended user.
- There needs to be an understanding of the perceived meanings behind product aesthetics to adequately associate with the critical elements of an existing product like the credenza. Am I better to reference the body form or proportions? Should I appropriate the legs?
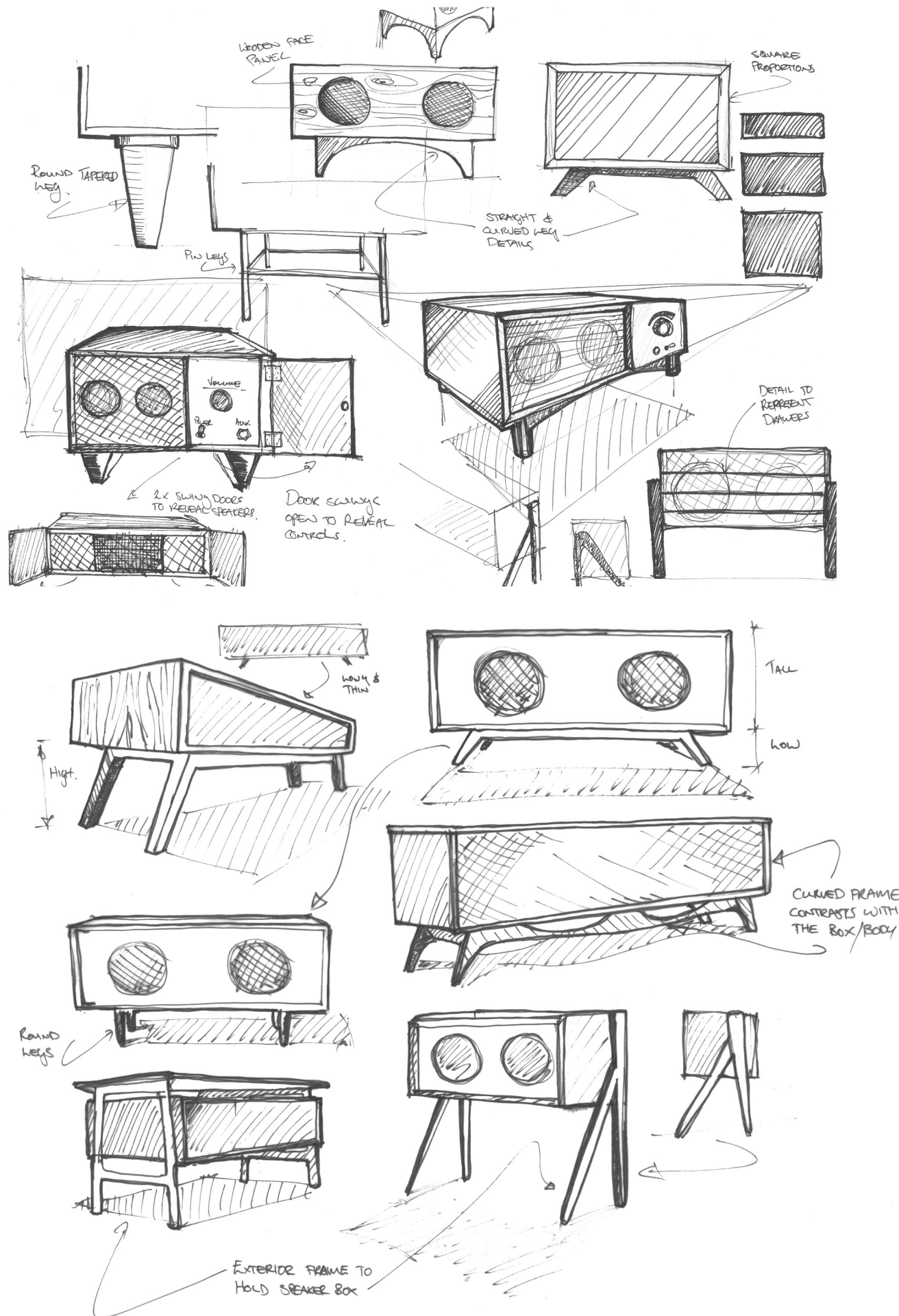
Figure 46. Maunsell-Wybrants, H. (2015). Sketches exploring embodiment through association

Implicit Design Cues

Implicit design cues are the details that communicate a specific personality trait without direct expression (Merriam-Webster, 2015). An example of an implicit design cue is the use of rounded corners on a shape/form to imply softness.

This research project explored how product personality is interpreted by the user through implicit design cues using visual design elements - specifically shape, proportion, colour, line, and texture.

Shapes and their Meanings

The meaning of shapes can change between cultures and contexts. For example, a red octagon in western cultures is commonly associated with 'stop' and stop signs (Cahill, 2013).

Cahill recognises shapes fall within one of three categories - Geometric, Organic, or Abstract. Of the three categories, geometric shapes are the easiest to recognise and understand. For this reason this research project was only concerned with geometric shapes.
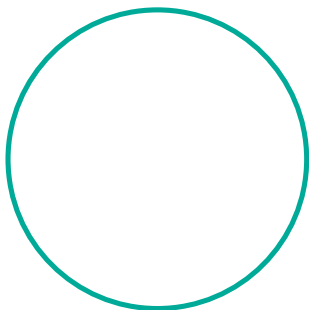
Circle - Protection, restricts, confines, unity, harmony, community, integrity, perfection, complete
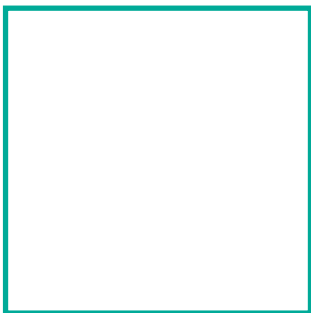
Square/Rectangle - Stability, familiar, trusted, order, formality, rationality, conformity, security, solidity, eveness, equality, peacefulness
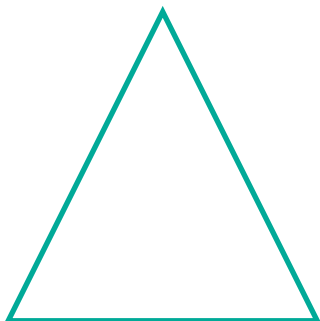
Triangle - Directs/points, stability (upright), unstable (upsidedown), progression, purpose, action, agression

Figure 47. Maunsell-Wybrants, H. (2015). Shapes and their meaning

Prototype

Two mock-up speaker prototypes were made using basic geometric shapes.
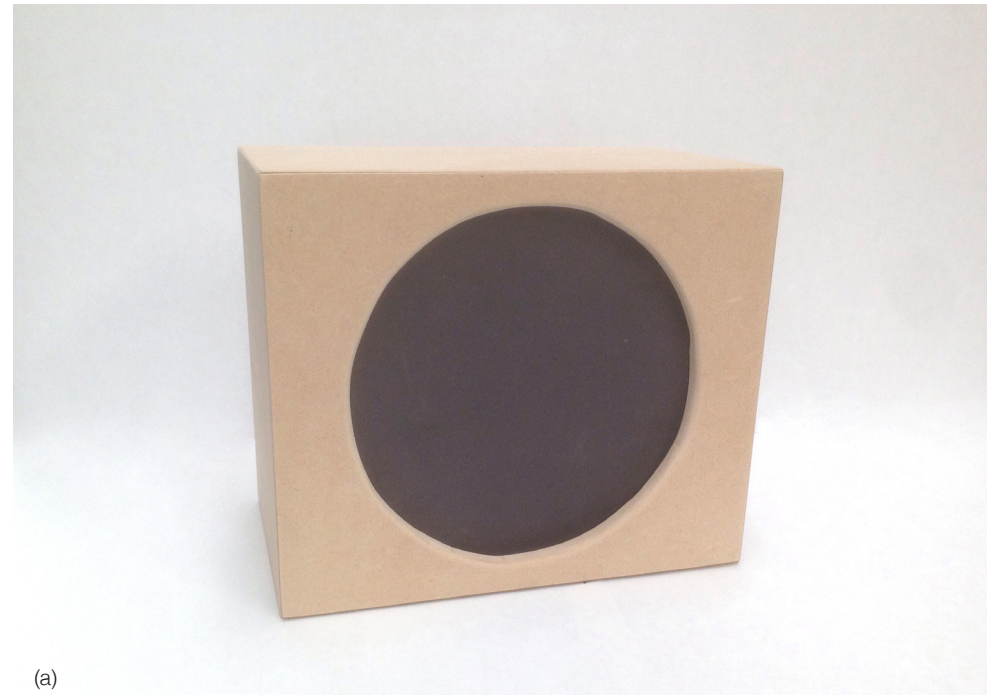
(a)

Figure 48. Maunsell-Wybrants, H. (2015). Square box with large circle cut-out
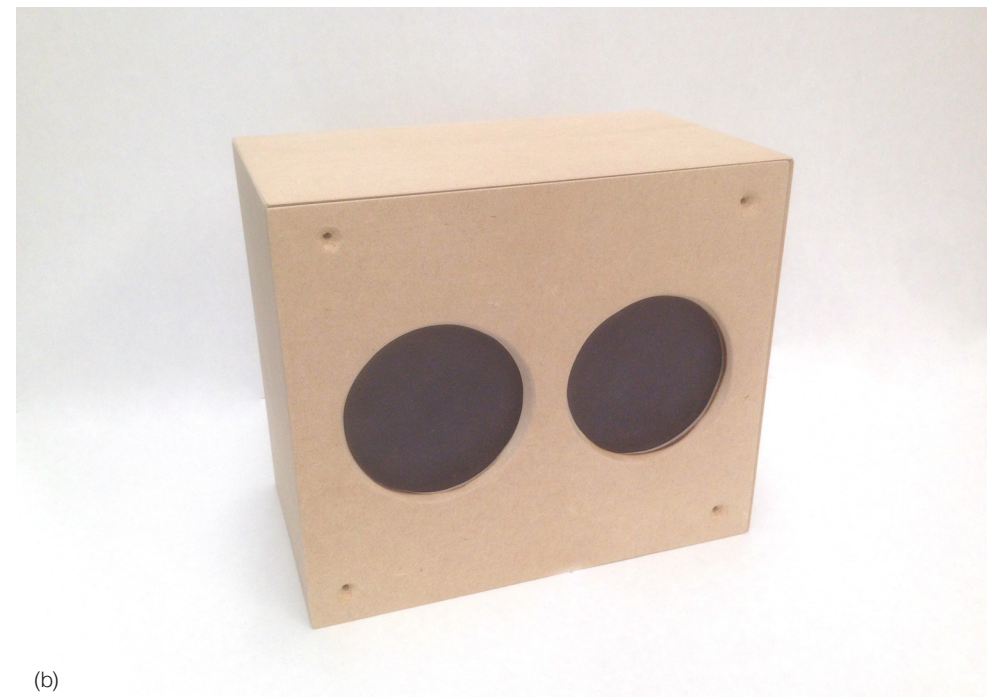
(b)

Figure 49. Maunsell-Wybrants, H. (2015). Square box with two small circle cut-outs

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Reflections

- Geometric shapes are most recognisable because they are most common. Using geometric shapes over organic or abstract shapes will generate a speaker that is more easily understood.
- Square shapes are the most appropriate geometric shapes for the wireless speaker because they communicate some personality attributes consistent with the target audience personalities - stable and trustworthy/honest.
- Shapes and their meanings are closely linked to Gestalt psychology and the two work together - shapes and their meanings refers to the specific shape while Gestalt psychology focuses on the arrangement of the shapes.

Proportion

It is well documented in design literature that the golden ratio (Figure 50) has historical roots that can be found in early architecture, art, and also nature. This is most likely a result of a subconscious aesthetic preference as opposed to any knowledge of the ratio (Lidwell, Holden, & Butler, 2003). According to Markowsky (1992), the use of the golden ratio should be used only as a guide to proportion because we have difficulty spotting it amongst closely proportioned forms.

There is substantial research and evidence, however, to suggest the golden ratio, and similar proportionate methods, can be used as a tool to generate pleasing proportions within a shape or form (Elam, 2001; Lidwell et al, 2003; Parsons, 2009).
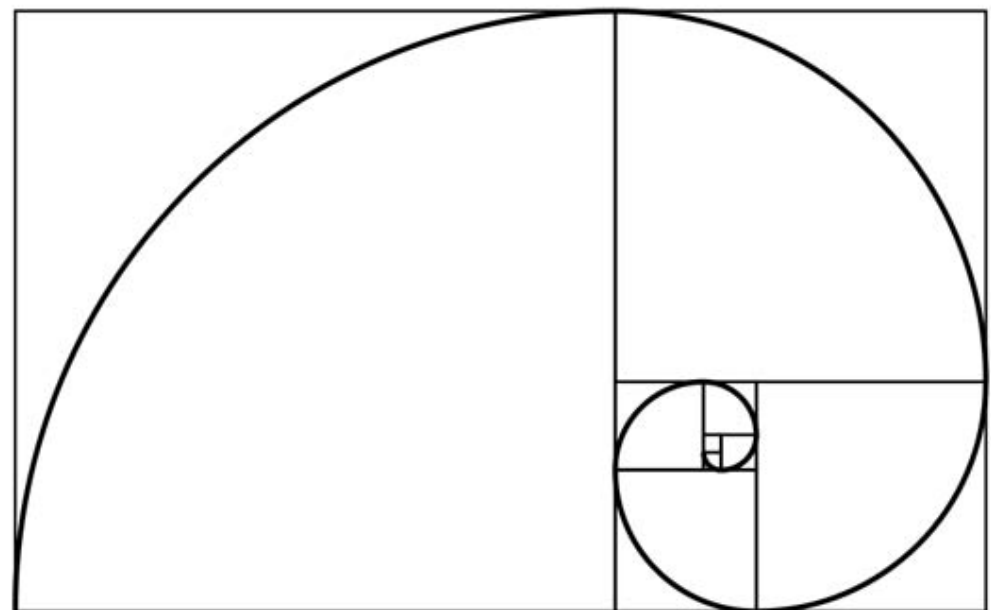
Figure 50. [Fibonacci spiral]. (n.d.). Retrieved from https://en.wikipedia.org/wiki/Golden_ratio#/media/File:Fibonacci_spiral_34.svg

8
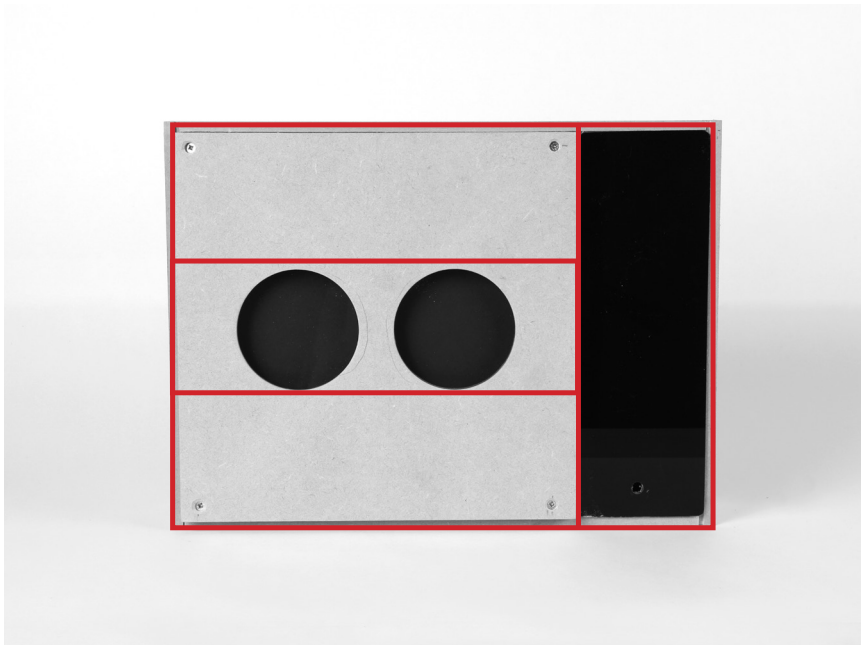
Figure 51. Maunsell-Wybrants, H. (2015). Square box proportioned to the rule of thirds
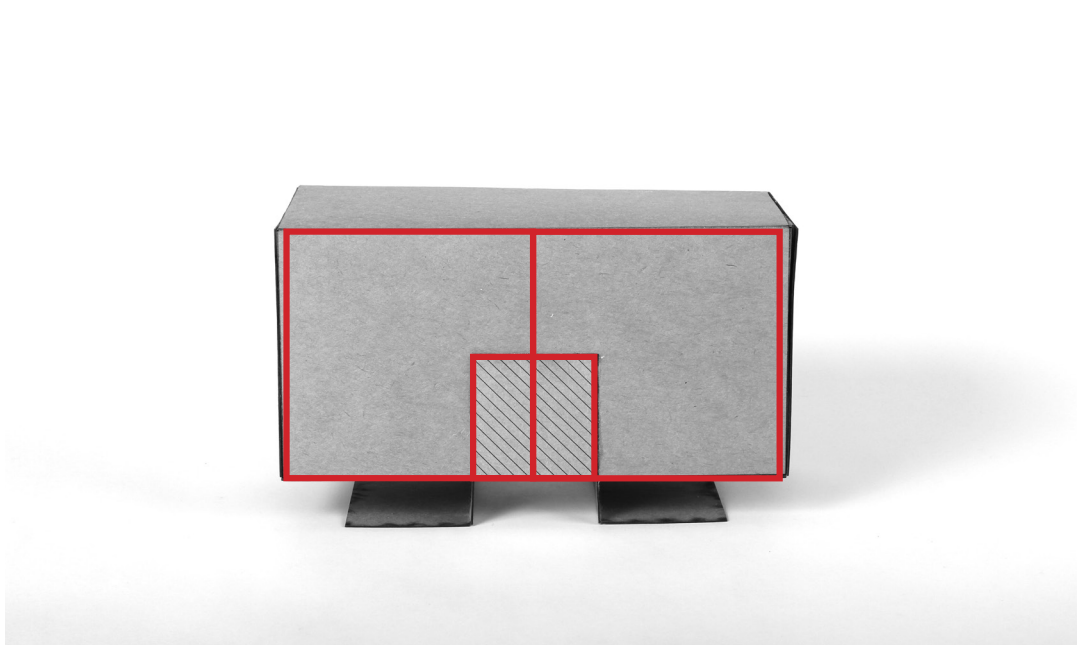
Figure 52. Maunsell-Wybrants, H. (2015). Cardboard model exploring 1:2 scale proportions

The two examples of proportion shown in Figure 51 & 52 illustrate alternative methods of proportion. Example (a) utilises equal sized rectangles to divide the shape into four parts and the height according to the 'rule of thirds'. Example (b) has been constructed from two squares positioned side-by-side generating a proportion of 1:2. Another square positioned centrally represents the volume control location.

The Golden ratio (Figure 53) was adopted and used to guide the speaker's proportions early into the design development phase after first exploring the 'rule of thirds' and the proportion of 1:2. Using the golden section ratio offered the best opportunity to achieve a pleasing proportion for the wireless speaker while also being the most functional.

Figure 53. Maunsell-Wybrants, H. (2015). Golden section ratio

Reflections

- Proportion for the speaker sets a hierarchy amongst the parts. A balance between physical size requirements for the drivers and the importance of the volume control must be weighed up.
- There is no formula for making decisions with regards to proportion. Instead this process is guided by ratios and evaluated using intuition.
- Proportion can be used to improve usability, for example, by emphasising the speaker volume control through an oversized control dial.

Colour Theory

The use of colour is very subjective in design. A particular colour that evokes a response in one person may not evoke the same response in a another because of cultural or personal differences (Chapman, 2010). There is a general understanding however, when it comes to colour theory and the psychology of colour, that certain emotions are commonly associated with specific colours due to embedded meanings (Color Wheel, 2002), as shown in Figure 54. Understanding how aesthetic qualities of colour can be used to express personality attributes in the wireless speaker was an important aspect of this project.

Dark blue is most suitable for the wireless speaker because they are psychologically stable and trustworthy according to Figure 54, which is closely related to honesty, and appeals to males and females. Blue also recedes into the distance (Saw, 2001) which can signify subtlety - another quality highlighted by the personas.

RED: Red is the color of fire and blood, so it is associated with energy, war, danger, strength, power, determination as well as passion, desire, and love.

ORANGE: Orange combines the energy of red and the happiness of yellow. It is associated with joy, sunshine, and tropics.

BLACK: Black is associated with power, elegance, formality, death, evil, and mystery.

THE BIG EIGHT
BRAND COLORS
PSYCHOLOGY BEHIND COLORS

YELLOW: Yellow is the color of sunshine. It's associated with joy, happiness, intellect, and energy.

WHITE: White is associated with light, goodness, innocence, and purity. It symbolizes safety, purity, and cleanliness. In heraldry, white depicts faith and purity.

GREEN: Green is the color of nature. It symbolizes growth, harmony, freshness, and fertility.

PURPLE: Purple combines the stability of blue and the energy of red. Purple is associated with royalty. It symbolizes power, nobility, luxury, and ambition.

BLUE: Blue is the color of the sky and sea. It is often associated with depth and stability. It symbolizes trust, loyalty, wisdom, confidence, intelligence, faith, truth, and heaven.

Blue represents the personality attributes specified in the design brief better than any other colour.

Figure 54. GraphicSprings. (2002). *The Big Eight Brand Colors: psychology behind colors*. Retrieved from http://www.color-wheel-pro.com/pics/gsinfographic1(color)large.jpg

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Colour Combination

Colours are not usually used in isolation when applied to products therefore a level of understanding about colour theory is necessary when selecting a colour combination that is visually appealing. (Ambrose & Harris, 2005).

Ambrose and Harris (2005) noted that in any design, colour is generally used in a structure of three: dominant, subordinate, and accent. Figures 55 - 58 explore this concept.

The colour combinations explored in this research project are orientated around the colour blue as define in Figure 54.

Dominant

The principle colour that is used to capture the viewers attention.

Potential use: Front/driver cover colour

Subordinate

A visually weaker colour that complements or contrasts with the dominant colour.

Potential use: Speaker box colour

Accent

A colour that is used to provide a sympathetic visual detail.

Potential use: Stand/feet, volume control, power switch detail

Figure 55. Maunsell-Wybrants, H. (2015). Colour combination. Adapted from Ambrose & Harris (2005).

Colour combination concepts
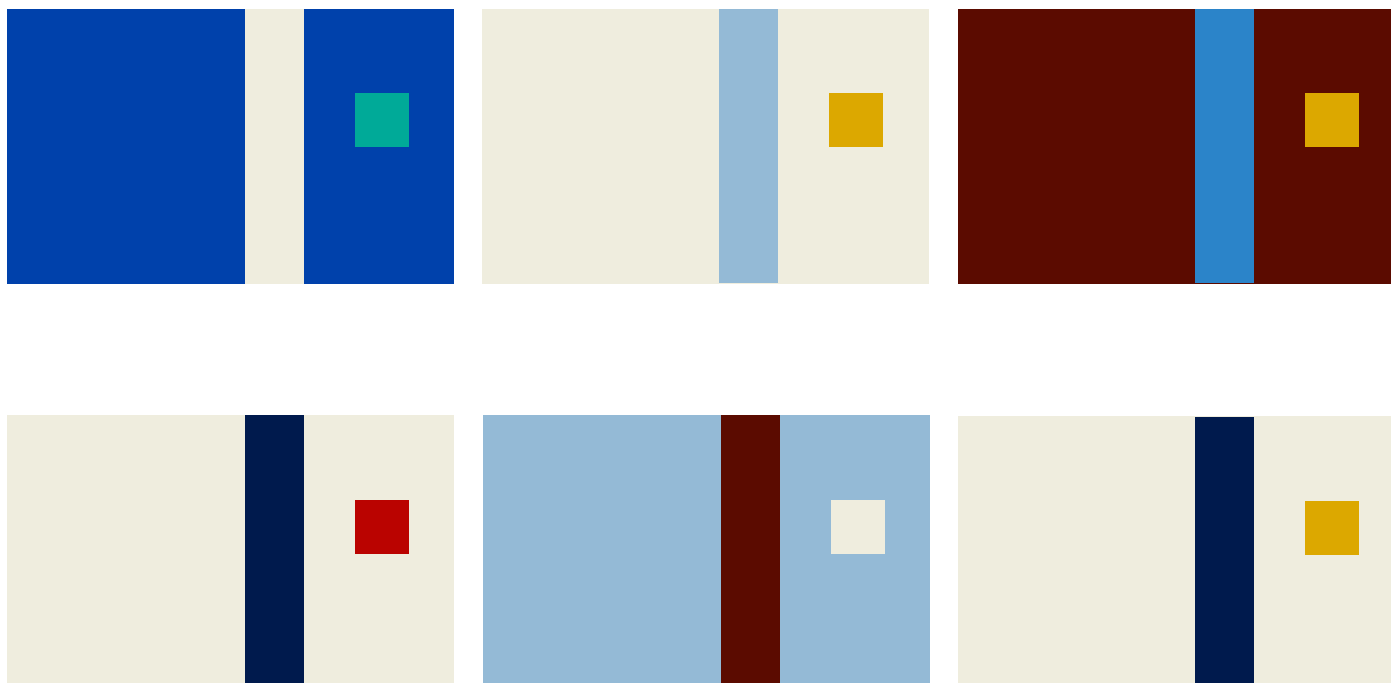
Figure 56. Maunsell-Wybrants, H. (2015). Colour combinations based on the colour blue

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Figure 57. Maunsell-Wybrants, H. (2015). Paper models showing blue colour combinations

Variations of blue have been tested alongside contrasting colours as suggested by Ambrose and Harris (2005). The small circle represents the volume control as an accent colour - possibly brass or anodised aluminium.

Subordinate colour - light, made
from timber such as Ash or Maple.

- Blue front provides the impression of *stability, subtlety,* and *honesty.*
- Light colour box is timber, an *honest* and *kind* material
- Yellow accent could represent a brass material which could be perceived as *moderate.*

Dominant colour - dark blue, made
from fabric.

Accent colour - made from brass or aluminium.

Figure 58. Maunsell-Wybrants, H. (2015). Blue, brass and blonde timber colour combination model

Reflections

- Dark blue supports the personality attributes defined in the brief more than any other colour - honest, stable and moderate.
- A blonde wood (maple) will provide a subordinate colour that supports the dominant dark blue colour.

The Personality of Lines

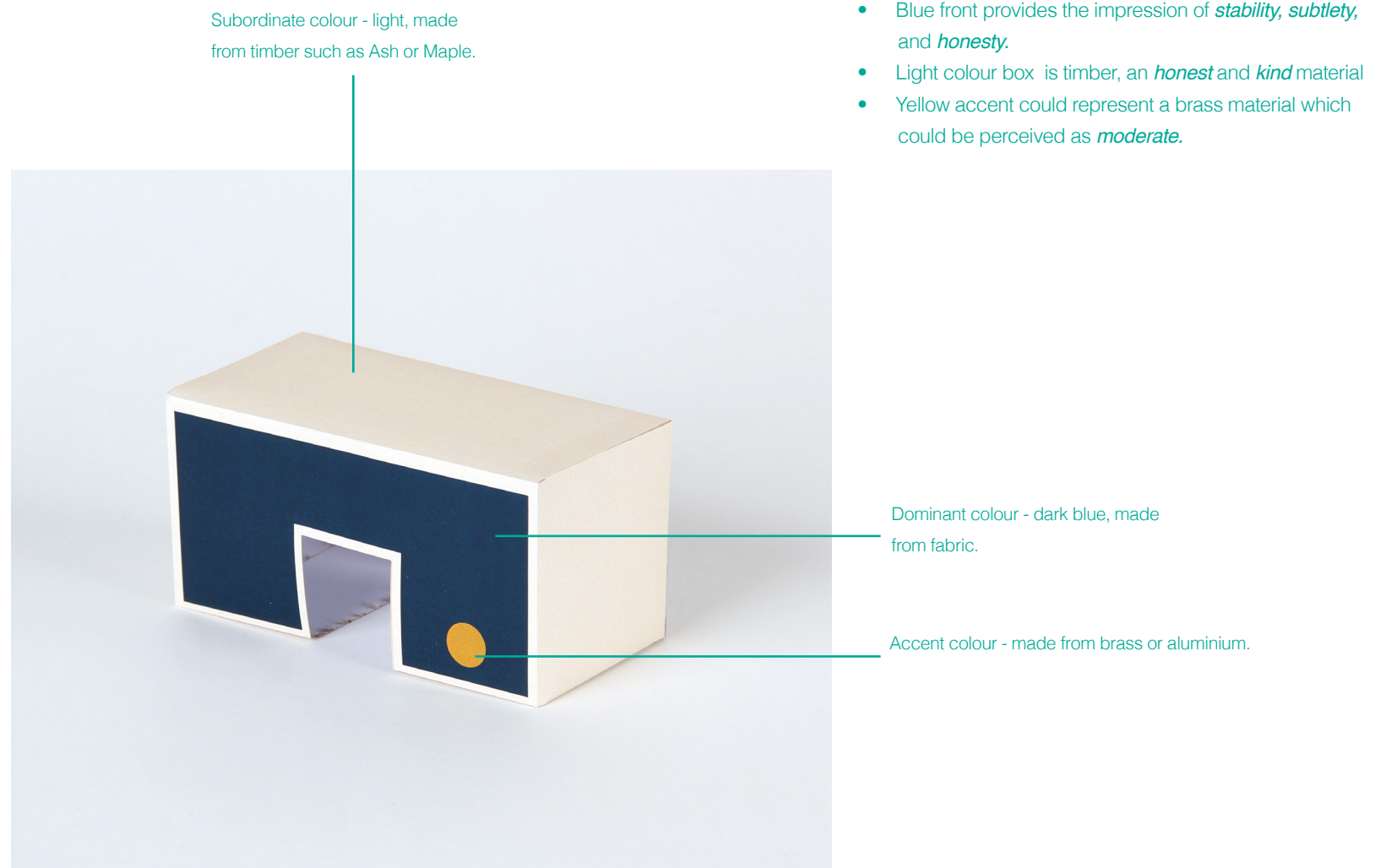The personality of a line can be determined by three factors - quality, direction, and character (as straight or curved) (Poffenberger & Barrows, 1924). Poffenberger and Barrows note that the quality of a line is expressed through weight as heavy or light, thick or thin.

According to a study carried out by Lundholm (1921), and three years later by Poffenberger and Barrows (1924), the personality of a line changes as the characteristics of the line change. These studies revealed that long, slow, curved lines are soft, calm, and gentle while angled lines tend to be more violent, energetic, and strong. The longer the curve or angle the slower and less intense the line becomes, but the shorter and closer the curve or angle the more intense and active the line is perceived to be (Figure 59).

The direction and character of the lines that form the wireless speaker are long, straight and slow in accordance with the requirements of the design brief.
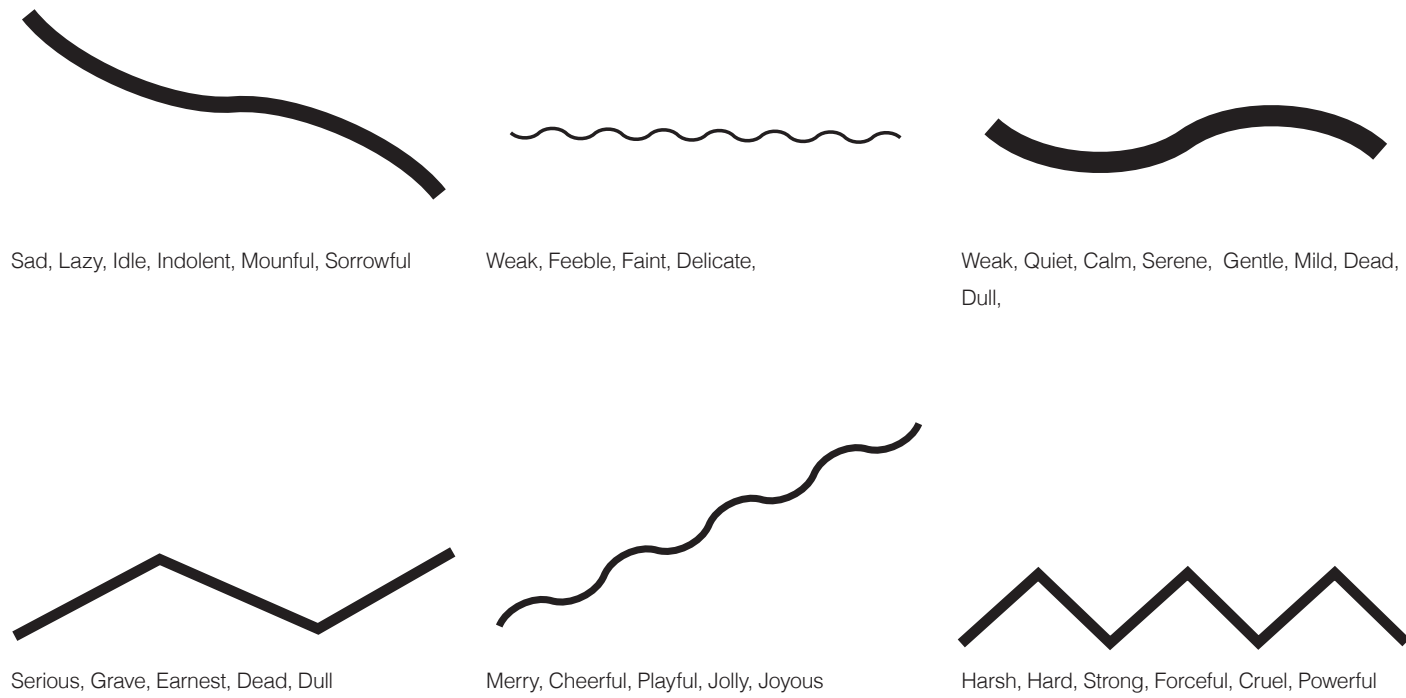
Sad, Lazy, Idle, Indolent, Mounful, Sorrowful

Weak, Feeble, Faint, Delicate,

Weak, Quiet, Calm, Serene, Gentle, Mild, Dead, Dull,

Serious, Grave, Earnest, Dead, Dull

Merry, Cheerful, Playful, Jolly, Joyous

Harsh, Hard, Strong, Forceful, Cruel, Powerful

Figure 59. Poffenberger, A. T., & Barrows, B. E. (1924). *The feeling value of lines.*
Adapted from Gorp, T. V., & Adams, E. (2012). *Design for emotion.* (p. 121). Waltham, MA: Morgan Kaufmann.
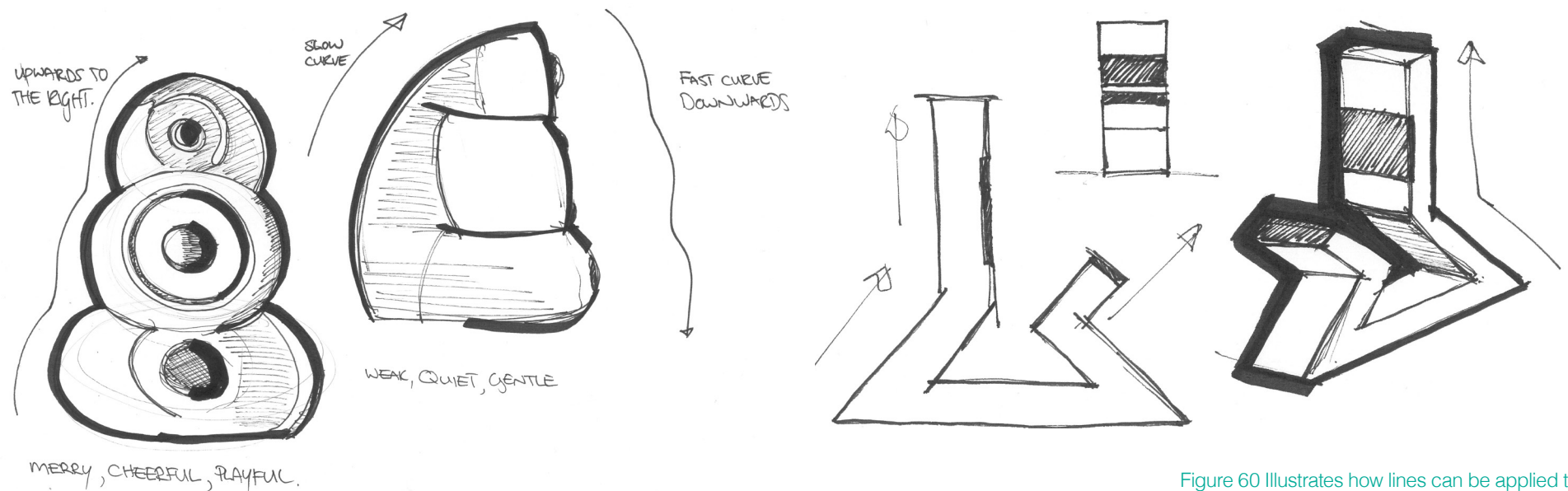
Figure 60. Maunsell-Wybrants, H. (2015). Sketches exploring the personality of lines in speaker designs

Figure 60 Illustrates how lines can be applied to (or visualised in) speaker designs to generate different personality perceptions.

Reflection

- The most appropriate line character for this project is a straight line.
- Because straight lines (horizontal or vertical) were not part of the research by Poffenberger & Barrows (1924) I need to anticipate how the lines of a square box might be interpreted by the viewer. I predict a horizontal straight line will appear submissive, boring, and stable while a vertical line appears dominant and unstable.

Define Phase
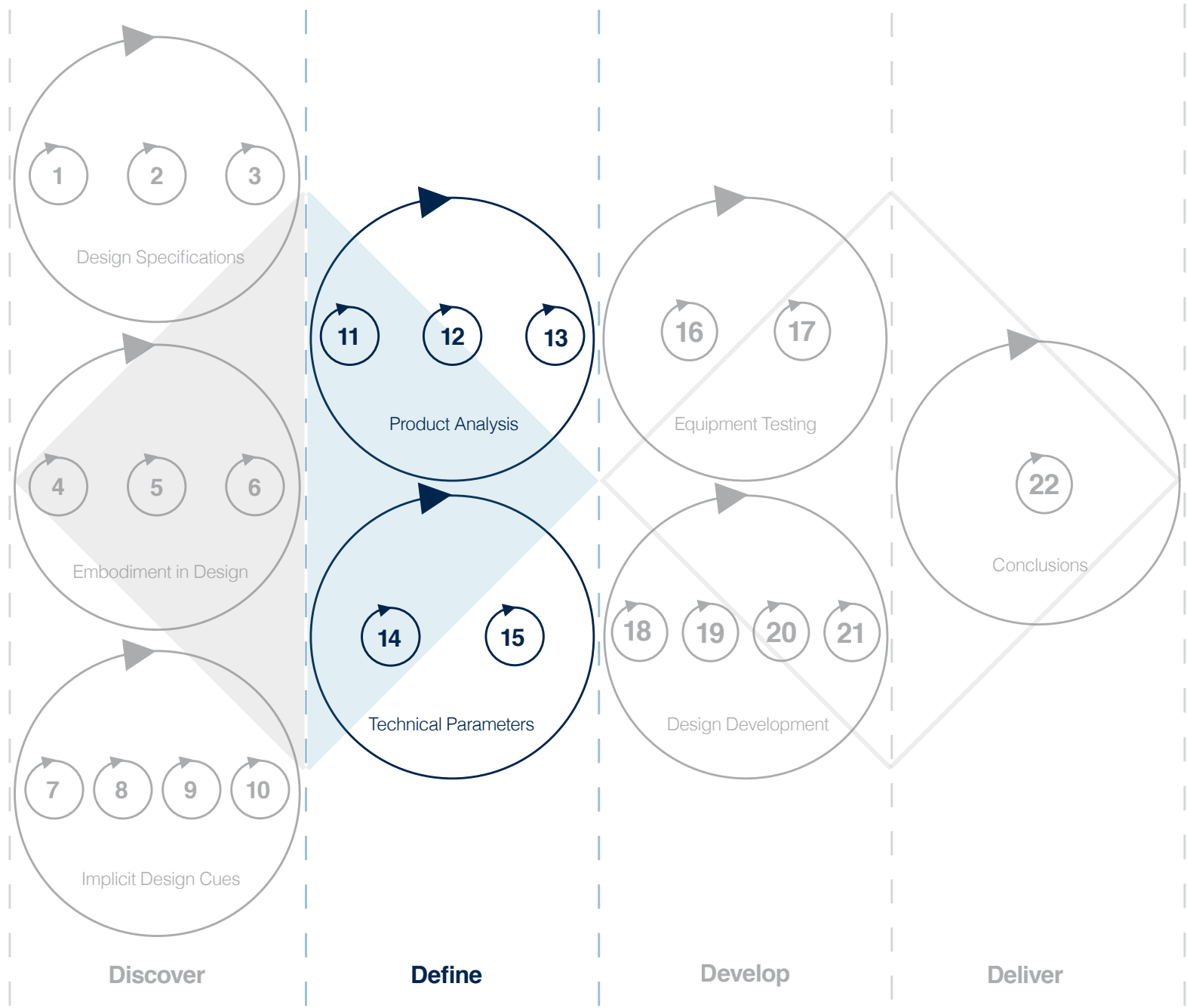
Figure 61. Maunsell-Wybrants, H. (2015). Project map highlighting 'define' phase

Define

11 Level of product personality

12 Product personality assessment   **Carrying Out a Product Analysis**

13 Attribute analysis

- -

14 Component specifications

                                                          Defining the Technical Parameters

15 Component dimensions
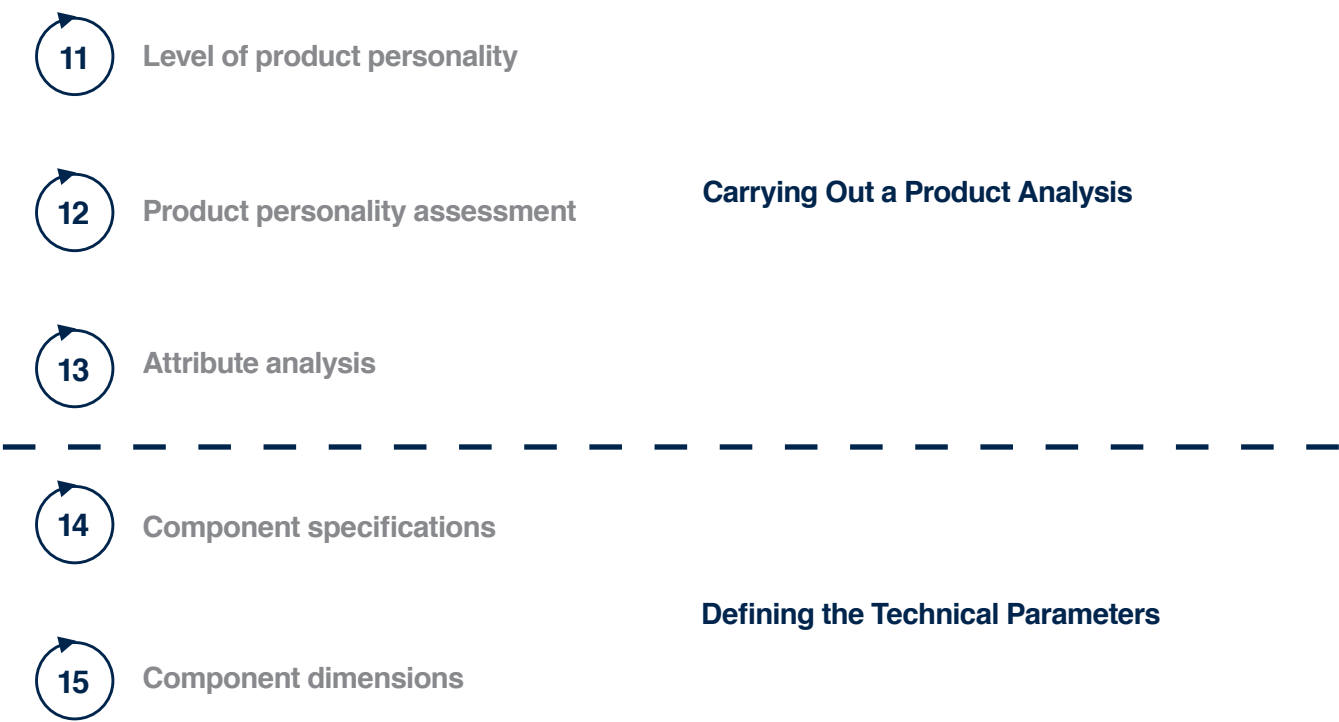
Product Analysis

Product analysis is the task of analysing existing products for the purpose of generating information that can be used to inform a new product design. This research analysed existing products for the personalities they express through product semantics.

First the level of personality is assessed according to friendliness and dominance to support the concept that products communicate personalities through form, shape and line. This process also reveals trends among product elements and the personalities they express, such as round speakers appearing submissive and friendly.

Next an attribute analysis is carried out. A selection of products expressing a personality trait the strongest and weakest then have their attributes analysed in an effort to uncover correlations between product semantics and personality attributes. The correlations discovered in the product analysis will form the basis for the new product design.

Level of product personality

van Gorp and Adams (2012) explained that there are two major personality dimensions that are assigned to products as identified by psychologists. They are dominance and friendliness. 25 products were positioned within a 5 x 5 grid according to an analysis of their perceived dominance and friendliness as defined by the information in Table 1. van Gorp and Adams describe friendliness as being measured by the level of wanting to approach the object and unfriendliness by the level of wanting to avoid the object. The products were first drawn in black pen to emphasise the lines, shapes, and forms making the visual analysis easier.

Small/medium sized speakers were the primary product range assessed in this study. However table lamps and chairs were added in an effort to give further depth and rigour to the process. Table lamps and chairs were chosen as they fit within the environmental context of the project, identified by the personas as the home/office.

The purpose of analysing a comprehensive, random selection of products that have been selected from the target product market, is to try to visually establish links between product personality to specific product attributes. If there is a strong correlation between round corners and friendliness, for example, then we might assume round corners to also express kindness - a personality attribute closely related to friendliness (Mugge, Govers, & Schoormans, 2009) and required as defined by the personas.

Table 1

Dominant versus Submissive Traits

Traits	Dominant	Submissive
Visual	Angular	Curved
	Straight	Round
	Up	Down
	Above	Below
	Bigger	Smaller
	Heavy	Light Weight
	Robust	Delicate
	In Motion	At Rest
Tactile	Rough	Smooth
	Hard	Soft

Note. Original table from Wellman, K., Bruder, R., & Oltersdorf, K. (2004). *Dominant versus Submissive Traits.*

Adapted from Gorp, T. V., & Adams, E. (2012). *Design for emotion.* Waltham, MA: Morgan Kaufmann.
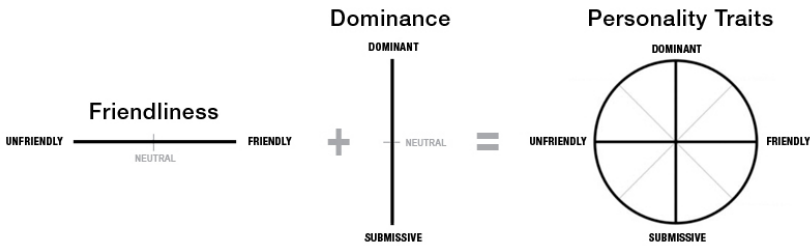
Figure 62. Van Gorp, T. (2006). *Personality Circumplex* [adapted from Reeves & Nass, (1998).]. Retrieved from http://seltar. soup.io/tag/Big%20Ideas?newer=1&since=0

Dominant

Unfriendly

Friendly

Submissive

Figure 63. Maunsell-Wybrants, H. (2015). Speaker dominant/friendly analysis grid

Dominant

Unfriendly

Friendly

Submissive

Figure 64. Maunsell-Wybrants, H. (2015). Chair dominant/friendly analysis grid

Figure 65. Maunsell-Wybrants, H. (2015). Table lamp dominant/friendly analysis grid

Product Personality Assessment

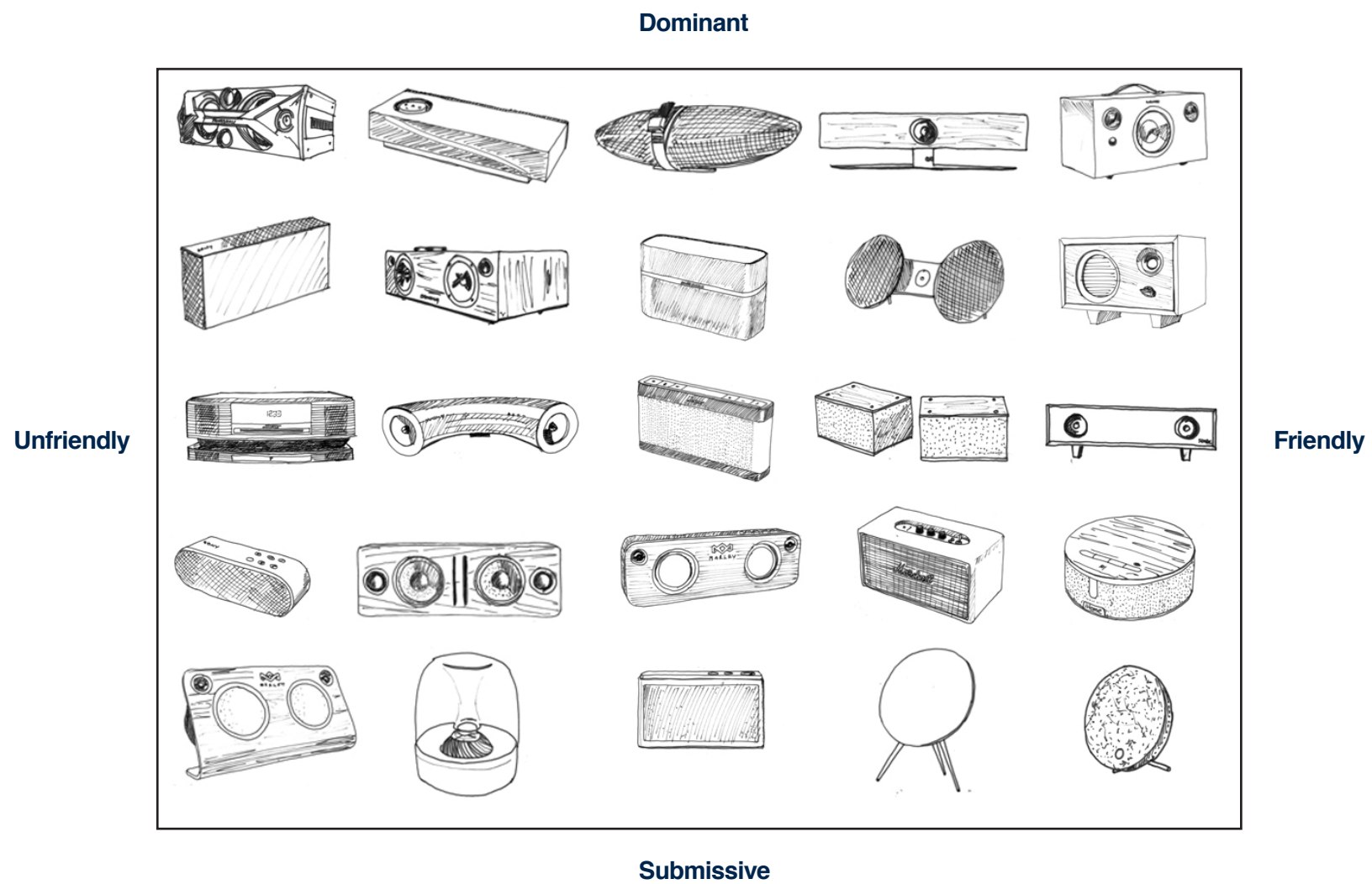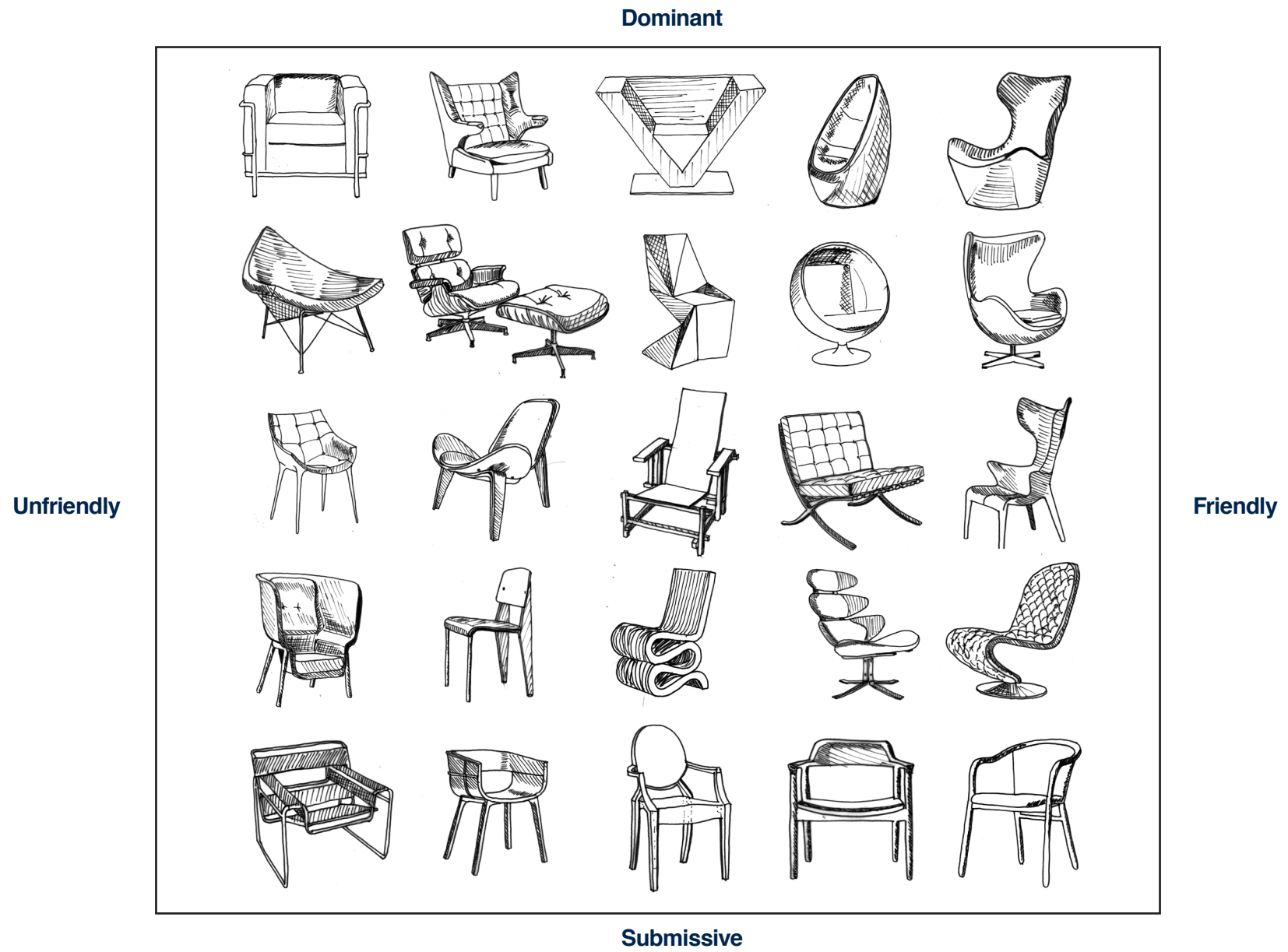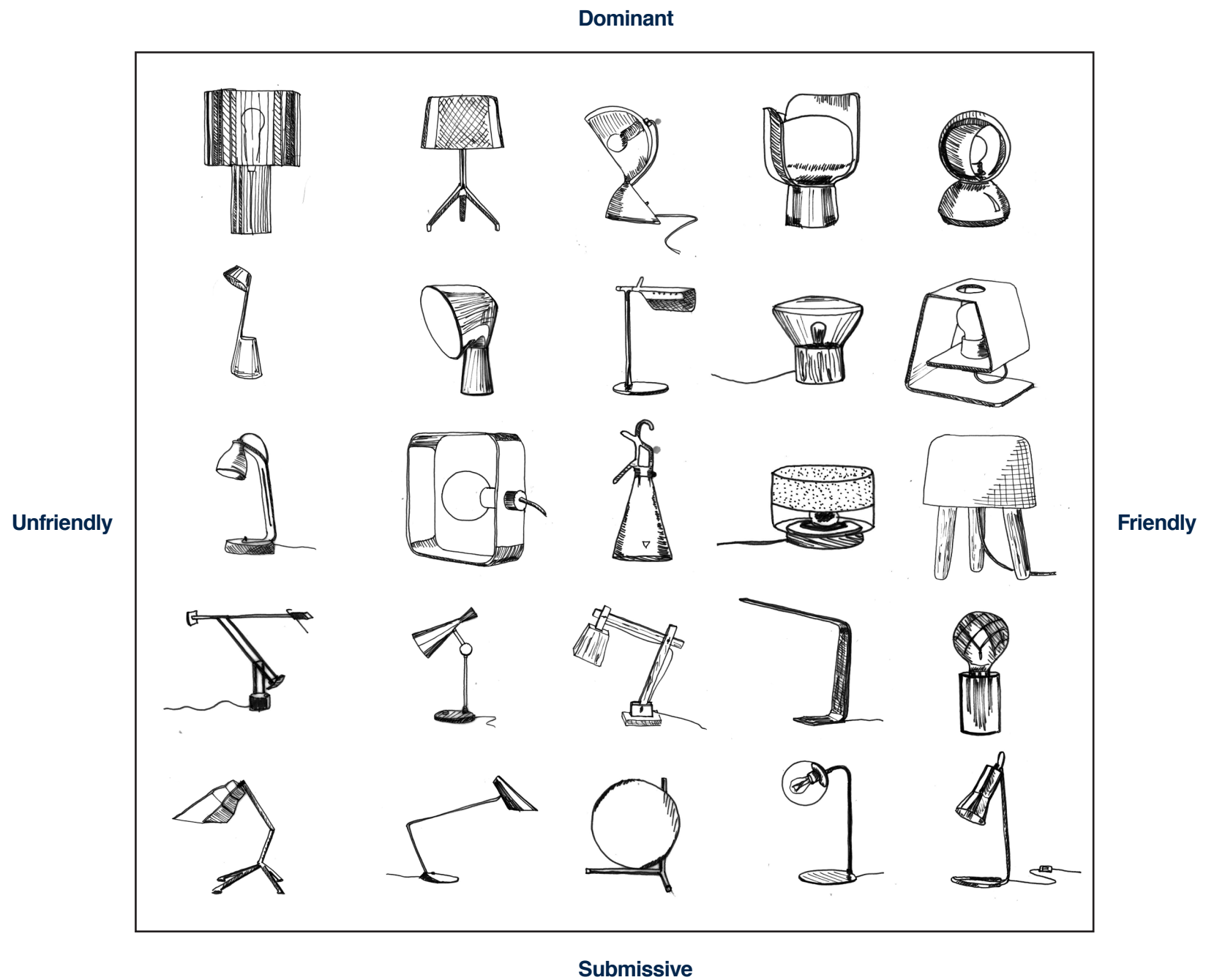Product personality assessment utilises Jordan's personality assignment test (2002) followed by an analysis of product attributes.

The purpose of the product personality assessment is to find correlations between products that are perceived to strongly express a specific personality attribute (in this case kind, simple, stable, moderate, and honest) and the physical dimensions that combine to define the product, such as shape or form. The information gathered through this process was used to guide decision making throughout the design development process.

The definition for the five personality attributes concerning this research project, as provided by Jordan (2002) are given below. These definitions set the criteria for which each product was assessed.

Kind/Unkind
Kind people are generous, caring, loving and compassionate. They are considerate of the needs of others and are supportive. Unkind people are selfish, uncaring and mean. They don't think of others needs and can be cruel.

Honest/Dishonest
Honest people are straightforward and trustworthy. They do not tell lies or deceive others. Dishonest people are untrustworthy and hypocritical. They can be fake and deceitful.

Stable/Unstable
Stable people are self-confident, calm and mentally tough. Their moods are quite steady. Unstable people are insecure, touchy and temperamental. They are prone to mood swings.

Excessive/Moderate
Excessive people tend to do things to extremes—whether it be work or play. They may be bon-viveurs, Epicureans, alcoholics or workaholics. Moderate people tend to do things to a 'sensible' degree. They live sensible but rather bland lifestyles.

Complex/Simple
Complex people may have depth to their character. They are thoughtful people who may have rather 'mixed-up' and complicated lives. Simple people are down-to-earth and live straightforward lives. They may be rather shallow and vacuous

	Attempt 1	**Attempt 2**	**Attempt 3**

Products arranged

Products arranged in a grid according to their expression of dominance and friendliness. One grid for each product range

Products arranged from strongest to weakest for expression according to the personality attribute concerned.

Speakers arranged from strongest to weakest for expression according to the personality attribute concerned.

Products selected

Corner products from dominance/ friendly chart selected. These products represent the extremes that communicate the strongest personalities

Two strongest and two weakest products (extremes) selected for each product range and each personality attribute to use for product analysis.

Five strongest and five weakest speakers for each personality attribute selected to use for product analysis

Attribute analysis

Attributes assessed and entered into a spreadsheet by allocating a 0 when the attribute is non-existent; 1 when the attribute is weak; 2 when the attribute is strong.

Data analysed

Data analysed to determine if there are any correlations between product attributes and the personalities they communicate.

Results

No correlation observed. Very weak trends could be seen within a product range but no trends could be seen across product ranges.

The weak results may be due to the products (selected from the grid corners) do not represent the strongest or weakest products for each specific personality attribute.

Attempt 2 shows stronger results within a product range for some personality attributes. There is very little correlation across product ranges however.

Interestingly the majority of the data highlights product attributes to avoid when designing for a specific personality attribute.

The results for attempt 3 reveal much stronger links between speaker form and the personalities expressed through product semantics.

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Figure 66. Maunsell-Wybrants, H. (2015). Attribute analysis flow-chart

Example

The following is an example of the process carried out for the personality attribute 'kind' on attempt 3. Attribute analysis tables for the remaining personality attributes are given in the appendices (appendix 1 - 4).

Products arranged

Strongest expression of 'kind'   Weakest expression of 'kind'

Figure 67. Maunsell, H. (2015). 25 speakers arranged from kindest to most unkind

Each of the 25 speakers were rapidly assessed (within 30 seconds) based on initial impressions to the speaker drawing. The order of the speakers could be adjusted as more were added while trying to keep the process fast.

Products selected

Strongest expression of 'kind'   Weakest expression of 'kind'

Figure 68. Maunsell-Wybrants, H. (2015). Selection of kind and unkind speakers

The 5 strongest and 5 weakest products that express 'kind' are selected for attribute analysis.

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Table 2

Speaker Attribute Analysis for the Personality Attribute 'Kind'

Kind Speakers		Kind					Unkind					Total Kind	Total Unkind
		Fawn	Libratone	B&O Beoplay	Addon	Symbol	Naim	Bose Soundlink	Samsung 750	Bose	Panasonic		
Attributes													
Shape & Form	Rounded Corners				1			2	2			1	0
	Sharp Corners	2				2	2			2	1	4	3
	Flat Surfaces	2	2	2	2	2	2	2	2	2	2	10	4
	Curved Surfaces			1	2						2	3	2
	Soft Edges			2	2	1		2	1		1	5	1
	Sharp Edges	2				2	2		2	2	2	4	4
	Straight Lines	2	1	2	1	2	1	1	1	2	2	8	4
	Curved Lines			2							1	2	1
	Sharp Lines					2	1			2	2	2	4
	Geometric	2	2	2	2	2	2	2	2		2	10	2
	Organic											0	0
	Angular						1				2	0	2
	Linear	1				1				2	2	2	4
	Planar	2	2	2		1		1			2	7	2
	Symmetrical	1	2	2	2	2	1	2	1	2	2	9	4
	Spherical			1	2							3	0
	Cylindrical			1	2						1	3	1
	Square	2			2	2	2	2	2	2	2	6	4
	Triangular										1	0	1
	Thin			2	2		1	2				4	0
	Tapered										2	0	2
	Solid	2	2	2	2	2	2	2	2	2	2	10	4
	Vertical			1	2							3	0
	Horizontal	1			2	2	2	1	2	2	2	5	4
	Anthropomorphic											0	0
	Top Heavy			2								2	0
	Base Heavy											0	0
	Dominant				2		2	1	2	2	2	2	4
	Submissive	1	2	2		1						6	0
	Box/cube	2			2	2	2	2	2	2	2	6	4
Visual Weight	Heavy	2	2	2	2	2	2	2	2	2	2	10	4
	Light											0	0

Data analysed

A total of 10 points is the most any one product dimension can receive - given there are five products that can receive a maximum of 2 points each. Only the dimensions that contain a difference of 6 points or more between kind and unkind are given a colour. If the product dimension supports the kind personality attribute it is given the colour yellow. However if the product dimension does not support the kind personality attribute it is given the colour red.

■ Attributes that support personality

■ Attributes that do not support personality

Table 3

Attribute Analysis Results for the Personality Attributes Kind, Honest, Stable, Moderate, and Simple

Attributes			Kind	Honest	Stable	Moderate	Simple		
Shape & Form	Rounded Corners								
	Sharp Corners								
	Flat Surfaces								
	Curved Surfaces			[red]		[red]			No Curved Surfaces
	Soft Edges								
	Sharp Edges								
	Straight Lines								
	Curved Lines			[red]					No Curved Lines
	Sharp Lines								
	Geometric								
	Organic								
	Angular								
	Linear								
	Planar								
	Symmetrical								
	Spherical								
	Cylindrical			[red]		[red]			Not Cylindrical
	Square			[yellow]					Square
	Triangular								
	Thin								
	Tapered					[red]			Not Tapered
	Solid								
	Vertical								
	Horizontal			[yellow]					Horizontal
	Anthropomorphic								
	Top Heavy								
	Base Heavy								
	Dominant		[red]						Not Dominant
	Submissive		[yellow]	[red]					N/A
	Box/cube			[yellow]					Box Shaped
Visual Weight	Heavy								
	Light								

Products semantics communicate personalities depending on their intended use.

The results from each personality attribute (as either a red or yellow indicator) are then added to another spreadsheet to reveal the overall positive and negative product dimensions and eliminate any conflicting dimensions that support one personality attribute but negatively impact on another.

Reflection

- Product analysis was useful because it provided a broad look at the target market and the gap existing for an artisanal wireless speaker influenced by Scandinavian design and the mid-century era.
- Product analysis also provided an opportunity to practically apply the knowledge of embodiment in design and implicit design cues, from the previous chapters.
- Using the dominant/submissive assessment technique provided a good tool to rapidly arrange products to make generalisations and connections between form and personality.
- It would be interesting to include more product elements into the product analysis such as colour and materials, however for this project these attributes have been defined by the implicit design cues.
- The overall results from the product analysis provided some good parameters for the wireless speaker design such as 'no curved surfaces'. There were not as many parameters defined as I had hoped.

Technical Parameters

The technical parameters pertaining to this project include:

Physical size of components (amplifier board & drivers)
Amplifier power rating - 50W @ 15v, 2 channel stereo
Speaker power rating - 15Wrms (30W peak)
Speaker resonate frequency - 80 Hz
Speaker impedance - 8 Ohms
Voltage supply to the amplifier - 12v
Speaker cabinet volume recommendation without a bass
reflex port (sealed) - 2L
Bass reflex port calculation to determine port length and width
(if used):

Lv = (23562.5 x Dv*2 x Np / (Fb*2 x Vb)) - (KxDv)

Dv = Port diameter (cm)
Fb = Tuning frequency (Hz)
Vb = Net Volume (Litres)
Lv = Port Length (of each port in cm)
Np = Number of ports
K = Port end corrections (flared/tapered or flat end.
Normal value is 0.732)

Cabinet materials - 14mm - 18mm MDF (to absorb low
frequencies) lined using acoustic insulation (to absorb high
frequencies and avoid standing waves inside the cabinet
(Practical guide, 2007a).

Cabinet shape/form (if no acoustic insulation is used) - No
parallel surfaces to avoid standing waves inside the cabinet
(Practical guide, 2007b).

Amplifier and Volume Control Dimensions

50mm

68mm

58mm

88mm

16mm

30mm

12mm
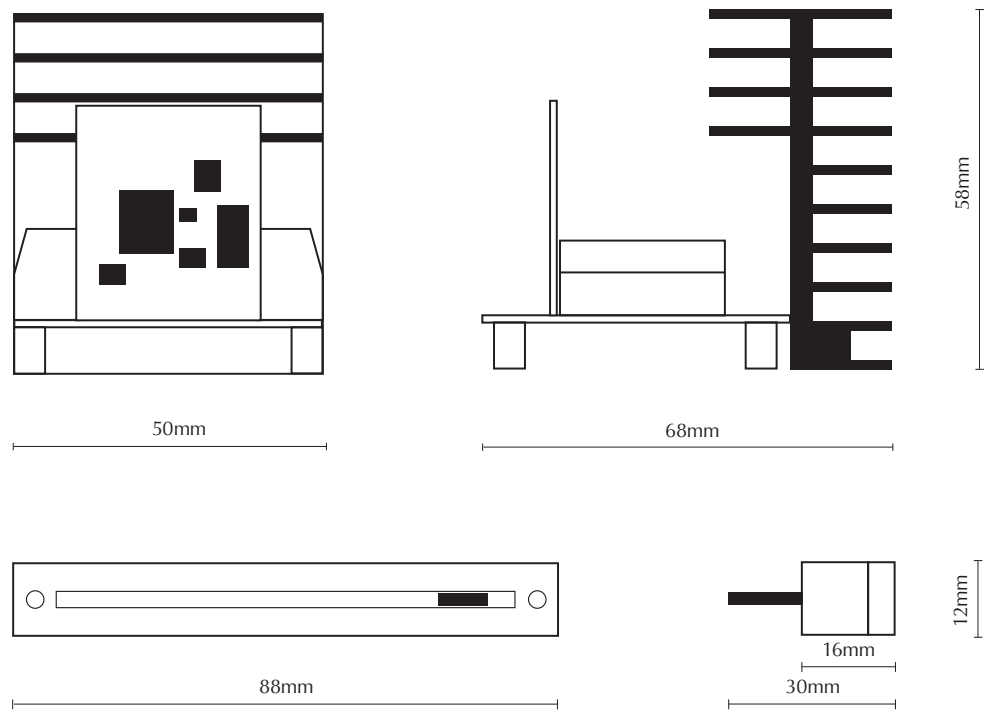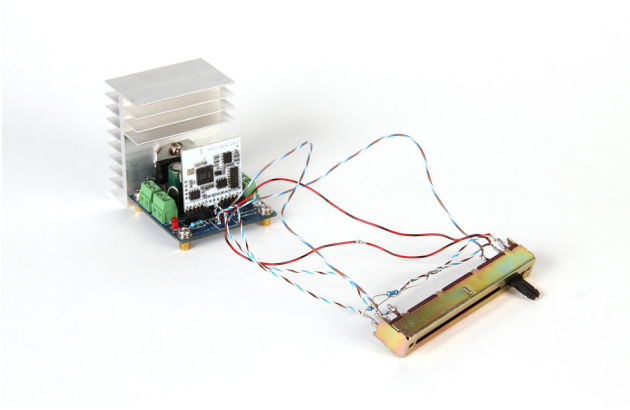
Figure 69. Maunsell-Wybrants, H. (2015). Amplifier and volume control
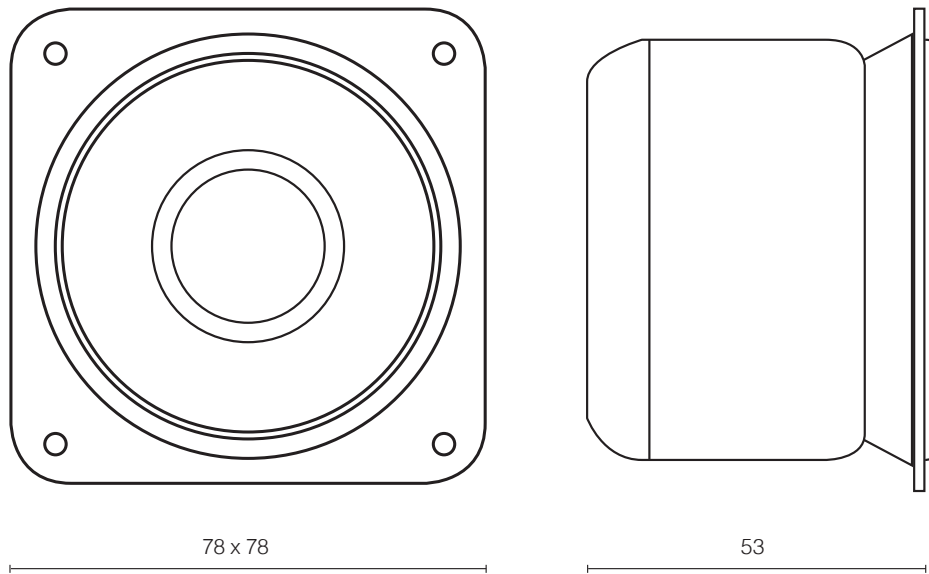
Driver Dimensions

78 x 78

53

Figure 70. Maunsell-Wybrants, H. (2015). Dimensioned drawings of amplifier and Driver
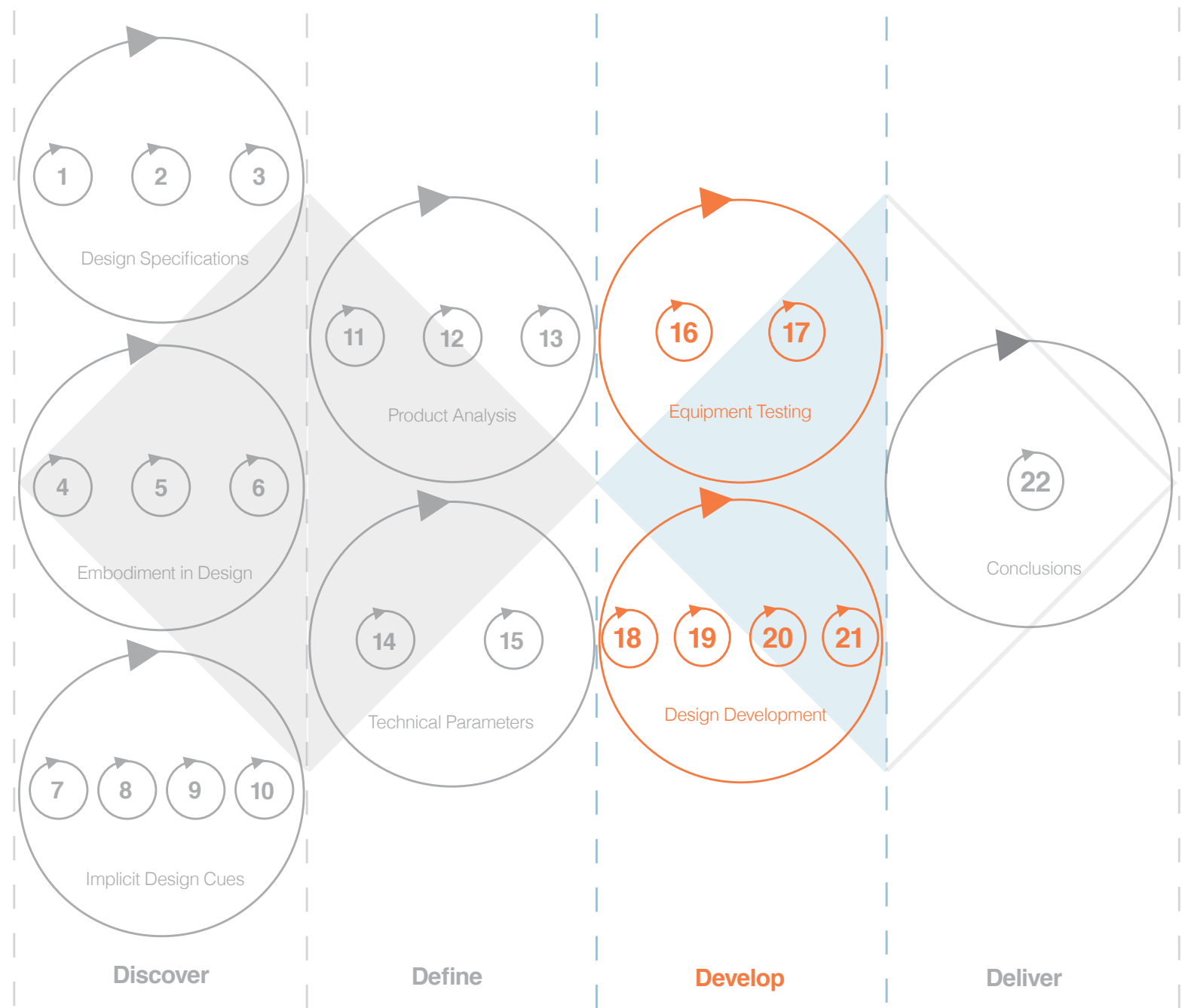
15

Develop Phase

Figure 71. Maunsell-Wybrants, H. (2015). Project map highlighting 'develop' phase

Develop

16   Speaker box size

17   Speaker loudness

18   Development cycle 1

19   Development cycle 2

20   Development cycle 3

21   Development cycle 4

Equipment testing

The amplifier and drivers were tested in a 2 litre speaker box to ensure suitability for the project.

Figure 72. Maunsell-Wybrants, H. (2015). 2L square speaker box
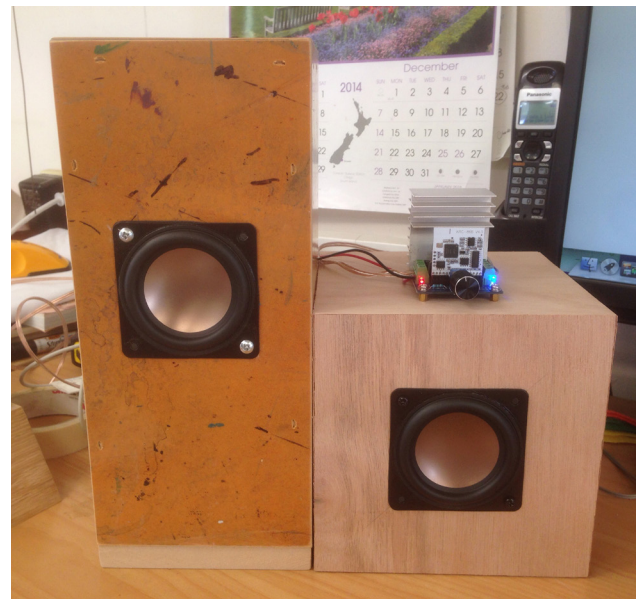
Figure 73. Maunsell-Wybrants, H. (2015). Testing 2 x 2L speaker boxes
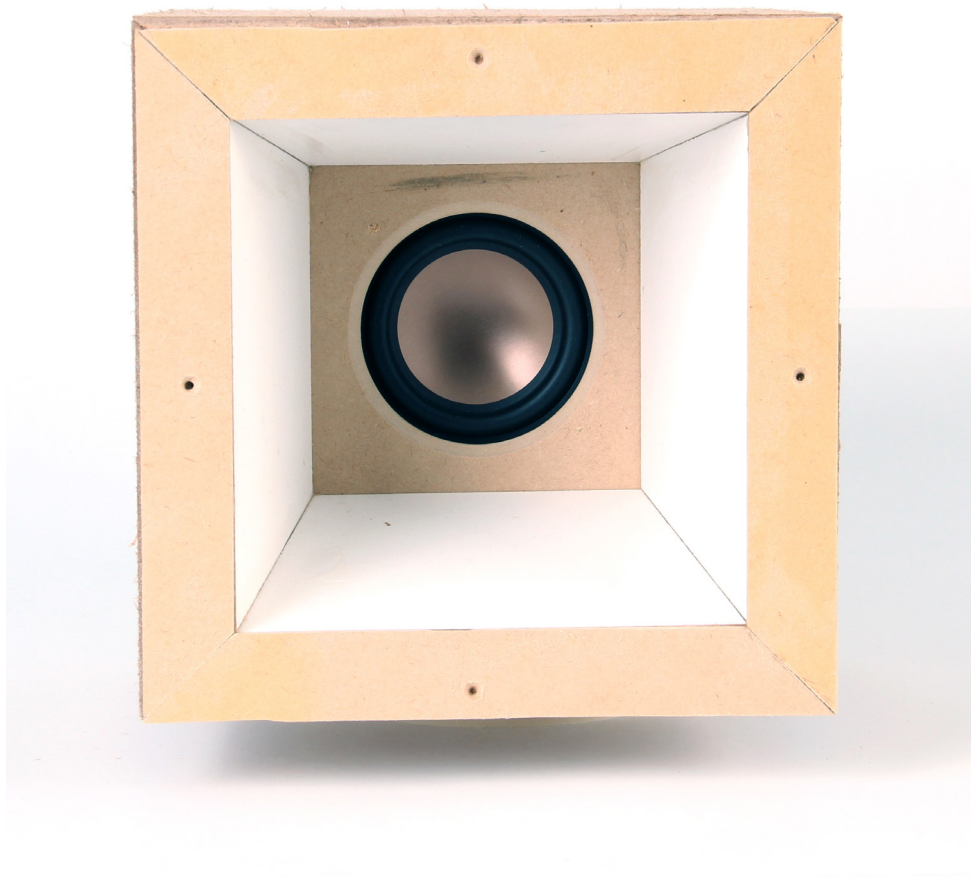
Figure 74. Maunsell-Wybrants, H. (2015). Speaker box with horn prototype

I considered the volume output of the equipment to be too low to fulfil the brief.

A horn design was tested to see if it could improve the speaker volume.

Reflection

• In reality, this box was much louder than the previous tests without the horn, however it only appeared to amplify the high frequencies making the speaker sound empty and light.

Figure 75. Avantgarde Acoustics. (2015). *Uno Fino Speaker.* Retrieved from http://www.avantgarde-acoustic.de/en/ hornloudspeaker/uno-fino/design.html?produkt=fino&f=silb er&s=ahorn2

A bass-reflex port (BRP) was calculated and tested. A speaker that is designed with a BRP does not require such a powerful amplifier to produce a loud volume compared to sealed speaker designs.

Speaker and audio theory is very complex and has not been the focus of this study. A lot of research involving the technical aspects of designing quality audio systems has been carried out for this project but only the details that have directly influenced the design and research process have been mentioned.

Figure 76. Maunsell-Wybrants, H. (2015). Testing a bass-reflex port on a 2L speaker box
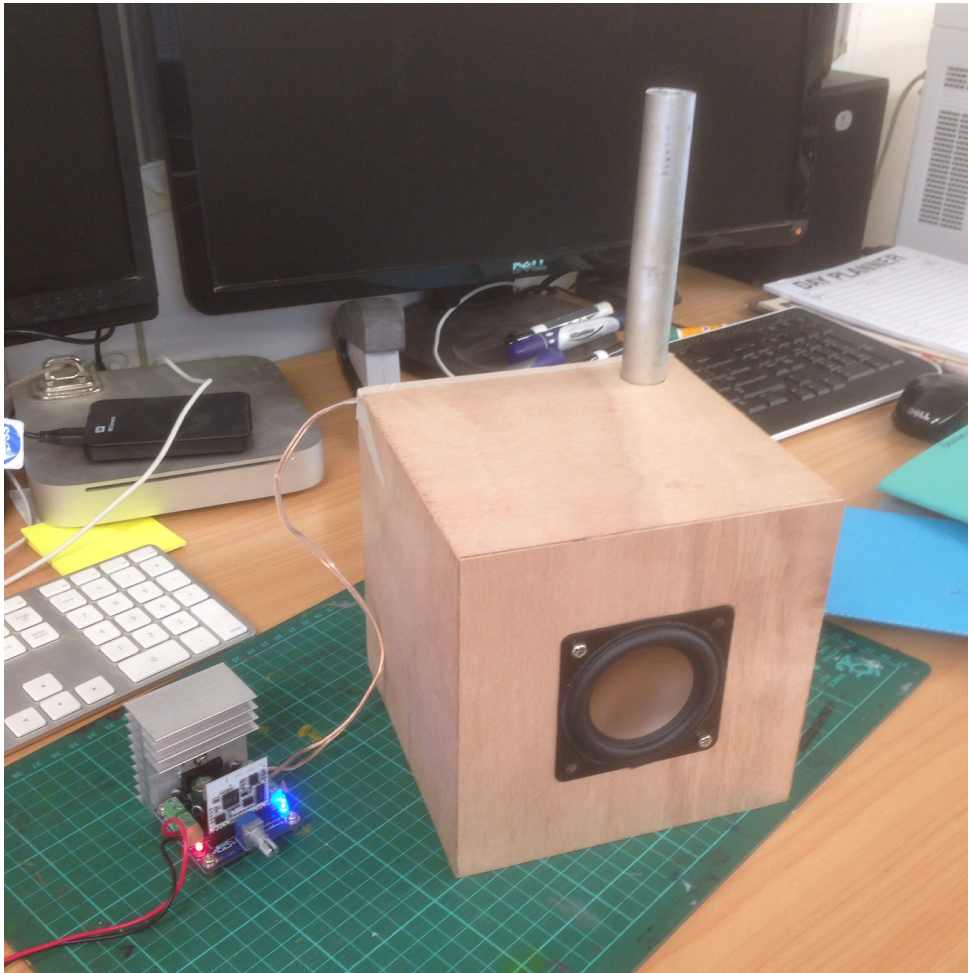
Figure 77. Maunsell-Wybrants, H. (2015). 2L speaker box with bass-reflex port tube

Reflection

- The equipment testing impacts the speaker design by highlighting technical constraints and requirements (such as requiring a bass-reflex port) that defines the final speaker form (Bloch, 1995).

Development Cycle 1

Through sketching a concept generated for gestalt psychology was further explored. This provided a starting point as the concept fit within the parameters of the brief with several directions it could be taken.
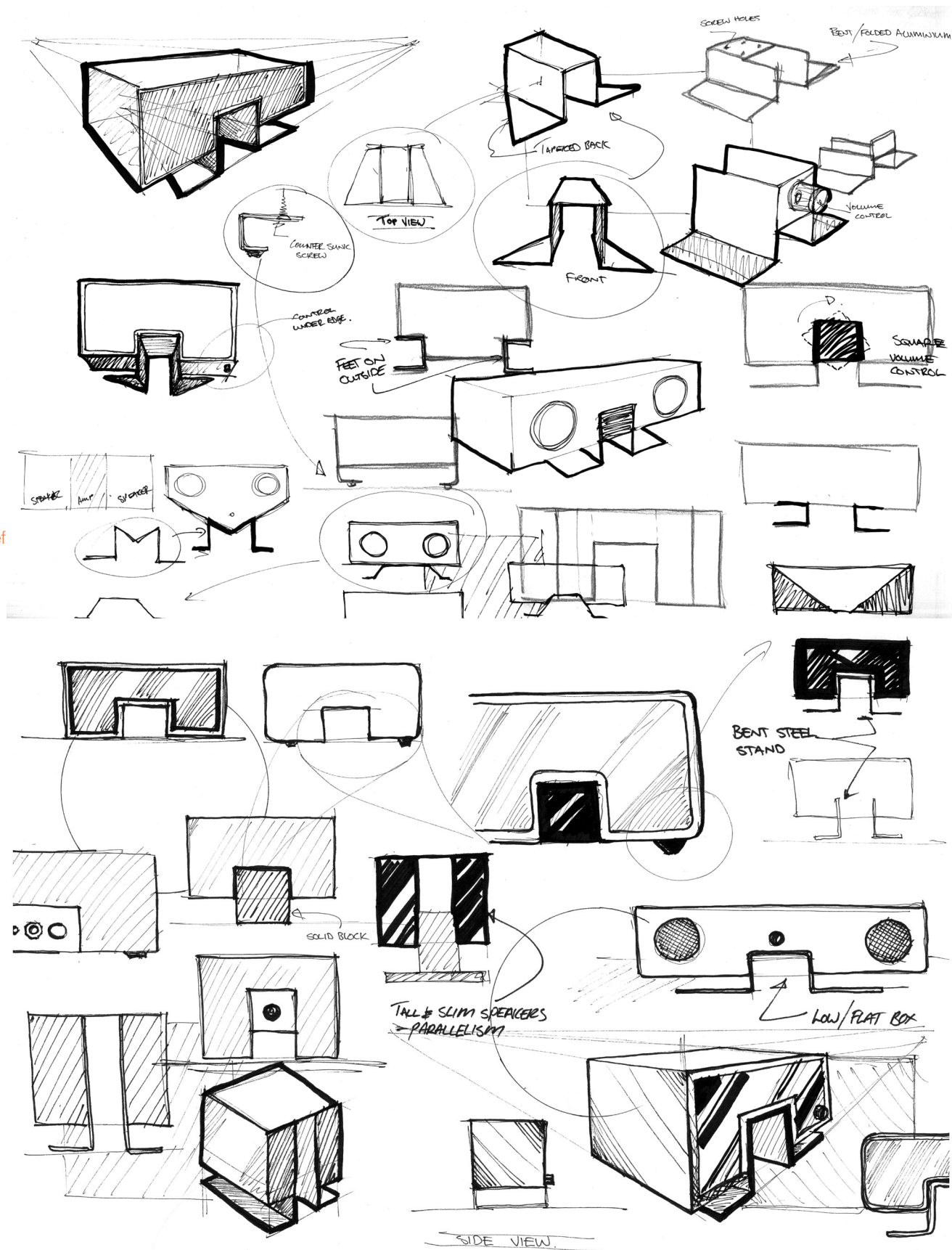
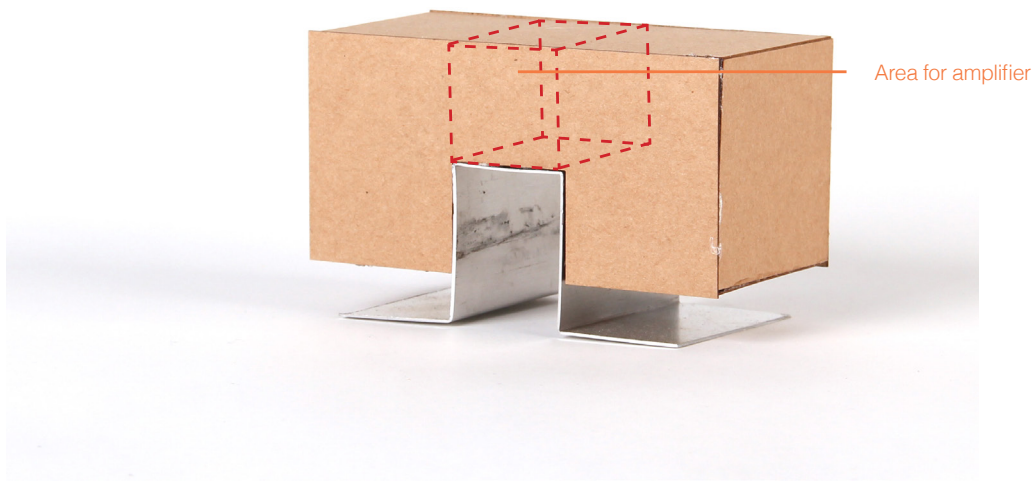Figure 78. Maunsell-Wybrants, H. (2015). Initial speaker development sketches

The development of the wireless speaker started with component placement. Placing the amplifier centrally orientated the terminal connectors for each speaker correctly.

Figure 79. Maunsell-Wybrants, H. (2015). Development model showing amplifier location

Oversized volume control dial - possibly wooden and framed by the mounting bracket edge?

A square dial can easily be recognised as being rotated as opposed to a round dial - better visual communication and usability.

Figure 80. Maunsell-Wybrants, H. (2015). Development model with square volume control

A possible driver cover shape. It appears almost like sunglasses or a handle-bar moustache, linking back to anthropomorphic forms.

Reflection

- The geometric form and straight lines are both understandable and communicate stability.
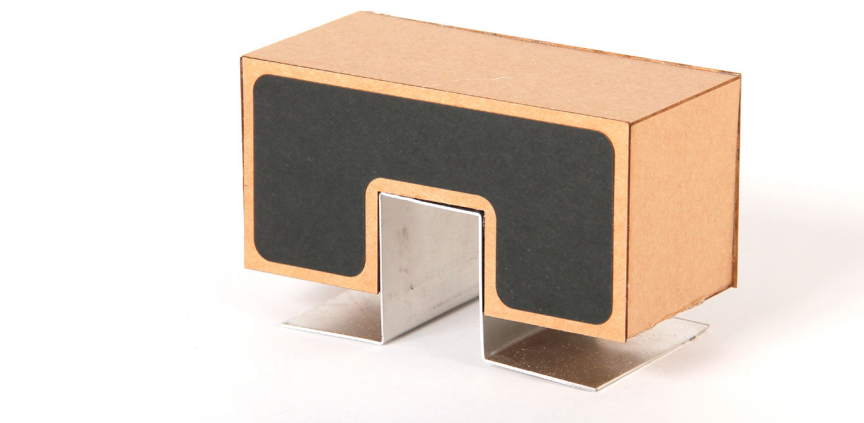
Figure 81. Maunsell-Wybrants, H. (2015). Development model showing driver cover

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Development Cycle 2

A 1:2 ratio proportion creates a speaker that is too tall compared to the width making the speaker appear dominant and unkind.
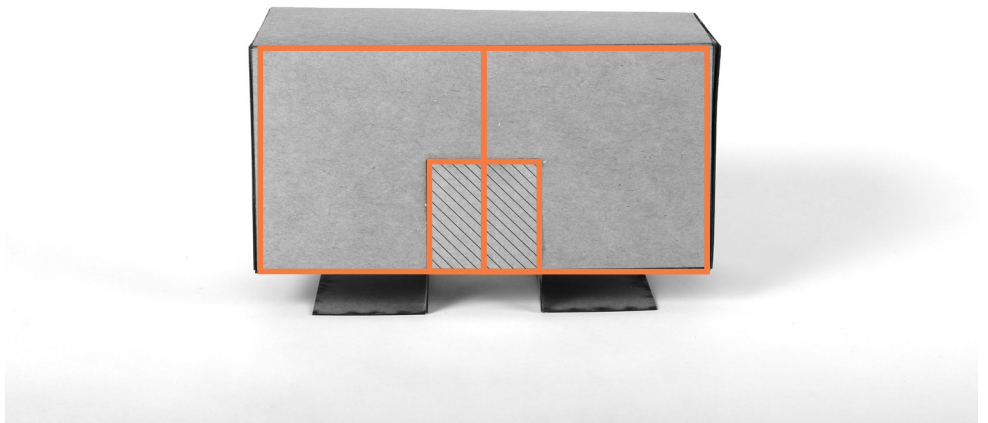

Figure 82. Maunsell-Wybrants, H. (2015). Proportion outline of initial development model

Golden Ratio

It is at this stage of the study that proportions according to the golden ratio is introduced. I want to retain visually pleasing proportions while still having the flexibility to develop the box.

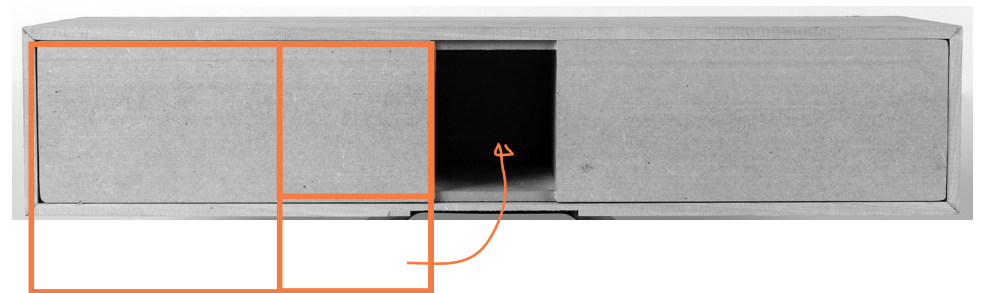The centre compartment houses the amplifier and is proportional to the small rectangle.

Figure 83. Maunsell-Wybrants, H. (2015). Wooden prototype using golden section proportions.

Figure 84. Maunsell-Wybrants, H. (2015). Wooden prototype introducing a bass-reflex port slot

Line

The addition of a horizontal slot (to function as a forward facing outlet for the bass reflex port) creates a visual line that lightens the box and references a 'mouth'. This creates an anthropomorphic feature that emphasises the 'kind' attribute.

The dimensions of the slot are proportional to the rest of the speaker based on the golden proportions.

Straight lines without any curves or angles were not part of the research by Lunholm (1921) or Poffenberger & Barrows (1924), but based on their research assumptions were made as to how straight lines without curves or angles might be perceived:

- Horizontal straight lines will most likely express rigidity and stiffness.
- Vertical straight lines stability, strength and vigour.

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Colour

The use of different dominant speaker colours (Refer to pages 79-81) was explored using a mid-century modern colour palette.

The brown and mustard colours embody associated values of the 1940's - 1960's. They are warm colours and therefore more energetic appearing to draw nearer to the viewer (Saw, 2001).

Blue is a cool colour which is calming and stable. it receedes from the viewer appearing more subtle and unobtrusive (Saw, 2001).
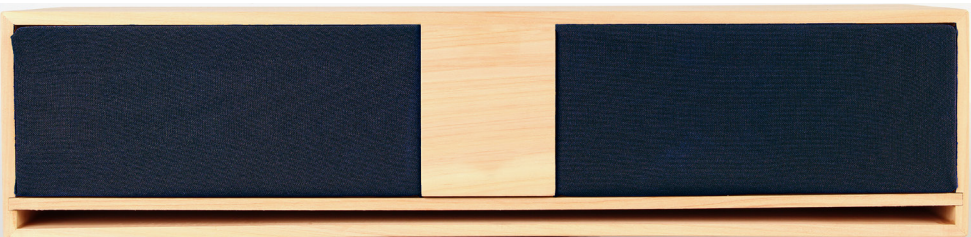
Figure 85. Maunsell-Wybrants, H. (2015). Exploring colour and material combinations

Principle of Familiarity - refers to the preference for familiar colours such as those found in nature or associated with fond memories (Fehrman & Fehrman, 2000).
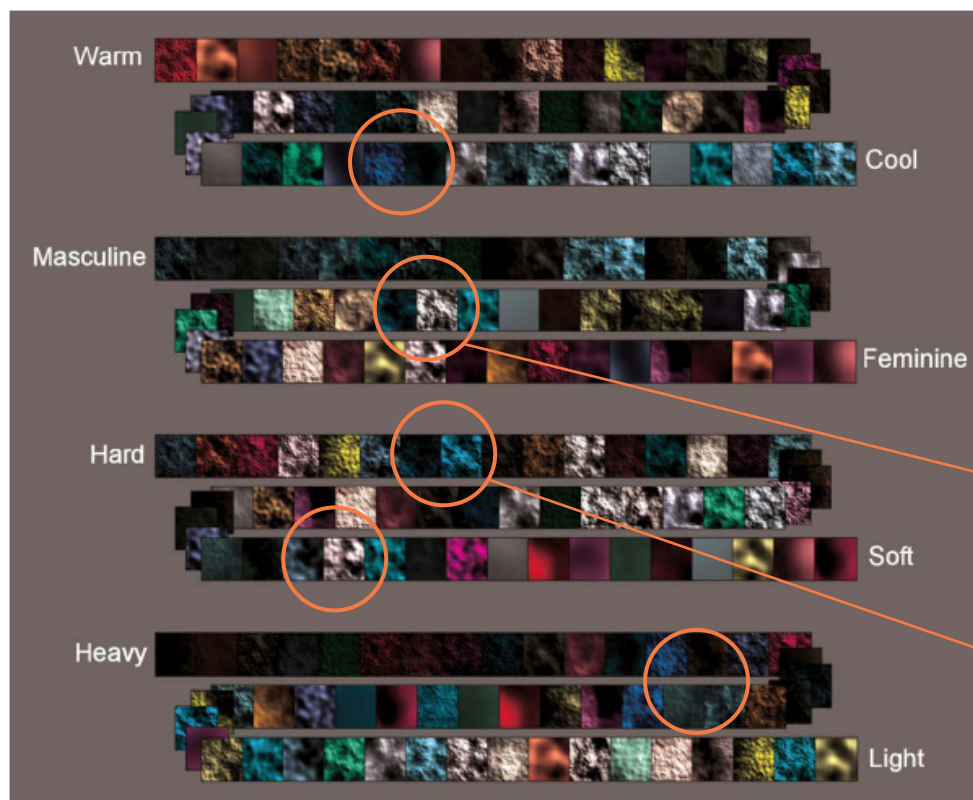
Mid-century modern

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Figure 86. Lucassen, M. P., Gevers, T., & Gijsenij. (2010). [Colour texture samples].
In Lucassen, M. P., Gevers, T., & Gijsenij, A. (2010). Texture affects color emotion. *Color Research and Application 36*(6),426–436. http://doi.org/10.1002/col.20647

Texture

A study carried out by Lucassen, Gevers, and Gijsenij (2010) concluded that the emotions associated with colour changed when texture was added (Figure 86). They note "when textured samples are involved in colour emotion studies, texture cannot be ignored" (p. 433).

Different emotions and personalities can be attributed to textures using colour (Wong, 1993).

Shows how the blue, used as the dominant colour of the speaker through textured fabric, fits into each texture dimension.

Blue can be described as either hard or soft making it less likely to communicate the personality attribute 'kind'. Other product dimensions will need to explore 'kindness' instead, like form and materials.

Figure 87. Maunsell-Wybrants, H. (2015). Investigating colour and texture

Reflection

- The rough texture of the brown fabric contrasts with the smooth wooden box to appear more kind by referencing items that are soft such as a warm blanket or soft toy.
- The soft fabric reduces the functionality and quality of the speaker by deadening the sound exiting the driver.
- A lighter, tighter weave fabric is functionally better by maintaining sound quality (Practical guide, 2007a).
- Fine fabric also has a more simple and refined aesthetic.

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These images explore of the central control panel in terms of shape, size and form.

Reflection

- A square control panel is more dominant and appears more important than a rectangular one.
- The proportions of the control panel associated to the rest of the speaker continue to apply the rules of the golden section.

Figure 88. Maunsell-Wybrants, H. (2015). Investigating the control panel size and shape
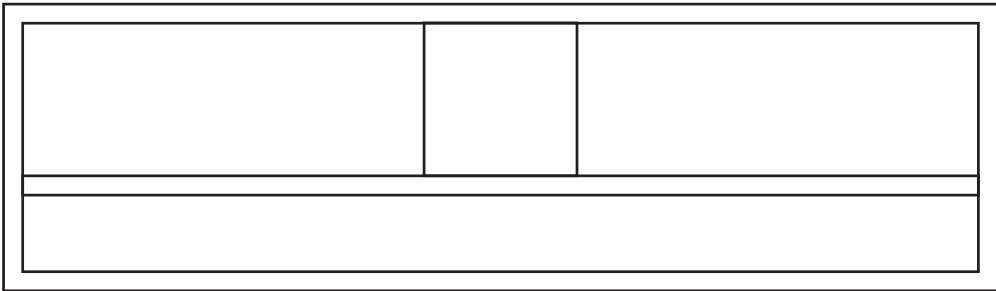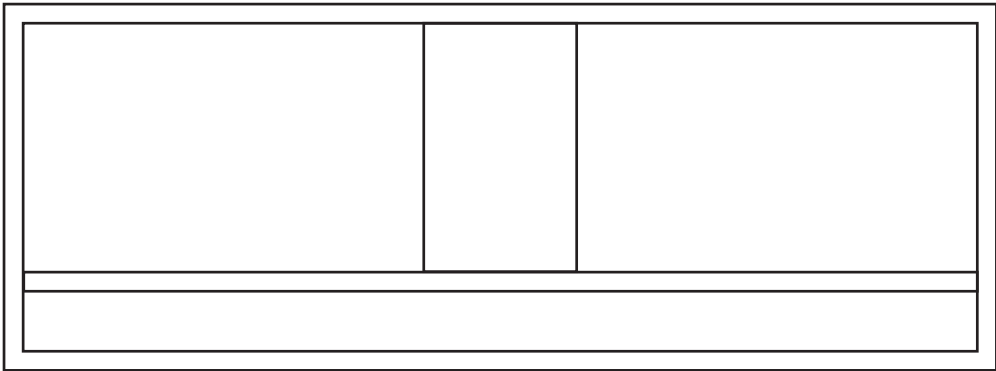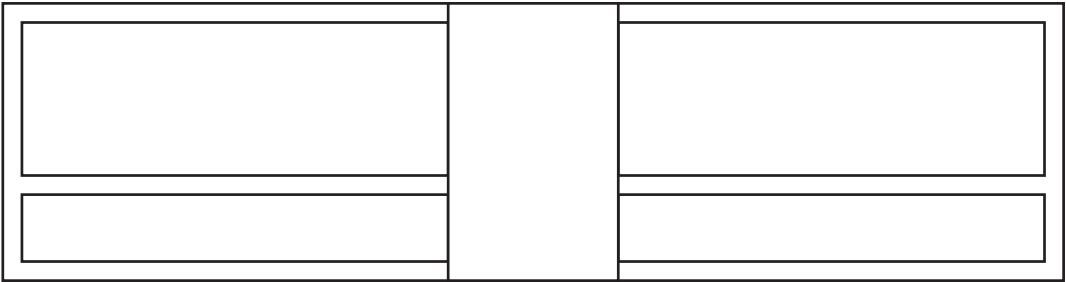
Development Cycle 3

Proportion

These images further explore variations of proportion and methods of incorporating the golden section.

This line of enquiry arose from questioning whether a larger BRP slot would appear more purposeful while still meeting the 'horizontal' attribute analysis requirement.
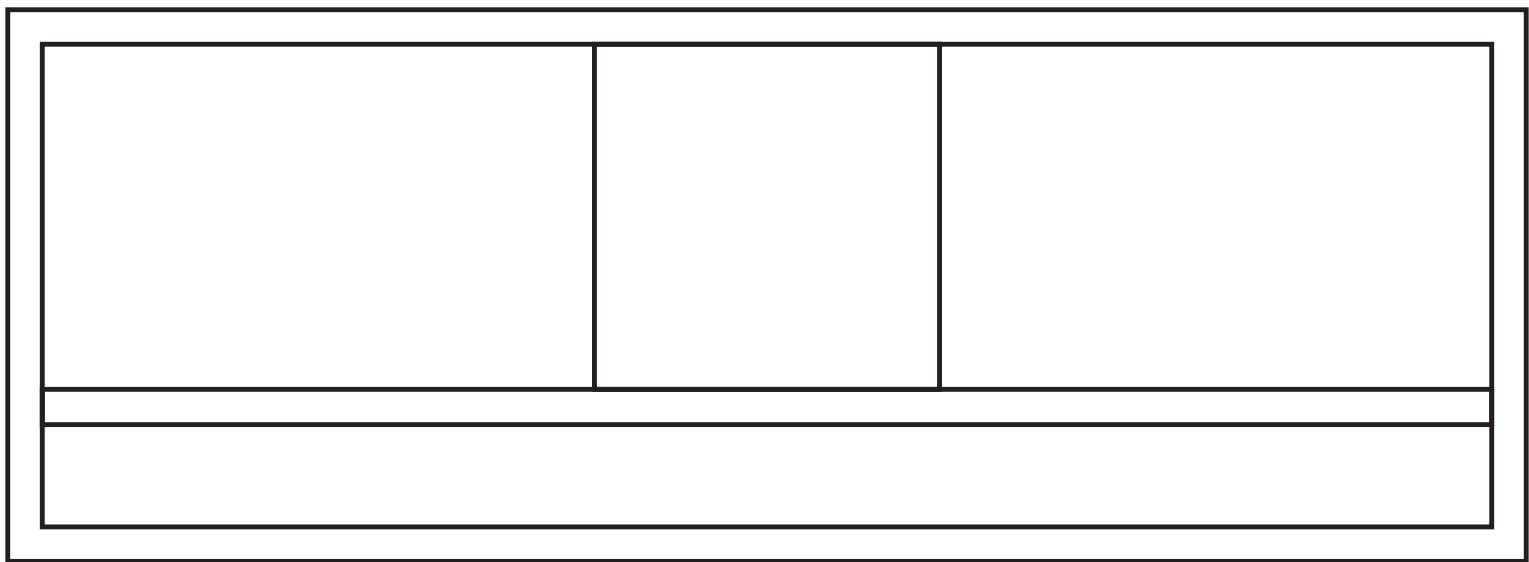
Figure 89. Maunsell-Wybrants, H. (2015). Drawings developing speaker proportions according to the golden section

The proportions of this concept gives each component (drivers, control panel, and BRP slot) a hierarchy.

The drivers are proportional to the control panel (which requires less area) but maintains importance by using a dominant shape.

The slot supports the drivers and control panel by providing a visual platform to rest on without overpowering the overall form.

Prototype

This design utilised a wooden shell (macrocarpa) with compartments designed to house the drivers and amplifier. The wooden shell explores an artisanal approach to design by focusing on the jointing methods used for construction.

Each of the internal panels have been joined using a rebate hidden on the front edge to appear simple and refined.

The mitre joints for the box corners are invisible when viewed from the side/edge making the box feel it is one complete object and not made up of parts ('law of totality', refer to page 66). Using this jointing method limits distractions and highlights the elements used to communicate personality while emphasising simplicity.

Figure 90. Maunsell-Wybrants, H. (2015). Proportion and construction development
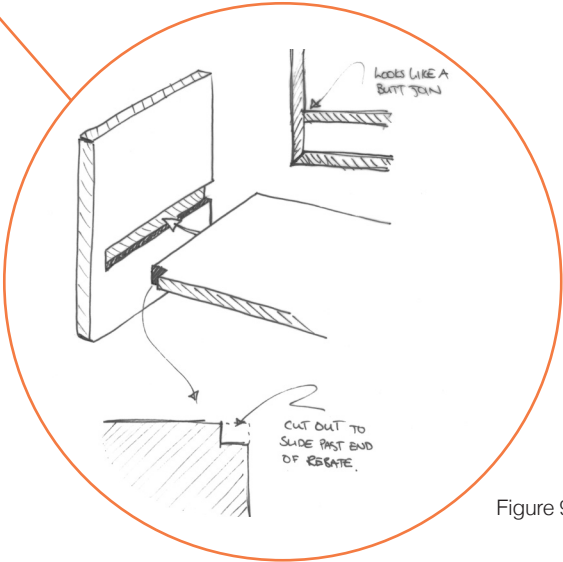

LOOKS LIKE A BUTT JOIN

CUT OUT TO SLIDE PAST END OF REBATE.

Figure 91. Maunsell-Wybrants, H. (2015). Rebate join detail

Line

Figure 92. Wong, W. (1993). *[Characteristics of straight lines]*. In Wong, W. (1993). *Principles of form and design*. New York: VanNostrand Reinhold.

Wong (1993) describes some of the more physical characteristics of straight lines and the effect this has on how the line is viewed. He illustrates how a lines thickness gives it weight, length, and direction (1993). Wong also states that the thicker a line becomes, the more prominent the lines endings appear to be, and when used as an edge to a plane, positive and negative space is divided. Figure 96 shows how the physical characteristics of lines in the speaker design effect how the line is viewed.
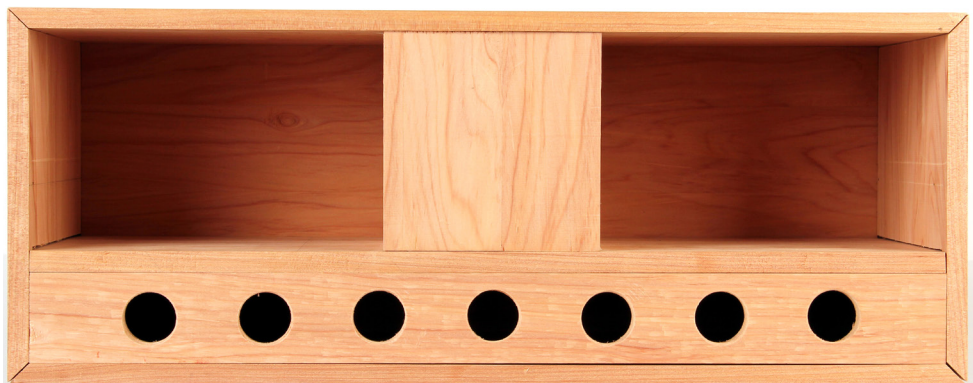
Now constructed and in timber, the proportion of the BRP slot to the rest of the box is visually too dominant.

The slot is designed be interpreted as a horizontal line to unite all of the components. It has been explored further in an effort to reduce visual dominance using the examples illustrated by Wong (1993).

Adding a radius to the end of the slot separates it from the rest of the box through the contrast created between the square box corners and round BRP slot ends.

The holes associate with mid-century modern patterns and geometric shapes were applied to the box to make it appear thinner. When placed in a line the circles adhere to the Gestalt law of order, and symmetry making the speaker understandable and calming for the viewer.

Reflection

- The hidden joins and simple construction methods appear kind, moderate and honest.
- Changing the proportions resulting in a larger BRP slot has produced a box that is too dominant.
- The proportions of the driver and amplifier compartments are visually pleasing however, so reducing the height of the BRP slot on this box should be explored.

Figure 93. Maunsell-Wybrants, H. (2015). Bass-reflex port slot variations

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Development Cycle 4

Line

The grain direction of the control panel guided the decision to install the sliding volume control vertically. From a usability perspective installing the slider vertically (sliding upwards to increase the volume) is user-centred design making use of the user's intuition.

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The thinner BRP slot from cycle (19) is much more elegant and purposeful. It creates uniformity between itself and the slot used for a sliding volume control.

Figure 94. Maunsell-Wybrants, H. (2015). Speaker prototype showing volume control slot

The stand for the speaker is a good opportunity to explore how line can be used to communicate specific personality attributes to the viewer.
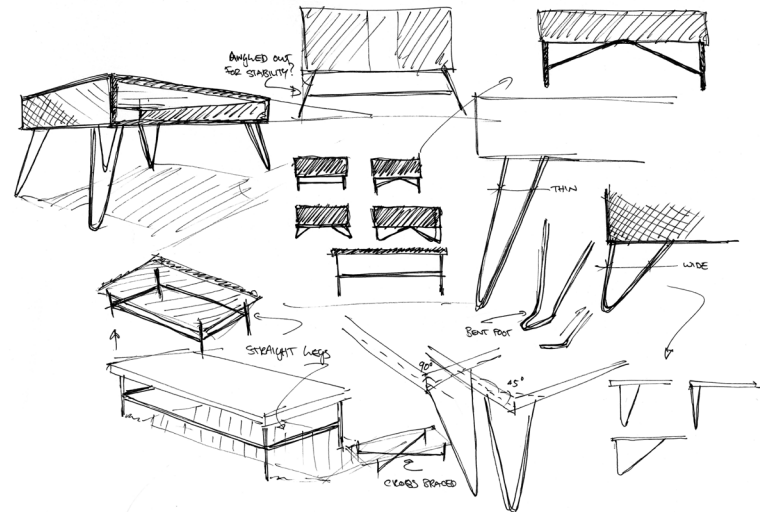

Figure 95. Maunsell-Wybrants, H. (2015). Wire leg variation sketches

This stand works to draw the users eye to the control panel increasing usability.

Legs reference hairpin legs commonly found on mid-century and Scandinavian furniture (Figure 95).

Made from brass the legs appear elegant and refined. The vertical and horizontal straight lines of the legs visually unites them with the box by maintaining a consistent visual language.

This stand is an excellent example of visual organisation using the Gestalt law of parallelism.
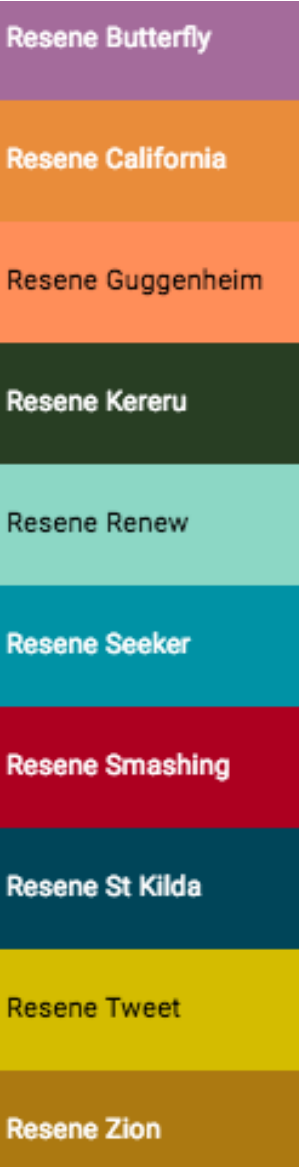
Reflection

- The straight brass stand visual lightens the speaker introducing a submissive quality which balances the dominance of the square form.
- Elegance and precision is now associate with the speaker and the nature of the raw materials enhances the 'honest' personality attribute.

Figure 96. Maunsell-Wybrants, H. (2015). Wire leg variations

Colours from a mid-century colour chart were explored using photo editing software.

Resene Butterfly	
Resene California	
Resene Guggenheim	
Resene Kereru	
Resene Renew	
Resene Seeker	
Resene Smashing	
Resene St Kilda	
Resene Tweet	
Resene Zion	

Figure 98. Habitat by Resene. (2013). *[Mid-century modern colour scheme]*. Retrieved from http://www.habitatbyresene.co.nz/get-mid-century-modern-look

Reflection

- After investigating colours based on their association to the mid-century modern design aesthetic, blue is still the most appropriate for this design project based on the psychology that supports blue being calming, trustworthy, refined, and stable (Figure 54).

Figure 97. Maunsell-Wybrants, H. (2015). Exploring mid-century modern colours

Figure 99. Maunsell-Wybrants, H. (2015). Wooden legs turned on the lathe
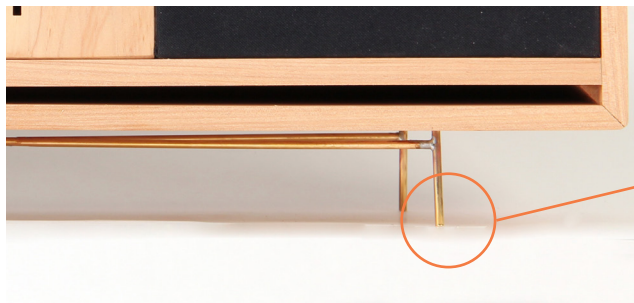
The small, sharp brass foot might damage the surface that the speaker sits on. Further development exploring the use of timber legs influenced by Scandinavian sideboards and chairs produced a selection of legs turned on a wood lathe (Figure 99).

Figure 100. Maunsell-Wybrants, H. (2015). Wire foot detail

Figure 101. Maunsell-Wybrants, H. (2015). Testing wooden leg variations on the speaker

The vertical leg is more simple. There is also something visually pleasing about the structure and order generated by lines that intersect at perpendicular angles.

'Not tapered' was a product dimension specified by the product analysis process, however Butter (1989) explains that "a designers tacit understanding of perception and visual composition often guide their intuitive judgements" (p. 12) as is the case here. I believe the tapered legs balanced the overall form of the speaker and their roundness adds an element of kindness to the products personality.
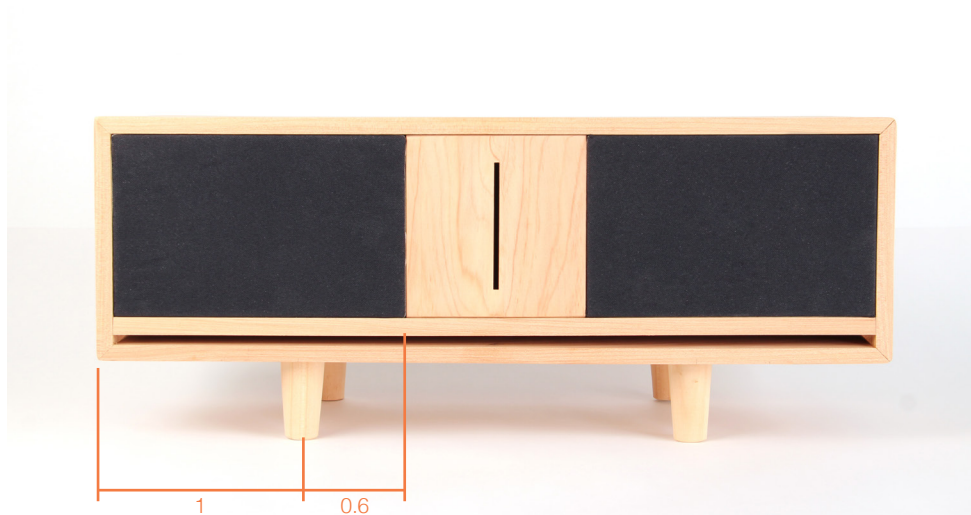
Figure 102. Maunsell-Wybrants, H. (2015). Positioning the wooden legs

The legs are positioned according to the golden section (figure 102).

Figure 103. Maunsell-Wybrants, H. (2015). Exploring brass foot details

Development (by adding a brass detail on the leg as a foot) was influenced by the design of a Scandinavian set of drawers (Figure 104).

Figure 104. United Furniture. (c. 1960). *Curved front drawers*. Retrieved from http://www.mrbigglesworthy.co.nz/index. php?a=gallery&c=15&p=1964

SQUARE TO GROUND.

RADIUS ON EDGE

TINY FOOTPRINT

UP SIDE DOWN CONE

FLAT TOP?

FOLLOWS THE TAPER OF THE LEG

HALF ROUND

TINY ACCENT ON BASE OF FOOT.

HALF WOODEN & HALF BRASS

Figure 105. Maunsell-Wybrants, H. (2015). Brass foot detail sketches.

Figure 106. Maunsell-Wybrants, H. (2015). Brass foot detail on finished leg.

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Reflection

- The speaker displays a strong link to Scandinavian and mid-century modern furniture through the embodiment in design method 'association'.
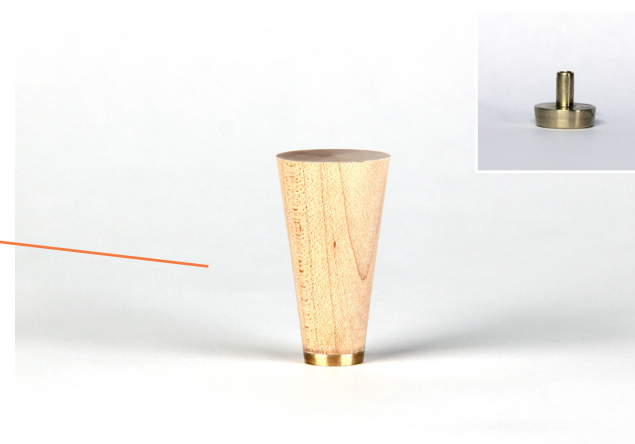- The association to Scandinavian and mid-century modern furniture embeds the affiliated personality attributes simple, honest, moderate, and stable into the speaker.
- Brass accents supports a moderate personality attribute and connect with the 'professional' target market.
- The brass foot visually grounds the speaker to the surface it sits on emphasising stability.
- The speaker appears anthropomorphic as all of the components come together with the drivers suggesting eyes, the volume slide slot a nose, the BRP slot a mouth, and all sitting on four stable legs.

Figure 107. Maunsell-Wybrants, H. (2015). Front view of speaker without LED indicators.

Continued Development

The development of the wireless speaker will continue between the hand in of this design research document and the presentation (see appendix 5). The speaker is not operational and this leaves room to design important details such as power supply and power switch type and position, visual signifiers for usability (LED operation lights), and refinement of the volume slider.
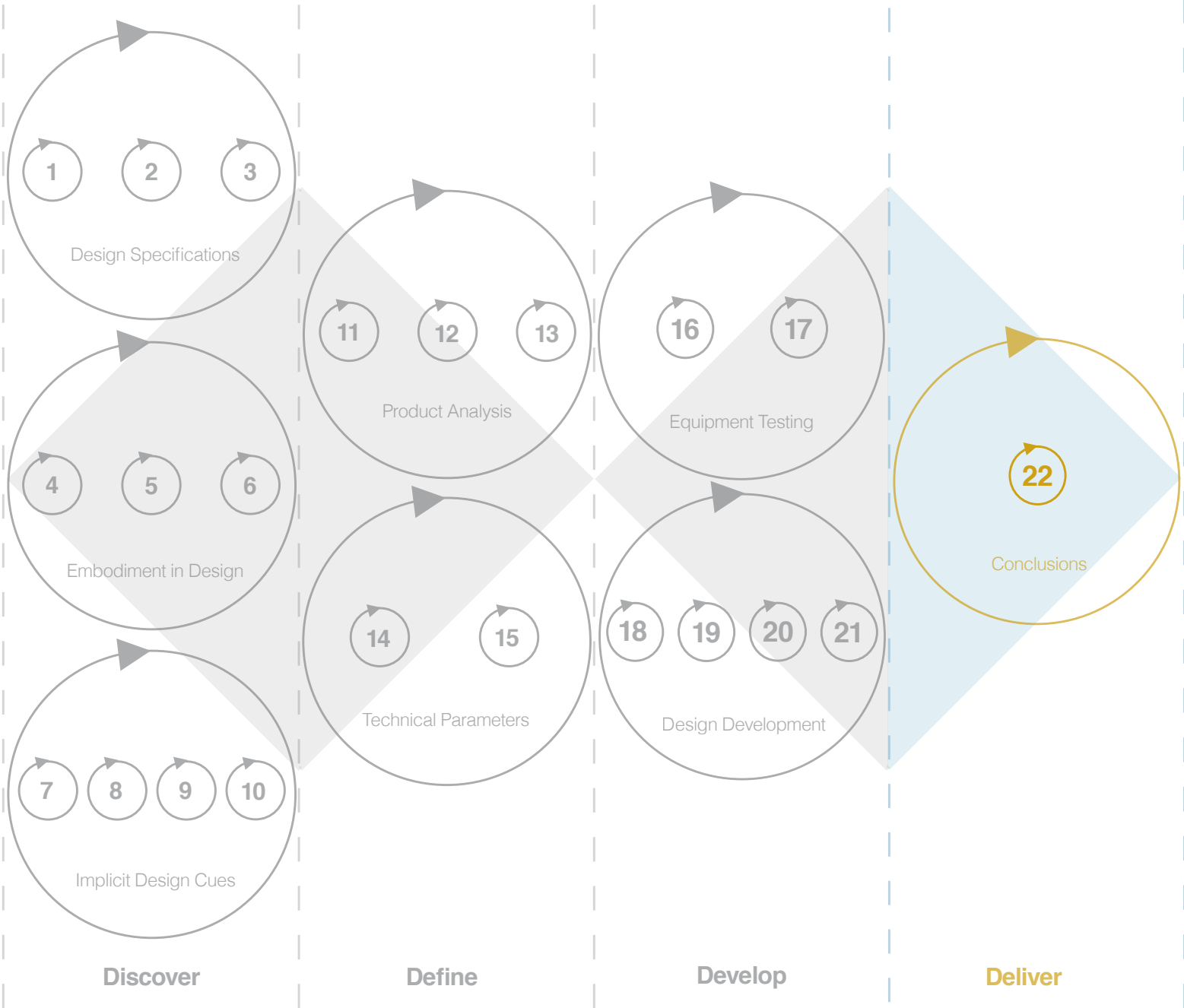
Deliver Phase

Figure 112. Maunsell-Wybrants, H. (2015). Project map highlighting 'deliver' phase

Deliver

22 **Conclusion**

**Conclusions from the Research
Project Findings**

Conclusion

The goal of a product designer is to develop a product that is successful for the target audience. Designing a product with a congruent personality to the intended consumer's, using knowledge of product semantics, is one method to achieve this connection.

People perceive different personalities in products by assessing the product aesthetics for visual cues. To improve a user's preference for a specific product the aesthetic qualities can be designed to communicate a personality consistent with the user's personality.

The aim of this project was to investigate how a combination of product elements and variations among product dimensions can communicate a personality congruent with the user's personality. By exploring embodiment in design and implicit design cues to inform existing product analysis, the knowledge gained from the process was then applied to a wireless speaker. The wireless speaker was constructed as a vehicle to illustrate how the personality attributes *kind, honest, moderate, simple* and *stable* could be communicated to the viewer using product semantics.

The rigorous process of analysing 75 products for personality and semantic differentiation did not produce results with a depth that was anticipated. What I had hoped would provide a collection of semantic options that could be used to express specific personality attributes for future design projects resulted in a limited set of guiding parameters to define to the design brief.

It is important for designers to understand how product attributes can be designed to deliver a message to the consumer. This project has outlined and explored a number of embodiment methods and semantic interpretations that has added to the body of knowledge on product personality and can be built on and tested through future research.

I acknowledge that there are limitations pertaining to this study that need to be addressed. The study is subjectively weighted. Unfortunately due to time constraints and guidance from my supervisors, it was decided that gaining ethical approval for a focus group was not practical. Without a focus group there was limited ability to test the product through the development process. Anecdotal evidence however, in the form of comments and reactions from the target market, have been strongly positive. This provides confidence in the wireless speaker's ability to successfully fulfil the design brief by illustrating a resolved solution based on the knowledge obtained in the research project.

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List of Figures and Tables

Figures

Figure 75. Avantgarde Acoustics. (2015). *Uno Fino Speaker.*
    Retrieved from http://www.avantgarde-acoustic.de/en/
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Figure 86. Lucassen, M. P., Gevers, T., & Gijsenij. (2010). [Colour
    texture samples].
In Lucassen, M. P., Gevers, T., & Gijsenij, A. (2010). Texture affects
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Figure 92. Wong, W. (1993). *[Characteristics of straight lines].*
In Wong, W. (1993). *Principles of form and design*. New
    York: VanNostrand Reinhold.

Figure 98. Habitat by Resene. (2013). *[Mid-century modern colour
    scheme]*. Retrieved from http://www.habitatbyresene.co.nz/
    get-mid-century-modern-look

Figure 104. United Furniture. (c. 1960). *Curved front drawers.*
    Retrieved from http://www.mrbigglesworthy.co.nz/index.
    php?a=gallery&c=15&p=1964

Tables

Table 1. Wellman, K., Bruder, R., & Oltersdorf, K. (2004).
    Dominant versus Submissive Traits [Table].
Adapted from Gorp, T. V., & Adams, E. (2012). *Design for emotion*.
    Waltham, MA: Morgan Kaufmann.

This thesis includes a number of illustrations and images created by the author
to demonstrate various aspects of the discussion. These include:
Figures 2, 7, 8, 10-13, 17, 23-38, 40-43, 46-49, 51-53, 55-58, 60, 61, 63-74,
    76-85, 87-91, 93-97, 99-103, 105, 106, 107, 108, 109, 110.
Tables 2,3.

Any future use of these images to be referenced to the source:
Maunsell-Wybrants. H. (2015). *Product Personality*: An investigation how
    congruent personalities identified in the target market can intentionally be
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Appendix 1

Speaker Attribute Analysis for the Personality Attribute 'Moderate'

Moderate Speakers			Moderate					Excessive						Total Moderate	Total Excessive
			Grain Speaker	Symbol Speaker	Q Speaker	Marley Get Together	Addon Speaker	Bose Speaker	Panasonic Speaker	Aura Speaker	Samsung 650	Samsung 750			
Attributes															
Shape & Form	Rounded Corners				1	2	1				2			4	2
	Sharp Corners		2	2				2	1					4	3
	Flat Surfaces		2	2	2	2	2	2	2		2			10	6
	Curved Surfaces							2	2	2				0	6
	Soft Edges				2	1	1	1	2	1	1			4	5
	Sharp Edges		2	2				2	2		2			4	6
	Straight Lines		2	2	1	2	1	2	2		1			8	5
	Curved Lines					2		1	2	2				2	5
	Sharp Lines			2				2	2					2	4
	Geometric		2	2	2	2	2	2	2		2			10	6
	Organic									2				0	2
	Angular								2					0	2
	Linear			1	1	2		2	2	1				4	5
	Planar		2	1	2	1			2	1				6	3
	Symmetrical		2	2	2	2	2	2	2	2	2	1		10	9
	Spherical									1				0	1
	Cylindrical							1	2	2				0	5
	Square		2	2	2	2	2	2	2		2			10	6
	Triangular								1					0	1
	Thin				1									1	0
	Tapered								2	2	1			0	5
	Solid		2	2	2	2	2	2	2		2	2		10	8
	Vertical									1				0	1
	Horizontal			2	2	2	2	2	2		2	2		8	8
	Anthropomorphic													0	0
	Top Heavy				2									2	0
	Base Heavy									2				0	2
	Dominant		1		1		2	2	2		2	2		4	8
	Submissive			1		2				2				3	2
	Box/cube		2	2	1	2	2	2	2			2		9	6
Visual Weight	Heavy		2	2	2	2	2	2	2		2	2		10	8
	Light									2				0	2

Speaker Attribute Analysis for the Personality Attribute 'Simple'

Simple Speakers			Simple						Complex						Total Simple	Total Complex
			Addon Speaker	Q Speaker	Symbol Speaker	Grain Speaker	B&O Beoplay		Panasonic Speaker	Bose Speaker	Aura Speaker	Samsung 750	Marshall			
Attributes																
Shape & Form	Rounded Corners		1	1								2	2		2	4
	Sharp Corners				2	2			1	2					4	3
	Flat Surfaces		2	2	2	2	2		2	2		2	2		10	8
	Curved Surfaces						2		2		2				2	4
	Soft Edges		1	2			2		1		2	1	2		5	6
	Sharp Edges				2	2			2	2		2			4	6
	Straight Lines		1	1	2	2	2		2	2		1	2		8	7
	Curved Lines						2		1		2				2	3
	Sharp Lines				2				2	2					2	4
	Geometric		2	2	2	2	2		2		2	2	2		10	8
	Organic														0	0
	Angular								2						0	2
	Linear			1	1				2	2					2	4
	Planar			2	1	2	2		2		1				7	3
	Symmetrical		2	2	2	2	2		2	2	2	1	2		10	9
	Spherical						2				1				2	1
	Cylindrical						2		1		2				2	3
	Square		2	2	2	2			2	2		2	2		8	8
	Triangular								1						0	1
	Thin			1			2								3	0
	Tapered								2		2				0	4
	Solid		2	2	2	2	2		2	2		2	2		10	8
	Vertical						2				1				2	1
	Horizontal		2	2	2				2	2		2			6	6
	Anthropomorphic														0	0
	Top Heavy			2			2								4	0
	Base Heavy										2				0	2
	Dominant		2	1		1			2	2		2	1		4	7
	Submissive				1		2				2				3	2
	Box/cube		2	1	2	2			2	2		2	2		7	8
Visual Weight	Heavy		2	2	2	2	2		2	2		2	2		10	8
	Light										2				0	2

Appendix 3

Speaker Attribute Analysis for the Personality Attribute 'Stable'

Stable Speakers		Stable					Unstable					Total Stable	Total Unstable
		Addon Speaker	Symbol Speaker	Q Speaker	Grain Speaker	Bowers&Wilkins A7	Panasonic Speaker	Aura Speaker	Bose Speaker	Marshall	Samsung 750		
Attributes													
Shape & Form	Rounded Corners	1		1		2			2	2		4	4
	Sharp Corners		2		2		1		2			4	3
	Flat Surfaces	2	2	2	2	1	2		2	2	2	9	8
	Curved Surfaces					1	2	2				1	4
	Soft Edges	1		2			1	2		2	1	3	6
	Sharp Edges		2		2	1	2		2		2	5	6
	Straight Lines	1	2	1	2		2		2	2	1	6	7
	Curved Lines					1	1	2				1	3
	Sharp Lines		2				2		2			2	4
	Geometric	2	2	2	2	2	2	2		2	2	10	8
	Organic											0	0
	Angular						2					0	2
	Linear			1	1		2		2			2	4
	Planar		1	2	2		2	1				5	3
	Symmetrical	2	2	2	2	2	2	2	2	2	1	10	9
	Spherical							1				0	1
	Cylindrical						1	2				0	3
	Square	2	2	2	2	2	2		2	2	2	10	8
	Triangular						1					0	1
	Thin			1								1	0
	Tapered						2	2				0	4
	Solid	2	2	2	2	2	2		2	2	2	10	8
	Vertical							1				0	1
	Horizontal	2	2	2			2		2		2	6	6
	Anthropomorphic											0	0
	Top Heavy			2								2	0
	Base Heavy							2				0	2
	Dominant	2		1	1	2	2		2	1	2	6	7
	Submissive		1					2				1	2
	Box/cube	2	2	1	2	1	2		2	2	2	8	8
Visual Weight	Heavy	2	2	2	2	2	2		2	2	2	10	8
	Light							2				0	2

Appendix 4

Speaker Attribute Analysis for the Personality Attribute 'Honest'

Honest Speakers			Honest						Dishonest						Total Honest	Total Dishonest
			Addon Speaker	Symbol Speaker	Fawn Speaker	Audiogine-B2	Q Speaker		Aura Speaker	Bose Speaker	B&O Beoplay	Libratone Speaker	iHome			
Attributes																
Shape & Form	Rounded Corners		1			1	1								3	0
	Sharp Corners			2	2					2					4	2
	Flat Surfaces		2	2	2	2	2			2	2	2	1		10	7
	Curved Surfaces								2		2	1	1		0	6
	Soft Edges		1			1	2		2		2	2			4	6
	Sharp Edges			2	2	2				2			2		6	4
	Straight Lines		1	2	2	2	1			2	2	1			8	5
	Curved Lines								2		2		2		0	6
	Sharp Lines			2						2					2	2
	Geometric		2	2	2	2	2		2		2	2	2		10	8
	Organic														0	0
	Angular														0	0
	Linear			1	1	1	1			2					4	2
	Planar			1	2	1	2		1		2	2	1		6	6
	Symmetrical		2	2	1	2	2		2	2	2	2	2		9	10
	Spherical								1		2	1			0	4
	Cylindrical								2		2	1	2		0	7
	Square		2	2	2	2	2			2					10	2
	Triangular														0	0
	Thin						1			2	2				1	4
	Tapered								2						0	2
	Solid		2	2	2	2	2			2	2	2	2		10	8
	Vertical								1		2	1			0	4
	Horizontal		2	2	1	2	2			2					9	2
	Anthropomorphic					1									1	0
	Top Heavy						2				2				2	2
	Base Heavy								2						0	2
	Dominant		2			1	1			2					4	2
	Submissive			1	1				2		2	2	2		2	8
	Box/cube		2	2	2	2	1			2					9	2
Visual Weight	Heavy		2	2	2	2	2			2	2	2	2		10	8
	Light								2						0	2
															0	0

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Finished Product

Figures 108 and 109 show the final product as it was exhibited in the final presentation for marking.

Figure 108. Maunsell-Wybrants, H. (2015). Front view of finished wireless speaker [Maple, brass and cotton, 190 x 440 x 175mm]. In *Product Personality Masters Exhibition.* Napier, New Zealand: Eastern Institute of Technology, Vent Gallery, 11 Feb - 25 Feb 2016.

Figure 109. Maunsell-Wybrants, H. (2015). Front angle view of finished wireless speaker. [Maple, brass and cotton, 190 x 440 x 175mm]. In *Product Personality Masters Exhibition.* Napier, New Zealand: Eastern Institute of Technology, Vent Gallery, 11 Feb - 25 Feb 2016.

Appendix 6

Final Presentation

The final presentation of work exhibited for marking was designed to show a comprehensive range of the physical explorations involved with this research project supported by relevant text boards and images. Organising the explorations (prototypes and test models) in a left-to-right linear display helped the viewer to 'read' the work in a more understandable way to its final conclusion, a resolved wireless speaker that sat on a plinth on its own.

A power supply to the speaker allowed for the demostration of the 'power on' and 'bluetooth' LED indicator lights to be made visible as well as enabling the viewer to test the speaker using their own phones bluetooth capabilities.

Figure 110. Maunsell-Wybrants, H. (2015). *Product Personality Masters Exhibition.* Napier, New Zealand: Eastern Institute of Technology, Vent Gallery, 11 Feb - 25 Feb 2016.

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