DESIGNERLY WAYS OF SPEAKING: INVESTIGATING HOW THE DESIGN TRIBE OF RESEARCHERS SPEAK ON DESIGN THINKING

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Abstract

This thesis investigates how a community of design researchers speak on ‘Design Thinking’, a key concept in design research. The thesis traces the development of Design Thinking theory over the last 100 years. It identifies errors associated with how influential research (for example, Buchanan; Cross) frames the history of investigation into Design Thinking. For example, influential theorists do not consider a complete history of investigation into the way that designers think when discussing timescales of Design Thinking research. The thesis then summarises existing research into ways of speaking associated with Design Thinking and identifies significant gaps in the knowledge. Gaps include the absence of an agreed definition of ‘Design Thinking’ despite repeated calls. A lack of existing studies which use methods specifically designed to investigate ways of speaking have helped to create the gaps in knowledge. The thesis asks: how do Design Thinking researchers speak on Design Thinking? What purposes do these ways of speaking serve? The original work involves using methods specifically designed to investigate ways of speaking (*Corpus Linguistics* and *Content Analysis*). Three studies on ways of speaking are undertaken. The data set consists of peer-reviewed papers which focus on Design Thinking. The papers are published in design journals so are representative of ways of speaking used by the small academic design research community. This thesis terms this community the *Design Tribe*. Ways of speaking contrast *progressive* Design Thinking with a range of *dominant*, established ways of thinking (for example, STEM models). A distinctive lexicon characterises the way that researchers speak on Design thinking. Design Thinking is: *agile, complex, fluid, multimodal* and *collaborative*; established alternative ways of thinking *conceal, standardize*, are *rigid, squash* and *reduce*. The study reveals a range of inconsistencies associated with the ways that researchers classify Design Thinking. These issues highlight the part that a distinctive lexicon plays in enabling researchers to claim knowledge on Design Thinking. While there is little evidence to suggest a distinctive Design Thinking, there is certainly a distinctive and coherent form of discourse. This thesis terms this discourse, *‘designerly ways of speaking’*. The thesis also uses critical theory developed by Gilles Deleuze and Felix Guattari to speculate on aspects which help to sustain *designerly ways of speaking*.

Contents

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Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the University Ethics Committee on **July, 2012**.

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Name: Aysar Ghassan

Signature:

Date: 31st March 2019

Chapter 1

Introduction

Researchers and designers have been investigating how designers think for about 100 years. During this time, researchers have consistently analysed how designers may be able to solve large-scale problems which affect society. To illustrate, in the pre-World War Two era, Walter Gropius (1935) argued that designers can facilitate cultural harmony by creating artefacts with standardized forms. Post-World War Two, theorists like Herbert Simon (1996) claimed that design formulae could be used to rebuild society. Contemporary researchers investigate how designers may be able to contribute to tackling a wide range of issues, including making business environments more innovative (Dorst, 2011) and helping to improve government procurement processes (Design Council, 2011).

Though researchers have been investigating the ways designers think for some time, the term ‘Design Thinking’ has not been in use for the whole period. The term was coined in 1987 by the architectural researcher Peter Rowe (Dorst, 2010). The term ‘Design Thinking’ describes a creative problem-solving process which, researchers claim, is frequently used by designers (Cross, 2011). There is currently no agreed definition of Design Thinking (Design Research Society, 2016). However, influential researchers commonly describe it as a *solution-focussed*, creative problem-solving process (Cross, 2004; Dorst, 2011). The process enables practitioners to make use of iterative steps in generating satisfactory solutions to a range of difficult problems across disciplines (Cross, 2004; Dorst, 2011). These *difficult* problems are often referred to a *wicked* problems (Rith and Dubberly, 2007). Characteristically, Design Thinking researchers describe the process as contrasting problem-solving methods used in the natural sciences. The latter are seen as being *problem-focussed* and non-iterative, and are not useful in tackling wicked problems (Cross, 2004; Dorst, 2011). Both design researchers and leading design experts claim that non-designers can master Design Thinking (Manzini, 2011; Brown, 2009).

The idea that Design Thinking can help non-designers tackle a range of problems has fuelled a huge amount of interest in the concept globally. To illustrate, a Google Trends inquiry (see Figure 1) into internet searches which include the term ‘Design Thinking’ highlights the increase in interest in the concept in the last decade or so.

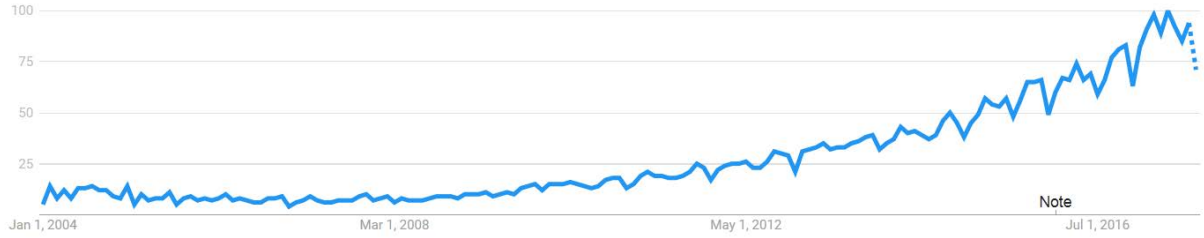


Figure 1. Interest in online searches for the term 'Design Thinking'. Taken from Google Trends (n.d., unpaged).

Currently, the interest is so high that a Google search for the term '*Design Thinking'* produces "About 35,300,000 results" (Google, n.d., unpaged). The huge amount of interest in Design Thinking has spawned discussion in a range of areas. Design Thinking is the "subject of an incredible number of articles and books", both in the popular press and in academic conferences and journals (Norman, 2013, unpaged). Books include *Design Thinking: Understand How Designers Think and Work* by the influential design academic Nigel Cross (2011). Interest in academia means that large international peer-reviewed conferences include paper streams which focus on Design Thinking (Design Research Society, 2016). In the broader professional realm, the regularly updated *Design Thinking Group* on the networking website *Linked In* has over 64,000 members, many of whom work in high profile companies and public institutions. (Figure 2).

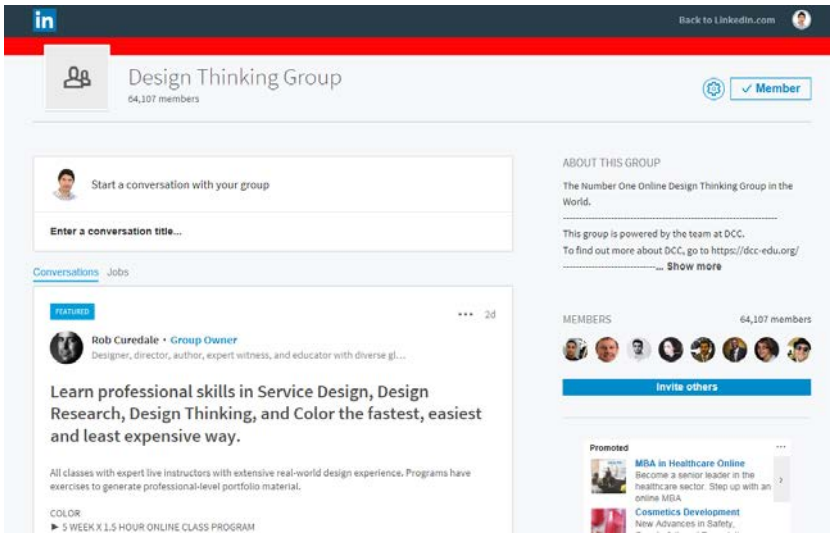


Figure 2. Interest in online searches for the term 'Design Thinking'. Taken from Google Trends (n.d., unpaged).

There are also countless blogs on Design Thinking. Blogs include, *The UX Blog*: https://theuxblog.com/blog/design-thinking and the *Design Thinker's Academy:* https://www.designthinkersacademy.co.uk/. Many commercial symposia claim to provide insights on how practitioners can apply Design Thinking methods. At an event hosted at Harvard University, delegates "hear[d] industry experts explain the power of creative thinking" (Harvard Magazine, 2013, unpaged). YouTube contains hundreds of videos on Design Thinking. These include posts uploaded by the Stanford Graduate School of Business (YouTube, 2016), the technology company IBM (YouTube, 2014) and the world's largest design consultancy IDEO (YouTube, 2014b). The videos claim to provide a summary

of Design Thinking and explore its use in helping people to solve problems. Each video has been viewed hundreds of thousands of times. There is also a great deal of interest in Design Thinking in teaching environments. Instruction in Design Thinking is available for learners of all ages and from all backgrounds and occurs at both non-assessed and assessed levels. Stanford University and IDEO have recently collaborated to create open-source teaching material with the aim of helping teachers across the world to educate children in Design Thinking (http://www.designthinkinginschools.com/). Stanford University and IDEO also run unassessed online "crash courses" in Design Thinking (Stanford University, n.d., unpaged). Stanford University (n.d., unpaged) claim that novices of all ages and from all backgrounds can use the online material to benefit their "personal and professional routines". Similarly, the Open University operates a successful online module in Design Thinking. The Open University (n.d., unpaged) claims their assessed course "will change your way of seeing and solving complex problems forever." Instruction on Design Thinking is also a feature at undergraduate level in leading institutions. To illustrate, at Loughborough University, Design Thinking forms an intrinsic part of the curriculum on the Design Ergonomics (Loughborough University A, n.d.) and Industrial Design and Technology (Loughborough University B, n.d.) programmes. Students can learn Design Thinking methods at MSc level—at Plymouth University (n.d., unpaged). With a new generation of learners becoming familiar with Design Thinking methods, it is likely that Design Thinking will continue to gain influence in a wide range of personal and professional areas.

A small body of research identifies important problems associated with Design Thinking research. This is noteworthy given the huge amount of interest in Design Thinking worldwide. Investigators question the idea that Design Thinking is a distinct and identifiable phenomenon. To this effect, Rylander (2009, p.10) claims influential research offers "little explanation" of the ways designers think. Similarly, Kimbell (2011, p.292) argues that research has yet to "generate[] a definitive or historically informed account of design thinking". Hassi and Laakso (2011) claim that empirical research on Design Thinking relies on flawed use of methodology. Incorrect application of methods makes it is impossible to "determine whether or not design thinking is [taking place]" (Hassi, and Laakso, 2011, p.2). Other criticisms highlight the way in which some non-design professions are represented in Design Thinking research. Investigators claim that Design Thinking researchers commonly create inaccurate representations of the ways that natural scientists solve problems (New and Kimbell, 2013; Farrell and Hooker, 2013). These inaccurate representations cast a critical spotlight on the idea that Design Thinking is a distinct and identifiable phenomenon. The huge amount of interest in Design Thinking in a range of areas makes it necessary to engage in further critical investigation of Design Thinking. Kimbell (2011) highlights the

presence of major gaps in knowledge on critical reflection on Design Thinking, claiming criticism is in its infancy. This thesis contributes a critical examination of Design Thinking research.

This thesis uses the idea of *discourse communities* in formulating the critical reflection. Research suggests that communities tend to represent concepts which are key to sustaining them in a manner which is not neutral (Thompson and Hunston, 2003; Swales, 1990). Instead, discourse communities skew these representations to claim legitimacy and influence (Thompson and Hunston, 2003; Swales, 1990). Communities use spoken or written language to create and disseminate their narratives. The term *ways of speaking* is commonly used to refer to the spoken or written language used by communities (Finken, 2003). Discourse communities are found in academia and centre around areas of research or teaching. Ways of speaking help academic discourse communities to claim ownership of knowledge in their specialised area (Becher and Trowler, 2001; Thompson and Hunston, 2003). Becher and Trowler (2001) argue that academic research communities can be extremely territorial over their subject area and as such function (in Becher and Trowler's terms[1]) as *tribes*:

> "we [are] concerned with the general characteristics of [academic] disciplinary cultures – their unifying features, cultural correlates and initiation processes"
> (Becher and Trowler, 2001, p.51)

Academics use ways of speaking which construct and defend the intellectual territory associated with their field of expertise. Ways of speaking are therefore vital in helping academic research communities to construct their identity and advance knowledge on their domain (Thompson and Hunston, 2003; Becher and Trowler, 2001). Becher and Trowler argue that 4 distinct avenues help a given academic tribe to create its ways of speaking. These are: how the tribe constructs its *intellectual territory*; how it *frames key concepts*; how members *speak on people*; how academics discuss *existing research* which is associated with their domain. Becher and Trowler term the last avenue, the *Collection Code*.

The huge level of interest in Design Thinking means that research on this concept is published in journals in a diverse range of field, for example, medicine (see, Patel et al, 2014), food science (see, Olsen, 2015), human computer interaction (see, Kim and Ryu, 2014), business management (Glen, et al, 2014) and children's spirituality (see, Tan and Wong, 2012). This thesis investigates ways of speaking on Design Thinking created and

[1] Indeed, Becher and Trowler's (2001) book is titled *'Academic Tribes and Territories'*

disseminated by members of the design research community. I term this the *Design Tribe* of researchers. I investigate this tribe because members claim that it originated research on Design Thinking and that the tribe has access to knowledge on the most authentic form of Design Thinking. Analysis of narratives constructed and disseminated by the Design Tribe may therefore provide insight into 'core' ways of speaking on Design Thinking. In the design literature, there are few examples of existing studies which identify ways of speaking on Design Thinking. Examples include New and Kimbell, (2013) and Farrell and Hooker (2013). This leaves a significant gap in the knowledge on ways of speaking which researchers use when constructing Design Thinking. In contributing to filling the gap in knowledge, I have tackled the following research question: *'How does the Design Tribe speak on Design Thinking?'* Investigation of the 4 avenues (or sub-themes) which Becher and Trowler (2001) have identified, enables a rigorous investigation of ways of speaking. With respect to this thesis, I investigate: how the Design Tribe constructs intellectual territory; how it frames Design Thinking; how members speak on designers and design students; how academics discuss the collection code.

The existing examples of studies which identify ways of speaking on Design Thinking result from reviews of literature. The contributions do not use methods specifically designed for investigating ways of speaking. This leaves a significant gap in the knowledge. I contribute to filling this gap by using methods specifically designed for investigating ways of speaking. I have used two methods in my analysis: *Corpus Linguistics* and *Content Analysis*. Corpus linguistics methods make use of specialised computer programs termed *concordancers*. Content analysis relies on manual analysis of texts. The use of both methods as discrete means of analysing sets of data are well-established in social science research (Baker et al, 2008). Their use in combination is also commonly seen in social science research. To illustrate, Baker et al., (2008) use corpus linguistics and content analysis in combination to research how British newspapers speak on asylum seekers. In this thesis, corpus linguistics analysis of article abstracts provides insights into initial indicative patterns in ways of speaking in the data set. Content analysis of full papers provides the definitive contributions. In 1982 the leading design researcher Nigel Cross, coined the term *designerly ways of knowing* to call for more research into how designers think. With reference to Cross' term, this thesis uncovers ***designerly ways of speaking***—the discourse which allows design researchers to create and sustain intellectual territory on Design Thinking. In uncovering *designerly ways of speaking*, the thesis creates knowledge on how researchers construct *Design Thinking*, *designers*, *design students* and *existing research on Design Thinking*. After focussing on the Design Tribe, the thesis uses critical theory developed by the post-

structuralist philosophers Gilles Deleuze and Felix Guattari (2004) to speculate on aspects which sustain *designerly ways of speaking*.

Prior to this thesis, corpus linguistics and content analysis methods had not been used in combination in design research. This thesis evidences the first application of the combination of these methods to the task of investigating ways of speaking in Design Thinking research. There follows a summary of the chapters which comprise this thesis:

Chapter 2 – 'Literature Review', begins by providing an overview of the history of Design Thinking research, both from the Early and Middle Decades of the 20th Century, and theory as put forward by more contemporary investigators. The literature review notes issues with the way that contemporary researchers commonly frame the dichotomy these two periods of Design Thinking research. This chapter then provides an overview of research on ways of speaking and discusses how these are produced and disseminated by academic tribes. I then note the idea of the 'Design Tribe' and reflect on existing evidence of ways of speaking which the are produced by the community before identifying large gaps in the knowledge on this subject. I move on to identify the research question which helps me to contribute to filling the gap in the knowledge.

Chapter 3 – 'Methodology', begins with by providing an overview of the history of research into ways of speaking. I then discuss overarching research considerations, including concepts of sampling and representativeness. I then introduce the methods which have helped me to tackle the research question (corpus linguistics and content analysis). I describe each method in detail, noting history, applications and limitations. I then discuss the data collection strategy and the process of creating the data sample. I reflect on the nature of the sample and describe the rationale for the primary research. The thesis contains primary 3 studies. The first 2 studies make use of corpus linguistics, the 3rd uses content analysis. Studies 1 and 2 produce initial findings. Study 3 produces results which form the contribution in this thesis.

Chapter 4 – 'Study 1', begins by describing the operational process of the investigation before stating the results. I move on to discuss the results as they relate to the 4 sub-themes of the research question. I conclude by providing a summary and list limitations.

Chapter 5 – ‘Study 2’, is structured in the same ways as Study 1. Additionally, it concludes by listing initial categories which emerge from the study. These studies were used when beginning Study 3.

Chapter 6 – ‘Study 3’, begins by describing the operational process of the investigation before stating the results. The results from this study form lead to the Definitve

Chapter 7 – ‘Discussion’, notes the significance of the results as they relate to the 4 sub-themes of the research question. This chapter also briefly introduces critical theory which helps me to speculate on aspects which sustain *designerly ways of speaking*.

Chapter 8 – ‘Conclusion’, clearly describes the contributions of the thesis and the limitations, and discusses possible areas of future work.

Chapter 2

Literature Review

The issue of *how designers think* has been a topic of interest for many influential researchers over the last 100 years. The leading design philosopher Richard Buchanan (2001) groups Design Thinking theories into two categories which he defines with respect to time frames. Buchanan (2001, p.13) terms the first approach to establishing theory on Design Thinking the “design theory of the early and middle decades of the twentieth century”. Buchanan (2001, p.13) terms the second the “new approach[] to design thinking”. For Buchanan, the two modes of Design Thinking are oppositional in character. Buchanan is not alone in putting forward a theory of 2 distinct, contrasting approaches to Design Thinking. This form of classification based on time-spans is common amongst contemporary design theorists. In this thesis I use the term ***Design Thinking of the Early and Middle Decades of the Twentieth Century*** to describe the design theory put forward in the early and middle parts of the last century. I use the term ***Contemporary Design Thinking*** to describe how modern-day design theorists classify Design Thinking.

2.1 Design Thinking of the Early and Middle Decades of the 20th Century

2.1.1 The Pre-World War 2 Era

Buchanan (2001) argues the first steps in initiating a theory of Design Thinking were taken at the *Staatliches Bauhaus*, a school of Art, Design and Architecture, formed in Germany in 1919. The Bauhaus was conceived by the renowned German modernist architect Walter Gropius (Weber, 2009). Gropius’ (Figure 3) ideas on Design Thinking came in reaction to what he saw as the prevailing aesthetic tastes of his era. At the time, affluent consumers sought highly decorative, hand-crafted artefacts. Ideas of *good design* therefore rotated around that of intricate decoration. Gropius (1935) criticised this elitism, claiming it to be a worrying sign of growing inequality in society. Referring to himself as a social reformer, Gropius stated his aim was to provide people of all social strata with access to what he believed to be good design.

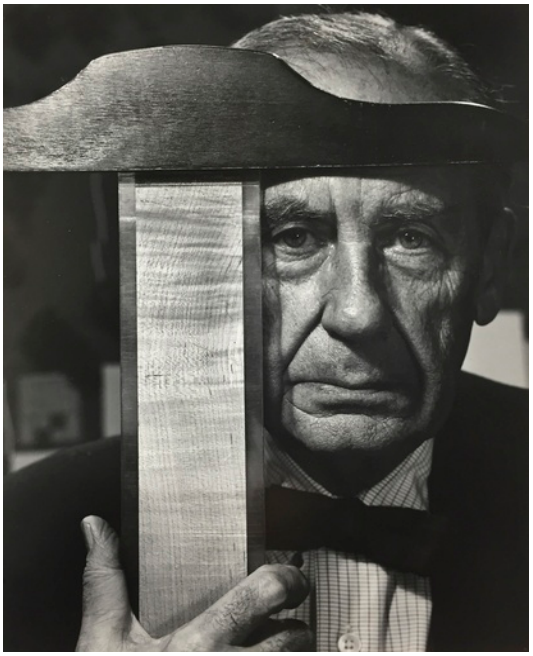


Figure 3: Walter Gropius. Taken from https://paddle8.com/work/philippe-halsman/111657-walter-gropius

Gropius (1935) argued that designers play a significant part in fuelling elitism. Gropius believed that designers have an irrational thinking process which leads them to input their emotions into the design process. The presence of emotion leads to an excessive amount of decorative additions to products. Gropius argued that to provide everyone with access to good design, the thinking around design had to alter significantly. He called on designers to refrain from including any emotions into the design process. In view of this, Gropius argued that design practice should be:

> "preceded by the elimination of the personal content of […] designers and all otherwise ungeneric or non-essential features"
>
> (Gropius, 1935, p.26).

Gropius argued that changing design practice into a rational process would eliminate emotions from it. To make design practice rational, designers should be guided by "impersonal [mathematical] standard[s]", numerical measurements that would dictate the form of all artefacts (Gropius, 1935, p.26). Gropius believed that the most successful method of effecting transition in the way that designers thought was to limit designers' use of hand-crafting techniques. Designers should instead create artefacts which can be manufactured using mechanised processes. Creating a revolution in the way that designers thought would mean that designers could work for a higher cause, solving social problems:

> "Mechanisation can have only one object: to abolish the individual's physical toil of providing himself with the necessities of existence in order that hand and brain may be set free for some higher order of activity."
>
> (Gropius, 1935, p.25)

Gropius argued that his rationalistic Design Thinking[2] would make all artefacts more cost-effective to produce (Gropius, 1935). His reformulated Design Thinking would allow more people access to good design, thereby improving their lives. Gropius also believed that his Design Thinking would create a situation where all objects would fit effortlessly into the context of a rationally designed modern home or city (Spitz, 2005). In this way, rationalistic Design Thinking would have a cumulatively positive effect in "enhanc[ing] civic dignity and coherence" (Gropius, 1935, p.27), thereby creating social cohesion.

Gropius argued that becoming familiar with scientific ways of thinking would enable designers to create social cohesion (Spitz, 2005; Gropius, 1962). Gropius believed scientific knowledge to be important for two reasons. Firstly, it enables designers to create the objectively correct generic objects which facilitate social reform. Secondly, scientific knowledge helps designers to collaborate with fellow professionals in multidisciplinary practice. The following quote provides insight into these points:

> "[A designer] has to absorb a scientific knowledge of objectively valid optical facts, a theory which guides the shaping hand and provides a general basis on which a multitude of individuals can work together harmoniously."
>
> (Gropius, 1962, p.24)

Although an architect by training, Gropius' Design Thinking is not limited to architectural design. Gropius (1935, p.35) instead claimed there to be a "fundamental unity underlying all branches of design". Therefore, Gropius suggests his interpretation of Design Thinking is widely applicable across design disciplines.

Gropius' enormous legacy in design practice and theory means that his take on Design Thinking is a valid starting point to further investigate pre-WW2 Design Thinking. It will become evident that the thinking of other leading theorists of this era is also influenced by a belief in rationalism and incorporating scientific knowledge into design practice.

The New Bauhaus

[2] Gropius did not use the term 'Design Thinking'. I use the term when discussing Gropius' philosophies to maintain consistency in the thesis narrative.

The Staatliches Bauhaus was closed in 1933 by the ruling German Nazi administration as it believed the School undermined its fascist cause. Leading Bauhaus thinkers fled to the USA. Amongst them, former tutor László Moholy-Nagy established the *New Bauhaus* design school in 1937 in Chicago (Findeli, 1990). The New Bauhaus was created as a spiritual successor to the Bauhaus (Findeli, 2001) and further advanced Gropius' Design Thinking. Moholy-Nagy was influenced by the Vienna Circle, an elite group of philosophers and social reformers who believed that rational, scientific principles should guide all human activity (Galison, 1996). Paralleling Gropius' belief that decoration in artefacts was unnecessarily wasteful, the Vienna Circle argued that human language was full of unnecessary terms and ways of phrasing sentences. Rational behaviour necessitated banning all but the most essential terms from use. Moholy-Nagy believed that to change society for the better, designers had to think in a rational, scientific manner which makes use of mathematical standards (Findeli, 1990). The spread of Bauhaus ideas to the USA led to wider dissemination of rationalistic pre-WW2 Design Thinking theory.

Le Corbusier

Le Corbusier (Figure 4) was an internationally renowned Swiss-French architect and designer.

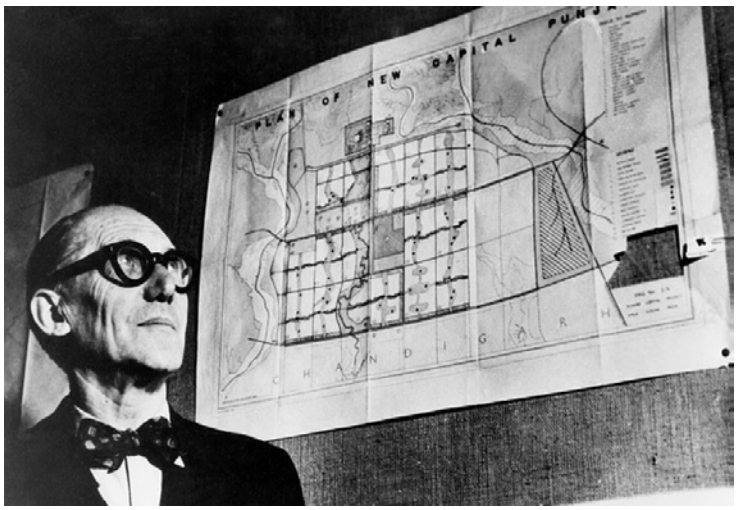


Figure 4: Le Corbusier.
Taken from https://www.curbed.com/2015/3/16/9980286/le-corbusiers-grave-in-france

Le Corbusier (1931) echoes Gropius in rejecting design which contains emotional elements. Le Corbusier criticised designers for producing irrational responses to design problems:

> “all the humbug talked about the unique object, the precious 'piece', rings false and shows a pitiful lack of understanding of the needs of the present day; a chair is in no way a work of art”
>
> (Le Corbusier, 1931, pp.141-142; original emphases)

Le Corbusier believed that the needs of his era could only be met if designers used rational, mathematical standards in their design process. Believing that engineers have a rational approach to problem-solving, Le Corbusier called for engineers (*and not designers*) to take the lead in design practice:

> “The engineer, inspired by the law of Economy and governed by mathematical calculation, puts us in accord with universal law. He achieves harmony”.
>
> (Le Corbusier, 1931, p. 11, Original Emphasis)

In downgrading the role of designers, Le Corbusier (1931) argued that their job should be limited to creating the physical form representing the material realisation of the engineer’s calculations. In foregrounding the role of engineers, Le Corbusier’s philosophy signposts further development of rationalistic pre-WW2 Design Thinking theory.

A Linear Order in the Design Process

Designers and educators responsible for creating pre-WW2 Design Thinking theory advocated a *linear order* in the design process. The term *linear* refers to a series of supposedly rational steps which occur in a prescribed, sequential order. Gropius’ (1935) Design Thinking evidences two linear stages in form development. The first is seen in his argument that mathematical standards should directly inform the creation of physical form. When a designer identifies a suitable form, he or she should use it in repetition to create an artefact. The presence of repeating form is fundamental to the overall success of Gropius’ answer to tackling social problems:

> “The repetition of standardized parts, and the use of identical materials in different buildings, will have the same sort of coordinating effect on the aspect of our towns as uniformity of type in modern attire has in social life.”
>
> (Gropius, 1935, p. 40)

Linear processes were also intrinsic to Le Corbusier’s Design Thinking. To provide insight on this it is necessary to discuss how Le Corbusier frames Design *problems* and *solutions*. Le Corbusier argued that mathematical standards result from effective identification of the design problem:

> "[mathematical standards] are based on a problem which has been well 'stated.'"
> (Le Corbusier, 1931, p. 4, Original Emphasis)

Le Corbusier illustrates what he means by a *well stated problem* by explaining the initial step needed to design an airplane:

> "…we must learn to see in the airplane *not* a bird or a dragon-fly, but a machine for flying…"
> (Le Corbusier, 1931, p.110)

In framing the airplane in this manner, Le Corbusier underscores his belief in a linear order of events in the design process:

> "The airplane shows us that a problem well stated finds its solution".
> (Le Corbusier, 1931, p.113)

Corbusier (1931) does not limit his Design Thinking to the creation of airplanes. He applies it to the design of chairs (Figure 5), automobiles, buildings and cities. Therefore, like Gropius, Le Corbusier applies his Design Thinking across design disciplines.

Figure 5: Le Corbusier's LC4 chair.
Taken from https://blendermarket.com/products/lc4-chaise-lounge-design-by-le-corbusier

2.1.2 The Post-World War 2 Era

WW2 caused an unprecedented level of destruction of infrastructure, creating large-scale design problems. Problems included rebuilding cities and manufacturing goods in sufficient quantities to meet the demands of consumers. Paralleling discussion in the Pre-WW2 era, leading theorists argued the subjective decision-making practices used by designers would

limit their ability to solve these large-scale problems. Leading theorists therefore rejected traditional craft methods in favour of automated processes (Jones, 1970; Jones and Thornley, 1963). Building on the legacy of the pre-WW2 era, the post-WW2 era became influenced by an increased focus on rational, scientific ways of thinking.

The Hochschule für Gestaltung

The Hochschule für Gestaltung (HfG)—an influential post-war School of Design—is for many a landmark in the development of post-WW2 Design Thinking (Valtonen, 2005; Krippendorf, 2006). Founded in Ulm, Germany in 1953, the HfG aimed to train designers to rebuild German infrastructure. The strategy for doing this was to view design as an "applied science" (Findeli, 2001, p. 9). Its director Tomas Maldonado was influenced by the emerging field of *ergonomics* (Valtonen, 2005). Ergonomics (Figure 6) was conceived as a natural science as its methods revolve around measurement (of the human body and objects) and subsequent statistical analysis (Dreyfuss, 1955). Ergonomic calculations then directly inform the design of artefacts. Maldonado (cited in Valtonen, 2005, p.4) argued that ergonomics was an objective discipline which led to the creation of "exact knowledge […] based on the human being".

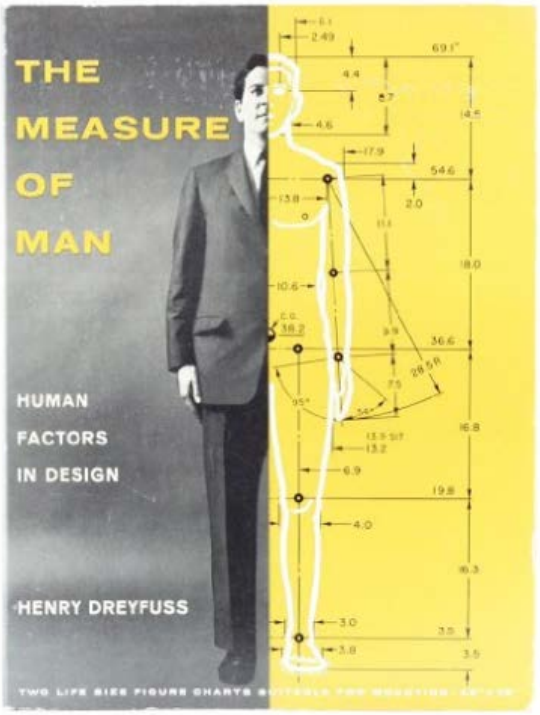


Figure 6: Henry Drefuss' book 'The Measure of Man', an early text in the field of Ergonomics. Taken from, https://www.amazon.com/measure-man-Human-factors-design/dp/B0007EJK6O

For Maldonado, the exactness of ergonomics meant that designers across disciplines could view humans as a set of numerical data. Framing them as data would help designers solve large-scale design problems:

> "…men are being transformed into things so that it will be easier to administer them. Instead of working with men, one can work with schemes, numbers, and graphs that represent men".
>
> (Maldonado, 1972, p. 22)

Maldonado's Design Thinking shares important attributes with the pre-WW2 philosophies of both Gropius and Le Corbusier: Maldonado's Design Thinking applies across disciplines and, according to him, is both rational and objective. In addition, the process of describing people (*users*) as numerical data then designing in accordance with that data suggests that Maldonado's Design Thinking is linear. Maldonado believed that his take on Design Thinking could create a better society. On this point, Koskinen et al. (2011) argue that Maldonado was convinced that his Design Thinking could end post-WW2 suffering:

> "By turning design into a science, one could get rid of "subjective interference" and pave the way to a world of plenty".
>
> (Koskinen et al., 2011, p. 33)

The 'Design Methods' Movement

The influence of perceived scientific ways of thinking is further evidenced in the growth of the *Design Methods* movement in the 1960s (Bayazit, 2004; de Vries et al., 1993). The Design Methods movement viewed design as a formulaic process in which creativity could be distilled into numerical data (Jones, 1970; Cross, 2001). In view of this, the Design Methods movement promoted a linear, rational, 3-stage process for solving large-scale design problems (Jones 1970). Chris Jones (1970), the leader of this movement, claimed that his model would make emotional ways of thinking used by designers obsolete. At the time, Design Methods theories were "widely accepted" both in design research and by practitioners (Downton, 2003, p.41). Influenced by the work of the Design Methods movements, the Nobel laureate philosopher and mathematician Herbert Simon attempted to determine numerical formulae to describe the design process (Simon, 1996; Crowther-Heyck, 2005; Cross, 2001). The ultimate ambition of the Design Methods movement was to completely remove designers from the design practice, thereby eliminating all subjective human error from Design Thinking in order

to solve social problems. Once the formulae were perfected, the emotional human could be replaced by a rational computer:

> "If the steps in a designer's processes could be identified, examined, and understood, they could be improved, or corrected and in the best circumstance, the designer could be replaced by a mechanical process or a machine – the then emerging computer."
>
> (Downton, 2003, p. 41)

Like all the theorists whose ideas I have reviewed in this section, Jones argued that his Design Thinking[3] is applicable across design disciplines. On this point, Jones claimed his Design Thinking could address the:

> "need for generalist techniques applicable to the larger problem that arise today".
>
> (Jones, 1971)

Clearly, all the theorists I have discussed in this section did not acknowledge disciplinary boundaries associated with design practices when constructing their take on Design Thinking theory. It is also clear that these theorists worked with binary differentiations between *rational* ways of thinking and *emotional* ways of thinking. The theorists associated rational values with scientific knowledge and emotional values with design practice. In creating their take on Design Thinking philosophy, the theorists all favoured rational values as fundamental to solving societal problems. The Design Thinking theory of the Early and Middle Decades of the 20th Century therefore focused on attempting to make designers think more like scientists.

2.2 Criticism of the Design Thinking of the Early and Middle Decades of the 20th Century

Contemporary design research tends to be critical of the Design Thinking theory of the Early and Middle Decades of the 20th Century. Criticism centres on the rationalistic values which support it. Researchers claim that the rationalistic values could not

[3] Jones did not use the term 'Design Thinking'. I use the term when discussing Jones' philosophies to maintain consistency in the thesis narrative.

provide designers with an appropriate understanding of the needs of users. Buchanan (2001) argues that when using rationalist Design Thinking, designers focussed on product form, materials and manufacturing methods and ignored the needs of users. For Buchanan (2001) the lack of focus on users limited designers' ability to provide good product and service experiences for users. Similarly, Keinonen (2008) argues that the theorists of the Early and Middle Decades of the 20th Century did not acknowledge the complexity of the day-to-day lived experiences of users. Designers' perceptions of users were, at the time, "built on rational assumptions" which proved to be inaccurate (Koskinen et al., 2011, p.15). This resulted in ideas on user needs which are "too-limited" (Keinonen 2008, p.15). Similarly, Bruno Latour argues that the rationalistic way of thinking used in the Early and Middle Decades of the 20th Century framed users in an artificial manner. Viewing users as data means removing them from their cultural envelopes, the all-important contexts in which they live. Latour argues that it is only possible to gain insight into the behaviour of humans when analysing them within their cultural contexts:

> "Naked humans are as rare as naked cosmonauts. To define humans is to define the envelopes, the life support systems, the *Umwelt* that make it possible for them to breathe."
>
> (Latour, 2008, p.8)

Influential design researchers position the reduction in interest in Design Thinking theory of the Early and Middle Decades of the 20th Century centres alongside the formation of the Design Research Society.

2.2.1 Influence of the Design Research Society

With its headquarters in the UK, the Design Research Society (DRS) is one of the world's largest collectives of academics who share an interest in design research. The DRS aims "to promote 'the study of and research into the process of designing in all its many field'" (Design Research Society, n.d., unpaged, original emphases). Formed in 1966, the DRS is the oldest global society specialising in enabling design research (Design Research Society, n.d.). The history of its beginnings is linked to the demise of the Design Methods movement. In the early 1970s, not long after the creation of the DRS, the design research community lost faith in Design Methods. This is because its most influential pioneers rejected the idea that all human needs and desires could be analysed through measurement and statistical analysis. The change in position taken by Design Methods pioneers influenced the design research community. The research

community rejected the idea that users could viewed as data to make them fit into rational frameworks (Jones, 1977; Cross, 2001).

In 2006, Nigel Cross, the leading Design Thinking researcher and then chair of the DRS, delivered a keynote presentation which summarised the first 40 years of the DRS. Interestingly, his presentation included a “reflect[ion] on the first forty years of design research” (Cross, 2006, unpaged). Cross’s statement indicates that he does not count the period prior to the inception of the DRS as producing legitimate Design research. Other Design Thinking researchers echo Cross’ thoughts. de Vries et al. (1993, p. 18) refer to the period in time that the DRS was founded as the “earliest days” in the community’s ongoing attempt to research how designers think. Mirroring Cross’ accounts, Meng (2009) appears to dispute the relevance of research on the way that designers think which emerged prior to the formation of the DRS. Meng (2009, p.60) argues the body of knowledge collected prior to the inception of the DRS represents “merely [a] technical interpretation of design”.

Cross’ and Meng’s dismissal of design research prior to the birth of the DRS may represent efforts to disown Design Thinking of the Early and Middle Decades of the 20th Century. This issue is of interest as I have noted that investigation into the way designers think can be traced back to 40 years prior to the mid-1960s—to the time of the Staatliches Bauhaus. Cross’ and Meng’s arguments therefore raise initial inconsistencies associated with the history of Design Thinking research.

2.3 A Transitional Period: Moving Towards ‘Contemporary Design Thinking’

2.3.1 Rittel and Webber’s Wicked Problems

Horst Rittel and Melvin Webber (1973) were city planning researchers. They used the term *Wicked Problems* to describe problems that, they claimed, cannot be solved using statistical analysis. Rittel and Webber’s (Figure 7) research contributed heavily to the design research community’s rejection of Design Methods values.

Figure 7. Horst Rittel. Taken From https://nevalalee.wordpress.com/tag/horst-w-j-rittel/

Rittel and Webber compared problems tackled in the natural sciences with those undertaken by city planners. They argued that problems in the former are expressible as numerical data. Rittel and Webber define these kinds of problems as being *tame*. The fact that tame problems can be expressed as numbers makes them "definable and separable" (ibid, p.160). Once describes as numerical data, tame problems become solvable though statistical analysis. Statistical analysis can make it possible to discover definitive solutions to tame problems. The following illustrates examples of tame problems:

> "consider a problem of mathematics, such as solving an equation; or the task of an organic chemist in analyzing the structure of some unknown compound; or that of the chessplayer attempting to accomplish checkmate in five moves. For each the mission is clear. It is clear, in turn, whether or not the problems have been solved".
>
> (Rittel and Webber, 1973, p.160)

In contrast, Rittel and Webber argued that city planning problems are not definable and separable. This is because they involve many stakeholders with different—but valid—lived experiences. It is therefore impossible to express them as numerical data. There are "no 'solutions' [to planning problems] in the sense of definitive and objective answers" (Rittel and Webber, 1973, p.155; original emphasis). The characteristics of planning problems make them *wicked*.

Rith and Dubberly (2007, p.74) argue the idea of Wicked Problems highlights the "limitations of design processes based on the […] rational view of science." Rittel and Webber's research was pivotal in curtailing interest in the Design Thinking of the Early

and Middle Decades of the 20th Century (Buchanan, 1992). The concept of Wicked Problems has heavily influenced subsequent Design Thinking theory as design researchers have consistently argued that the idea relates not just to the area of city planning but instead to *design problems in general* (Buchanan, 1992; Coyne, 2005; Downton, 2003; Cross, 1993; Cross, 2001; Rith and Dubberly, 2007). To illustrate, Downton (1993) claims that,

> "most if not all [of the characteristics of Wicked Problems] apply fully or largely, to the issues faced in [many] design disciplines."
>
> (Downton, 1993, p.43)

The idea of Wicked Problems helped set in course the emergence of what would become Contemporary Design Thinking theory. Contemporary Design Thinking theory rests on the idea that designers use a distinctive form of problem solving (termed *Design Thinking*) to effectively tackle Wicked problems.

2.3.2 Second Generation Design Methods

Rittel and Webber's research inspired the formation of a design movement termed Second Generation Design Methods in the mid-1970s (de Vries et al., 1993). Researchers associated with the Second Generation Design Methods movement believed that the design of artefacts affects the lives of different stakeholders in different ways. The movement therefore rejected the possibility of creating design solutions that could optimally suit *all* stakeholders (de Vries et al., 1993). Instead, theorists moved "towards recognition of satisfactory or appropriate [design] solutions" (de Vries et al., 1993, p.17). According to Bayazit (2004), Second Generation Design Methods initiated interest in Participatory Design, a process where users are involved in the design process. Participatory design is often described as being important in Contemporary Design Thinking theory.

2.3.3 Donald Schon's Reflective Practice

The acknowledgement of the existence of Wicked Problems prompted theorists to argue that designers think differently to professionals who tackle tame problems. Researchers argued that scientists commonly tackle tame problems. The influential theorist Bruce Archer (1979, p.18) claimed there is a "designerly way of thinking" which differs from ways of thinking used by natural scientists. Similarly, Cross (1982) argued that research had never produced a model which could successfully account for the

way that designers think. Cross called for continued investigation into what he termed *Designerly Ways of Knowing*[4] which are separate to, and as credible as, those of the scientific community. In calling for more research, Cross asks:

> Why should it be such a recognisably 'designerly' way of proceeding is probably not just an embodiment of any intrinsic inadequacies of designers and their education, but is more likely to be a reflection of the nature of the design task and of the nature of the kinds of problems designers tackle.
>
> (Cross, 1982, p.224; original emphasis)

Neither Archer nor Cross claimed to be able to describe how ways of thinking used by designers differ from those used by natural scientists. According to Cross (2011), the educational theorist Donald Schon (Figure 8) made a fundamental contribution in this area.

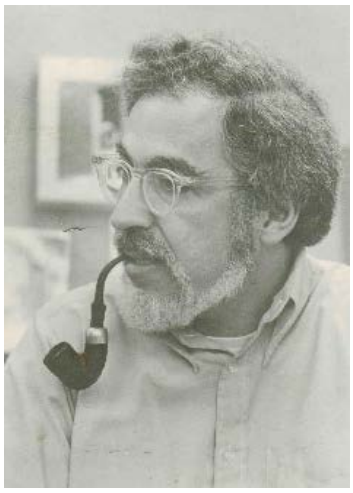


Figure 8: Donald Schon.
Taken from, https://www.amazon.co.uk/Reflective-Practitioner-Donald-Schon/dp/046506874X

Influenced by the idea of Wicked Problems, Schön (1983) argued that each design problem is unique. Because each design problem is unique, it is impossible to fully comprehend a problem when initially confronted with it. Design problems instead need to be constructed during the design process. This characteristic makes them "puzzling, troubling, and uncertain" in nature (Schön, 1983, p. 40). In contrast Schon believed that scientific problems are not unique—it is therefore possible to comprehend scientific problems when faced with them. Schon therefore argued that design problems are fundamentally different to scientific problems. Because of this, "scientific theory and technique" (Schön, 1983, p.21) cannot adequately describe design practice. Schon argued that the ambiguous nature of design problems forces designers to think in

[4] Indeed, Cross' (1982) article is titled 'Designerly Ways of Knowing'.

particular ways. To solve design problems, designers need to engage in a reflective conversation with issues they face when constructing design solutions:

> "…the [design] situation talks back, the practitioner listens, and as he appreciates what he hears, he reframes the situation once again…"
>
> (Schön, 1983, pp. 131-132)

Schön argues that this conversational way of solving problems is fundamentally different to the way that natural scientists solve problems. The conversations mean that designers solve problems in an iterative manner. Unlike scientists, designers do not make use of a linear problem-solving process (Schön, 1983).

Schön believed that researchers had ignored the fundamental difference between the way designers think and the way scientists think and called for the development of a body of work which focusses on fully understanding the way designers think,

> "an epistemology of practice implicit in the artistic, intuitive processes which some practitioners do bring to situations of uncertainty, instability, uniqueness, and value conflict"
>
> (Schön, 1983, p.49)

Schön's research into the way designers think presents a stark departure from the Design Thinking of the Early and Middle Decades of the 20th Century. Indeed, for Koskinen et al. (2011), Schön's contribution created a perceptible *turn* in the way Design Thinking would come to be understood. To illustrate, echoing Schön's ideas, the design researcher Bryan Lawson argues:

> "the more experienced final year architecture students consistently used a strategy of analysis through [problem] synthesis. They learned about the problem through attempts to create solutions rather than through deliberate and separate study of the problem itself."
>
> (Lawson, 2005, p.44)

According to Cross, Schön paved the way for the development of a form of research into design philosophy which Cross (2001, p. 53, Original Emphasis) terms "'design thinking research'".

2.4 The Emergence of Contemporary Design Thinking

From now on I use the term *'Design Thinking'* in relation to Contemporary Design Thinking unless otherwise stated.

Though theorists have been researching the ways designers think for a century, the term 'Design Thinking' has a relatively recent origin. Design academics argue that the term was coined in 1987 by the architectural researcher, Peter Rowe (Dorst, 2010; Blizzard et al., 2015). In his book *Design Thinking* (Figure 9), Rowe examines four case studies in which architects undertake large projects. His observations enable him to create "a generalized portrait of design thinking" (Rowe, 1987, p. 1). Therefore, like other theorists whose work I have explored in this chapter, Rowe claims his interpretation of Design Thinking is applicable across design disciplines.

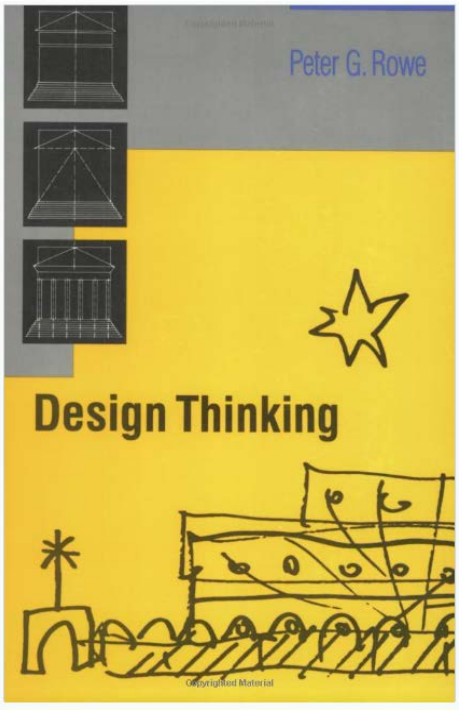


Figure 9: Peter Rowes' Book Design Thinking.
Accessed, https://www.amazon.co.uk/Design-Thinking-Pg-Rowe/dp/026268067X#reader_026268067X

Despite Rowe's contribution, there remains no real clarity on the origins of Design Thinking research. Cross (2001) seems to dispute whether Rowe initiated contemporary research on Design Thinking. Instead, Cross (2001, p.53) argues what he terms "design thinking research" began in the 1990s with the inception of the *Design Thinking Research Symposia* (DTRS), a series of conferences which aim to contribute knowledge on the ways designers think. The DTRS symposia are affiliated with the Design Research Society—the group of academics which was at the time led by Cross.

Disputes over the origins of Design Thinking research seem to provide an indication of political motivations on the part of contemporary design researchers. The disputes over origins may signal a competition amongst researchers over what might be termed 'ownership of Design Thinking'.

2.4.1 Design Thinking and 'Problem-Solving'

The issue of *problem-solving* is key in Design Thinking research. Design Thinking researchers commonly discuss the way that designers solve problems in a manner which follows Schon (1983). As a result, researchers tend to describe the way that designers solve problems in opposition to the way that scientists solve problems. To illustrate, Cross claims that scientific thinking is understood across research communities to be the dominant mode of problem-solving (Cross, 2004). Cross claims that scientists attempt to identify a problem fully and then work to solve it. The focus on identifying a problem leads Cross (2004) to term scientific thinking a *problem-focussed* process. Once scientists have identified the problem, they apply rational, evaluative frameworks to solving it (Dorst, 2011). Design Thinking researchers therefore view scientific problem-solving as a *linear* practice (Cross, 2004, 2011). This *linear, problem-focussed* way of thinking limits both exploration of problems and idea generation and can therefore produce unsatisfactory solutions (Cross, 2004. 2011; Dorst, 2011, 2010; Oxman, 2002; Stempfle and Badke-Schaub, 2002).

In contrast, contemporary Design Thinking researchers argue that designers do not attempt to identify a problem prior to beginning to solve it. Instead, they work to understand a problem as they attempt to solve it (Cross, 2004). Therefore, rather than focusing on a problem, designers focus on finding the solution. The focus on identifying a solution leads Cross (2004) to term Design Thinking a *solution-focussed* process. Dorst (2010, 2011) claims that designers work to identify the problem via undertaking a series of cyclic steps in which they iteratively return to the problem in order understand different elements of it. The presence of cyclic steps indicated that Design Thinking is *non-linear* in nature. This *non-linear*, *solution-focussed* way of thinking enables design solutions to evolve progressively, allowing opportunity for reflective practice:

> "[Designers] know that bringing the full force of evaluation to bear upon a fledgling idea is a very effective way of killing it, blocking any further exploration and stifling any progress in the project".
>
> (Dorst, 2010, p.133)

The unique way in which designers think has led to them being termed "'ill-behaved' problem solvers" (Cross, 2004. p.439; original emphasis). Design Thinking researchers claim this behaviour to be advantageous as it enables designers to create better solutions to problems (Dorst, 2010; Cross, 2011; Oxman, 2002). These representations of *linear problem-focussed* thinking and *non-linear*, solution-focusses thinking

illustrates contemporary Design Thinking researchers construct a dichotomy between scientific thinking and Design Thinking.

Design researchers argue that the way that designers solve problems means that Design Thinking is valuable both within the design profession and beyond. In view of this, Design Thinking is an "exciting new paradigm for dealing with problems in many professions" (Dorst, 2011, p.521) and can solve problems "across disciplines" (Razzouk and Shute, 2012, p. 331). For Design Thinking researchers, its use across disciplines means that Design Thinking can be applied to wide-scale problems. Design Thinking can promote environmental sustainability (Davey et al., 2002), facilitate decision-making on effective procurement within government bodies (Design Council, 2011) and is "acknowledged in mankind's drive to address the challenges of global, systemic issues" (Sanders and Strappers, 2008, p.14).

Design Thinking researchers claim that Design Thinking is not exclusively practiced by design professionals. With training, non-designers can become versed in it too (Manzini, 2011; Burns et al, 2006). Because of this, Meinel and Leifer (2011, p. xiii) claim that Design Thinking can enable individuals from diverse disciplines such as "engineering, medicine, business, the humanities, and education [to collaborate to] solve big problems in a human centered way". Some Design Thinking researchers argue that the potential of Design Thinking means that is a "21stcentury Skill[]" which everyone should possess (Razzouk and Shute, 2012, p. 331).

Professionals regularly face a multifaceted range of problems in both their professional and personal lives. Researchers who claim to have insight into ways of solving these problems may potentially be able to accrue a great deal of power and influence. Over the last 100 years, Design Thinking researchers have claimed to have insight into how designers can solve multifaceted problems. Theorists responsible for constructing the Design Thinking theory of the Early and Middle Decades of the 20th Century argued that to solve large-scale

problems, designers should think like scientists. In contrast, theorists who are influential in creating knowledge on Contemporary Design Thinking claim that to solve large-scale problems everyone should think like designers. The issue of problem-solving may then be important in driving the narratives of contemporary Design Thinking researchers.

2.5 Design Thinking: Inconsistencies, Disagreements and Criticisms

Badke-Schaub et al. (2010) suggest there is a level of agreement within the design research community on important principles of Design Thinking theory, claiming:

> "the concept of design thinking has been established and widely accepted in the scientific community for as long as 25 years"
>
> (Badke-Schaub et al., 2010, p. 40)

Badke-Schaub's et al.'s description of harmony does not provide a full picture. Many inconsistencies, disagreements and criticism remain within design academia.

2.5.1 The Emergence of 'Design Thinking' [5]

A central inconsistency emerges when reflecting on the history of the emergence of the term 'Design Thinking'. I noted in Section 2.4 that the term 'Design Thinking' was coined in 1987 by Peter Rowe (Dorst, 2010; Blizzard et al., 2015). Research on 'Design Thinking' therefore began in the 1980s. This is contrary to the idea that Design Thinking research began in the 1990s with the commencement of the Design Thinking Research Symposia (Cross, 2001; Lloyd et al., 2007). Deeper reflection on Rowe's description of Design Thinking provides clues on a possible reason for the inconsistency in discussion on origin.

Peter Rowe's Design Thinking

Rowe (1987) suggests that whilst practicing Design Thinking, designers regularly engage in forms of problem-solving which are at odds with descriptions common in contemporary

[5] An earlier version of the discussion in this section is available in Ghassan (2016). This article is available in Appendix 10 – 'Peer Reviewed & Published Paper 1'.

Design Thinking research. Rowe argues that designers regularly use *inductive reasoning*. Rowe provides the following description of *inductive reasoning*:

> "…the expression 'If conditions Z are encountered, then problem X becomes defined' can be seen to lend itself to an inductive reasoning process, where one moves from the particularities of a situation to a more comprehensive conclusion."
>
> (Rowe, 1987, p. 101, original emphasis)

Rowe's description of inductive reasoning does not provide a picture of a designer working to understand a problem as they attempt to solve it. Rowe's account therefore differs from the description offered by influential Design Thinking researchers including Cross (2004) and Dorst (2011). Rowe's explanation of inductive reasoning suggests that designers identify a problem at the beginning of the design process:

> "…a designer at the outset of tackling a problem in housing may decide to make use of a particular type of configuration. Furthermore, that type becomes the model through which the problem is essentially understood and construed."
>
> (Rowe, 1987, p. 102)

Rowe's account of the ways that designers solve problems therefore appears to share attributes with what other Design Thinking researchers claim to be a scientific mode of problem solving (Ghassan, 2016). Of significance is Rowe's suggestion that architects do not make use of inductive reasoning in isolated instances. Rather at times, Design Thinking is:

> "almost totally dominated by the a priori use of a particular building type as a model for resolving the problem at hand."
>
> (Rowe, 1987, p. 2)

Therefore, for Rowe, designers spend a notable proportion of their time thinking like scientists. Interestingly, the design researcher Lucy Kimbell (2011, p. 291) claims that "Rowe is rarely cited in more recent" Design Thinking research. Both Dorst (2010) and Blizzard et al., (2015) note that Rowe (1987) coined the term 'Design Thinking' but neither provide further discussion on Rowe's work. Hassi and Laakso (2011, p. 3) describe Rowe's (1987) contribution as "seminal" in their exploration of the roots of Design Thinking research but do not discuss his research in greater depth. A handful of other researchers provide a little more discussion on Rowe's work. In the most notable instance, Cross (2004) argues that Rowe's research contributes to evidence suggesting that designers do not solve problems in the same way as scientists. Cross' (2004) argument appears flawed given Rowe's discussion on

inductive reasoning. It is important to note that in the many years since Rowe (1987) conducted his investigation, researchers have not criticised his study—neither with regards to the methods he employed, nor with respect to his conclusions on inductive reasoning.

The relative silence on Rowe's work may be partially explained by the idea his findings run contrary to the position set down by the large body of Design Thinking research—namely that designers think differently to scientists.

2.5.2 Definition, Tools and Processes

The Definition of Design Thinking

Confusion over the definition of 'Design Thinking' raises additional inconsistencies. On this point, Rylander (2009, p.9) claims the term 'Design Thinking' is "composed of two ambiguous words that defy straightforward definition". Existing influential descriptions of Design Thinking offer "little explanation" of the phenomenon and are "tautological" (Rylander, 2009, p.10) in nature. Research suggests that despite the high level of focus on Design Thinking amongst researchers it is not possible to locate "a concise portrayal or a clear-cut breakdown of what the concept encompasses" (Hassi and Laakso, 2011, p.1). Equally critical of Design Thinking research, Kimbell (2011, p.292) argues that academics have yet to "generate[] a definitive or historically informed account of design thinking". The search for a definition of Design Thinking is ongoing. The Design Research Society 2016 conference included an 'Additional Themes Session' devoted to Design Thinking. The session called for researchers to contribute knowledge on locating "definitions of Design Thinking" (Design Research Society, 2016; unpaged).

Tools, Methods and Effectiveness

Disagreements in Design Thinking research go beyond discussing the lack of consensus on a definition. There is disagreement over which "tools and methods" best enable practitioners to effectively use Design Thinking to solve problems (Design Research Society, 2016, unpaged). The DRS 2016 conference calls for researchers to contribute knowledge in this area (Design Research Society, 2016). In addition, there is no agreement on the impact of Design Thinking when it is practiced in both commercial settings and not-for-profit environments (Design Research Society, 2016).

There is also criticism of the idea that Design Thinking is an effective problem-solving method. As I have noted, researchers commonly claim that Design Thinking enables designers to enact solution-focused problem solving. The efficacy of this form of problem-solving has been questioned. Kruger and Cross (2006, p.545) claim solution-focused problem-solving delivers solutions of a "low overall quality" compared with outcomes derived through using a problem-focussed method. Another central argument in support of Design Thinking is the idea that it can help professionals from a range of disciplines work together to solve problems (Meinel and Leifer, 2011). Maciver et al. (2016) critique the extent to which Design Thinking may be useful in enabling interdisciplinary problem-solving:

> "While in theory the design thinking approach emphasises the value of interdisciplinarity in each phase, in practice this has been problematic"
>
> (Maciver et al, 2016, p.9)

The issues occur because professionals from different disciplines frame problems and deliverables in different ways. Maciver et al. (2016) claim that, when engaged in multidisciplinary Design Thinking, professionals who work in different fields do not alter the way in which they frame problems and deliverables. This reluctance of professionals from different areas to use a common method of framing problems limits the effectiveness of Design Thinking.

Research Process

The leading Design Thinking research Nigel Cross (2004) argues that observation of designers in practice conducted over many years supports the idea that designers solve problems in a distinct, solution-focused manner. Kimbell (2011, p.292) disputes the validity of observational work in Design Thinking research, arguing that investigators have not produced "any explanation for why [designers] might have a particular cognitive style". Going further, Badke-Schaub et al. (2010, p. 48) suggest that existing research on Design Thinking is unreliable as it lacks "scientific rigor in terms of data assessment, analysis and interpretation." Hassi and Laakso (2011, p.2) argue that flawed data analysis means that it is necessary to question the "factual reliability and objectiveness of […] descriptions of the occurrence of Design Thinking" [making it impossible to] "determine whether or not design thinking is [taking place]" (Hassi, and Laakso, 2011, p.2).

To summarise, there are inconsistencies associated with dates of commencement of Design Thinking research. There is evidence to suggest that designers think like scientists. In

addition, there is a lack of agreement on the very definition of Design Thinking and no consensus on which tools and methods should be used in Design Thinking processes. There is disagreement over the impact of Design Thinking and criticism of the efficacy of Design Thinking both in terms of facilitating problem-solving and interdisciplinary collaboration. There is also criticism of the validity of data collection and analysis in Design Thinking research. Together, these aspects highlight important gaps in knowledge on Design Thinking. These gaps in knowledge indicate that a great deal more research needs to be done before pivotal aspects of Design Thinking can become truly established and accepted.

In view of the inconsistencies, the lack of agreement on key issues and the criticism of key principles is it appropriate to question why many influential Design Thinking researchers appear to be so convinced of the usefulness of Design Thinking. I have noted that researchers who can claim to have insight into effective problem-solving methodologies may be able to wield power and influence. With this in mind, it is now appropriate to discuss broader contextual issues which are associated with the tendency for communities to claim ownership of intellectual territory. This necessitates a move away from design-focussed literature and towards researched based in the social sciences.

2.6 Discourse and Ideology

2.6.1 Discourse Communities

The linguist John Flowerdew (2013) argues that knowledge claimed by groups or institutions is never completely true. Rather it is produced to suit the aims and objectives of the group (Flowerdew, 2013; Swales, 1990; Rabinow, 1991). Because of this, knowledge is always *skewed*. The term *discourse* is used to describe the skewed knowledge disseminated by a given social group or institution (Flowerdew, 2013). The term *discourse community* denotes the collection of individuals making up such a group (Swales, 1990). A discourse community creates discourse with the aim of occupying a particular intellectual territory termed a *domain* (Rabinow 1991). This means that the community aims to claim ownership of the knowledge associated with the domain. Discourse communities have “a broadly agreed set of common public goals” (Swales 1990, p.471) in relation to their domain. Agreement on issues helps the community to claim ownership of the knowledge on the domain. Individuals are members of a particular discourse community because they share aims and objectives (Flowerdew, 2013). Members use written or spoken language to disseminate the discourse of the

community (Flowerdew, 2013). Individuals do not have to come into physical contact with one another to be defined as members of a discourse community.

2.6.2 Ideology

Discourse on given issues contributes to the creation of *ideology*. An ideology "constitute[s] an illusion" (Althusser, 2004, p.693) because it is founded on skewed knowledge. Members of a discourse community tend to be immersed in the ideology which they help to create. Because of this, members may not perceive both knowledge and resulting ideologies to be skewed. Ideologies therefore have a powerful influence on members of discourse communities for they "make allusion [sic] to reality" for them (Althusser, 2004, p.693). The lack of opportunities for reflection help to perpetuate ideologies within a community (Rabinow 1991).

Ideological orientations help construct the identity of discourse communities and their members (Rabinow, 1991). Ideological stance also enables discourse communities to differentiate themselves from other collections of individuals (Rabinow, 1991). Members of a discourse community can be secure of their position so long as the ideological orientations are maintained. Thus, ideologies provide:

> "the absolute guarantee that everything really is so, and that on condition that the subjects recognize what they are and behave accordingly, everything will be all right *(sic)*"
>
> (Althusser, 2004, p.701)

The term ***ways of speaking*** is often used by theorists to characterise the language discourse communities use then they are disseminating their ideological orientations (Finken, 2003). (Confusingly, the term *ways of speaking* encompasses both verbal and written communication). Theorists tend to define discourse communities by the ways in which they speak on given issues. Researchers may for example refer to: the *discourse of managerialism*, the *discourse of advertising*, *gay discourse* or *Christian discourse* (Flowerdew, 2013). The fact that theorists categorise groups of people by the discourse community to which they belong underscores the importance of illusion in constructing both knowledge and identity. In this thesis, I will use the term *ways of speaking* to refer to the discourse that communities create.

2.6.3 A Regime of Truth

Discourse communities are only sustainable if they can maintain their perception of truth and their hold over the production of knowledge (Rabinow, 1991). To do this they create what the eminent historian and philosopher Michel Foucault (1980 p.131) referred to as a "regime of truth". This is a pervasive knowledge creation, dissemination and filtering system. A discourse community creates knowledge which it deems to be true in places such as laboratories and it disseminates it in *systems of dispersal* like journals and libraries (Foucault, 1980). It also rejects knowledge which threatens to undermine its position. If successful, the process of knowledge creation undertaken by a given discourse community undermines the validity of knowledge created by other discourse communities. This is because it "exercise[s] […] a power of constraint upon other forms of discourse" (Foucault, 1971, p.11). The process of constraining other forms of discourse enables a discourse community to claim legitimacy and wield power (Rabinow 1991; Foucault, 1971).

2.6.4 Ramifications

Ways of speaking have both positive and negative ramifications. Ways of speaking created by discourse communities can benefit some members as they provide them with a positive identity, help them claim legitimacy and wield power. Ways of speaking can be harmful to other members of society as they construct them in ways which can dehumanise them. Discussion of *reification* highlights both positive and negative ramifications.

When *reified*, people are referred to in ways which ignore their lived experiences. Therefore, when reified, "people appear to be no more than things" and become dehumanised (Brown, 2006, p.180). When reified people therefore become commodities. The anthropologist Michael Taussig (1980) uses the traditional relationship between patients and medical professionals to provide an example of reification in practice. Patients experience disease as it occurs in their bodies. However, patients do not always own ways of speaking on their disease. Instead medical professionals have traditionally used their status as experts over the domains of disease and healing to lay claim to ways of speaking on disease:

> *"the moral and metaphysical components of disease and healing are concealed by the use of the natural science model."*
>
> (Taussig, 1980, p.5)

The idea that doctors lay claim to ways of speaking on disease means that patients can become detached from their own experiences of disease. In this way, patients are not allowed to be the authors of their own experiences: "What is revealed to us here is the denial of authorship" (Taussig, 1980, p.5). When patients' experiences are nullified, patients become *reified*—things (rather than people) which are bearers of disease which they do not own. The issue of not following doctors' recommendations highlights how reification distorts narratives associated with people who are unable to own their own experiences:

> *"patients who disobey doctors' "orders", serves to remind us just how colossal a distortion is involved by reifying social relations so that pointed political vulues [sic] smuggled under the guise of technical constructs remain immune to criticism, stamped with the authority of the hard and impenetrable scientific fact."*
> (Taussig, 1980, p.5; original emphasis)

The process of reification can therefore have negative ramifications for patients. In contrast, the act of reifying patients has traditionally reinforced the status and power of medication professionals.

2.7 Academic Tribes and Territories

As the research in this thesis centres on how design researchers frame Design Thinking, it is now necessary to explore how ways of speaking are produced and maintained within academic discourse communities. Social science literature contains expertise in this area.

2.7.1 Skewed Narratives

From an external perspective, it may at first be difficult to imagine academic narratives as being skewed. This is because academic subjects are—by their nature—serious and studious. Ken Hyland (2001)—an investigator of discourse used by academics—argues that research is often mistakenly viewed as being written in a distanced manner. Persuasive language helps academics to skew arguments in their favour. The difficulty comes in spotting these strategies as academics tend to use *subtle* persuasion—ways of speaking which nudge the reader into accepting the argument. Authors tend to write papers in ways which,

> "requir[es readers] to *note*, *concede*, or *consider* something in the text, thereby leading them to a particular interpretation"

(Hyland, 2001, p.564; original emphasis).

Research into how academics speak and construct knowledge has been ongoing for many years. The philosopher Thomas Kuhn (1962) helped to pioneer investigation into the construction of knowledge in academic subjects. Kuhn focussed on the creation of knowledge in the natural sciences. Kuhn investigated how academic subjects defend knowledge associated with accepted theories in their area. Kuhn suggested that communities maintain their reliance on them at all costs. This is partly because accepted theories help sustain both the authority of the community and the identity of its members.

When researchers discover new knowledge, the community moves to make it appear to adhere to the intellectual domain occupied by the accepted theory. When new knowledge challenges an accepted theory, the community often goes to considerable lengths to dispute the validity of the new knowledge. To this end, the community may claim that the emergence of errant new knowledge may be due to faulty data analysis equipment, errors in experimental procedure or the misinformed nature of investigators. Kuhn uses research associated with Isaac Newton's Laws of Motion to illustrate these points. Newton's Laws dominated in physics research in the 18th and 19th Centuries. Newton's Laws therefore provided the physics community with a sense of authority and helped its members shape their identity. During this time some researchers noted errors and inconsistencies when using Newton's Laws. The dominant position of Newton's Laws meant that the community dismissed the work of scientists who noted errors as flawed research. It was only in the early 20th Century when Einstein's theories became accepted that the research community accepted the presence of errors in Newton's calculations.

2.7.2 Tribes and Territories

More recently, Tony Becher and Paul Trowler (2001) have investigated the way in which academic fields construct discipline-specific knowledge. Becher and Trowler argue that academic disciplines function as—in their terms—*tribes*[6]. Certain aspects connect tribe-members. Members may have certain types of physical artefacts in their working environments. For example,

[6] Indeed, Becher and Trowler's (2001) book is titled *Academic Tribes and Territories.*

> "a chemist's desk is prone to display three-dimensional models of complex molecular structures, an anthropologist's walls are commonly adorned with colourful tapestries and enlarged prints of beautiful black people…"
>
> (Becher and Trowler, 2001, p.46)

Physical artefacts are of interest, but in the main tribe-members cement their identity through ways of speaking:

> "the professional language of a disciplinary group plays a key role in establishing its cultural identity."
>
> (Becher and Trowler, 2001, p.46)

This is not to say that academic disciplines are entirely homogeneous. The way certain principles within a discipline are taught differs from institution to institution. There are also regional differences within academic tribes. Academics in certain nations may focus on creating knowledge on certain aspects of a discipline over others. Physicists in Britain quizzed on working practices of counterparts in Russia illustrate this to be the case. The British physicists based their opinion of methods used in Russia on "national stereotypes of a conventional (and relatively crude) kind" (ibid, p.44, original emphasis). Despite regional differences, "strong resemblances persist between different branches of the same [academic discipline]" (ibid, p.44). In this respect, disciplines have specific ways of speaking on knowledge associated with their domain. Historians tend to use the term "masterly" to commend a piece of research (ibid, p.46). Mathematicians praise a formula by calling it "elegant" or "powerful" (ibid, p.46). Sociologists often term good research "thought-provoking" or "stimulating" (ibid, p.46). Indeed, for academics, ways of speaking on given subjects are shaped by the discipline to which the researchers belong.

Becher and Trowler's (2001) use of the term *tribe* highlights the territorial battles between disciplines which—from an external perspective—may appear to be very closely connected. To illustrate, the linguists Geoffrey Thompson and Susan Hunston (2003) illustrate how a researcher in the field of applied linguistics uses ways of speaking to differentiate the field of applied linguistics from that of theoretical linguistics. Thompson and Hunston's investigation involves analysing how the applied linguist in question (John Swales) frames both disciplines in an article abstract. The abstract appears in a journal which specialises in publishing research on *applied* linguistics. In differentiating between these areas, the applied linguist infers that "Both types of research are valid but applied research is more significant" (Thompson and Hunston, 2003, p7). In speaking in this way, the applied linguist invokes a sense of camaraderie with other members of the community "Precisely [because members of the applied linguistic community] write and read papers like this" (Thompson and Hunston,

2003, p7). The sense of camaraderie helps to both underscore the legitimacy of the tribe of applied linguists and reinforces the identity of individual members.

2.7.3 Classification and Boundaries

Becher and Trowler (2001) identify 3 aspects which help to empower both an academic discipline and academics who work within it.

> "A situation in which a discipline is *highly classified*, *strongly framed* and has a *strong collection code* is one in which academics are highly empowered"
> (Becher and Trowler, 2001, p.37, added emphases)

Academics focus on *classifying* concepts which are key to the domain they occupy (or aim to occupy). The process of classification refers to naming concepts and the relations between them. The *taxonomic* classification system is a case in point. A taxonomy is described as being,

> "a systematic framework for distinguishing, ordering, and naming types and groups within a subject field"
> (John et al. 1988, p.172).

Taxonomies help researchers to both classify elements and relationships between elements in their domain. The system was first applied in biological research by Carolus Linnaeus (1707-1778) (John et al. 1988). Linnaeus classified the living world into various strata including, *kingdoms*, *families* and *species.* Figure 10 shows an illustrated a biological taxonomy. In biological research, taxonomies allow classification of individual species and the relationships between organisms.

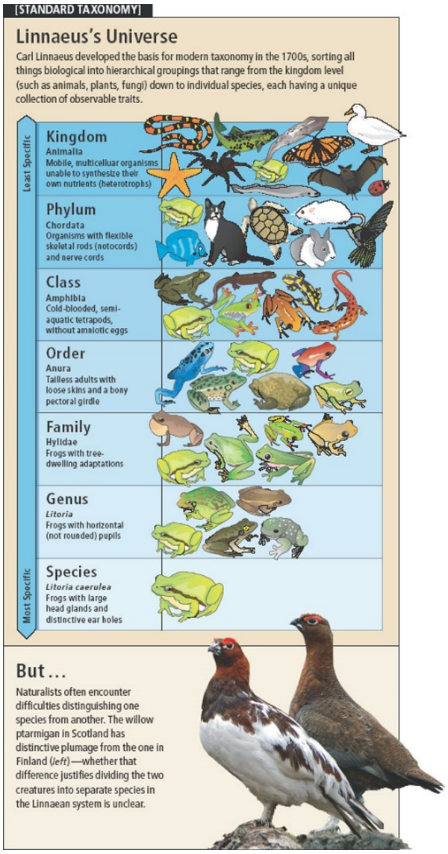


Figure 10: A taxonomy of living organisms, taken from Zimmer (2008, p.72)

The practice of classification helped scientists to construct the natural world into objects of biological investigation, enabling biologists to claim ownership over their domain.

When classifying ideas, a community aims to use a distinctive language, a "particular set of favoured terms [and] sentence structures" (Becher and Trowler, 2001, p. 47) which are specific to the tribe. Use of specialised terms empowers the community as it constructs ways of speaking that people from outside the community find difficult to critique. Figure 10 shows that biologists use Latin to construct their domain. Medical professions use Latin in a similar manner—Figure 11 illustrates its use in classifying the human wrist.

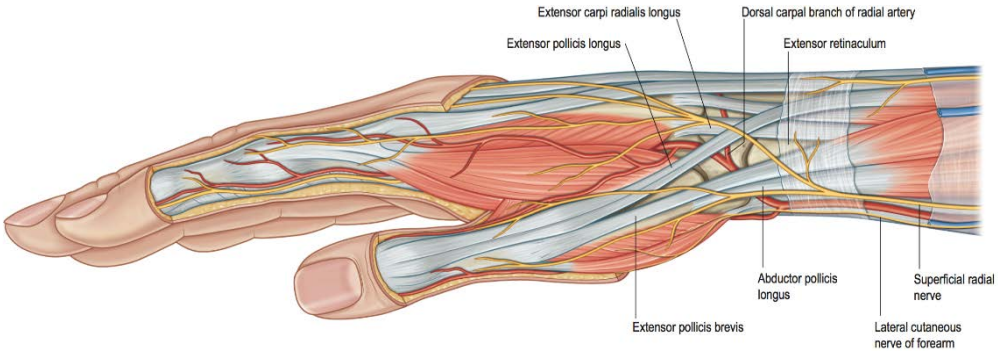


Figure 11: An anatomical drawing of a hand. Taken from, https://www.google.com/search?q=anatomy+book+hand&source=lnms&tbm=isch&sa=X&ved=0ahUKEwi1gNbH_M3bAhXiBsAKHUlzBQQQ_AUICigB&biw=1778&bih=838#imgrc=Nxz1InDowRhyzM:&spf=1528801275333

Complicated classifications help empower doctors, providing them with authority. At the same time, classifications can disempower patients, potentially reducing their ownership of disease (Taussig, 1980). Taxonomies therefore contribute to reification.

Becher and Trowler (2001) use the term *frame* to refer to theories and practices used by a community in its attempt to create its intellectual territory. The tendons, muscles and nerves illustrated in Figure 11 are formed from collections of cells. Observing and measuring cells helps anatomists to conclude the cells have different functions. The act of classifying tendons from muscles therefore legitimates the use of theories and practices which enable classification. This underscores the sense of legitimacy of research in the field, further strengthening the community's claim to ownership of it.

Becher and Trowler use the term *collection code* to denote the way in which academics build knowledge in their subject area. When a discipline has a strong collection, "knowledge is seen as cumulative" (ibid, p. 37) as academics incrementally build on the work of others in their community. The idea that knowledge is built up from *within* the community is important as it helps researchers to claim the presence of strong intellectual boundaries with other academic fields. Strong boundaries further strengthen the claim to legitimacy. (The aforementioned attempt by an *applied* linguist to draw a distinction between his field and *theoretical* linguistics highlights the importance of intellectual boundaries for tribes-members). Becher and Trowler describe disciplines with a strong collection code as *tightly knit*. Researchers have been investigating human anatomy for hundreds of years. Anatomical classifications associated with the human hand appear to be set in stone, increasing the level of perceived legitimacy of the field. In contrast, in a discipline with a weak collection code, knowledge appears to be made up of a jumbled assortment of elements (ibid, 2001). Often these elements may come from *outside* of the discipline. Influx of theory from outside signals a permeable intellectual boundary:

> "[researchers in fields with a weak collection code] readily absorb ideas and techniques from neighbouring intellectual territories, and even identify themselves with other academic professions than their own".
>
> (ibid, p.59)

A weak collection code makes it more difficult for an academic community to defend the legitimacy of its ways of speaking. The field of literary criticism is far younger than anatomy

and displays a weak collection code. Academics in literary criticism absorb theories from "psychology, sociology or structural anthropology" (ibid, p.61). The permeability of the boundary indicates that members working in the field of literary criticism are loosely knit. Compared to tight knit communities, it is "not so easy [for loosely knit communities] to defend" their intellectual territory (ibid, p.59).

2.7.4 Questioning My Intentions

In this thesis, I aim to investigate ways of speaking which exist in the domain of Design Thinking research. Becher and Trowler (2001) do not apply their concept of academic tribes to design academia. Conceivably, this may be because analysis into ways of speaking is not relevant in design research. Conceivably, this may be because design is frequently argued to be a practice-led area. In this respect, a large body of research argues that investigators should concentrate on investigating *practice* (Frayling, 1993; Zimmerman, et al., 2007; Niederrer, 2013; Rust et al., 2007). With respect to this, Rust et al. (2007, p. 10) claim that many design academics "naturally [perceive] methods of practice as methods of inquiry". The focus on practice has given rise to peer-reviewed conferences (Wallace et al., 2014) and journals (Wallace et al. (Eds.), 2015) which are dedicated to foregrounding practice in design research. If design is a practice-led discipline, then conceivably, research into ways of speaking may be of questionable benefit in Design Thinking research. Commonly design researchers suggest this is the case. Lowgren and Stolterman (2004, p.140) argue that investigating written or spoken language cannot shed light on the design process as language, "says nothing about how to design an artifact or how to address its totality". Similarly, Eckert et al. (2010) claim that written or spoken language does not help designers to adequately describe their creations. This is because language does not enable designers to convey the "subtleties of visual and physical form" (Eckert et al., 2010). Specifically, research suggests that investigation into written and spoken language is not optimally suited to uncovering knowledge on Design Thinking. On this point, Lloyd et al. (1995) claim that this form of analysis cannot sufficiently uncover the processes of Design Thinking.

> "although [analysis of verbal language used by designers] can reveal some aspects of design thinking there are many types of design thinking that remain impervious to concurrent verbalization"
>
> (Lloyd et al., 1995, p.239)

In view of the above criticism, it is important to underscore the idea that this thesis does not aim to investigate aspects of *design practice*. Furthermore, I do not aim to uncover

psychological processes which may be associated with Design Thinking. Rather, I intend to investigate the existence of ideologies in Design Thinking *research*. Academics whose research is in the area of Design Thinking disseminate their findings predominantly through submitting written work to peer-reviewed conferences and journals. Indeed, even academics whose research is practice-led disseminate their findings in peer-reviewed environments which necessitate the submission of written outputs. On this point, the call for one such conference, *Research Through Design 2017* (Cumulus, n.d, unpaged) notifies prospective authors that "papers should accompany the exhibited artefact"). Therefore, an investigation of ways of speaking is *fundamentally relevant* to this thesis.

2.8 Initial Indications of Ways of Speaking in Design Thinking Research

2.8.1 A Dichotomy Between Design Thinking Theories of the Early and Middle Decades of the 20th Century and Contemporary Design Thinking

Maciver et al (2006) contrast the traits which contemporary Design Thinking researchers commonly associate with designers with those which are frequently linked to scientists in a table (see, Figure 12).

Sciences	***Arts***
Mathematics, physics, engineering	Creativity, language
Logic	Intuition, subjectivity
Left brain	Right brain
Linear, sequential	Holistic, chaotic, divergent
Reductionist enquiry	Naturalistic enquiry
Facts, figures, formulae	Interpretive forms, subjective expression
One correct answer	Many solutions
Technologists - computer scientists, software engineers, information science experts, coders…	***Designers*** - product designers, interface designers, design researchers, graphic designers…

Figure 12: A comparison between traits associated with 'technologists' and 'designers'. Taken from Maciver et al. (2016, p.3)

Maciver et al's (2016) comparison is useful as it provides a neat summary of many of the issues I have discussed in this chapter. Questioning the validity of Maciver et al.'s (2016) dichotomy provides a useful way to begin to unpick ways of speaking in contemporary Design Thinking research. Reflecting on the achievements and legacy of Walter Gropius provides a useful starting point. Gropius was a leading modernist designer whose creations are still celebrated. The design school he founded 100 years ago continues to influence design education and practice globally. Gropius also wrote influential theoretical texts on design philosophy. With reference to Maciver at al's table, Gropius' achievements may mean that he should be classed as a 'designer' (and 'design researcher')? However, Gropius suggested that designers should use a rationalist, linear, way of thinking. Does this point make him a 'technologist'? The case of Gropius highlights a weakness in the dichotomous nature of contemporary deceptions of Design Thinking theory of the Early and Middle Decades of the 20th Century and that of modern-day Design Thinking.

There are other problems with Maciver et al.'s (2016) dichotomy. As noted, there are severe criticisms of the rigour of empirical work on Design Thinking: indeed, research suggests the lack of impossible to distinguish when Design Thinking is actually taking place (Hassi and Laakso, 2011) and there is no clear evidence for a distinctive style of Design Thinking (Kimbell, 2011). The lack of a reliable means of deciphering when Design Thinking is taking place necessarily means it may not be possible to
successfully categorise how designers think (and therefore to compare and contrast this with how scientists think).

Maciver et al.'s (2016) dichotomy shows signs of being flawed. Conceivably, the dichotomy may indicate the presence of ways of speaking which allow Maciver et al. to construct intellectual distance between 'designers' and 'scientists'. This in turn may enable Maciver et al. to form intellectual territory which Design Thinking researchers can claim belongs to them. Flaws inherent in Maciver et al.'s table therefore appear to provide initial signs of the workings of a Design Thinking academic discourse community.

2.8.2 'Academic' and 'Commercial' Streams of Contemporary Design Thinking Theory

The design academics Badke-Schaub et al. (2010) and Johansson-Sköldberg et al (2013) argue there are two streams of Contemporary Design Thinking theory. The first stream originates in design academia. These researchers' accounts of the *academic stream* mirror

those described in Section 2 of this chapter. Badke-Schaub et al. and Johansson-Sköldberg et al. claim the second stream is created by commercial design practitioners and business management researchers. I term this the *commercial stream.* Design practitioners include Tim Brown (2008; 2009), CEO of the IDEO, the world's largest design consultancy. Business management researchers include Roger Martin (2009), former Dean of the Rotman School of Management at the University of Toronto.

Badke-Schaub et al. and Johansson-Sköldberg et al. both criticise the commercial stream. Both sets of researchers argue that the commercial stream has emerged from the academic stream and is a less-well described version of Design Thinking. On this point, Johansson-Sköldberg et al. (2013, p.123; original emphasis) claim the commercial stream is a "simplified version of [academic] 'designerly thinking'".
Badke-Schaub et al. (2010) criticise theorists responsible for disseminating the commercial stream for not acknowledging the years of research that design academics have conducted on Design Thinking. In underscoring the importance of the long history of research contributed by design academics, Badke-Schaub et al. argue there to be a high level of agreement between design academics on key issues:

> "the concept of design thinking has been established and widely accepted in the scientific community for as long as 25 years"
>
> (Badke-Schaub et al., 2010, p. 40)

The instances of inconsistencies, disagreement and criticisms which I highlighted in Section 2.5 of this chapter however highlight the idea that key principles in Design Thinking are not as widely accepted as Badke-Schaub et al. claim them to be. There are issues associated with both Badke-Schaub et al.'s and Johansson-Sköldberg et al.'s descriptions of the two streams. An analysis of a body of texts enables Badke-Schaub et al. to differentiate between academic and commercial streams. Badke-Schaub et al. however do not specify how many (or which) texts they investigate in creating their classifications. It is therefore impossible to verify whether Badke-Schaub et al.'s classifications are valid. Investigation of 168 items of literature written by a range of academics and non-academics helps Johansson-Sköldberg et al. differentiate between streams. Their classifications emerge following the analysis of "types of literature, rather than the specific content" contained within the literature (Johansson-Sköldberg et al., 2013, p.122). Therefore, a superficial analysis of the data informs their method of categorisation. The issues with Badke-Schaub et al.'s and Johansson-Sköldberg et al.'s research methods problematises the concepts of the *academic*

stream and the *commercial stream* of Design Thinking. The flaws inherent in both Badke-Schaub et al. and Johansson-Sköldberg et al.'s analyses indicate the presence of ways of speaking which allow these investigators to create intellectual distance between 'the design-based Design Thinking research community' and 'the business/marketing-based Design Thinking research community'.

Together, several points contribute to the idea that design researchers may be engaged in what can be termed an ideological battle over ownership of Design Thinking. These points are:

- The separation between Contemporary Design Thinking and Design Thinking of the Early and Middle Decades of the 20th Century.
- The oft-argued dichotomy between 'design' and 'science',
- The claim to ownership of origins of Design Thinking research,
- The claim to possessing knowledge of the most legitimate form of Design Thinking.

Both the moves to distance Contemporary Design Thinking from Design Thinking of the Early and Middle Decades of the 20th Century and the dichotomy between 'design' and 'science' can be viewed as efforts taken by design researchers to create an *intellectual boundary* between their domain and other domains. The claim to ownership of the origins of Design Thinking research suggests a move to strengthen the *collection code*.
The claim to possessing knowledge of the most legitimate form of Design Thinking signposts efforts to own the way that Design Thinking is *framed*. All these points are linked to Becher and Trowler's (2001) characterisations of the workings of an academic tribe. The points therefore provide insight into the actions of a design-based discourse community of Design Thinking researchers, in other words, a ***Design Tribe*** of academics. Indeed, appearing to refer to the ideological battle of ownership of Design Thinking, the influential design academic (and former head of the Design Research Society) Nigel Cross argues:

> "It is time to re-claim design thinking as a fundamental aspect of the discipline of design, something that pertains to the skilled, educated practice of designing".
> (Cross, 2010, p. 99)

The indication of battles over intellectual territory suggest that the *academic tribes and territories* lens provided by Becher and Trowler (2001) can be applied to investigate ways of

speaking in Design Thinking research. This thesis uses Becher and Trowler's lens to create knowledge on how the Design Tribe use ways of speaking to construct Design Thinking[7].

2.9 Existing Research on Ways of Speaking in Design Thinking and in Wider Design Research

There is relatively little research on ways of speaking in Design Thinking research. One reason that may account for this is the commonly-held suggestion amongst design researchers that design investigation is primarily practice-led (e.g., Niederrer, 2013; Rust et al., 2007). The relative lack of studies on ways of speaking in Design Thinking research means it useful to also outline existing analyses which have been conducted in broader design-related research communities. The existing studies highlight gaps in knowledge and indicate of ways of working which are applicable to this thesis.

2.9.1 Investigating the Formation of Intellectual Territory

Classifying: A Critique of Ways of Speaking in 'Research Through Design' Research

Mark Blythe (2014) analyses ways of speaking in 'Research Through Design' (RTD) peer-reviewed papers. The RTD community argues that design research can be most authentically conducted through practiced-based means like making artefacts (Wallace et al. (Eds.), 2015). Blythe uses a method termed *Corpus Linguistics* to enable his investigation. Corpus linguistics methods use specialised software to facilitate analysis of textual data. Corpus linguistics approaches focus on how words or terms in a data set are used in context (Mautner, 2009). The researcher may choose words he or she wishes to investigate, or the computer program may highlight words which may be of interest in creating ways of speaking. Blythe investigates how the word '*design*' (and its variants) is used in RTD research.

[7] I outline my research question in Section 2.10 of this chapter.

The word *design* can be used as noun or a verb in the English language. Blythe (2014, p.704) notes that in the data set, *design* occurs most commonly as a noun, "as in 'the design', or 'the design process' or 'the design approach'". Blythe claims that researchers use the term *design* in an honorific way—to associate processes and approaches with *design*:

> "when design is a noun it is also an honorific. This is because one person's 'design' is another's gizmo or gadget."
>
> (Blythe, 2014, p.704; original emphases)

The idea that RTD researchers associated concepts which are important to them with *design* signals the practice of *classifying* in order to claim intellectual territory. This process may aid the RTD research community to gain a sense of legitimacy (Blythe, 2014). Blythe's use of corpus linguistics provides insight into how this method may be applied to uncovering ways of speaking in Design Thinking research. In view of this, I use corpus linguistics tools in my forthcoming analysis.

Classifying: Critique of Ways of Speaking on Sex and Sexuality in HCI Research

Kannabiran et al. (2011) investigate ways of speaking on sex and sexuality in research on Human Computer Interaction (HCI). Their study involves analysis of 70 peer-reviewed publications. Kannabiran et al. argue that sex is represented in distinctive ways in HCI research. Sex is framed in scientific terms, as "the object of inquiry" (ibid, p.700). Sex is not represented as an intimate human activity, nor is sex framed as being central in identity formation. Instead, it is represented as a "as a methodological apparatus" (ibid, p.700) in HCI research. In addition, Kannabiran et al. claim that HCI research does not discuss alternative sexualities, alternative sexual practices or anything other than traditional gender categories. The field instead frames sex and sexuality in terms of traditionally accepted "general cultural norms" (ibid, p.699).

In view of their findings, Kannabiran et al. (2011, p.699) claim to have uncovered ways of speaking (they term these "discursive rules") which inform how research on sex and sexuality is conducted in HCI. These ways of speaking have "a real impact on what kind of work can be published and presented" (Kannabiran et al., 2011, p.699). Because of this, they may influence how legitimacy is framed and how power is exercised within HCI research.

In investigating how sex and sexuality are framed in HCI design research, Kannabiran et al. analyse how researchers *classify* ideas and the potential ramification of these classifications. Kannabiran et al.'s study suggests it would be valuable to investigate how the practice of classification influences the types of claims that Design Thinking researchers make. I conduct this form of investigation in my forthcoming research.

Boundary Formation: Research on Ways of Speaking Used in Design Thinking of the Early and Middle Decades of the 20th Century

The Design Historian Adrian Forty (2000) analyses ways of speaking used by leading modernist designers like Gropius and Le Corbusier. Forty argues that ways of speaking were integral in helping modernists frame their vision:

> "Modernist architecture, as well as being a new style of building, was also a new way of talking about architecture, instantly recognizable by a distinctive vocabulary: Wherever two or more of the words 'form', 'space', 'design', 'order', or 'structure' are found in company, one can be sure that one is in the world of modernist discourse".
>
> (Forty, 2000, p.19, original emphases)

The Modernist era led to substantial achievements in both the built environment and in industrial design. However, Forty (2000, p.19) elevates the place of what he terms the "system" of language created during this period above the colossal architectural achievements. On this point, Forty (2000, p.20; original emphasis) argues Modernists' use of codified language remains the "most 'real' aspect" of the modernist era. Similarly, the historian Gordon Bearn (1992) underscores the significance of ways of speaking used by modernists, claiming they are the most important contribution of the Modernist era:

> "…modernism was not […] a set of buildings; it was more basically a body of documents defining modernism and interpreting those buildings."
>
> (Bearn, 1992, p.228)

Therefore, for Bearn, the written language used by Modernists articulated the ideological orientations which legitimated modernist form language and enabled the global dissemination of Modernism. Ways of speaking used by Modernist architects and designers therefore made the construction of huge city infrastructure possible (Bearn, 1992; Forty, 2000).

Forty (2000) claims that the ways of speaking employed by leading modernists has had a long-lasting influence. This is because, decades after its inception, the architectural community has been unable to form a new way of speaking to replace it. Those who try can only fail as “modernism drove out all previous vocabularies, and there is none to take its place” (Forty, 2000, p.20). The long-lasting impact of ways of speaking used by Modernists provides further clues on why contemporary Design Thinking researchers like Buchanan (2001) and Maciver et al. (2016) create flawed dichotomies between Design Thinking of the Early and Middle decades of the 20th Century and Contemporary Design Thinking. Conceivably, contemporary design researchers may find it difficult to move out of the intellectual shadow created earlier design researchers. The pervasive influence of this shadow may help to account for why Meng (2009, p.60) dismisses the knowledge formed by researchers responsible for creating and disseminating theory on the Design Thinking of the Early and Middle decades of the 20th Century as “merely [a] technical interpretation of design.

The presence of a set of terms which are strongly associated with Design Thinking of the Early and Middle decades of the 20th Century raises the possibility that use of distinctive terminology may be important in constructing ways of speaking on Contemporary Design Thinking. The forthcoming studies in this thesis attempt to shed light on this issue.

Boundary Formation: Criticism of the Idea that Design Thinking Differs from Scientific Thinking

A central premise of Contemporary Design Thinking theory is the idea that Design Thinking differs from scientific thinking. A small body of research (New and Kimbell, 2013; Farrell and Hooker, 2013) investigates ways of speaking associated with this commonly claimed idea. The investigations revolve around idea of *empathy* and *wicked problems*.

On Empathy

New and Kimbell (2013) reject the idea that Design Thinking is unlike scientific thinking. In evidencing their position, New and Kimbell argue that Design Thinking research does not present a *true* representation of scientific approaches to problem-solving. Rather, design research creates a skewed interpretation. New and Kimbell claim that in Design Thinking research, the ways that designers think is:

> "repeatedly characterized in opposition to a caricature of rationalist, analytical 'orthodox' approaches"
>
> (New and Kimbell, 2013, p.139; original emphases)

To illustrate their argument, New and Kimbell criticise the position taken by influential design researchers on the issue of *empathy*. As a vehicle for their critique, New and Kimbell illustrate how design research commonly frames how designers generate empathy. New and Kimbell use the example of a hypothetical study in which designers try to create empathy with wheelchair users:

> "…design practice would perhaps involve the designer themselves using a wheelchair, or collecting data on the *overall* travel experience, and look [*sic*] for interactions with the wider process."
>
> (New and Kimbell, 2013, p.144; original emphases)

New and Kimbell argue that this form of empathy is not unique to designers. Rather they suggest it has parallels with the form of empathy developed through an analytical approach to problem solving:

> "This type of empathy, however, might still only be 'cognitive'. For 'affective' empathy to be involved the process of seeing through others' eyes requires a deeper engagement: this requires sharing the emotional response of the other. In the wheelchair example, it would require the designer to share, perhaps, the level of anxiety that a user might experience in the situation, or anger […] It is not that one can rationally appreciate the fact of another's emotions, *but that one has the emotions oneself*."
>
> (New and Kimbell, 2013, p.145; original emphases)

New and Kimbell (2013) therefore argue that when it comes to generating empathy with users, the way designers think is similar to the way scientists think. Skewed ways of speaking on empathy enable the design research community to create intellectual territory on designers which differs to that which they associate with scientists. In researching how design investigators commonly speaks on empathy, New and Kimbell's work provides insights into how Design Thinking researchers may form *intellectual boundaries* with other disciplines.

On Wicked Problems

Design researchers commonly characterise design problems as being *wicked* (Buchanan, 1992; Lowgren and Stolterman, 2004). A large body of design research uses of the concept of wicked problems to differentiate design problems from those faced by scientists. To this

effect, Robert Farrell and Cliff Hooker (2013) summarise the stance taken in a swathe of design research. It is usual for design investigators to claim that:

> "design is characteristically faced with wicked problems whereas science is not".
> (Farrell and Hooker, 2013, p.681)

Farrell and Hooker (2013, p.683) argue that influential work on Design Thinking is "fundamentally flawed" in its depiction of science. They claim that design theorists construct an erroneous dichotomy between design and science which serves to propagate a myth that scientific problems are not wicked. Farrell and Hooker argue that, contrary to the position taken by design researchers, scientific problems are indeed wicked. To make their argument, Farrell and Hooker discuss the scientific debate which led to the description of the illness, *chronic fatigue syndrome*. One of the features of wicked problems is the idea that they can only be solved by negotiation between stakeholders. Negotiation was a feature of the diagnosis of chronic fatigue syndrome:

> "It was [...] initially unclear whether chronic fatigue syndrome was caused by a bacterium or virus, a fungus or mould, in each case perhaps deeply embedded in tissue, or was due to a psycho-somatic condition, with any of these options difficult and resource demanding to pursue. Then, just as with design, the issue becomes which few of these possibilities is currently most worth pursuing and in which specific forms. Various options will be developed in more detail, their resource demands and risks analysed and their merits spelled out for consideration. During that process more specific versions of the initial general problem will be developed, some of them (e.g. the psycho-somatic option) perhaps requiring a significant reformulation of both what the problem is and what criteria a solution would need to meet. A critical debate will develop about these options, the upshot being that one or two of them will be selected to pursue, perhaps by individual laboratories, perhaps as cooperative ventures."
> (Farrell and Hooker, 2013, pp. 688-689)

The example of chronic fatigue syndrome allows Farrell and Hooker to underscore the relationship between the way that scientists think and the way that designers think. Design researchers commonly claim that one distinction between the way that designers and scientists think is the idea that designers engage in iterative cycles to solve problems. Farrell and Hooker argue that scientists used iterative cycles when attempting to describe chronic fatigue syndrome:

> "After the results of [a] round [of debate and investigation] are in, the whole process [was] repeated again and again until an at-least-satisfactory explanation emerge[d] within the investigatory resources available."
> (Farrell and Hooker, 2013, pp. 689)

Reflecting on the connection between the way that scientists and designers solve problems, Farrell and Hooker suggest the existence of an intrinsic relationship between how these professionals think: both modes of thinking are the "product of a common core cognitive process" (2013, p.701). Farrell and Hooker's description of the commonalties between both ways of thinking leads them to argue that in Design Thinking research, the process of constructing an erroneous dichotomy between design and science helps enable the design research community to claim intellectual territory. The ability to claim intellectual territory potentially aids Design Thinking researchers to claim legitimacy and exercise power. Farrell and Hooker (2013, p.701) question this legitimacy, claiming their argument may help design researchers become more critical and "widen their outlook and reflect on their practices".

In investigating how design researchers commonly frame wicked problems, Farrell and Hooker analyse how investigators form *intellectual boundaries* with scientific disciplines. Both New and Kimbell's (2013) investigation into use how empathy is framed and Farrell and Hooker's (2013) work on wicked problems raise the need to further investigate how boundaries are formed in Design Thinking research and the potential ramifications of these ways of speaking. I investigate these issues in this thesis.

2.9.2 Investigating How Design Researchers Frame People

Framing People: Research on Ways of Speaking Used in Participatory Design Research

Participatory Design is as a form of design activity in which users are involved in the design process (Finken, 2003). Participatory design is commonly argued to be an important aspect of Contemporary Design Thinking. There is large body of research which discusses the benefits of participatory design (Finken, 2003). Researchers argue that enabling users to participate in the design process creates better user experiences. However, research also questions the effectiveness of the practice. Criticisms revolve around its effectiveness and scalability. Darses and Wolff (2006) argue that participatory design is time-consuming and resource intensive. When practiced in organisations, it is therefore difficult for companies to justify the expense of including individuals such as freelancers and contractors in the process (Rittenbruch and Kahler, 1999). Resource issues mean that participatory design excludes individuals. Participatory design projects tend to be small in scale and isolated (Clement and Van den Besselar, 1993). Their isolated nature often means that when a

participatory design project is completed, benefits are rarely disseminated broadly within the participating organisation. Therefore, once design researchers complete a project and leave the organisation, unless significant organisational changes have been realised, implementations are “difficult to maintain” (Kensing, and Blomberg, 1998, p.179). The benefits of participatory design may therefore be short-lived.

The criticisms of participatory design raise the need to investigate ideological orientations in participatory design research. Sisse Finken (2003) aims to identify ways of speaking in this area. Finken undertakes a close reading of three peer-reviewed papers which she claims are pivotal in the formation of discourse in participatory design research. The articles suggest that the practice is a politically motivated and morally-driven activity. The papers claim that participatory design exists solely to promote the “interests of […] users [and fight for] justice [for them by providing them with] a voice in
the development process” (Finken, 2003, p.66). Existing critiques of participatory design however suggest that it may not be highly effective in promoting the interests of users. Finken questions whether participatory design exists solely to benefit the interests of users:

> “might the statement ‘from the user’s point of view’ be seen as a production of truth that establishes a specific way of speaking. Might the concern for users’ interests position the designer’s interests as the starting point of systems development?”
> (Finken, 2003, p.66, Original Emphasis)

Finken argues that academic participatory design research serves a dual purpose. On one hand, the articles are a “representational apparatus” (Finken, 2003, p.70) which reflect methods used in participatory design. The articles also aid the participatory design research community to construct “certain truths”—namely that participatory design research exists *solely* to benefit users (Finken, 2003, p.70). Finken argues that participatory design research foregrounds this point. Concurrently, investigators background the notion that participatory design research also serves to promote and elevate the role of design researchers.

Finken’s (2003) analysis of ways of speaking therefore uncovers ideological orientations in participatory design research. These ideologies reinforce the legitimacy of participatory design research whilst downplaying criticisms associated with its effectiveness. Finken’s study suggests it would be valuable to investigate how Design Thinking researchers may use ways of speaking to foreground certain issues which help them to claim legitimacy whilst backgrounding others which do not. The forthcoming studies in this thesis attempt to uncover processes of foregrounding and downplaying in Design Thinking research.

In investigating how participatory design researchers frame users, Finken's (2003) research illustrates the value of focussing on how researchers speak on *people* (users). To this effect, my forthcoming studies will analyse how speaking on people helps researchers to construct the domain of Design Thinking

2.9.3 Investigating the Collection Code in Design Research

Investigating the nature of the collection code provides insight into level of coherence within an academic research community (Becher and Trowler, 2001).

Collection Code: Investigating how Design Researchers Speak on Donald Schön's Work

In Section 2 I noted the influence that Donald Schön's concept of *reflective practice* has had in Design Thinking research. Schön's legacy is such that he is the most cited author in the highly regarded design journal, *Design Studies* (Chai and Xiao, 2012).

Jordan Beck and Laureline Chiapello (2016) investigate how design researchers speak on Schon's work. To do this, they analyse how researchers use Schön citations in peer-reviewed articles presented at 2 recent international Design Research Society conferences. Studies of what are termed *citation function* are common, researchers regularly investigate how citations are used to enable ways of speaking in many academic fields. Beck and Chiapello (2016) however claim that their investigation is the first of its kind in design research. The lack of research on citation function provides another indication of the low level of investigation into ways of speaking
in design (and Design Thinking) research.

To undertake their study, Beck and Chiapello use a method termed *Content Analysis*. Conducting content analysis necessitates reading, analysing and interpreting text under investigation. Researchers allot portions of the text into categories. The categories in turn provide indications of ways of speaking. It is then possible to argue the presence of patterns in ways of speaking and to explore their ramifications (ibid).

Beck and Chiapello claim that in their data set, Schön citations often function to legitimate researchers' own practices:

> "[the action of citing Schon] supports [researchers'] own research topics, methods or methodologies, arguments"
>
> (Beck and Chiapello, 2016, p.9)

Commonly, the citations also function to "credit[] Schön for his concepts or ideas" (ibid, p.9). This is particularly evident when researchers refer to Schon's concept of "reflective practice" (ibid, p.10). It is in Schon's (1983) idea of *reflective practice*, that he claims that designers engage in iterative conversations with problems. The concept of reflective practice is therefore central in helping contemporary design researchers to differentiate Design Thinking from scientific thinking. Beck and Chiapello (2016, p.10) argue that often in the data set, the mention of reflective practice is accompanied by a "lack [of] any explanation or discussion" on what this term may indicate. For Beck and Chiapello (2016, p.10), the lack of explanation or discussion is detrimental for it "potentially undermine[s] attempts" to fully investigate, challenge and learn more about Schön's concept. The lack of discussion or critique is problematic as it potentially limits the community from developing a more complete understanding of Design Thinking or engaging in criticisms of Design Thinking.

Beck and Chiapello claim that the example of reflective practice highlights a common issue seen when design researchers cite Schön. Beck and Chiapello (2016, p.9) argue that design researchers frequently make "uncritical use" Schön's work: in the main, investigators do not build on it, critique it or extend it. This does not however mean that Schön's work is beyond criticism. Academics in fields outside of design have critiqued Schön's work extensively. Beck and Chiapello however claim that there are no examples of such criticism within their data set, indicating a lack of rigour. Beck and Chiapello query whether their conclusions on the function of Schön citations indicate a more widespread lack of rigour in design research. They ask:

> "are scholars publishing at the DRS conference are *(sic)* less interested in argumentation cumulative knowledge building?"
>
> (Beck and Chiapello, 2016, p.12)

Beck and Chiapello do not provide an answer to this question. Their question however resonates with other arguments which highlight the lack of criticality in Design research. Derek Miller (2010, p. 5), former Senior Fellow at the United Nations Institute for Disarmament Research, argues that professionals should be involved in critiquing and evaluating the validity of their belief systems through "figur[ing] out what is wrong with their own ideas, and not what is right about them." Miller however identifies a lack of such reflective behaviour in design research:

> “Design is trying to prove itself, rather than disprove itself. It is the latter, though, that will serve the social good”.
>
> (Miller, 2005, p.5)

In investigating how Schon citation are used in design research, Beck and Chiapello (2016) investigate how knowledge is accumulated in design research. Their work therefore analyses the nature of the *collection code* in design research. The idea that researchers in Beck and Chiapello’s sample do not build on, critique it or extend Schon’s work suggest that design research may evidence a weak collection code. The weak collection code in turn provides evidence of a lack of criticality in the sample.

Beck and Chiapello’s research suggests the need to investigate the collection code in Design Thinking research. This investigation will enable insight into both the level of cohesion and the level of criticality. I will be investigating these issues in this thesis. Beck and Chiapello’s use of content analysis highlights that use of this method may help me to identify ways of speaking in Design Thinking research.

2.10 The Research Question

The formation and dissemination of ways of speaking help academic discourse communities claim knowledge and ownership over their domain. In this chapter I have highlighted some of the workings of a Design Tribe of researchers who use ways of speaking to claim ownership of the domain of Design Thinking. There are relatively few existing studies which examine ways of speaking on Design Thinking. The commonly held argument that design research is practice-led may have contributed to a lack of recognition amongst design researchers of the importance of ways of speaking in enabling academics to create knowledge on Design Thinking. The lack of studies has left many gaps in knowledge in this area—indeed the prominent Design Thinking researcher Lucy Kimbell (2011) has claimed that critical examination of Design Thinking is in its infancy. This situation is problematic given the fact that Design Thinking is a key concept in design research and education worldwide.

The existing critical examinations of Design Thinking research do not make use of methods which are specifically designed for investigating ways of speaking. This has contributed to the gaps in knowledge. My thesis helps to fill this gap by using methods which are specifically designed for these purposes. The methods are *Corpus Linguistics* and *Content*

Analysis. My research involves collecting and analysing a set of data which is representative of ways of speaking created and disseminated by the Design Tribe.

In 1982, Nigel Cross coined the term *designerly ways of knowing* when calling for more research into how designers think. In reference to Cross' term, analysing a set of data using corpus linguistics and content analysis allows me to investigate ***designerly* ways of *speaking***, the discourse which enables design researchers to construct knowledge on Design Thinking.

2.10.1 Outlining The Research Question

This thesis asks:

"How does the Design Tribe speak on Design Thinking?"

This is an open-ended question. It involves researching points which Becher and Trowler's (2001) argue as being key in helping academic tribes construct knowledge on their domain:

Formation of Intellectual Territory

The practices of *classifying* ideas and *forming boundaries* help academic disciplines to create discrete intellectual territory (Becher and Trowler, 2001). Researching into the way in which researchers in the Design Tribe classify ideas and form boundaries will provide insight into the intellectual territory claimed by the discourse community. These points prompt me to ask: *how do Design Thinking researchers form intellectual boundaries?*

Framing of Design Thinking

The practice of *framing* key ideas helps academic discourse communities claim ownership of them. Because of this I ask: *how does the Design Tribe frame Design Thinking?*

Framing of People

The way in which discourse communities *frame people* is important in helping them to create ideology (Becher and Trowler, 2001). This prompts me to ask: *how do Design Tribe researchers frame people?*

The Collection Code

Research on the *collection code* provides insight into level of coherence in an academic research community (Becher and Trowler, 2001). Investigation of collection code requires analysing how academics frame existing research. I ask: *what are the features of the collection code in Design Thinking research?*

Chapter 3

Methodology

3.1 An Introduction to Research on ‘Ways of Speaking’

Research into ways of speaking necessitates analysing words used by a discourse community and interpreting their use in creating discourse (Guest et al, 2012). Researchers have not always believed that investigating use of words can create knowledge on ways of speaking. In the 1960s, it was commonly thought that it is impossible to conduct this form of research. At the time, researchers argued that cognitive development dictated which words a person chooses to use (Carter, 2004). In the 1960s, the cognitive psychologist Noam Chomsky was the leading authority on this issue. Chomsky (1969) argued that people tend to use words which are easier to remember than those which are more difficult to recall. This, thought Chomsky, is why people frequently favour using shorter words over longer ones. It was therefore commonly assumed that analysis of spoken or written language can only create knowledge on the physiological structure of the human brain (Carter, 2004; Chomsky 1969). In the latter half of the 1960s, this dominant school of thought was challenged by a handful of academics, the most influential of whom is John Sinclair (Hoey and O’Donnell, 2008). Sinclair argued that humans choose to use words which reflect their affiliation with discourse communities (Sinclair interview cited in Teubert, 2004).

When investigating ways of speaking associated with a particular topic or field, researchers term this area a research ***domain*** (Nesi, 2016). People who are associated with the domain are termed ***speakers*** (Stubbs, 1996). With reference to this terminology, I have investigated ways of speaking in the domain of Design Thinking research. To do this, I have analysed a data set provided by a set of speakers. The aim of research into ways of speaking is to uncover patterns in the way speakers discuss their domain. The practice of uncovering patterns allows researchers to critique their use in generating discourse (Teubert, 2004).

A range of analytical methods facilitate research on ways of speaking (Guest et al, 2012). In this chapter, I discuss the strategies that have helped me to investigate ways of speaking in the domain of Design Thinking research. This chapter contains 4 sections:

3.2 Overarching Considerations

3.2.1 Quantitative and Qualitative Approaches

There are two approaches for conducting empirical research, *quantitative* and *qualitative*. They are often framed in opposition to one another (Guest et al, 2012; Johnson and Onwuegbuzie, 2004).

Historically speaking, scientific research became established in the physical sciences and makes use of *quantitative* methods (Kerlinger, 1970). Quantitative methods make use of statistics. Statistics drive both the data collection process and analysis of findings (Guest et al, 2012). Quantitative methods are founded on the ideals of *neutrality* and *objectivism* (Kincheloe et al, 2004). When conducting quantitative research, researchers should not allow external interests (such as the political ambitions of funding bodies) to influence the investigative process. Investigators should therefore remain neutral throughout their research. Traditionally, advocates of quantitative research have claimed that a neutral stance facilitates objectivity (Kincheloe et al, 2004). The traditional narrative has long been challenged. Fusch and Ness (2015) claim that a researcher's judgment is always influenced by his or her *personal lens*—their experiences, ambitions and prejudices. This lens therefore inevitably reduces the objectivity of research (Widdowson, 1995; Barbour, 2001; Nickerson, 1998).

Qualitative research is commonly used to analyse ways of speaking and does not make use of statistics. This is because researchers argue discourse cannot be described as numerical data (Kincheloe et al, 2004; Guest et al, 2012). Therefore, researchers interpret data subjectively. This subjectivity means that researchers cannot claim to remain neutral; nor are they able to argue that their results are objectively valid. Critics therefore claim qualitative research is not rigorous (Sandelowski, 1986).

Some researchers (Bryman and Burgess, 1994; Strauss and Corbin, 1990) suggest that frequent reliability checks can improve the robustness of qualitative methods. This in turn can make qualitative research of equal standing to quantitative research (ibid).
In contrast, some qualitative researchers reject the idea that qualitative research should be framed with reference to quantitative research (Guest et al, 2012). They argue that as the two approaches are used to study different phenomena, the success of qualitative research cannot be measured in terms of the rules set down in the quantitative tradition. This position

has prompted use of methods which disrupt traditional quantitative research protocols. *Cultural Probes* is one such method. Probes-led studies aim to collect data in a deliberately unsystematic manner—researchers post ambiguous adverts for participants in places like local newspapers. Probes-led inquiry is also designed to collect ambiguous data from study participants (Gaver et al., 2004). My research question necessitates collecting data from a highly prescribed set of speakers belonging to a particular discourse community and to report coherent patterns on ways of speaking. Disruptive methods are therefore not applicable to my thesis.

Combining Quantitative and Qualitative Approaches

The dichotomy between quantitative and qualitative methods can restrict opportunities for analysis (Guest et al, 2012; Johnson and Onwuegbuzie, 2004). Instead, a combination of approaches can create a more rounded analysis (ibid). I have combined qualitative and quantitative approaches in investigating how the Design Tribe speak on Design Thinking. I have however ***focussed*** on qualitative research as it is better suited to enabling a deep understanding of ways of speaking: quantitative analysis allows me to uncover initial insights which help form starting points to drive my qualitative research; my definitive claims result from using qualitative analysis. The use of reliability checks has allowed me to reflect on the consistency of my analytical process. I explore strategies which I use to limit cherry picking in Section 3.4.2 of this chapter.

3.2.2 Types of Data

Types of data which can be used to investigate ways of speaking include, *field notes, observations, interviews, imagery, performance* and *texts* (Guest et al, 2012). The researcher question helps to influence which data-type to analyse. I have aimed to investigate ways of speaking used by a community of academic researchers. Predominantly, academic communities disseminate ways of speaking to other tribes-members in peer-reviewed literature (Becher and Trowler, 2001; Thompson and Hunston, 2003). I have therefore analysed peer-reviewed literature which focuses on Design Thinking. Interviews and speeches are not peer-reviewed so do not provide as much insight into how a community claims and defends its intellectual territory. I have not therefore conducted interviews with individual researchers and have not analysed speeches on media such as YouTube.

There are limitations associated with only making use of academic peer-reviewed literature. The peer-review process can take a considerable amount of time. In addition, it can take months for articles to become available in the public domain. Therefore, academic literature may not represent the latest discourse on given domains (Cronin et al., 2008). Despite this limitation, analysing peer-reviewed articles is preferable to analysing non peer-reviewed items like blogs as these are not as valuable in providing insight into academic discourse communities.

3.2.3 Data Sampling

It is often impossible or impractical to analyse all the available data associated with a domain (Biber et al, 1998). One reason for this is that the complete data set may be too large to collect and analyse effectively. Researchers often collect and analyse *samples* of data, "severely scaled down versions of the [total data] population" (Váradi, 2001, p.590). Analysing samples can allow for far more in-depth research than is possible when analysing the total data population (Biber et al, 1998). As the concept of Design Thinking is very influential in design research, the complete possible data set is too large to collect and analyse effectively. (This is especially the case when undertaking qualitative analysis). Analysing a sample of data has helped me to engage in a deeper level of analysis. There are two approaches to sampling: *Probabilistic and Non-probabilistic*.

Probabilistic sampling implies that the sample should be mathematically representative of the elements found in the domain (Váradi, 2001; Guest et al., 2006). It is used to facilitate quantitative analysis (Guest et al., 2006). In *non-probabilistic sampling* the data set is not mathematically representative of the domain (Guest et al., 2006). Non-probabilistic sampling is applicable to qualitative analysis. When engaged in non-probabilistic sampling, the researcher uses their judgement to choose which data to include in the sample (Fusch and Ness, 2015). As I have focussed on qualitative research, I have used non-probabilistic sampling. A researcher's judgment is influenced by his or her *personal lens*—his or her experiences, ambitions and prejudices (ibid). This lens may prompt a researcher to *cherry pick* data (Baker, 2012)—to include data which helps confirm his or her prejudices. I explore strategies which I have uses to limit cherry picking in Section 3.4.2 of this chapter.

3.2.4 Generalisability

Research often aims to provide insights which apply beyond the confines of the data sample (Larsson, 2009). In-so-doing, a researcher will aim to suggest that their findings are *generalizable* to a broader group of individuals. My research question necessitates providing insights into how a community of Design Thinking researchers speak on their domain. The concept of generalisability therefore applies to my thesis. There are two levels of generalisability: a study may be *statistically generalisable* or generalisable at a *descriptive level*.

Results are statistically generalisable when a researcher can claim to accurately predict when or where patterns observed in the sample may be observable in the wider domain (Guest et al., 2006). This level of generalisability only applies when probabilistic sampling has been used to collect data (ibid). When claiming generalisability at a descriptive level, it is not possible to predict when or where patterns observed in the sample may be observable in the wider domain (Larsson, 2009). This level of generalisability applies when non-probabilistic sampling has been used to collect data in order to conduct qualitative research (Guest et al., 2006).

The claim to descriptive generalisability is narrative-based. The themes that the researcher has uncovered in the qualitative research should be coherent enough to provide readers with enough information to enable them to recognise when and where patterns in ways of speaking occur in the wider domain (Larsson, 2009). In my data analysis, I have aimed to build sufficiently strong narratives in order to claim generalisability at a descriptive level.

3.2.5 Research Paradigms

Traditionally, either one of two opposing research paradigms have been used to conduct empirical research. The paradigms are termed *deductive proof* (deduction) and *inductive discovery* (induction) (Gray, 2014). The deductive approach is used to investigate the validity of underlying theoretical assumptions or hypotheses (Gray, 2014; Hsieh and Shannon, 2005). The issue of *confirmation bias* is a limitation of deductive investigation (Hsieh and Shannon, 2005). This is the tendency for researchers to produce findings which confirm their underlying assumptions. The inductive paradigm is used to tackle open-ended research questions (Gray, 2014). Conclusions emerge solely from analysis of the data set. Induction is criticised as offering a “naive perspective” (Hsieh and Shannon, 2005, p.1283) on ways of speaking as it does not take into account researchers’ underlying biases. When conducting inductive research, investigators can concentrate too much on initial findings and make

conclusions prematurely (Gray, 2014). Engaging in iterative cycles of analysis can help to combat this issue (Hsieh and Shannon, 2005). My research question is open-ended, so I use the inductive approach in my forthcoming studies.

3.3 The Methods

Several methods allow investigation into ways of speaking. Conducting *participant interview*s, *focus groups* and engaging in *ethnography* can help shed light on how individuals or small collection of people create ways of speaking (Guest et al, 2012). These methods are not applicable in my thesis as I aim to investigate ways of speaking created by a community of researchers based in—geographically speaking—a diverse range of locations.

Research communities construct and disseminate ways of speaking in peer-reviewed texts. The methods termed *Corpus Linguistics* and *Content Analysis* enable analysis of textual data (Baker et al, 2008). Use of either in isolation can uncover ways of speaking (Baker et al, 2008). However, their combined use can help to overcome their limitations, resulting in more in-depth analysis (Baker et al, 2008). I have used corpus linguistics to provide *indicative* findings. Use of content analysis uncovers *definitive* insights.

3.3.1 Method 1: Corpus Linguistics

The field of linguistics covers a range of areas which focus on a variety of aspects of human language (McEnry and Wilson, 2001). The area termed *corpus linguistics* is concerned with how people construct and convey ways of speaking. Corpus linguists analyse data sets consisting of spoken or written language. The data sets are termed ***corpora***. Corpus linguists argue that speakers "express[] an ideological position" (Stubbs, 1996, p.107) when choosing words or terms to use. Researchers therefore look for patterns in word use in the corpus. Uncovering patterns can create cohesive insights into ways of speaking (Hoey and O'Donnell, 2008).

Corpus linguistics research began in the late 1960s. The British linguist John Sinclair (1933 – 2007) is credited as being a pioneer in this field (Hoey and O'Donnell, 2008). I noted in Section 1 of this chapter that Sinclair's work came in reaction to an idea which was dominant during the era in which he worked, namely that investigation into patterns of word use could not provide insight into ways of speaking. Sinclair's research overturned the prominent view

and has since helped to initiate the formation of centres for corpus linguistics in universities worldwide. Corpus linguistics research often provides insights into how those in powerful positions exercise their power and the ramifications of these ways of speaking. Because of this, it is well-suited to investigating how academics construct *designerly ways of speaking*.

Examples of Existing Corpus Linguistics Research

Ways of Speaking Used by Tony Blair

Mautner (2009) analyses a corpus consisting of emails written by former British Prime Minister Tony Blair in a fraught historical context. Blair's emails were written in response to criticism on the issue of UK anti-terror legislation. At the time, The UK government were introducing this legislation. The legislation proved controversial as campaigners argued that it limited human rights (Mautner, 2009).

Corpus linguistics analysis focuses on how speakers use individual words to create ways of speaking. Mautner focuses on how Blair uses the word *people*—Blair uses this term a lot in the corpus. Mautner (2009, p.41) argues that if one goes solely by its dictionary definition, it is possible to conclude that *people* is "semantically bland"—i.e. it is not loaded with semantic significance. Analysis however shows that Blair's use of *people* is central in helping him to create his narratives. Blair uses *people* to signify "ordinary folk" (Mautner, 2009, p.42). His emails claim that terrorism has affected the lives of ordinary people negatively: their lives have "been turned into a daily hell", they "mourn the loss of respect" and "live in fear" (Blair quoted in Mautner, 2009, p.42). Mautner (2009, p.42) concludes that Blair uses *people* to "construct[] a group [which he] aligns himself with". Blair's use of *people* therefore helps him to legitimise the implementation of anti-terror legislation. The example of unpicking Blair's use of what—at initial inspection—appear to be innocuous terms, highlights the value of corpus linguistics. The process of examining use of particular terms helped me to uncover how the Design tribe construct *designerly ways of speaking*.

International Arts English

Rule and Levine (2011) analyse ways of speaking in the world of high-end modern art. To do this, they research a corpus consisting of artists' statements—texts which often accompany

artwork displayed in galleries. Written by artists or their representatives, these statements summarise the artist's influences and the aims and objectives of the artwork.

Analysis reveals that high-profile artists tend to be concerned with what they claim to be important human and environmental issues. The artists do not aim to solve these issues, instead, they aim to raise awareness of them. Artists use terms like "interrogate", "problematize" and "blur boundaries" in the context of raising awareness (ibid, unpaged). Rule and Levine argue that use of these terms helps artists to consistently frame the ruling classes as failing to confront pressing human and environmental issues. In this way, artists' statements tend to "convey[] the sense of political tragedy" (ibid, unpaged). In addition, the artists' statements frequently contain forms of words which are rarely used in everyday language and are elitist in nature. Rule and Levine argue that the statements use of a particular *take* on English, which they term *International Arts English* (IAE). IAE helps the high-end modern art community construct its elite identity, making it appear legitimate. IAE is also vital in forming intellectual boundaries—those who use it are part of the community, those that do not are excluded. In uncovering how members of the international high-end modern arts community frame their domain and create intellectual boundaries, Rule and Levine's research illustrates how corpus linguistics can be applied to my research question.

Concordance Software

Analysis is facilitated by specialised web-enabled software termed *concordancers*. Examples include *AntConc* (Gries, 2009), *WordSmith* (Scott, 2014) and *Sketch Engine* (Brezina and Gablasova, 2015). I used *Sketch Engine* (Figure 13) to conduct my research. I made this decision after consulting with academics who teach corpus linguistics at my place of work, Coventry University. The academics informed me that all their colleagues and students use it and that there is free institutional access to it.[8]

[8] To help me to become familiar in corpus linguistics methods and processes, I enrolled on a summer school at Lancaster University. (http://wp.lancs.ac.uk/corpussummerschools/). Lancaster University has a world-leading presence in the field of corpus linguistics.

Figure 13: The Concordancer 'Sketch Engine'. Taken from, https://www.sketchengine.eu/

Concordancers provide quantitative insights on data (see subsection 'Corpus Linguistics Tools', below). The researcher then uses qualitative analysis (see subsection 'Corpus Linguistics Tools', below) to interprets these. There are advantages and disadvantages to using concordancers.

Advantages

Reducing the Impact of Researcher's Personal Lens

The way that concordancers analyse texts differs to the way that humans analyse textual data. Humans analyse texts through manual reading. A researcher's personal lens may cause him or her to focus on portions of the data which support their underlying theories (Baker 2012). Concordancers do not have underlying theories associated with particular data sets and are therefore not biased in the same way that researchers are. This means that concordancers analyse all the data in a given corpus with equal priority (Biber et al, 1998). Use of concordancers may therefore reduce the impact of a researcher's personal lens.

In addition, concordancers can, to a certain extent, anonymise data. Concordancers can only process text which has been converted to a Unicode format termed, *UTF-8* (McEnery and Xiao, 2005). UTF-8 text is a homogenised form of text—it supports only one font, one text size and a single colour. In addition, it cannot support images: converting data to UTF-8 causes loss of imagery. Conversion also deactivates any embedded web-links. It may therefore be more difficult for a researcher to identify the origins of text once converted to

UTF-8. This may also help to diminish the effect of a researcher's personal lens on analysis. A degree of anonymisation is valuable in my thesis as my corpus linguistics analysis followed an in-depth review of literature on Design Thinking.

Quick Analysis

Data sets can be very large, containing many words. Concordancers analyse large corpora in seconds. This can quickly provide researchers with initial insights into ways of speaking. The relatively quick process associated with corpus linguistics provides a supportive contrast to the far more time-consuming practice of *content analysis* (see, Section 3.3.2).

Disadvantages

Data sets consisting of transcribed spoken conversation do not include important communication features such as body language. Critics therefore argue corpus linguistics to be an over-reductive form of analysis (Widdowson, 1995). These issues do not apply to this PhD as I have only analysed written text. Another disadvantage of concordance software is that researchers may become over-reliant on computer-generated quantitative insights (Baker, 2004). To overcome this issue, I have focussed on using qualitative analysis to interpret quantitative data. The following section discusses the corpus linguistics tools which allowed me to do this.

Corpus Linguistics Tools

Keyword Analysis (Quantitative)

When creating discourse, communities tend to focus on using terms which are important in allowing them to construct knowledge. The terms vary from discourse community to discourse community. These words are termed *keywords* as they are important ('key') in helping a particular community to create their ways of speaking (Flowerdew 2013). The process termed *keyword analysis* aims to identify these terms.

Keyword analysis is a comparative investigation. To measure keyness, it is necessary to compare the frequency of appearance of terms in the research corpus with their occurrence

in another corpus. This ‘other’ corpus acts as a ‘norm’ by which to judge word frequency in the research corpus. The norm is termed the *reference corpus* (Baker, 2004).

Reference Corpus

The source of the text in the reference corpus influences which words are key to the research corpus (Biber et al., 1998). The choice of reference corpus depends on the aims of the research. Reflection on Rule and Levine’s (2011) study of artists’ statements illustrates the rationale for choosing a reference corpus. Rule and Levine compare language used in artists’ statements with that of standard English. Their reference corpus therefore consists of a form of standard English. Concordancers enable access to a range of reference corpora, including data sets which are designed to act as standard English corpora. Rule and Levine (2011) discover that noun-form of words appear as keywords in the artists’ statements:

> “*visual* becomes *visuality*, *global* becomes *globality*, *potential* become *potentiality*, *experience* becomes *experiencability.*”
>
> (Rule and Levine, 2011, unpaged)

Rule and Levine argue the use of these noun-forms mimics a form of “highbrow written French” used by French poststructuralist philosophers such as Jacques Derrida. According to Rule and Levine, their use represents attempts to elevate elite modern-art gallery practice and to provide a sense of intellectual authority and legitimacy.

Research communities tend to use specialised ways of speaking which help to differentiate the world of academia from might be termed *lay communities*. Because of this, I would expect that the words the Design Tribe focus on using differ to the terms that are commonly used in standard English. For this reason, a reference corpus comprised of standard English would not help me to research my question. It is more useful to compare how the Design Tribe speak in relation to other academic communities (Nesi, 2016, personal communication). This allows me to uncover terms which are over-used by the Design Tribe and investigate how speakers use them in context.

The reference corpus termed the *British National Corpus* (BNC) (University of Oxford, 2010) contains 100 million words taken from a broad range of sources. The BNC contains specific *sub-corpora*—a collection of language from a specific genre. The sub-corpus termed *‘Written Academic’* contains a range of texts found in the “the ‘Short Loan’ collections of seven

University libraries" Burnard (2007, unpaged; original emphasis). Short loan collections consist of academic texts which are core in their respective fields (Burnard, 2007). They therefore contain ways of speaking which are core to specific academic tribes. Specifically, the BNC Written Academic sub-corpus consists of text from the following areas: *humanities; medicine; natural sciences; politics; law; education; social and behavioural sciences; technology; computing; engineering*. The corpus does not include text from art or design-based subjects (I could not locate an art or design-based corpus). Therefore, using the Written Academic sub-corpus as my reference corpus has enabled insight into keywords used by the tribe of Design Thinking researchers. *Sketch Engine* enables access to the BNC.

A Statistical Measure

Keyness is a statistical measure[9]. Concordancers calculate keyness and provide words with a keyness score, a numerical figure. To facilitate analysis, concordancers present keywords in descending order of keyness (Hunston, 2006). Figure 14 illustrates an example of a keyword list taken from the user guide for the concordancer *Sketch Engine*. The list shows keywords associated with an article on the subject of 'software' found on Wikipedia. The reference corpus is a large corpus of standard English. The term *microsoft* is a highly-ranked keyword. This suggests that the company 'Microsoft' is strongly associated with the domain of software.

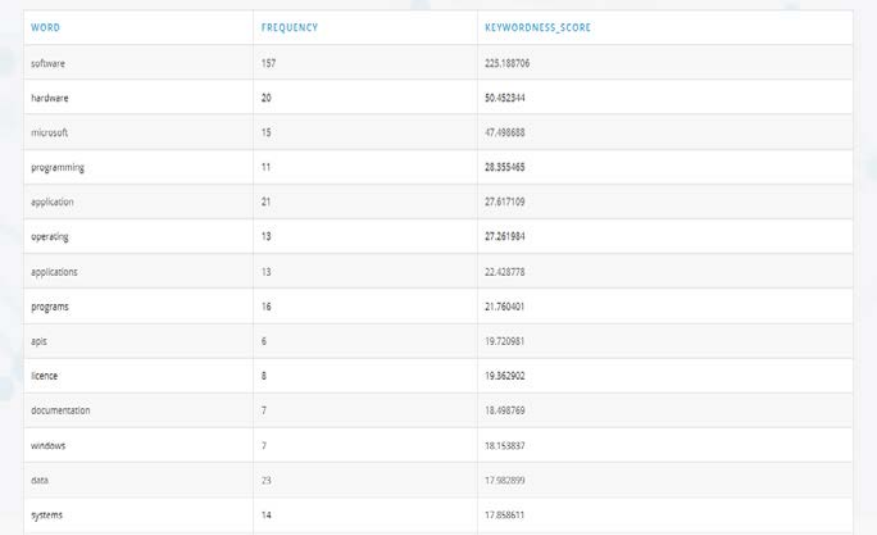
[9] Sketch Engine uses the following formula to calculate the keyness of a term in the research corpus (Lexical Computing, 2005):

$$\frac{fpm_{focus} + n}{fpm_{ref} + n}$$

I am not a statistician. Because of this, I asked a statistician (Dr Liam Brierley) at my place of work (Coventry University) to put the formula in terms in that a non-expert could understand. Kindly, Dr Brierley 'translated' the formula as follows:

$$\frac{\text{[Frequency of word in research corpus if it were comprised of 1million words]} + 1}{\text{[Frequency of word in reference corpus if it were comprised of 1million words]} + 1}$$

It is usual to use the number '1' in place of 'n' to prevent a situation in which the formula results in a division by zero. Division by zero is not possible in mathematics.



WORD	FREQUENCY	KEYWORDNESS_SCORE
software	157	225.188706
hardware	20	50.452344
microsoft	15	47.498688
programming	11	28.355465
application	21	27.617109
operating	13	27.261984
applications	13	22.428778
programs	16	21.760401
apis	6	19.720981
licence	8	19.362902
documentation	7	18.498769
windows	7	18.153837
data	23	17.982899
systems	14	17.858611

Figure 14: Example of a Keyword List, taken from Sketch Engine (n.d., unpaged)

Tolerance

When evaluating keyness scores, it is necessary to choose a tolerance to work to. The tolerance represents the likelihood that a particular word is actually key to the data set. Words with keyness scores above the level of tolerance are considered to be keywords (Baker, 2004). Often researchers work to a 95% likelihood of keyness (Gries, 2009). In statistical annotation, level of likelihood is described with a p-value (where 'p' stands for probability (Lancaster University, n.d.)). 95% likelihood is written as $p < 0.05$. I have used this level of significance to denote keyness in my studies.

Establishing keyness does not guarantee that a word contributes to ways of speaking in the corpus. Baker (2004) illustrates this idea in his analysis of fiction written for gay and lesbian audiences. Baker uncovers the keyword *wuz*. *Wuz* is used in the corpus as an alternative spelling to the word 'was'. Conceivably therefore, over-use of *wuz* may indicate the presence of a colloquialism in the gay and lesbian fiction corpus. Conceivably, this may in turn signal a particular way of speaking which is important in gay and lesbian communities.

A closer examination shows that this is not the case. Baker discovers that *wuz* appears in only one of the fictional works in the corpus. The keyness of *wuz* is therefore due to one author's idiosyncratic use of language. Its use does not provide an indicating of ways of speaking in the corpus as a whole. When evaluating word keyness it is therefore important to consider its rate of dispersion in the data set.

Dispersion Plots

Concordancers facilitate dispersion analysis by providing *dispersion plots* of given words or terms (McEnry and Wilson, 2001; Baker et al, 2006). These provide a visual representation of the rate of a word's appearance throughout the corpus. Analysis of concordance plots is a vital final step in evaluating the keyness of a word (Baker et al, 2006).

Examples of dispersion plots can be found in corpus linguistics literature (e.g. Baker et al, 2006). My literature search suggests that existing examples tend to come from use of concordance software with interfaces which may be unclear to research communities outside of the corpus linguistics community. This limits the effectiveness of including an existing example here. Because of this, I used Sketch Engine—which has a clearer interface—to create dispersion plots. The plots result from analysing the *British National Corpus*. Figure 15 shows a dispersion plot for the word *'the'*.

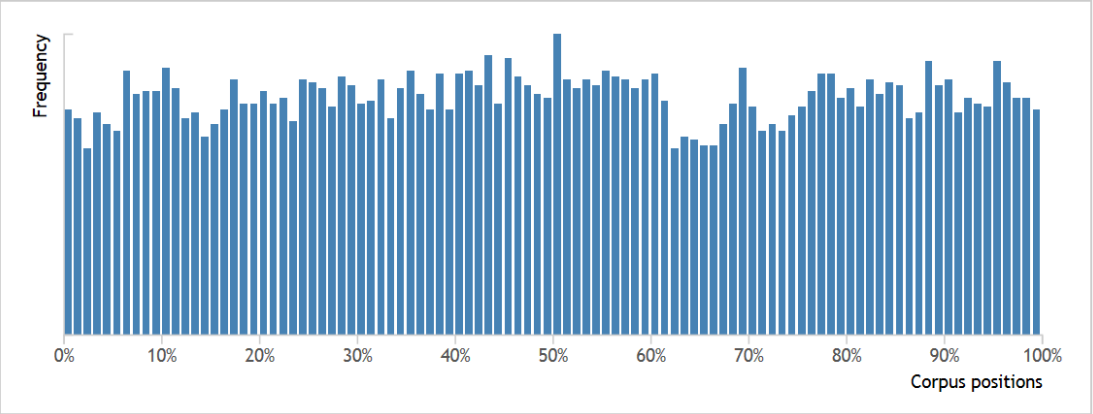


Figure 15: A Dispersion Plot for the Word 'The'.

The axes on the plot require clarification. The X-axis ('Corpus Position') refers to the distance (word count-wise) along the data set. To illustrate, the point '50%' occurs half way through the corpus. The Y-axis denotes the frequency of appearance of the term in question (in Figure 15, *'the'*). There is a reasonably even spread of use of the term across the data set. Any insights into ways of speaking associated with the term can therefore be argued as being broadly applied across the corpus.

The situation is different in Figure 16. Figure 16 shows a dispersion plot for the term *'binoculars'*. The plot shows a spike of use of the term in a certain area. Analysis of ways of speaking are therefore unlikely to be representative of those used across the corpus.

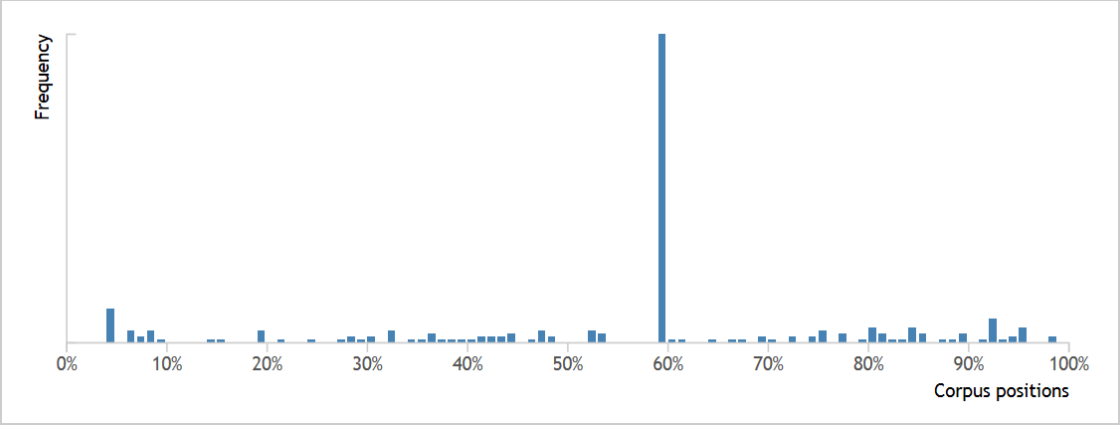


Figure 16: A Dispersion Plot for the Word 'Binoculars'.

Concordance Analysis (Qualitative)

Establishing that a particular word is key to a corpus provides a useful starting point in uncovering ways of speaking. To provide further insights it is then necessary to analyse how the keyword is used in context. This stage—termed *concordance analysis*—is a qualitative form of investigation (Baker, 2004). Concordance analysis necessitates manual examination of portions of text which contain the keyword under investigation. The process involves looking for contextual patterns which indicate ways of speaking (Hunston, 2007). Investigating the context surrounding the use of *every* instance of a particular keyword helps to reduce the effects of a researcher's personal lens (McEnry and Wilson, 2001).

In the first instance, analysis involves investigating *concordance lines*, short segments of text containing a keyword under investigation (Hunston, 2007). Concordancers visually aide inspection of concordance lines by positioning the keyword in the centre of the screen. Hunston's (2007) analysis of the term *persistent* highlights concordance analysis in practice. Hunston aims to uncover how the word *persistent* is used in a large corpus of standard English. Figure 17 shows some of the concordance lines.

1 seats has volunteered despite persistent arm twisting by regional
2 were having to defend against persistent Bradford attacking. In the fir
3 heel of this administration: its persistent determination always to look
4 oard for a grant to rehabilitate persistent drug users, ex-offenders and
5 on thin ice at 4-115 against a persistent England attack. Bevan survived
6 industry, charging it with persistent errors in consumers' details,
7 dentified. <p> Whether it is the persistent intimidation that takes place,
8 ringing in tougher sentences for persistent offenders and ensuring that al
9 of the Ten Hours Bill, which met persistent opposition from government and
10 considerations, thus creating a persistent paradox. Ainerica's dilemma
11 t unfortunately I can't." After persistent rain, which reached stair-rod
12 story about one particularly persistent recruiter. <p> Michael
13 plus the Shamir government's persistent refusal to give any ground on
14 later this year. Despite persistent reports of opposition to the
15 th of it. They said there was a persistent rumour that Mary was actually
16 he practice of folk swayed by a persistent sense of wonder, chance, and
17 ranssexual an individual with a persistent sense of discomfort with his o
18 hat this situation is a sign of persistent sexism, while optimists say th
19 te of the hospital but the most persistent talk of the more able-bodied
20 e spent on health and pensions. Persistent unemployment is keeping spendi

Figure 17: A sample concordance, adapted from Hunston (2007, p.254-255).

In Figure 17, use of *drug users* (line 4)*, errors* (line 6) and *intimidation* (line 7) clearly illustrate that use of *persistent* is associated with negative events or circumstances (Hunston, 2007, p.254). At other times the analysis of concordance lines is inconclusive, prompting the need to investigate a longer span of text. Concordancers facilitate further analysis by displaying expanded portions of text. Figure 18 shows an expanded version of line 15 in Figure 17:

> *15: I talked to a couple of women who had worked with Mary at that clothing factory in Melbourne… They said there was a* ***persistent*** *rumour that Mary was actually a part-time prostitute, specializing in really rough trade.*

Figure 18: Expanded texts related to concordance lines 15 in Figure 4.
Taken from Hunston (2007, p.255).

Figure 18 illustrates that the term *persistent* helps speakers to create narratives which describe undesirable proceedings (Hunston, 2007).

When constructing discourse, speakers may choose to use various synonyms or colloquialisms in place of a given word or term. Concordancers may not highlight all of these (Baker et al, 2008). For a more rounded analysis, it is common practice to supplement corpus linguistics with manual close reading of data sets (Baker et al, 2008). Content analysis helped me to supplement the use of corpus linguistics. Indicative findings gained from employing corpus linguistics were used to create starting points to inform the content analysis process.

3.3.2 Method 2: Content Analysis

The method termed, *content analysis* is used to categorise elements in data sets in order to uncover patterns (Graneheim and Lundman, 2004). It can be used to investigate surface-level (*manifest*) issues or explore deeper (*latent*) issues.

Manifest Issues

Examples of manifest issues include,

> "the gender of a character in a film, or certain behaviors (blinking eyes, scratching head) in interpersonal conversations."
> (Potter and Levine-Donnerstein, 1999, p.258, original emphases)

Analysis proceeds by counting the occurrence of elements and allotting them into relevant categories (Baxter, 1991; Graneheim and Lundman, 2004). It is often quite easy to objectively verify the results of investigating manifest issues (Potter and Levine-Donnerstein, 1999). Originally, content analysis was used to analyse manifest data. Krippendorff (1980) traces its use to Scandinavia in the 18th Century. Swedish scholars used the method to scrutinise hymns for blasphemous references.

Latent Issues

The term, *latent issues* is used to describe the social or political contexts which are associated with the data set (Potter and Levine-Donnerstein, 1999). These elements underpin "the elements on the surface of a message" (ibid, p.258) and therefore require the researcher to qualitatively interpret his or her findings with respect to, for example, social or political contexts. Qualitative content analysis of latent issues is commonly used to investigate ways of speaking (Graneheim and Lundman, 2004). To facilitate brevity, I use the term 'content analysis' to mean *qualitative content analysis of latent issues* in the remainder of this thesis. The *qualitative* nature of content analysis necessarily means it is a subjective form of investigation.

Content Analysis[10] Procedure

[10] A note on terminology: alongside *content analysis*, there are other procedures which are used to conduct qualitative analysis of text-based data. The term *Thematic Analysis* describes a process in which researchers investigate a domain by analysing data sets for patterns in ways of speaking (Joffe and Yardley, 2004). Analysis proceeds through manually allotting elements contained with the domain into categories (ibid). The patterns can provide insights into latent issues contained in the data set (ibid). The description of Thematic Analysis is therefore similar to that of Content Analysis. Indeed, the terms appear interchangeable:

> "Historically the terms 'content analysis', 'qualitative content analysis' and 'thematic analysis' have been used interchangeably to refer to very similar approaches to qualitative data analysis."

Content analysis necessitates close manual reading of textual data (Potter and Levine-Donnerstein, 1999). Software is not used to facilitate the investigation. The analytical process involves allotting portions of text into *theoretical categories* (often just termed *categories*) (Graneheim and Lundman, 2004). The categories represent ways of speaking which are contained in the data set. The categories therefore function as a "translation device" that allow systematic categorisation of the data set (Poole and Folger, 1981, p.477).

The term *coding* refers to the process of translating textual data into categories (Graneheim and Lundman, 2004). Categories which contain similarities are grouped into more substantive *themes*. The objective is to look for patterns of ways of speaking which re-occur in the data set (Joffe and Yardley, 2004). Content analysis research practice includes several steps:

Identifying the Unit of Analysis

The *unit of analysis* refers to the "objects of study" (Graneheim and Lundman, 2004, p. 106), i.e. the format of the data under investigation. Data may be printed, or available electronically (Hsieh and Shannon, 2005). In my thesis, I used online searches to gather data.

Identifying the Meaning Unit[11]

When conducting analysis, it is necessary to divide the unit of analysis into portions of text. These portions are analysed discretely from one another. The portions are coded into theoretical categories which each represent an instance of a way of speaking. These portions of text are termed *meaning units* (Graneheim and Lundman, 2004).

The purpose of delineating a meaning unit from other meaning units is to form a consistent basis for analysis, thereby potentially reducing its subjectivity. To promote

(The University of Auckland, n.d., unpaged; original emphases)

Guest et al (2012) use the term *Applied Thematic Analysis* to describe a process which is used to research latent issues. The process involves categorisation of data and analysis of patterns. Guest et al. (2012) argue that the Applied Thematic analysis research process is very similar to that applied in Content Analysis. The similarities between Content Analysis, Thematic Analysis and Applied Thematic Analysis are such that, in the interests of maintaining consistency, I will only use the term *Content Analysis* in the remainder of this thesis.

[11] I describe the process of identifying the meaning unit in my primary research in **Appendix 1 - '*Becoming Familiar With The Data Set*'.**

consistency, researchers often delineate meaning units prior to beginning the analysis (Rourke et al, 2001). Commonly, fixed grammatical units are used as the basis for defining the meaning unit. Individual *sentences* (Joffe and Yardley, 2004) or *paragraphs* (Hara et al, 2000) are often used to delineate the meaning unit. Rourke et al (2001) criticise these methods. Sentences may be too narrow in breadth, leading to an overly-fragmented analysis (Elo and Kyngäs, 2008; Rourke et al, 2001). Paragraphs may be too broad in scope and therefore contain several meanings (ibid). This can dilute the effectiveness of the categorisation process.

Henri (1991) argues it is not appropriate to define the meaning unit prior to beginning the research. This is because the way in which speakers convey meaning cannot be consistently confined to fixed grammatical units. Instead, Henri argues that the data content should influence how meaning units are defined. In view of this, Henri (1991) suggests the meaning unit should be fluid and that researchers should define them whilst analysing data. The presence of fluid meaning units may however increase the subjectivity of the analysis (Rourke et al, 2001). Reading the data set helped me to become familiar with it, in turn allowing me to define the meaning unit. I used the *paragraph* as the starting point in defining the meaning unit. Following Henri (1991), when necessary, I subdivided paragraphs into discrete meaning units.

Coding[12]

Coding Protocol

The term *coding protocol* applies to the set of rules which allows meaning units to be coded into categories (Joffe and Yardley, 2004). The coding protocol is therefore a translational device allowing text to be allotted into categories. (I provide an example of a coding protocol when discussing Beck and Chiapello's (2016) investigation of Schon citations—see below).

Mutual Exclusivity

It is common to code a given meaning unit into a single category (Burla et al., 2008; Matthes, and Kohring, 2008). This involves observing *mutual exclusivity* between categories (Joffe and Yardley, 2004). Observation of mutual exclusivity requires

[12] **Appendix 2 – 'Content Analysis Categories**' contains the categories which emerged from the Content Analysis.

development of clearly defined coding protocols. The practice aids robustness as it can facilitate systematic analysis and comparison between categories. Meaning units are to some extent an artificial device, because of this, human experiences are often “intertwined” within them (Graneheim and Lundman, 2004, p.107). This can make it difficult to observe mutual exclusivity. Small semantic differences contained within meaning units can substantially affect coding decisions. Joffe and Yardley (2004) illustrate the difficulty associated with analysing subtle semantic differences. They discuss a scenario in which a researcher analyses interviews with patients. The researcher has two categories: “‘coping strategies’ and ‘handicap’ (changes in lifestyle due to illness)” (ibid, p.60; original emphases). Subtle semantic differences make it difficult to observe mutual exclusivity:

> “if someone with dizziness says that they were so dizzy that they ‘had’ to hold on to a railing, should this be coded as an instance of coping (by holding on) or handicap (as they were unable to walk unaided) or both?”
>
> (Joffe and Yardley, 2004, p.60; original emphases)

The presence of subtle differences in meaning may prompt researchers to assign a given meaning unit into more than one category (Joffe and Yardley, 2004). This practice can make the process of comparing categories more difficult, reducing the robustness of the research (Potter and Levine-Donnerstein, 1999). Though difficult, I have observed mutual exclusivity. It has prompted me to write clearly defined coding protocols and enabled robust comparison between categories.

Deduction and Induction

Coding can proceed through both deductive and inductive approaches. Often, these paradigms are framed in opposition to one another. There is however a level of crossover between them which can make for more effective research practice.

A deductive approach is used to investigate the extent to which aspects of the data set behave in accordance to an existing theory. Deductive content analysis therefore involves coding meaning units into categories which were defined prior to beginning the analysis (Potter and Levine-Donnerstein, 1999). Beck and Chiapello (2016) use a deductive approach to analyse how a data set consisting of design conference research papers make use of Schon citations. Beck and Chiapello’s research uses existing categories created by the linguist Nigel Harwood (2009). Harwood studies reasons which may influence academics to cite certain researchers over others. Harwood identifies 11 different reasons. Beck and

Chiapello (2016) provide abridged versions of the *coding protocols* for each category. This term refers to the text which communicates the rules which enable researchers to code data contained in given meaning units into a given category (Joffe and Yardley, 2004). To illustrate, Figure 19 shows the protocols for categories 1-4. In Figure 19, the bold text signals the name of the category. The list of protocols in a study is termed the *coding frame* (ibid).

1. **SIGNPOSTING** citations direct readers to other sources in order to (i) help/interest less informed readers; (ii) to keep the argument on track; and (iii) to save space.
2. **SUPPORTING** citations help authors justify (i) the topic of their research; (ii) the method and/or methodology employed; and/or (iii) the authors' claims.
3. **CREDIT** citations acknowledged authors' debt to others for ideas or methods.
4. **POSITION** citations allowed authors to (i) identify representatives and exemplars of different viewpoints; (ii) explicate researchers' standpoints in detail; and (iii) trace the development of a researcher's/field's thinking over time.

Figure 19: Part of a coding frame for Harwood's (2009) citation function categories (1-4). Taken from Beck and Chiapello (2016, p.3)

Beck and Chiapello code the vast majority of references to Schön into categories 2 (*Supporting*) or 3 (*Credit*). Beck and Chiapello provide examples of text from the data set which they have allotted into categories. They code the following Schön citation (from Bang et al., 2014, p.1116) into the *Supporting* category:

> "Design students are special in the sense that they are trained to use the power of conjecture (Lawson, 2006) for instance through sketching and visualizing possible solutions (Schön, 1983; Cross, 1995)"
>
> (Bang et al., 2014, p.1116, quoted in Beck and Chiapello, 2016, p.6)

Beck and Chiapello claim that this Schön citation helps justify Bang et al.'s choice of research topic and possibly their claims. Beck and Chiapello argue the pattern amongst speakers in the data set to use Schön citations in claiming legitimacy to be a recurring theme. Because of this, Beck and Chiapello code many meaning units into the *Supporting* or *Credit* categories. Most of these meaning unit do not expand on, challenge or critique Schön's research, thereby indicating that speakers choose not to discuss Schön's work in a critical manner.

My Literature Review chapter has not identified a hypothesis that I have aimed to test. Instead, it identifies the need to tackle an open-ended research question. My content analysis has not therefore relied on deductive investigation.

Inductive content analysis begins without a guiding theory. Categories instead emerge through the process of analysis (Potter and Levine-Donnerstein, 1999). The lack of guiding theory at the beginning of the process can make it more challenging than deductive enquiry (ibid). To form a tangible starting point it is possible to begin an inductive study with existing categories (Altheide, 1987). The categories may remain throughout the study or, as the analysis progresses, it may become necessary to remove or adapt them (ibid). There is therefore a level of crossover between deductive and inductive approaches.

My content analysis builds on my corpus linguistics work. I have incorporated findings from the corpus linguistics work into theoretical categories and have used these categories at the beginning of my content analysis. This highlights a certain level of crossover between deductive and inductive paradigms in my content analysis. The presence of an open research question has however meant that I have focussed on using an inductive approach. Indeed, the vast majority of the final categories emerged from the content analysis. *Appendix 2 –'Content Analysis Categories'* contains the coding frames for the final categories which enabled me to form the contributions in this thesis.

Open Coding

Inductive content analysis begins with a process of coding text from a variety of perspectives. During this process—termed *open coding*—"categories are freely generated" (Burnard, 1991, p.462). Categories developed at this stage may not be definitive. The process of open coding can therefore be thought of as a first draft. Figure 20 shows an example of open coding taken from Burnard (1991). The coding is conducted on a transcribed healthcare interview.

Interview transcript	Open coding
I suppose most people need counselling at some point in their lives. I would think that some nurses are quite good at it. They have the skills. Although I'm not sure if many nurses get counselling training as part of their nurse training.	Open coding Most people need counselling . . . Some nurses are good at it . . . They have the skills . . . Not sure about counselling training in nurse education . . .

Figure 20: an example of open coding. Taken from (Burnard, 1991, p.462).

The open coding stage provides an opportunity to evaluate and compare the emergent categories (Burnard, 1991; Gale et al, 2013). Coding is an iterative process, after completion of the open coding stage it is necessary to conduct another round of coding (Gale et al, 2013). Engaging in coding cycles helped me to reflect on, and, where necessary, adjust the rationale I used when categorising meaning units. Cycles of coding therefore helped to make my coding process more robust.

Grouping and Splitting

Small differences between category coding protocols can create an "arbitrary and artificial" (Joffe and Yardley, 2004, p.60) distinction between categories and detract from providing a coherent picture of ways of speaking. When faced with coding protocols that may be overly similar, it is possible to merge categories together through a process termed *grouping* (Burnard, 1991). Categories which show similarities should be grouped together under higher-order (broader) headings (ibid). The presence of "fewer, more powerful categories" (Joffe and Yardley, 2004, p. 61) tends to create more coherent evidence for ways of speaking. It is however important not to make grouped categories too broad as this will dilute the study (ibid).

Burnard (1991) illustrates the process of grouping in an analysis on issues associated with nursing practice. The process of open coding leads to the emergence of the following three categories (Burnard, 1991, p.462):

- Some nurses have counselling training
- Nurses have training in counselling
- Need for counselling training.

Burnard (1991, p.462) argues that, due to their similarities, the categories can be grouped into the following overarching category: "Counselling Training for Nurses". Both the nature of the research question and the presence of emerging insights can influence the decision to group categories (Burnard, 1991; Joffe and Yardley, 2004). In contrast, further coding iterations may make it evident that certain categories are not focussed enough. In these instances it can become necessary to *split* a category into two or more categories (Joffe and Yardley, 2004). The processes of *grouping* and *splitting* underscore the organic nature of inductive content analysis. I describe examples of when it became necessary to group or split categories in Chapter 6.

Ambiguous Meaning Units

The coding process often highlights meaning units which do not initially appear to fit into any category (either existing or emergent). Their ambiguity makes them easy to ignore. These meaning units should therefore be temporarily coded into a category marked *other* (Gale et al, 2013). Further coding iterations make it possible to effectively code them. The content analysis is complete when all meaning units are coded (ibid). In Chapter 6, I discuss how I negotiated ambiguous meaning units.

Theoretical Saturation

During the course of analysis, there should come a point when new theoretical categories cease to emerge from the data set. At this point, the study has reached *theoretical saturation* and can produce meaningful results (Guest et al., 2006). I reached theoretical saturation after coding the 30th paper in the data set during the second iteration.

The impetus to reach theoretical saturation means that *confirmation bias* can affect research. This is the "tendency to press [textual information into] an already existing […] category" (Matthes, and Kohring, 2008, p.261). Confirmation bias can limit study robustness. Coding is intensive and time consuming and can lead to researcher fatigue, which can result in incorrect coding (Potter and Levine-Donnerstein, 1999). I believe that taking regular breaks from coding has helped my coding process become more systematic and has improved its reliability.

Gauging Study Reliability[13]

Content analysis is a subjective process. The subjectivity can potentially diminish the reliability of findings (Hsieh and Shannon, 2005). It is therefore important to gauge the reliability of the analysis.

Intercoder Agreement

[13] **Appendix 3 - *'Gauging Reliability'*** contains discussion on how I gauged the reliability of my content analysis process.

Commonly, a peer evaluation process is used to gauge reliability. A fellow researcher (termed *independent expert* (Hsieh and Shannon, 2005)) checks coding conducted by the original researcher. The peer codes a portion of the data set and compares the results with the original researcher's findings. The aim of the process is to gauge the level of agreement between researchers (the level of *Intercoder Agreement*).

The expert should be both independent to the original researcher and familiar with content analysis methods (Lombard et al., 2002). To create a more level platform for comparison, both researcher and expert should come from similar academic disciplines (Potter and Levine-Donnerstein, 1999). It is acceptable for the independent expert to code 10% of the overall data population (ibid). The process of coding is considered valid when a researcher can report sufficient agreement between themselves and the expert (Milne and Adler, 1999). When differences are identified, the researcher and expert should engage in communication in order to attempt to resolve the dissimilarities. If necessary, the researcher may need to re-analyse data (ibid).

Measuring Intercoder Agreement

There are several methods of measuring intercoder agreement. The method termed *percentage agreement* is the most straightforward and the most commonly used practice across academic subject areas (Hughes and Garrett, 1990; Kolbe and Burnett, 1991). As its name implies, this method reports "the percentage of all coding decisions made by pairs of coders in which the coders agree" (Lombard et al., 2002, p. 590). Percentage agreement does not account for chance agreements between researcher and independent expert (Milne and Adler, 1999). A statistical measure of agreement can overcome this limitation (Lombard, Snyder-Duch and Bracken, 2002). However, statistical measures can also be inaccurate (ibid). My content analysis does not make use of probabilistic sampling. Because of this, I have not aimed to generate generalisability at a statistical level. Therefore, I have not used a statistical agreement measure. Instead, I have used the percentage agreement measure.

Measuring Agreement Level

Commonly, numerical measurements are used to measure agreement level. Numerical measures of intercoder agreement are represented as coefficients. No agreement at all

is represented as '.00' (0% agreement); perfect agreement is described as '1.00' (100% agreement) (Lombard et al., 2002). A coefficient of .70 is commonly taken as sufficient in exploratory studies (Neuendorf, 2002). A coefficient of .80 or greater is frequently seen as acceptable in most situations (ibid).

Not all researchers see the value of using coefficients to measure agreement levels. Barbour (2001) argues that coefficients are an artificial measure of study success. Barbour instead argues that conversations between the researcher and the independent expert are most important outcome of the process of gauging reliability. This is because the procedure should be concerned with refining research protocols:

> "the degree of concordance between researchers is not really important; what is ultimately of value is the content of disagreements and the insights that discussion can provide for refining coding frames".
>
> (Barbour, 2001, p.1116)

I have followed Barbour (2001) in using the intercoder agreement process to refine my research process. I have also aimed for coefficient of .80 or greater. I achieved a coefficient of .79. *Appendix 3 - 'Gauging Reliability'* describes the intercoder agreement process associated with my content analysis. The document shows numerical scores associated with reliability check and summarises discussions between myself and the independent expert which helped me to further clarify affected coding frames. The conversations with the expert left me feeling confident that my coding process is reliable.

A Final Note on Corpus Linguistics and Content Analysis

Academics who specialise in the use of corpus linguistics sometimes conduct both content analysis and corpus linguistics in the same study. To illustrate, alternating between these methods allows Baker et al. (2008) to gain insight into terms which enable journalists to construct refugees and asylum seekers. Use of corpus linguistics entails reliance on quantitative investigation. I have noted that I am not a statistician. Because of this, I did not want to use quantitative methods to support my definitive findings. I have therefore chosen to use corpus linguistics and content analysis in separate studies. To underscore my rational, corpus linguistics investigation provided initial insights. Qualitative content analysis led to definitive insights on ways of speaking associated with the domain.

3.4 Data Collection and Filtering Strategy

The term *study power* is used to describe the effectiveness of a study. A study is defined as being powerful enough when it reaches theoretical saturation (Guest et al., 2006). Consideration of the internal consistency of data, as well as its *richness* and *thickness,* increases the likelihood of creating a powerful study.

3.4.1 Data Richness, Thickness and Consistency

Data is described as being *rich* when it is focussed enough to allow valuable insights on the research domain to emerge (Guest et al., 2006). In practical terms, rich data tends to be quite homogenous. To illustrate, when aiming to understand ways of speaking produced by people who work in a particular profession, it is important to only include data from people who work in that profession (ibid). Data is described as being *thick* when there is enough of it to enable saturation (Fusch and Ness, 2015; Guest et al., 2006). Too little data can mean that study categories will not have been explored in sufficient depth to allow meaningful results to emerge.

Despite their importance, there are no universal measures of appropriate levels of data richness and thickness. Instead, individual researchers must carefully align the strategy for collecting data with the specific aims of their own study (Fusch and Ness, 2015; Guest et al., 2006; Nesi, 2016). Because of this, appropriate data richness and thickness varies with each study. The following examples illustrate some of the variations. Pope (2000) analyse experiences of care givers. Pope et al. argues that analysing the experience of 1 care giver is sufficient to generate findings which are generalisable at a descriptive level with respect to a population of care givers. Finken (2003) studies ways of speaking in the field of participatory design research. Finken claims that an analysis of 3 influential articles produces conclusions which are generalisable at a descriptive level with respect to the international field of participatory design research. Guest et al (2006) investigate ways of speaking produced by female sex workers in a particular region in Africa. They claim interviews of 12 sex workers allows them to generalise their findings to a population of sex workers in that geographic region. The lack of universal guidelines means that researchers often attempt to overcompensate by analysing a lot of data—and to boot, this data tends to be ill-focussed on

the domain—in the hope of yielding saturation (Nesi, 2016; Pope et al., 2000). Pope et al. (2000) claim this strategy can be counterproductive. Large samples can make in-depth analysis more difficult without yielding more powerful results.

The lack of guidelines made it necessary for me to create an appropriate and relatively efficient strategy for investigating how the Design Tribe speak on Design Thinking. To add to the challenge, it is worth recalling that prior to this thesis, there had never been empirical investigation on ways of speaking in Design Thinking research. When immersed in data collection it can be difficult to make consistent choices as to whether or not to include given data from the study sample. Because of this, it is important to apply rules associated with data collection in a consistent manner (Garretson and Connor, 2007). Consistency helps to limit the influence of subjective decision-making and increases the likelihood of maximising data richness and thickness (Garretson and Connor, 2007).

3.4.2 My Strategy for Collecting and Filtering Data

My strategy for creating a rich, thick and internally consistent data set which would allow me to analyse ways of speaking used by the Design Tribe involved: collecting and analysing data sourced from ***peer-reviewed*** articles published in ***design journals***. I only investigated papers which ***focus on Design Thinking*.**

Peer Review

In the process termed *peer-review*, impartial contemporaries of the submitting researcher judge the quality of submitted research (Cope and Kalantzis, 2009). The process has a long history as it can be traced back to Francis Bacon's (1561-1626) philosophy of science. The practice allows work to be "socially validated" as a legitimate source of knowledge in a particular academic field (ibid, unpaged). Once validated, the research becomes available for dissemination in journals or conferences. Limitations of peer review have been reported. Research tribes can often be quite small, and experienced academics tend to become familiar with the work of authors in their field. Reviewers may show bias towards particular authors or research areas (van Rooyen, 2001). Sexism has also been reported (Wennerås and Wold, 1997). Despite its flaws, the peer-review system remains a fundamental sign of rigour in academic journals (Rowland, 2002; Cope and Kalantzis, 2009).

The importance of peer-review in academia means that ways of speaking found in peer-reviewed papers can be considered as more legitimately representative of knowledge produced by an academic community than can discourse found in material which is not been peer-reviewed. Because of this, peer-reviewed material is commonly used as data by researchers wishing to investigate how academic communities speak. Examples include Brezina (2012), Hyland (1997) and Bartels (2003). Brezina (2012) investigates peer-reviewed papers in the areas of applied linguistics and physics to compare the language researchers use to make claims in these 2 research communities. Hyland (1997) compares how researchers in 4 areas (microbiology, marketing, astrophysics and applied linguistics) present their professional identities and persuade readers of the legitimacy of their arguments. Such is the influence of tribalism in academia fields, Bartels (2003) investigates ways of speaking in sub-tribes within an academic community—within the field of applied linguistics. Bartels compares how ideas are framed in peer-reviewed articles which are aimed at researchers and in peer-reviewed papers which are aimed at teachers in the field of applied linguistics.

The socially validated nature of peer-review means that I have only analysed peer-reviewed articles in this thesis. This strategy has helped to increase the richness of my data set.

Peer Review - Maintaining Consistency

Despite its importance in academia, there is no agreed standard peer-review process (Cope and Kalantzis, 2009). Different journals use different numbers of reviewers and differ in their policy on reviewer anonymity. To maintain consistency, it was necessary to form a definition of peer-review which would be used throughout the data collection and filtering process.

The literature on peer-review focusses on the process as it is applied in academic journals. The literature does not seem to discuss the issue in relation to conferences. Generally, when a paper is submitted to a peer-reviewed journal it is initially reviewed by the publication's chief editor (Cope and Kalantzis, 2009). After passing the editor's analysis it is sent to reviewer(s). Members of a journal's editorial team and/or other experts may serve as reviewers (Rowland, 2002). To maintain data consistency, my definition of peer review stipulates that reviews must not have been conducted solely by one person. The review must have been undertaken by at least one other person in the peer-review college.

The issue of *reviewer anonymity* is a matter of discussion in research on peer-review. Traditionally, the *double-blind* peer-review system has been argued as representing the gold standard (Rowland, 2002). During this procedure both reviewers and authors remain unaware of one another's identity (ibid). Research however questions the value of double-blind review. Experienced reviewers in a research tribe can guess the identity of submitting authors, thereby negating the anonymity of the double-blind system (Rowland, 2002). Therefore, in practice, the double-blind system may not be more rigorous than other systems. In my study, to qualify as a peer-reviewed article, a paper need not have been subject to blind review.

Journal Articles

Commonly[14] in academic fields, academic journals are more prestigious than conferences. Because of this, researchers often publish initial results in conference articles and aim to develop this research in journals papers. (The higher prestige of journals may be one reason to explain why literature on peer-review processes focusses on the practice as it is applied in academic journals.) Commonly therefore, knowledge disseminated in journal papers is considered as being more legitimate than knowledge published in conference articles. This may explain why research on ways of speaking in academic communities tend to focus on analysis of journal papers (Brezina, 2012; Hyland, 1997; Bartels, 2003). The argument on journals applies to the area of design research. There are several design research conferences. Amongst these, there are two large, well-established biannual international symposia organised by influential committees. These are the Design Research Society conference (http://www.drs2018limerick.org/) and the International Association of Societies of Design Research conference (http://www.iasdr2017.com/). Conferences in design research are however not as prestigious as design journals (Mansfield, 2016).

In this thesis, analysis of peer-reviewed journal articles provides deeper insight into socially validated ways of speaking on Design Thinking which are disseminated by the Design Tribe than does investigation of conference papers. Inclusion of journal articles therefore increases the richness of the data set. I have therefore only analysed peer-reviewed journal articles.

Design Journals

[14] The argument on journals does not reply to all academic fields. In Human Computer Interaction research, the *CHI* series of conferences (https://chi2018.acm.org/) are considered to be of a level which is equivalent to journals in the area.

Members of an academic tribe focus on publishing in particular journals as this practice enables researchers to form both their "academic identity and [their sense of] worth" (Lee and Boud, 2003, unpaged). Indeed, in recognising the benefits it brings, many academics attempt to "identif[y] and analys[e] key journals and the practices of submission" to improve the prospect of publishing in them (ibid, unpaged). In attempting to identify ways of speaking formed by the Design Tribe, it was important to identify the peer-reviewed journals in which this community tend to publish. There is currently no definitive list of these journals (Mansfield, 2016; Gemser et al., 2012). Indeed, creating lists of design journals is "notoriously difficult and [the results are] always controversial" (Mansfield, 2016, p.903). This may be because design research is both interdisciplinary and a relatively young field of research (Gemser et al., 2012). The lack of a definitive list means that it was necessary for me to create a list of design journals from which to sample data.

Academic journals have a remit which states the area(s) of research which are published in the journal. Information on remit is often clearly printed in a prominent location on the journal website home page or under a heading titled 'About This Journal' (or words to that effect). Therefore, the practice of including journals which contain the term 'design' in the remit presented a logical place to begin forming a list of design journals.

Broad and Specialised Remits

Design journals can be classed into those with broad remits and others which are more specialised (Mansfield, 2016). Broad remit journals like *Design Studies* and *Design Issues* are familiar to a broad spectrum of Design Tribe researchers. Specialised journals tend to be less well known across design research (ibid). The *Journal of Interior Design* is a publication with a specialised remit. In this thesis, increasing data richness and thickness meant including both broad remit and specialised journals in my list of design journals.

Multidisciplinary Remit

As design is a multidisciplinary area of research, the remit of some journals places 'design' alongside other areas of research. Reflecting on multidisciplinary journals was a necessary step in avoiding making the sample too narrow.

In multidisciplinary journals, design is included alongside Engineering or Ergonomics (for example, *Journal of Engineering Design*), Management (for example, *Journal of Organization Design*), Human Computer Interaction (for example, *Human Computer Interaction*) and Art (for example, *Visual Cultures*). My Literature Review chapter suggests that the Design Tribe of researchers distance themselves from the analytical sciences and management. For this reason, I do not include journals which place design alongside either engineering or management. Researchers in the area of Human Computer Interaction (HCI) tend to focus on publishing in arenas which are different to those favoured by Design Tribe academics. HCI researchers tend to concentration on publishing in conferences and journals which are affiliated with the Association for Computerised Machinery (ACM) (https://www.acm.org/). The ACM Human Factors in Computing Systems (CHI) series of conferences are important to HCI researchers. In terms of journals, HCI researchers tend to aim to publish in *Interactions* and *ACM Transactions on Computer-Human Interaction*. The difference in arenas makes the 'HCI Tribe' different enough to the 'Design Tribe' to justify not including HCI journals in the sample. To reflect on whether to include journals which place design alongside art, it was necessary to consider how design is framed in the UK Research Excellence Framework Assessment.

The Research Excellence Framework Categorisation of 'Design'

Worldwide, there is no standard measure for assessing the quality of academic research. In Europe, member countries tend to each use their own measurement (Sivertsen, 2017). In the UK, The Research Excellence Framework (REF) is used to assess the quality of research in UK higher education institutions (REF 2014, 2014). Implemented by UK government bodies in 2014, the REF is an official measure. REF assessment is conducted under discrete subject heading, termed *Units of Assessments* (UoAs). REF assessment therefore takes into account the sense of tribalism in academic research. Design is categorized under *UoA 34: Art and Design: History, Practice and Theory* (REF 2014-B, 2014). Therefore, the REF assessment categorises design alongside art. This method of categorisation reflects both the structure traditionally found in universities and the way that central funding is allotted in the UK. In universities, design subjects are often found in faculties which group them with arts and/or humanities areas rather than physical science subjects, engineering or business studies. In terms of funding, the UK government classes Design as an 'Arts' subject rather than a Science, Technology, Engineering or Mathematics (STEM) subject (Morgan, 2010). Using the REF assessment categorising as a starting point

made it is possible to categorise journals whose remits include ‘design and art’ as design journals.

The REF assessment applies only to the UK. Using it in helping me to form my data set means that my data collection strategy has a UK-centric focus. This is potentially problematic as I have not aimed to limit the scope of my research to any geographical region. However, using the REF categorising framework has been preferable to creating my own subjective method. The fact that design has always been both a multidisciplinary practice and area of academic research means that no method of categorising design journals can ever be completely satisfactory. The practice of grouping ‘design’ with ‘art’ has provided an appropriate and pragmatic point of reference in helping me to refine a remit-based strategy for collecting and filtering my data set.

Considering Impact Factor

When an article is cited, the citation is noted by search engines, making it possible to calculate how many citations a journal has received. Citation data helps provide a ranking—termed the *impact factor*—of academic journals (Adams, 2002). Numerical impact factors are often seen as an impartial measure of prestige and are increasingly used to create lists of key journals in many subject areas (ibid). Hypothetically, in my thesis, a strategy to increase data richness could involve including only papers from design journals with an impact factor above a nominal value.

There are limitations associated with using of impact factor to create lists of key journals. Citations received by a small number of articles published in a journal often disproportionately skew the journal’s impact factor. Indeed, Seglen (1997, unpaged) argues that “the most cited 15% of the articles account for 50% of the citations” of the journal. The idea of impact factor may not be as relevant to design journals as it is to journals in other fields. Gemser et al. (2012, p.20) argue that “most journals in the [design] field […] have no measured impact factor”. Therefore, creating a list of design journals using impact factor data would facilitate insight into ways of speaking contained within a small minority of publications. Making use of impact factors may therefore lead to an excessively narrow sample of data. I have not therefore used this strategy.

Considering Peer Recommendation

Peer recommendation involves asking academics in the research field to list journals which they believe to be important. Mckercher et al. (2006) use this process when listing journals in the areas of Tourism and Hospitality. In-so-doing, they ask academics in these fields about their familiarity with a range of journals. Mckercher et al. find that many of the academics are familiar only a very small minority of these journals. The academics tend to be familiar with journals whose remit relates to their specialised area of research. Gemser et al (2012) poll design academics in aiming to create a list of key journals in a range of areas of design research. In findings which mirror Mckercher et al.'s (2006), they argue that the academic background of the respondent influences which journals the academic believes are key:

> "respondents with an academic background in humanities seem to prefer arts-related design journals, those with a background in social and behavioral sciences seem to prefer ergonomics-related journals, while those with a design-related background seem to prefer in particular general design journals."
>
> (Gemser et al. 2012, p.20)

The range of respondents means that in addition to including journals which focus on *design* in their remit, Gemser et al's (2012) list includes journals in the field of Human Computer Interaction, Engineering Design and Ergonomics. This range of journals is too broad for the purposes of my thesis. In my study, using the peer recommendation method to create a list of design journals runs the risk of creating a data set which is not focused enough to allow me to answer the research question. I would then have to edit the list, negating the point of using the peer recommendation strategy. Section 3.5.2 of this chapter contains a list of the publications I have classed as design journals.

Papers Which Focus on Design Thinking

The term 'Design Thinking' is synonymous with contemporary research on the way designers think. Because of this, including papers which contain the term 'Design Thinking' may appear to be a rational starting for creating a data set to investigate how the research tribe speak on Design Thinking. The fact that a paper contains this term is however no guarantee that it *focuses* on Design Thinking. Conceivably, the paper may only mention Design Thinking in passing. To increasing sample richness I have included only papers which *focus* on Design Thinking. In working towards forming an appropriate filtering strategy, I decided to gain an initial picture of the available data.

Focussing on Design Thinking: An Initial Data Search with Google Scholar

Google Scholar is an online bibliographic search engine which is commonly used to source scholarly texts (Brezina, 2012). Several points make Google Scholar a valuable and accessible tool. It is updated frequently (several times a week) (Google, 2011); access to it is not dependent upon affiliation with a particular institution; Google Scholar's Advanced Search Tool facilitates tailored queries (Brezina, 2012). Google Scholar has been used successfully to source data for research on ways of speaking in academic literature. Brezina (2012) uses it to analyses ways of speaking in the fields of Physics and Applied Linguistics. I requested Google Scholar to show articles containing the term 'Design Thinking'. The search produced a large number of results—around 41000. It was necessary to filter these results to include only those which focus on Design Thinking.

A brief inspection of the results indicated that some are published in journals which cannot be classed as design journals. Examples include *International Journal of Children's Spirituality* and *Journal of Oncology Practice*. Google Scholar's Advanced Search Tool enables searches for articles in specific journals. Because of this, it can help refine the search by only including papers which are published in journals which I specify as design journals. I began my search for data being familiar with some design journals. I suspected however that my knowledge on this issue was not comprehensive. (The presence of journals with specialist remits (Mansfield, 2016) raised suspicion that my knowledge on design journals was incomplete). I therefore decided not to use the search-by-journal-title option. I instead filtered the search results for the level of focus on Design Thinking prior to compiling the list of design journals.

Article Focus: Strategies for Filtering the Data Set

Article focus is a subjective issue. Subjectivity can increase the opportunity for cherry picking given results. It therefore became necessary to use a systematic strategy to filter the data set for article focus. Commonly, authors use *Author Keywords*, article *Abstracts* and article *Title* to signpost readers to the focus of the paper.

Author Keywords

An author highlights several terms (*keywords*) which he or she claims represent the focus of a research paper[15]. Search engines use keywords as markers (Beel et al, 2009). Because of this, researchers often use keywords to filter large data sets (Bentley, 2008). Often in practice however, author keywords do not mirror the focus of academic research. This is because authors can be prone to "random[ly] copying" popular terms within given research fields in an effort to disseminate their research (Bentley, 2008, unpaged). To test the viability of using keywords, I read a small selection of papers which contain the author keyword *Design Thinking*[16]. In many instances, it was difficult to rationalise the decision to include or exclude articles.

Technological issues also limit the effectiveness of using author keywords to filter data. Google Scholar does not currently enable keyword-specific searches. To further investigate the viability of using keywords, I used another search engine named *Locate*. Locate is available at my workplace, Coventry University[17]. I discovered that Locate does not facilitate keywords-driven searches. The combined limitations meant that I did not use author keywords to filter data for article focus.

Abstracts

The purpose of the *abstract* in academic articles is to "reflect fully and accurately the work reported" in the paper (Pitkin et al., 1999, p.1110). Researchers therefore frequently review abstracts when searching for academic papers. Abstracts however can over-exaggerate the significance of the research contribution in the paper (Boutron et al, 2014). To illustrate, Pitkin et al. (1999, p.1111) argue that in a sample of medical journals, up to 86% of abstracts are inaccurate as they "contain[] information which is not verifiable in the article's main body". Pitkin's research raised the possibility of there being limited value in using abstracts to filter data in this study.

[15] To avoid any confusion, it is necessary to note that *author keywords* are not linked to the concept of *key words* in corpus linguistics.

[16] I could not find any existing research on the level of relevance of keywords in design papers.

[17] Locate does though allow authors to search by what it terms *Subject*. I performed a Locate search for articles containing the subject 'Design Thinking' and manually inspected the first 100 results. Firstly, I discovered that some results only mention the way designers think in passing so were not focussed enough to be suitable for inclusion. Secondly, I found it difficult to rationalise the decision to include or exclude other articles.

To test the viability of using abstracts as a method of filtering data, I read the abstracts of a small selection of the search results[18]. After reading several, I grew concerned about the way I was categorising whether or not given papers should be classed as *focussing* on Design Thinking. My decisions seemed too subjective. There are also technological issues associated with using abstracts to filter data. Neither Google Scholar nor Locate currently support abstract-specific searches. The combination of issues mean that I did not use abstracts to filter data.

Article Title

The article title exists to "inform readers of the topic of the article" (Nagano, 2015, p.134). The article title is the most evident indicator of the focus of the paper (Jamali and Nikzad, 2011). Reviewers often use article title to help them to gauge article relevance in the peer review process (Nagano, 2015). Researchers tend to rely on article title as the "main source of information" for judging article relevance (Jamali and Nikzad, 2011, p.653). Technology also supports searches conducted by article title. When using an online search engine to hunt for articles it is necessary to input terms which are relevant to the research domain. Academic search engines tend to prioritise searching for articles which contain these key terms in the article title (Nagano, 2015; Beel et al, 2009). Users are more likely to access these results than those further down the results list (Nagano, 2015). These results may therefore be more likely to contribute to the discourse of an academic community than articles which are found further down the list. This idea is especially important when—like with my initial search for Design Thinking papers—there are a lot of search results. Furthermore, search engines may not find a given article if its title does not contain the user's key terms (Moore, 2010).

I used Google Scholar to search for texts containing the term 'Design Thinking' in the title. This process filtered down the initial 41000+ results to 3,420 results. An inspection of some of these results revealed that the term 'Design Thinking' appears frequently both in all article abstracts and in the main body of the texts. I concluded that creating a sample of data consisting of papers which contain the term 'Design Thinking' in the title will produce a rich body of data. I concluded that manually investigating search results further—and only keeping only ones which are published in *peer-reviewed design journals*—would allow me to collect the desired data sample.

[18] I could not find any existing research on the level of accuracy of abstracts in design papers.

3.4.4 Potential Limitations of My Data Collection and Filtering Strategy

The Issue of Design Journals

The interdisciplinary nature of design research means that design researchers sometimes publish in non-design journals (Mansfield, 2016). My data sampling rejects these papers, limiting data set richness and thickness. My analysis will however take into account how speakers frame existing research in a range of areas. This is termed the analysis of the *collection code* (Becher and Trowler, 2001). Analysis of the collection code reduces the impact of this limitation.

Papers Which Focus on Design Thinking

Contemporary researchers may use different terms when discussing the way designers think. To illustrate, the leading academic Nigel Cross often uses the term *Designerly Ways of Knowing* to refer to Design Thinking. He has published research which contains the term 'Designerly ways of Knowing' in the title (Cross, 2001). Other researchers choose to use terms such as 'Design Cognition' in place of Design thinking both in the main body and in the title of the paper (Lloyd, et al., 1995). My filtering strategy excludes papers like these from the data set. The strategy is therefore limited as it excludes important, relevant research.

My strategy is defendable as I do not aim to investigate how specific researchers (such as Nigel Cross) speak on Design Thinking. Instead my aim is to research ways of speaking which are associated with a *community* of Design Thinking researchers—the Design Tribe. As the term 'Design Thinking' is commonly employed across the community, using the term as a basis to filter my data set allows me to gain insight into these ways of speaking.

In addition, my research question prompts me to provide insight into how the Design Tribe frames the work of influential researchers who may choose to use terms other than 'Design Thinking' in the titles of research papers. Researchers like Cross are cited heavily in design research. Analysis of the collection code will therefore highlight how the community frames existing research on Design Thinking. This point helps to further reduce the limitation of my data collection and filtering strategy. The decision to collect articles with the term 'Design Thinking' in the title, has been peer-reviewed (Ghassan, 2019). This provides further indication that the data collection and filtering strategy was valid in creating insight on the

domain. In addition, my data collection strategy proved vital in allowing me to spot and analyse movements in terminology associated with Design Thinking. I discuss this issue more in Section 1.3 of Chapter 7.

3.5 Collecting the Data Sample

I began by collecting *peer-reviewed journal papers which contain the term 'Design Thinking' in the title*. I then inspected the journal remit for every journal which published these papers. In the first instance, I used Locate to search for data[19]. An additional Google Scholar search provided an opportunity to collect addition data that Locate may have missed. After completing my search, I filtered the resulting articles to only include ones published in *design journals*.

3.5.1 Using 'Locate' and 'Google Scholar' to Search for Data

The *Locate* search produced 544 results. Locate classes 242 as peer-reviewed journal articles. There is no information available on how *Locate* delineates peer-reviewed articles from non peer-reviewed ones. There is therefore no guarantee that Locate's definition of peer review parallels my own[20]. Because of this, I manually inspected all 544 results. The inspection led me to filter the results for a range of issues. Issues included: *repetition of results*, *missing results*, *result not in written in English*, the presence of *editorials* and *interviews* as well as *use of the term Design Thinking in a context which is not relevant to the theme of this thesis*[21]. The inspection led me to cut the 544 results to **106 articles** which met my criteria for inclusion.

[19] Google Scholar only enables searches for articles containing the term 'Design Thinking' in the title. At the beginning of the data collection process I reasoned that Locate may enable me to fulfil my search criteria more efficiently. I therefore began my data collection process by using Locate. Locate searches enable adjustments of certain parameters. Parameters in include *Language* and *Time Frame*. As I can only read English, I limited the search to texts written in English. With regards time frame, my research question does not necessitate investigation of ways of speaking on Design Thinking within a particular period of time. I therefore did not limit the search to articles published in a particular time frame. The Locate query took place on 17-19 June 2016.

[20] By way comparison, Brezina (2012) reports a success rate of around 43% when using Google Scholar to search for academic articles in the fields of physics and linguistics containing a particular term ("fit into place"). Brezina (2012) recommends manually inspecting search results for relevance when using search engines to hunt for papers. There is not data available on the success rate of Locate searches.

[21] The following issues led me to remove associated results: repetition of results; missing results; result not in English (one result —(Grots and Pratschke, 2009)). I also removed editorials and interviews. Editorials contextualise themes contained within respective journal issues, often condensing arguments made in published papers. Including editorials risks duplicating data. Friedman (2011) and Parker (2014) are examples of editorials in the data set. Two results (Bower et al. (2013) and Masterman et al. (2013)) use the term 'Design Thinking' in a context which is unrelated to the theme of this thesis. Both papers discuss *Learning Design*—the design of strategies which aim to help students learn. Both papers use the term 'Design

The Google Scholar search[22] produced over 3000 results, over 6 times the number delivered by Locate. I systematically inspected the results, starting at the first. By the time I had inspected the first 1000 results, the inspection had ceased to produce new results. At this point, there was no need to continue to search for data. Bowen (2008) terms this the point of sampling, *redundancy*. Sampling to the point of redundancy provides reassurance that the sampling process has been undertaken with a sufficient level of robustness (ibid). Many results were unsuitable for the reasons I identified whilst discussing the Locate filtering process. The Google Scholar search yielded additional reasons to remove data. I filtered out: *conference articles, book chapters*; *books* and *citations*[23].

The Google Scholar search produced several articles which were not present in the Locate search. Of these, 14 results adhere to my definition of peer-reviewed journal articles. '*Appendix 4 - Additional Appropriate Results'* contains a list of these articles[24].

The Data Set After the 'Locate' Search and the 'Google Scholar' Query

Combined, the *Locate* search and the *Google Scholar* query produced 118 papers which both contain the term 'Design Thinking' in the title and are peer-reviewed. *'Appendix 5: List of All Peer Reviewed Papers'* lists these articles.

Thinking' in the context of *Learning Design Thinking*, the practice of creating strategies to help students learn. Both papers are published in the journal *Educational Media International*. I removed the papers from the data set.

[22] The Google Scholar search took place between 30th June and 7th July 2016.

[23] The query produced several conference papers—including Kimbell (2009) and Dorst (2010). As I only aim to analyse journals papers, I removed all conference papers. Book chapters are not as highly regarded as journal articles. This can be evidenced by the fact that companies who compile statistics on research prestige collect data on journals, not books (Adams, 2002). Similarly, the literature on peer-review focusses on the process as it is applied in academic journals, not book chapters (Cope and Kalantzis, 2009; Rowland, 2002). For these reasons I removed book chapters. Book chapters included Köppen and Meinel (2015) and Royalty et al. (2015). The search also produced books, including Martin (2009) and Ogilvie and Liedtka (2011). Academic books are far longer than journal articles—Martin (2009) is 208 pages long, around 10 times longer than many papers. The difference in length means that books contain many more words—and therefore instances of ways of speaking—than do papers. Analysing very long texts alongside far shorter ones disproportionately takes into account the views of speakers authoring the long texts (Sinclair, 2005). The practice therefore can skew findings. I removed books from the data set. The Google Scholar search produced citations for books and articles. I removed citations from the data set. (I have since discovered is it possible to filter out citations whilst conducting Google Scholar searches).

[24] Peer-reviewed results available through Google Scholar but not available through Locate include papers published in the following peer-reviewed journals: *International Journal of Art & Design Education; Australasian Medical Journal; Design Research Quarterly; Environment and Planning B: Urban Analytics and City Science; Propulsion and Power Research; Design and Technology Education: an International Journal*; *The Design Journal; Swedish Design Research Journal*. A subsequent Locate search for articles published in these journals showed that Locate does provide access to some of these journals. This indicates that Locate may not provide full access to all articles in every journal. The inconsistencies associated with Locate underscore the value of using Google Scholar to augment the Locate query.

'Appendix 6: List of Journals' contains a list (in alphabetical order) of journals which have published the papers in Appendix 5. Appendix 6 shows that papers have been published in 78 different journals. Appendix 6 highlights the level of interest in Design Thinking in a range of academic fields. Areas include medicine, marketing, psychology, policy studies and mechanical engineering.

3.5.2 Filtering the Data Set for Papers Published in Design Journals

To qualify as a design journal in this thesis, the remit of the journal needed to either focus on design or on design and art. My experience as a design researcher provided me with some insight into which of the journals in Appendix 6 can be classed as design journals[25]. To enable me to filter 'design journals' from 'non-design journals' I investigated the remit of the journals which with I was unfamiliar.

Investigating Journal Remit

Appendix 6 shows the remit associated with each of the journals[26]. Filtering took place in 2 stages.

Stage 1: Removing Journals Which do not Contain 'Design' in the Remit

Figure 21 lists examples of journals which do not refer to 'design' in their remit.

- Medical journals (*Journal of Commercial Biotechnology*; *Journal of Oncology Practice*)
- Management journals (*Journal of Management Inquiry*; *Journal of Management Education*; *Journal of Management Inquiry*; *Journal of Marketing Management*; *Academy of Management Learning & Education*; *California Management Review*; *Project Management Journal)*.
- Marketing Journals (Journal of the Academy of Marketing Science; Marketing Theory).
- Environmental journals (*GAIA*; *Journal of Cleaner Production*); education journals (*Education + Training*; *Review of Educational Research*; *The Turkish Online Journal of Distance Education*; *College Composition and Communication*)

[25] I knew for example that the publications *Design Studies* and *The Design Journal* can be classed as design journals.

[26] In the vast majority of instances, I have taken text associated with remit directly from the respective journal website. This has helped to reduce the need to subjectively interpret journal remit, which in turn reduces opportunities for me to cherry pick certain journal titles over others.

- Psychology journals (*Journal of Community & Applied Social Psychology*; *Procedia - Social and Behavioral Sciences*)

Figure 21: Examples of journals which do not include 'design' in their remit.

Stage 2: Removing Journals Which Contain 'Design' in the Remit

Focussing on the Design Tribe necessitated removing journals whose remits place design alongside engineering, management and human computer interaction. This led me to remove papers published in the following journals: *Journal of Engineering Design; Advances in Mechanical Engineering*; *Journal of Organization Design*; *Human*

Computer Interaction; Automation in Construction. This process removed a further 5 journals from the data set.

The Issue of Architecture

The data collection process uncovered journals in the areas of architecture and urban planning. I had not considered these areas in developing the strategy for filtering data. Returning to my Literature Review Chapter helped me to resolve this issue. The term 'Design Thinking' was coined by Peter Rowe (1987) in the field of architectural research. The Design Tribe has an ambivalent relationship with Rowe's contribution. On the one hand, it acknowledges a debt to it (Cross, 2004; Kimbell, 2011). On the other hand, design researchers tend not to explore Rowe's ideas in depth. Rowe's research suggest that designers may share thinking styles with scientists—this may help to explain why design researchers do not explore Rowe's idea in depth. The ambivalence towards Rowe makes the decision on whether to keep papers published in architectural journals in the sample a difficult one. However, the idea that contemporary Design Thinking research may owe its roots to architectural research led me to include architectural journals in my sample.

Appendix 6 shows that the *International Journal of Architectural Research* and *The Middle East Technical University Journal of the Faculty of Architecture* focus on architectural research. The decision to include these is therefore straightforward. Other journals which refer to architecture in their remit were more difficult to categorise. The affected journals are *Environment and Planning B: Urban Analytics and City Science*; *Urban Design; Urban Design International*. The remit of these journals is comparatively broad as it includes city planning and urban development. These issues are far removed from the focus of this thesis. I therefore decided not to class these as design journals.

'Appendix 7: List of all papers-Design and Non Design' shows the full list of 78 journals categorised into design journals and non-design journals. *Appendix 7* illustrates that I have classed 16 journals as design journals. The design journals are:

- *Art, Design and Communication in Higher Education*
- *Co-Design*
- *Design and Culture*
- *Design and Technology Education: An International Journal*
- *Design Issues*

- *Design Research Quarterly*
- *Design Studies*
- *International Journal of Design*
- *International Journal of Architectural Research*
- *International Journal of Art and Design Education*
- *Journal of Interior Design*
- *Middle East Technical University Journal of the Faculty of Architecture*
- *Swedish Design Research Journal*
- *Techne Series—Research in Sloyd Education and Craft Science 'A'*
- *The Design Journal*
- *Visible Language*

The filtering process reduced the total number of articles which qualify as peer-reviewed papers which contain the term 'Design Thinking' in the title and are published in design journals to 45. Henceforth, I term these 45 papers the ***Design Thinking Data Set***.

3.5.3 The Design Thinking Data Set

Figure 22 shows the remit of the 16 design journals and the number of papers in the Design Thinking data set which are published in each of them.

Design Research or Non Design Research	Field of Research	Name of Journal	Remit (From Website)	Number of Papers	Overall Total	
Design Research	Design	CoDesign	"collaboration in design"	1	35	
		Design and Culture	"'design' as a cultural phenomenon today"	2		
		Design Issues	"design history, theory, and criticism"	6		
		Design Research Quarterly	"the wide range of design fields and subfields"	1		
		Design Studies	"all domains of application" of Design	14		
		International Journal Of Design	"all fields of design"	1		
		International Journal of Architectural Research	"architectural and design research, and urban planning and built environment studies"	1		
		Journal of Interior Design	"design of the interior environment"	2		
		Middle East Technical University Journal of the Faculty of Architecture	"man-environment relations, design and planning"	1		
		Swedish Design Research Journal	"design research and development of the design field"	1		
		Techne Series-Research in Sloyd Education and Craft Science 'A'	"Craft"	1		
		The Design Journal	"all aspects of design"	3		
		Visible Language	"all forms of research in visual communication"	1		
	Design Education	Art, Design & Communication in Higher Education	"Focusing on arts and media-based subjects, and encompassing all areas of higher education"	1	10	
		Design and Technology Education: an International Journal	"primary, secondary and higher education sectors"	5		
		International Journal Of Art & Design Education	"art and creative education"	4		
					45	Total

Figure 22: The design journals, their remit and the number of papers in the Design Thinking Data Set published in each journal.

Evaluating the Design Thinking Data Set

Representativeness: The 'Design Tribe'

Design Journals

The field of design research contains both large-circulation, broad-remit journals and less well-known specialist-remit publications (Mansfield, 2016). Paralleling this, the data set contains both types of journals. Broad-domain journals include, *Design Studies*; *Design Issues*; *The Design Journal*. Specialised publications include, *The Swedish Design Research Journal; Middle East Technical University Journal of the Faculty of Architecture; Techne Series-Research in Sloyd Education and Craft Science 'A'*. There are many aspects to design: design is a practical area with a range of disciplines; designed objects and services affect the lives of users and the broader environment; design education occurs in formalised environments like universities and schools. Reflecting the range of aspects associated with design, the journals in the data set focus on disseminating knowledge on a

range of subjects. Discipline specific publications include, *Journal of Interior Design*; *Middle East Technical University Journal of the Faculty of Architecture; International Journal of Architectural Research*. Education-focused journals include *Art, Design and Communication in Higher Education; Design and Technology Education: An International Journal; International Journal of Art and Design Education*. Journals which focus on cultural issues include *Visible Language*; *Design and Culture; CoDesign*. The presence of both broad-remit and specialist-remit journals as well as publications which focus on a range of interests, indicates that the data set broadly reflects a range of aspects which are associated with the Design Tribe.

10 out of the total of 45 papers are published in journals which focus on design education. Interestingly, many of the remaining papers either focus on design education or on more general education. Research on education may therefore be a particularly common theme in Design Thinking research conducted by the Design Tribe.

Types of research

Figure 23 contains the list of papers contained in the data set. The list includes the code I have given to each article[27]. In Figure 23, I have also categorised each paper with regards the main thrust of the research contained in it. I have classed a paper as *pedagogical* when it discuss educational issues. Pedagogical papers all contain primary research conducted on a group(s) of learners. To illustrate, Paper 41 discusses how Graphic Design students use Design Thinking when creating interventions for a museum exhibition. I have classed a paper as *practice-based* when it discusses how professional designers or managers solve problems. Practice-Based articles contain primary research conducted on practising designers or managers. To illustrate, Paper 88 discusses how 3 practising designers use an embodied approach in HCI. I have categorised an article as *theoretical* when it focusses on contributing a theoretical or philosophical contribution on Design Thinking. Theoretical papers tend not contain primary research. To illustrate, Paper 71 makes comparisons between Design Thinking and Bricolage.

Code	**Citation**	**Research Thrust**
Paper 1	Adams, R. S., Daly, S. R., Mann, L. M., and Dall'Alba, G. (2011). Being a professional: Three lenses into design	Theoretical

[27] I refer to the codes of the papers in the Design Thinking Data Set when discussing findings in Study 3. I do not refer to the codes when discussing the results of Studies 1 and 2. This is because Studies 1 and 2 only provide initial insights.

	thinking, acting, and being. Design Studies, 32(6), pp.588-607.	
Paper 11	Bjögvinsson, E., Ehn, P., & Hillgren, P. A. (2012). Design things and design thinking: Contemporary participatory design challenges. Design Issues, 28(3), pp.101-116	Practice-Based
Paper 12	Blizzard, J., Klotz, L., Potvin, G., Hazari, Z., Cribbs, J., & Godwin, A. (2015). Using survey questions to identify and learn more about those who exhibit design thinking traits. Design Studies, 38, pp.92-110.	Pedagogical
Paper 13	Börekçi, N. A. (2016). Usage of Design Thinking Tactics and Idea Generation Strategies in a Brainstorming Session. METU Journal of the Faculty of Architecture, 32(2), pp.1-17.	Pedagogical
Paper 14	Bousbaci, R. (2008) “Models of Man” in Design Thinking: The “Bounded Rationality” Episode. Design Issues, 24(4), pp.38-52	Theoretical
Paper 15	Buchanan, R. (1992). Wicked problems in design thinking. Design issues, 8(2), pp.5-21	Theoretical
Paper 16	Burdick, A. and Willis, H. (2011) Digital learning, digital scholarship and design thinking. Design Studies, 32(6), pp.546-556	Pedagogical
Paper 17	Carlgren, L., Elmquist, M., & Rauth, I. (2014). Exploring the use of design thinking in large organizations: Towards a research agenda. Swedish Design Research Journal, 1(14), pp.47-56.	Practice-Based
Paper 18	Carlgren, L., Elmquist, M., & Rauth, I. (2014) Design thinking: Exploring values and effects from an innovation capability perspective. The Design Journal, 17(3), pp.403-423	Practice-Based
Paper 21	Carmel-Gilfilen, C. and Portillo, M. (2010). Developmental trajectories in design thinking: an examination of criteria. Design studies, 31(1), pp.74-91	Pedagogical
Paper 22	Carmel-Gilfilen, C. (2012) Uncovering Pathways of Design Thinking and Learning: Inquiry on Intellectual Development and Learning Style Preferences. Journal of Interior Design, 37(3), p.47-66	Pedagogical
Paper 23	Carroll, M., Goldman, S., Britos, L., Koh, J., Royalty, A., & Hornstein, M. (2010). Destination, Imagination and the Fires Within: Design Thinking in a Middle School Classroom. International Journal Of Art & Design Education, 29(1), pp.37-53.	Pedagogical
Paper 24	Cassim, F. (2013) Hands On, Hearts On, Minds On: Design Thinking within an Education Context. International Journal Of Art & Design Education, 32(2), pp.190-202	Pedagogical
Paper 26	Cheung, M. (2012) Design thinking in healthcare: innovative product development through the iNPD process. The Design Journal, 15(3), pp.299-324	Practice-Based
Paper 28	Cusens, D. and Byrd, H. (2013). An exploration of foundational design thinking across educational domains. Art, Design & Communication In Higher Education, 12(2), p.229-245	Pedagogical
Paper 29	Dalsgaard, P. (2014). Pragmatism and design thinking. International Journal of design, 8(1), pp. 143-155.	Pedagogical
Paper 33	Dorner, D. (1999). Approaching design thinking research. Design Studies, 20(5), pp.407-415	Theoretical

Paper 34	Dorst, K. (2011) The core of 'design thinking' and its application. Design studies, 32(6), pp.521-532.	Theoretical
Paper 41	Fontaine, L. (2014). Learning Design Thinking by Designing Learning Experiences: A Case Study in the Development of Strategic Thinking Skills through the Design of Interactive Museum Exhibitions. Visible Language, 48(2), pp.48-69	Pedagogical
Paper 43	Galle, P. and Kovács, L. B. (1996). Replication protocol analysis: a method for the study of real-world design thinking. Design Studies, 17(2), pp.181-200.	Pedagogical
Paper 50	Goldschmidt, G. (1994). On visual design thinking: the vis kids of architecture. Design studies, 15(2), pp.158-174.	Pedagogical
Paper 51	Goldschmidt, G. and Rodgers, P. A. (2013). The design thinking approaches of three different groups of designers based on self-reports. Design Studies, 34(4), pp.454-471.	Pedagogical
Paper 52	Gray, C.M. (2013) Factors That Shape Design Thinking. Design and Technology Education: an International Journal 18(3), pp. 8-20.	Pedagogical
Paper 53	Gray, C.M and Siegel, M.A (2014) Sketching Design Thinking: Representations of design in education and practice. Design and Technology Education: an International Journal, 19(1), pp.48-61.	Pedagogical
Paper 54	Hadjiyanni, T. and Zollinger, S. (2013). Writing in Design Thinking--Deconstructing the Question of Being. International Journal of Architectural Research, 7(1), pp116-127	Pedagogical
Paper 57	Ho, C. H. (2001) Some phenomena of problem decomposition strategy for design thinking: differences between novices and experts. Design Studies, 22(1), pp.27-45.	Practice-Based
Paper 60	Kangas, K. Seitamaa-Hakkarainen, P. and Hakkarainen, K. (2013) Design Thinking in Elementary Students' Collaborative Lamp Designing Process. Design and Technology Education: an International Journal, 18(1), pp. 30-43.	Pedagogical
Paper 63	Kimbell, L. (2011). Rethinking design thinking: Part I. Design and Culture, 3(3), pp.285-306.	Theoretical
Paper 64	Kimbell, L. (2012). Rethinking design thinking: Part II. Design and Culture, 4(2), pp.129-148.	Practice-Based
Paper 70	Liu, Y. T. (1996) Is designing one search or two? A model of design thinking involving symbolism and connectionism. Design Studies, 17(4), pp.435-449.	Practice-Based
Paper 71	Louridas, P. (1999). Design as bricolage: anthropology meets design thinking. Design Studies, 20(6), pp.517-535.	Theoretical
Paper 81	Orthel, B. D. (2015), Implications of Design Thinking for Teaching, Learning, and Inquiry. Journal of Interior Design, 40(3) pp.1–20.	Pedagogical
Paper 82	Owen, C. (2007). Design thinking: Notes on its nature and use. Design Research Quarterly, 2(1), pp.16-27.	Theoretical
Paper 83	Oxman, R. (2004) Think-maps: teaching design thinking in design education. Design studies, 25(1), pp.63-91.	Pedagogical
Paper 86	Pauwels, P., De Meyer, R. and Van Campenhout, J. (2013) Design Thinking support: Information systems versus reasoning. Design Issues 29(2), pp.42-59	Theoretical

Paper 88	Poulsen, S.B. and Thøgersen, U. (2011) Embodied design thinking: A phenomenological perspective, CoDesign, 7(1), pp.29-44	Practice-Based
Paper 92	Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. Design and Technology Education: An International Journal, 17(3), pp.8-19.	Pedagogical
Paper 94	Senturer, A., & Istek, C. (2000). Discourse as Representation of Design Thinking and Beyond: Considering the Tripod of Architecture–Media, Education, & Practice. International Journal Of Art & Design Education, 19(1), pp.72-85.	Pedagogical
Paper 100	Teal, R. (2010). Developing a (Non-linear) Practice of Design Thinking. International Journal Of Art & Design Education, 29(3), pp.294-302	Pedagogical
Paper 102	Tonkinwise, C. (2011). A taste for practices: Unrepressing style in design thinking. Design Studies, 32(6), pp.533-545.	Theoretical
Paper 104	Vanada, D. I. (2014). Practically Creative: The Role of Design Thinking as an Improved Paradigm for 21st Century Art Education. Techne Series-Research in Sloyd Education and Craft Science A, 21(2), pp.21-33.	Pedagogical
Paper 108	Wang, J. (2013) The importance of aristotle to Design Thinking. Design Issues, 29(2), pp.4-15	Theoretical
Paper 115	Wu, J.-C. Chen, C-C., and Chen, H.-C. (2012) Comparison of Designer's Design Thinking Modes in Digital and Traditional Sketches. Design and Technology Education: an International Journal, 17(3), pp.37-48.	Practice-Based
Paper 116	Wylant, B. (2010) Design thinking and the question of modernity. The Design Journal, 13(2), pp.217-231.	Theoretical
Paper 117	Wylant, B. (2008). Design Thinking and the Experience of Innovation. Design Issues, 24(2), pp.3-14	Theoretical

Figure 23: The 45 papers in the Design Thinking data set and the code I have assigned to each article.

Altogether, the Design Thinking Data Set consists of 13 theoretical papers, 9 practice-based papers and 23 pedagogical papers. The presence of all 3 types of papers suggests the data set is broadly representative of typology in design research. However, the majority of papers (indeed, 50% of the overall data set) have an education-focussed slant. As part of the content analysis (Chapter 6) of full papers, I reflect on results as they apply to the 3 types of papers.

Speakers

The 45 papers in the data set contain the work of 79 researchers, all except 1 of these work as an academic[28]. The fact that the vast majority of contributors are academics suggests the data set is useful in providing insight into ways of speaking produced by the Design Tribe.

[28] The one exception is a Design and Technology teacher at pre-tertiary level.

A Global Community

The design research community is global in nature. The data set contains researchers who are based in a range of globally diverse locations including, the UK, USA, Scandinavia, China, Australia and South America. The sample therefore reflects, to some extent, the presence of a global community of researchers.

Make Up

Academics working in 12 research areas contribute to the 45 papers in the data set. Figure 23 illustrates the investigative areas and the corresponding number of researchers working in each of them.

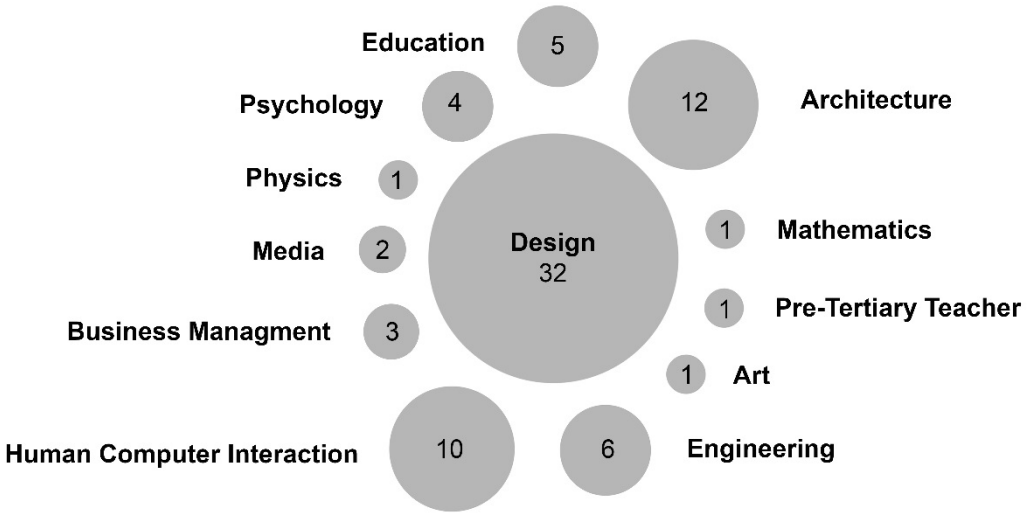


Figure 24: An infographic illustrating the research areas and the corresponding number of researchers working in each area.

Figure 24 shows that the area of *design research* is the single largest area of work for contributors. This fact suggest that data set is useful in helping me to tackle the research question. Contributors are by no means confined to working in design research. Contributors work in a broad range of areas including engineering, computing, psychology, media and physics. The data set therefore reflects some of the multidisciplinary aspects of Design Thinking research and provides an indication of the range of speakers who help to form the Design Tribe. The relative breath of contributors suggests the data set is useful in allowing insight into ways of speaking formed by the Design Tribe *community*, rather than merely facilitating insight into discourse formed by a narrow selection of individuals.

A Note on Speakers' Contributions

Many of the papers are co-written. 71 of the 79 researchers contribute to 1 paper in the data set. The remaining 8 researchers contribute to 2 papers. The proportion of researchers contributing to more than 1 paper is therefore quite low, suggesting that the sample is not adversely skewed by the work (and ways of speaking) of any particular researcher(s). This raises the likelihood that the sample provides insight into how a *community* speak on Design Thinking (rather than a few notable individuals).

3.5.4 An Overview of Forthcoming Primary Research

Use of corpus linguistics helped me to uncover initial results and content analysis uncovered the definitive findings. Aspects of the composition of the Design Thinking data set influenced the design of my studies. I conducted 3 studies: studies 1 and 2 made use of corpus linguistics; study 3 made use of content analysis. The studies built progressively to enable me to answer the research question.

Study 1

14 papers are published in the *Design Studies*. This is by far the most papers published in a single journal. An investigating of ways of speaking present in these papers was a rational place for me to begin my investigation. I analysed a corpus of abstracts from the Design Studies papers. This small study also allowed me to test the use of corpus linguistics tools.

Study 2

Study 2 built on Study 1. I used corpus linguistics tools to analyse a corpus of abstracts taken from all the papers in the data set. The papers published in *Design Issues* and the *Middle East Technical University Journal of the Faculty of Architecture* do not contain abstracts[29]. I was not able to include these papers in this study. The limitations of this study meant that it could only provide indicative insights.

Study 3

[29] Together these papers comprise around 16 % of the Design Thinking Data Set.

Study 3 built on Study 2. I conducted a content analysis of the full texts of all the papers in the Design Thinking data set. Study 3 provided definitive insights on how the Design Tribe speak on Design Thinking.

Chapter 4

Study 1

4.1 An Overview of Study 1

In the Design Thinking data set, 14 papers are published in the journal *Design Studies*. This is by far the most papers published in a single journal. (The next highest number of papers published in a single journal is 6, in *Design Issues*). Investigating ways of speaking present in the *Design Studies* papers was a rational place for me to begin my analysis of primary data. I analysed a corpus of abstracts from the papers. This small study also allowed me to trial the use of corpus linguistics tools.

4.1.1 The Journal Design Studies

First published in the late 1970s, *Design Studies* was the first academic journal to focus on design research (Downton, 2003). It is also the official journal of the *Design Research Society* (DRS), the largest and most established academic design-focussed society. For many years, the journal's editor was Nigel Cross, the long-serving Chair of the DRS. In my Literature Review chapter, I noted Cross' argument that the design research community must re-establish ownership over the concept of Design Thinking:

> "It is time to re-claim design thinking as a fundamental aspect of the discipline of design, something that pertains to the skilled, educated practice of designing".
>
> (Cross, 2010, p. 99)

As a key journal, Design Studies plays an important part in disseminating ways of speaking which are linked to this quest for ownership. Investigating discourse present in Design Studies articles therefore may provide initial insight into 'core' ways of speaking which are constructed and dispersed by the Design Tribe.

4.1.2 Analysis of Abstracts

The purpose of abstracts is to summarise the research in the article (Pitkin et al., 1999). Because of this, they tend to contain a condensed form of discourse, so can provide a rich source of data which can be used to evaluate ways of speaking in research communities (Thompson and Hunston, 2003). The literature contains examples of corpus-led enquires performed on abstracts (Hyland and Tse, 2005; Blythe, 2014; Nagano, 2014).

There are limitations to researching abstracts. Abstracts tend to be quite short so they contain a limited amount of information. In addition, there is no guarantee that abstracts accurately represent research contained within respective articles (Boutoron et al, 2014; Pitkin et al., 1999). These limitations mean that I have only used findings as possible starting points to begin analysis of full papers.[30]

4.2 The Research Process

4.2.1 Creating the Research Corpus

I copied and pasted the Design Studies abstracts into separate MS Word documents, then converted them all to the *UTF-8* format[31]. I then uploaded the files to the concordancer, *Sketch Engine* (https://www.sketchengine.co.uk/). I term the resulting research corpus, *'The Design Studies Corpus'*[32]. This corpus contains 1758 words.

Research corpora in corpus linguistics studies can be very large—they can contain millions of words (Nesi, 2016). By comparison, the Design Studies Corpus is small. Its size does not prevent it from being a valuable source of data. The corpus is designed to provide a rich data source which focusses on a particular research domain. When investigating narrow domains, it is often preferable to work with small highly-focussed data sets (Nesi, 2016). The literature contains examples of specific-domain corpus-led research which makes use of small corpora. To illustrate, a corpus of fewer than 5000 words provides insight into how meaning is constructed in engineering research (Nagano, 2014). Mautner's (2009) corpus of 2200 words of Tony's Blair's thoughts on Anti-Terror legislation offers insights into how the former prime minister allies himself with British citizens.

4.2.2 Analytical Tools

This study made use of *keyword analysis* and *concordance analysis*. After identifying keywords, I analysed their use in context using concordance analysis. The Written Academic sub-corpus of the British National Corpus served as the reference corpus for the keyword analysis.

[30] I analyse full papers in Study 3 (Chapter 6).
[31] Like all concordancers, Sketch Engine cannot process Word documents. It processes text which has been converted to a Unicode format termed *UTF-8* (McEnery and Xiao, 2005).
[32] The longest abstract in The Design Studies Corpus contains 230 words, the shortest 72 words.

4.2.3 The Term 'Speaker'

Researchers refer to the people using written language to create ways of speaking as ***speakers*** (Stubbs, 1996). The Design Thinking data set contains both single-authored papers and collaborations. Collaborations are presented as knowledge created by a single voice. Therefore, I use the singular form *speaker* to refer to both types of papers. The aim of this thesis is to investigate patterns in word use in a *community*—it is not to investigate which authors use specific terms. The term *speaker* allows me to place emphasise on patterns in word use.

4.3 Results

4.3.1 Keyword Analysis

Figure 25 shows an edited version of the keyword list[33]. The terms *designers, designing, thinkers, design and thinking* are found at the top of the list[34]. Their increased frequency highlights the condensed nature of the corpus[35]. The high level of use of these terms indicates that the focus of the data set is *Design Thinking,* which in turn supports my data sampling strategy. The frequent use of these terms also signposts the presence of a tribe

[33] The frequency of each keyword in the reference corpus and keywords occurrence calculated in terms of frequency per million words are shown in the original keyword list. This information is not relevant in this study. I have therefore edited the list to create a clear narrative. Figure 25 contains 3 columns. The left-hand column lists the keywords in descending order. The word at the top (*'designers'*) is the therefore the most key to the Design Studies corpus. The middle column shows the number of times each keyword appears. The right-hand column shows the keyness score associated with each keyword. The keyness score indicates of the level of keyness of the respective word. Corpus-led researchers commonly work to a 95th percentile certainty of keyword significance ($p < 0.05$) (Baker, 2004). $P < 0.05$ is associated with a minimum keyword score of 3.84 (Lancaster University (n.d.)). This necessitates disregard keywords with a keyness score below 3.84 (ibid). Figure 25 does not include keywords with a score of less than 3.84.

[34] Keyword lists tend to contain words which have one of two functions. Some words provide insight into the style in which the text is written (Scott, 2014). Words such as *because*, *shall* and *already* provide insight into style (University of Oxford, 2010, unpaged). They tend to be commonly used and are usually found towards the top of keywords list (ibid). They tend not to provide insight into how speakers construct discourse (ibid). Other keywords may provide evidence of ways of speaking. In so doing, these words relate to the "aboutness" (Scott, 2014, unpaged) of the text. These terms are often less frequently used and tend to appear lower down in keywords lists (Scott, 2014). Analysis of Figure 24 shows that the keywords list does not adhere to this commonly observed pattern. Analysis of the keyword *we* illustrates this point. Speakers use *we* to refer to claims they aim to make. Speakers refer to *"**we** view"*, *"**we** pose questions regarding"*, and *"**we** assert"*. Use of *we* therefore provides evidence of the style in which the texts are written. *We* appears towards the bottom of the keyword list (see Figure 25). In contrast, terms like *Designers, designing, thinkers, design and thinking* – all of which provide clues on the aboutness of the text – appear the top of the list.

[35] Figure 25 shows that the term *paper* is a highly ranked keyword. In every incidence, speakers use *paper* in relation to the article they are writing: speakers state *"this **paper** argues"* and *"in this **paper**"*. I will not analyse use of this term signposts corpus style. Reflecting on the reference corpus may provide insight into why the term appears on the Design Studies Corpus keyword list. The BNC Written Academic sub-corpus contains text from books, not articles. Therefore, a speaker may not commonly refer to the *paper* he or she is writing in this corpus.

which uses these terms to differentiate itself from the range of other academic communities which are represented in the reference corpus.

word	frequency	Score
designers	6	486.5
designing	6	475.1
thinkers	5	349.8
design	58	271.0
thinking	18	108.2
reasoning	6	104.8
framework	9	68.7
paper	13	61.6
criteria	5	32.1
search	5	29.8
learning	6	20.1
questions	5	14.1
knowledge	7	12.9
We	7	8.6
how	6	6.1
new	7	5.5

Figure 25: Keywords in The Design Thinking Corpus

Classifying Design Thinking

The keyword list includes the terms *reasoning; framework; criteria.* Concordance analysis suggests that speakers use these terms when classifying aspects of Design Thinking. Separate speakers discuss a *"**framework** that speak broadly to aspects of 'design thinking'"*; *"recognize multifaceted **criteria** in the design process"*; claim that *"Dualistic thinkers employed fewer **criteria**"* than more advanced thinkers; aim to identify the "fundamental ***reasoning*** pattern behind design" and *"capture the designer's authentic line of **reasoning**"*.

Use of these keywords indicates that the process of classifying Design Thinking is important to speakers. This is to be expected as academic tribes focus on classifying aspects which they claim to be important to their domain (Becher and Trowler, 2001).

Meta-knowledge

Kalfoglou et al (2000, p. 381) use the term *meta-knowledge* to signify "reusable modelling frameworks" which seek to describe knowledge on a particular subject. Meta-knowledge therefore indicates classifications which can be used to describe recurring patterns. Speakers use the terms *reasoning, framework and criteria* in classifying broadly applicable models of Design Thinking—they therefore appear to create meta-knowledge on Design

Thinking. This is an indication that speakers may claim that models of Design Thinking are broadly applicable amongst designers.

Use of the following non-keywords—*visual*, *sketching, sketch, shapes, form*—support my findings on the trait for classifying commonality between designers. Speakers use these terms to claim that activities and traits which are common to designers facilitate Design Thinking: a speaker supports *"the paramount role of **visual** reasoning"*, claiming that *"interactive imagery through **sketching** is a rational mode of reasoning"*. Others argue that designers *"**sketch** to generate images of **forms** in their minds"*; that designers reason by *"restructuring **shapes** in terms of emergent **subshapes**"* and "*invariably use imagery to generate new **form** combinations which they represent through **sketching**"*.

The practice of framing activities and traits as shared by designers further helps speakers to frame models of Design Thinking as generally applicable amongst designers.

Speaking on Designers

The term *designers* occurs at the top of the keywords list, indicating its importance in constructing discourse. Speakers tend to use it when claiming similarities between the ways in which designers think: ***"Designers** invariably use imagery to generate new form combinations"*; *"**designers** often decompose an ill-structured design problem into well-structured subproblems".*

More evidence for the idea that speakers may focus on discussing similarities amongst designers comes though observing how speakers *do not* talk about designers. Speakers do not focus on issues which are specific at what I will term a 'local level' to designers. The term *designers* is never accompanied by adjectives which provide further details on these professionals. Speakers do not discuss specific occupations (e.g. *fashion designers*; *industrial designers*), level of seniority (e.g. *junior designers* or *senior designers*) or gender. Only one speaker discusses issues which designers may experience at a local level, claiming that *"**designers** are hermeneutists of proximal taste regimes"*. Interestingly, the term used to refer to an individual (*designer*) is absent from the corpus. The word *designer's* is present—but it is never used to refer to individuals. Rather, speakers use it to refer to an undefined body of designers: *"little study has focused on the **designer's** search strategies in dealing with well-structured design subproblems"*; *"this method offers distinct advantages over traditional 'design protocol analysis', which seeks to capture the **designer's** authentic line of reasoning"*.

Two speakers use the term *thinkers* (a highly-ranked keyword) in place of *designers*. Following the pattern, speakers use it when discussing a body of designers: a speaker *"Aims to analyse the qualitative traits of design **thinkers**"*.

The results suggest that speakers construct a body (or community) of designers which are classified as *people who practice Design Thinking*. The emphasis on framing designers and students in this way is not surprising as the corpus focusses on Design Thinking. To reflect on this way of speaking further it is necessary to return to how speakers classify Design Thinking. Speakers frame Design Thinking as generally applicable amongst designers. The classification of designers also involves creation of meta-knowledge: *speakers frame designers as a general body of people who practice a generally applicable Design Thinking.*

The two ways of speaking (on Design Thinking and on designers) and are symbiotic, helping to establish one another. Using metaphor helps illustrate the idea of symbiosis. The ways of speaking can be thought of as organisms, which rely on fuel to sustain them. Generalised designers can be thought of as fuel which helps speakers to make broadly applicable claims on Design Thinking. In turn, generally applicable Design Thinking is the fuel which may allow speakers to make broadly applicable claims on designers. The removal of either party could make the current classification of the corresponding party unsustainable. This may help to explain why speakers frame the parties as they do.

Speaking on Design and Designing

Design is the most frequently occurring keyword (it occurs 58 times). A dispersion plot provides some insight into where the term is used in the corpus (see Figure 26).

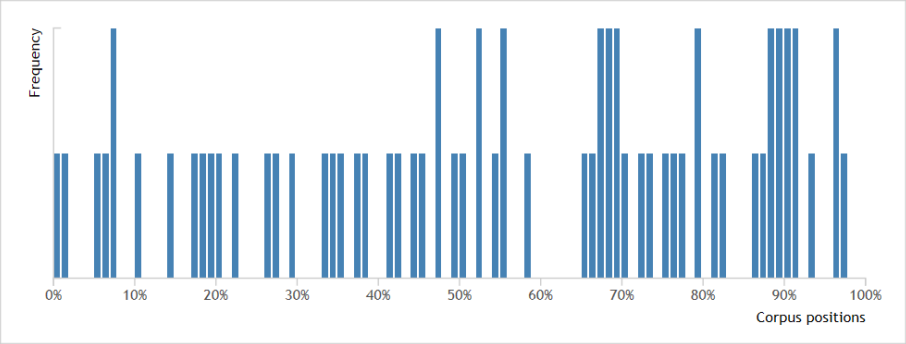


Figure 26: Dispersion plot for the term *design* in the Design Studies Corpus

Figure 26 illustrates that *design* is quite evenly spread across the corpus. Findings on how speakers use it may therefore be generally applicable across the corpus.

To begin with I analysed use of *design* in terms of *parts of speech:* whether/when the term appears as a verb or as a noun. The overarching pattern is for speakers to use *design* as a noun.

Design-as-Verb

It is possible to use the term *design* when discussing the act of creating an object or a service: *"I want to design a chair"*. Concordance analysis reveals that the term *design* is never used as a verb in the corpus.

When using *design* as a verb it is possible to describe activity in the past tense or in the present tense. Either of these necessitate using other forms the term *design*: *"she designed that chair"* (past tense); *"I'm designing a chair"* (present tense). A fuller investigating necessitates analysing how these forms are used in the corpus. *Designed* is absent. *Designing* is present—and is a highly ranked keyword. On most occasions, speakers seem not to use it to discuss the process of creating a particular artefact or service. Rather, speakers use the term in a more general manner, in relation to creating a nominal artefact or service. A speaker explores a *"key aspect of the agency of **designing**"*; another discusses *"the Measure of **Designing**"*. A further speaker claims that in his research:

> "***designing*** is interpreted as a combination of two searches: a shape restructuring search and a knowledge transforming search."

Only one speaker discusses issues associated with *designing* at a more local level. In so doing, the speaker notes *"the problem of **designing** a new machine"*. Interestingly though this speaker too makes claims on the design process which appear to be generally applicable across disciplines: *"I shall also try to answer the question of how a theory about thought in **designing** may be constructed."*

In English, the term *design* is not used exclusively to describe the act of creating form or service. People may use forms of the verb *to create* in place of *design*: *"he created a service"*. Both past and present forms of the term *create* (*create*; *creates*; *creating*; *created*) are absent from the corpus. It is evident that speakers consistently use the verb form of *design* (the keyword *designing*) to classify a generally applicable Design

Thinking. Use of the term supports the idea that speakers use keywords in the corpus to create meta-knowledge on Design Thinking.

Design-as-Noun

In every concordance line, the term *design* is used as a noun. Speakers discuss *"intermediate **design** students"*, *"the current vogue for **design** in management discourses"*, "*the relationship of **design** to art*" and *"the **design** awarded the first prize"*. The pattern for exclusively framing *design* as a noun means that for speakers, *design* is first and foremost a '*thing'*—and secondly an act.

Ringfencing Intellectual Territory

In many instances, speakers use the noun form of *design* to discuss issues which they claim are particular to design practice or research. Speakers explore "a '*logic of **design**'"; "the **design** process"; "the **design** research community"*; *"the core **design** practices"*; *"the specific **design** domain"; "the fundamental reasoning pattern behind **design**"*. Through claiming aspects which are particular to design, it is evident speakers are attempting to establish or reinforce intellectual territory associated with it. Metaphorically speaking, the practice of consistently framing design as a noun (a 'thing') may help speakers establish a *territory*.

Blythe's (2014) study of 'Research Through Design' (RTD) literature in the field of Human Computer Interaction helps me to reflect on these findings. Blythe notes that the term *design* is predominantly used as a noun in RTD research abstracts. Speakers affiliate practices and process with design, discussing "'the design', or 'the design process' or 'the design approach'" Blythe (2014, p.704, original emphases). The results in my study mirror Blythe's. Blythe (2014, p.704) claims that the act of affiliating practices and process with *design* means that RTD speakers use the term *design* in an "honorific" context. This helps RTD speakers to elevate the status of the field. Similarly, the pattern for speakers in the Design Studies corpus to use the noun-form of *design* to establish intellectual territory, may signal their attempts at raising the status of their domain.

4.3.2 What is 'Missing' from the Keyword List?

Words which are absent from keyword lists can provide clues on what speakers are **not** primarily concerned with (Baker, 2004). Design practices often result in the creation of artefacts or services. Indeed, this aspect differentiates design practices from many other disciplines. Because of this, I expected to see associated terms such as *object, artefact, form or service* in the keywords list. These terms do not feature as keywords. As noted earlier in this study, speakers use these terms when classifying Design Thinking processes. Designers can spend a great deal of time focussing on object aesthetics—discussing them and working to improve them. I would therefore expect to find terms like *beauty* or *aesthetics* in the keywords list. This is not case. The idea that speakers are not primarily concerned with issues of form or aesthetics suggests that they are engaged in creating intellectual territory which differs from that occupied by design practices. The lack of interest in speaking about the design of *specific* 2D or 3D artefacts or *specific* design occupations and levels of seniority amongst designers supports this idea.

4.3.3 On Design Thinking

The term *Design Thinking* occurs 16 times. Figure 27 shows an edited screen shot taken from Sketch Engine of all the concordance lines. To facilitate the discussion, I have assigned a letter to each line (A-P).

A	paper presents three lenses for interpreting	design thinking	: a framework on learning to become professionals
B	framework that speak broadly to aspects of '	design thinking	'. The first lens draws on a framework for
C	lenses contribute to a working synthesis of	design thinking	and learning. The current vogue for design
D	of action. Questions intended to identify	design thinking	traits were developed and tested on a national
E	mapped to five related characteristics of	design thinking	: collaboration, experimentalism, optimism
F	exploration of compelling relationships between	design thinking	traits and other variables. Our analyses
G	and other variables. Our analyses found	design thinking	traits correlated with higher achievement
H	This paper identifies opportunities for	design thinking	to be integrated into digital learning
I	digital humanities, the paper argues that	design thinking	that is situated, interpretive, and user-oriented
J	initiatives. The paper concludes with a call for	design thinking	research to engage with emerging models
K	be constructed. In the last few years, "	Design Thinking	" has gained popularity - it is now seen
L	two key questions: "What is the core of	Design Thinking	?" and "What could it bring to practitioners
M	argued that for the study of real-world	design thinking	this method offers distinct advantages
N	intuitive visuality. This paper compares the	design thinking	approaches of three groups of student-designers
O	regarding design methods in the era of '	design thinking	' wherein designers are required to adopt
P	and expanded in additional processes of	design thinking	. Web-Pad - a computational tool that implements

Figure 27: Concordances for the term *'Design Thinking'*

Discourse communities tend to frame terms which help them to construct their discourse in ways which are either consistently positive or consistently critical (Flowerdew, 2013). The consistency helps communities to create a definitive stance

on their domain (Flowerdew, 2013). This idea prompted me to begin to look for positive and critical associations with *Design Thinking*.

Only two of the concordance lines (lines G and H) provide clear insight on this issue. Design Thinking is framed positively in both lines: *"**design thinking** traits correlated with higher achievement"* (Line G); *"identifies opportunities for **design thinking** to be integrated into digital learning"* (Line H). To gain a better understanding of value judgements I analysed expanded versions of the remaining lines. Sketch Engine facilitates this by showing the expanded text.

Analysis of Expanded Concordance Lines

In 5 further instances, speakers make positive associations with Design Thinking: Design Thinkers evidence 5 positive traits, *"collaboration, experimentalism, optimism, feedback-seeking, and integrative thinking"* (Line E); Design Thinking can help create "new modes of knowledge" in education (Line I); it tackles problems in a range of sectors like *"IT, Business, Education and Medicine"* (Line K); it fosters *"entrepreneurship"* (Line O); it enables knowledge acquisition, *"knowledge can later be accessed and expanded in additional processes of **design thinking**"* (Line P).

In the remaining 9 instances it is not possible to conclude whether speakers frame Design Thinking positively or critically. Most of the incidences discuss research aims or operational issues: *"'what is the core of **Design Thinking**?'"* (Line L); *"Questions intended to identify **design thinking** traits were developed"* (Line D). There are no instances in which speakers discuss Design Thinking in a critical manner. The presence of several open-ended references to research questions however makes it impossible to make claims on whether speakers predominantly frame Design Thinking positively or in a critical way.

The results may signpost other patterns in ways of speaking. When speaking positively, speakers note that Design Thinking helps people to connect both with other people and ideas (*"collaboration"*; *"integrative thinking"; "knowledge can later be accessed and expanded*) and to create something new (*"experimentalism"; "optimism"; "new modes of knowledge"; "entrepreneurship"*). The qualities of 'connecting' and 'creating something new' may therefore be important in helping speakers claim intellectual territory associated with Design Thinking.

4.4 Discussion

4.4.1 Formation of Intellectual Territory (Classification & Forming Boundaries)

The processes of *classification* and *boundary-formation* help academic tribes to claim discrete intellectual territory (Becher and Trowler, 2001).

Classification

Speakers use both keywords and non-keywords to classify Design Thinking. The focus on classification indicates that speakers may be primarily interested in establishing or reinforcing intellectual territory associated with Design Thinking. This comes as no surprise as the Design Studies corpus focusses on Design Thinking.

What is interesting however is the particular way in which speakers approach classification. Both keywords and non-keywords are used to establish broadly applicable *meta-knowledge* on Design Thinking. Speakers identify a *"**framework** that speaks broadly to aspects of 'design thinking'*". Similarly, they discuss the creation of nominal (rather than specific) artefacts: "***designing*** is interpreted as a combination of two searches". Equally, speakers frame traits and activities as being common amongst designers: designers think by *"restructuring **shapes** in terms of emergent **subshapes**".* The practice of creating broadly applicable classifications serves to increase the range of intellectual territory claimed by speakers, making the research community appear more established.

Use of the noun-form of *design*—the most commonly occurring keyword—is particularly useful in helping speakers to construct intellectual territory. Speakers attach a broad range of aspects to this noun: "a '*logic of **design**'", "the **design** process"*, *"the specific **design** domain"*. Billig (2008) reports a strong tendency for researchers across academia to focus on using the noun-form of words. Researchers use this strategy (termed *nominalisation*) when constructing classifications which appear robust.

> "By turning verbs into nouns, speakers/writers can convey that the entities, denoted by nominalization, have a real and necessary existence"
>
> (Billig, 2008, unpaged)

The idea that nominalised descriptions come with a sense of authority helps transform how readers perceive texts. The process of nominalisation enables speakers to frame an idea which is subjective as an objectively valid phenomenon:

> "speakers/writers turn processes into entities and typically assume the existence of such entities."
>
> (Billig, 2008, unpaged)

To illustrate the power of nominals, it is valuable to examine use of the term *market forces* in economics. Economists use it to denote fluctuations in finances without taking into account the actions of individual actors in fiscal systems (Billig, 2008). In this way, market forces have a life of their own, distinct from the actions of people who buy and sell things (ibid). Use of the *term market* forces has enabled economists to claim authoritative knowledge on financial systems without needing to defend the fact that they may not take into account the full range of transactions between people which create monetary systems. Use of the term *market forces* therefore enables economists to write this process into existence. Similarly, the authoritative appearance of nominals may help speakers in the Design Studies data set to write the intellectual territory of their tribe into existence.

Forming Boundaries

The act of creating artefacts or services helps to differentiate design practices from many other disciplines. However, associated terms such as *object, artefact, form or service* do not feature as keywords. Nor do terms such as *beauty* or *aesthetics* which help designers describe object appearance. Speakers do not therefore appear to be primarily concerned with classifying objects or aesthetics. This suggests that speakers are attempting to create intellectual territory which differs from that occupied by design practice. The lack of interest in speaking about the design of *specific* 2D or 3D artefact or *specific* design occupations and levels of seniority amongst designers supports this idea.

The boundary between Design Thinking research and design practices prompts the need to reflect on discourse commonly used in design research. The idea that the process of creating artefacts and services is integral to design practices has influence the concept of *practice-led* design research. A large body of design literature claims that design research is (or at least should be) *practice-led* (Frayling, 1993; Zimmerman, et al., 2007; Niederrer, 2013; Rust et al., 2007). Summarising the argument for practice-led research, Rust et al. (2007, p. 10) claim that many design academics "naturally [perceive] methods of practice as

methods of inquiry". The intellectual boundary evident in the Design Studies corpus suggests that speakers may frame themselves differently to practice-led researchers. The intellectual boundary provides more evidence for the presence of the tribe of Design Thinking researchers—helping to support my research aims.

4.4.2 How Speakers Frame Design Thinking

Speakers claim that Design Thinking helps people to connect—both with other people and ideas (*"collaboration"*; *"knowledge can later be accessed and expanded*), and to create something new (*"experimentalism"; "new modes of knowledge"*). The qualities of 'connecting' and 'creating something new' may therefore be important in helping speakers to claim intellectual territory. This may indicate a sense of idealism amongst speakers. In a broader sense, Miller (2010) notes the presence of idealism in design research. Miller (2010, p. 5) argues that "Design is trying to prove itself, rather than disprove itself." My findings appear to support Miller's.

4.4.3 How Speakers Frame People

Speakers use keywords (*designers; designer's; thinkers*) to construct designers as a group of people. To illustrate, speakers *analyse "the **designer's** authentic line of reasoning"* and *"the qualitative traits of design **thinkers**"*. Speakers therefore frame designers as a community who practice Design Thinking. For speakers, these designers do not have a particular profession, or a gender. Because of this, designers in this corpus are abstracted, generalised figures. The construction of this generalised community appears important in enabling speakers to form broadly applicable classifications on Design Thinking. This leads me to ask: is there such a thing as a generalised designer? If the answer is 'no' then the idea of a generally applicable Design Thinking seems highly questionable. Studies 2 and 3 cast further light on how speakers frame designers.

4.4.4 The Collection Code

Becher and Trowler (2001) use the term *collection code* to refer to the way in which academics build knowledge in their subject area. When a discipline has a strong collection, "knowledge is seen as cumulative" (Becher and Trowler, 2001, p. 37) as researchers incrementally build on the work of others in their community. The results show

there to be high levels of cohesion amongst speakers with respect to how they form intellectual territory, frame people and discuss Design Thinking. This signals a high level of agreement amongst speakers on key issues. The results do not however allow real insight into the collection code. Insight comes from analysing how speakers frame existing knowledge—this involves investigating how speakers refer to existing research which they cite in their papers. This level of insight is found in Study 3.

4.5 Conclusions

This study has identified consistent patterns in ways of speaking. Knowledge production in the Design Studies corpus is focussed on the use of classification and boundary-formation to create intellectual territory associated with Design Thinking. Constructing a generalised, abstracted body of designers appears to help speakers to create a generally applicable, idealistic concept of Design Thinking.

The lack of critique of Design Thinking highlights potential issues with the data source, the journal *Design Studies*. Its longstanding connection with the Design Research Society makes the journal a reputable, robust source of knowledge on design research. My findings question whether the generalised constructions of designers and Design Thinking seen in the corpus are concomitant with the reputation for robustness held by the journal. Further discussion on ways of speaking specific to Design Studies is beyond the remit of this thesis. The importance of the journal to the Design Tribe means that the subject would however make for a valuable topic of study.

It is not possible to claim that the ways of speaking identified in this study are applicable beyond this investigation. Three factors influence this:

Abstracts

Abstracts contain a limited word count. Their condensed narrative may help to explain the presence of generalised claims to intellectual territory. Analysis of full papers in Study 3 helped me to overcome limitations associated with investigating abstracts.

The Nature of Corpus Linguistics

The focus on terms makes corpus linguistics a characteristically reductive method (Widdowson, 1995). This may have led me to miss nuances in ways of speaking. Use of content analysis in Study 3 allowed me to overcome these limitations.

The Sample

The corpus is taken from one source. This prevents me from claiming that my findings are generalisable across the Design Tribe. Study 2 helps to overcome these issues. In Study 2 I have conducted a corpus linguistics study of a corpus which combines the abstracts from every paper which contains an abstract in the Design Thinking data set.

Chapter 5

Study 2

5.1 An Overview of Study 2

Building on Study 1, Study 2 uses corpus linguistics methods to analyse all the abstracts from every paper in the Design Thinking data set which includes an abstract.[36] 38 of the 45 papers in the Design Thinking data set include an abstract. Altogether, these 38 papers are published in 14 of the total number of 16 design journals. I term the resultant research corpus, *The Wider Corpus*[37]. The Wider Corpus contains 5800 words[38], making it larger than the research corpus used to facilitate Study 1. Its increased size and scope means that it provides further insights into ways of speaking which are present in the Design Thinking data set. In Study 2 I used the same reference corpus (the British National Corpus Written Academic sub-corpus) that I used in Study 1. Paralleling Study 1, Study 2 makes focuses on concordance analysis of keywords.

5.2 Results[39]

5.2.1 Keyword Analysis

Figure 28 shows an edited version of the keyword list associated with the Wider Corpus[40].

[36] 7 of the total number of 45 papers do not contain abstracts. These papers are published in the journal *Design Issues* and the *Middle East Technical University Journal of the Faculty of Architecture*.

[37] To create the Wider Corpus, I followed the same steps that I used to create the research corpus in Study 1. The longest abstract in The Wider Corpus contains 249 words, the shortest 72 words.

[38] By way of comparison, the Design Studies Corpus contains 1557 words.

[39] Many of the findings of Study 2 are published in Ghassan (In Press). Appendix 11 – 'Peer Reviewed & In Press Paper 2' contains this article.

[40] Figure 28 shows only terms with a keyword score which is associated with a 95th percentile certainty of significance. This corresponds to a keyword score of 3.84 or higher. (I have used the same editing that I used in Study 1). The Wider corpus has yielded many more keywords than The Design Studies Corpus. This may be because it is a larger data set. To display the list effectively I have divided it into 2 columns. A Note on Representativeness: the keyword list contains terms which provide insight into academic subject areas which feature strongly in the text. Terms include: *students; educators; architectural; digital; media; interaction; innovation; organizations*. The terms indicate that speakers focus on education, architecture, digital media and business. The range of areas suggests that the corpus is not overly-narrow in focus. Results may therefore be broadly representative of Design Tribe research on Design Thinking.

word	frequency	Score
DT	13	2022.1
students'	5	778.4
designer's	5	778.4
designers	25	548.0
Thinking	9	350.9
design	211	266.6
constructivist	5	239.0
designing	10	214.2
Design	14	198.2
explores	6	169.3
thinkers	8	151.4
pedagogy	6	145.5
thinking	86	139.8
digital	8	124.8
educators	6	118.4
architectural	5	101.6
solving	9	98.6
innovation	11	83.8
innovative	5	77.2
architecture	5	52.1
situated	5	51.3
paper	32	41.0
styles	5	33.3
students	34	33.1
explore	5	28.5
reasoning	6	28.4
learning	31	28.0
conceptual	6	25.6
representations	6	24.7
framework	10	20.7
classroom	6	18.0
offers	5	17.8
article	9	16.5
organizations	5	16.5
interaction	7	16.0
argues	6	14.9
concepts	7	14.8
media	8	14.6
domain	5	14.4
project	8	13.8
author	5	13.1
understanding	14	13.1
perspective	6	12.9
strategies	5	12.3
practices	8	11.6

word	frequency	Score
process	29	11.3
skills	9	11.3
criteria	6	10.4
employed	5	9.9
contemporary	5	9.9
search	6	9.7
theoretical	5	9.4
ideas	9	8.2
ways	12	8.1
student	5	8.1
literature	5	8.1
processes	7	8.0
development	21	7.9
research	15	7.8
traditional	7	7.7
style	5	7.6
thought	12	7.4
environment	5	7.3
practical	5	7.2
study	22	7.1
art	5	7.0
science	6	6.9
identified	6	6.7
key	5	6.3
presented	5	6.2
concept	6	6.1
how	22	6.1
knowledge	12	6.0
related	7	5.6
writing	5	5.5
practice	11	5.2
education	12	5.0
current	5	4.9
term	7	4.9
teaching	5	4.8
We	14	4.6
problem	11	4.6
questions	6	4.6
activities	5	4.6
results	7	4.1
using	8	4.1
better	5	4.1
role	8	4.1
through	15	4.0

Figure 28: an edited Keyword List for The Wider Corpus

Classifying Design Thinking

Speakers use the keywords *reasoning*, *framework*, *criteria, process*, *processes* and *practices* to classify aspects of Design Thinking. When classifying, speakers create meta-knowledge—descriptions which are broadly applicable: speakers *"recognize multifaceted **criteria** in the design **process**"*, understand *"design thinking as a **process** comprised of both linear and non-linear aspects"*. Speakers also discuss models of Design Thinking as being broadly applicable amongst designers, noting a *"contingent set of **practices** carried out by professional designers"*. Making reference to broadly applicable design practices helps speakers to frame models of Design Thinking as generally applicable amongst designers.

Speaking on Designers and Students

The terms *designers, designer's*, *thinkers, students' and students* are found towards the top of the keyword list, indicating their importance in the Wider corpus. There is a difference between the way speakers discuss *designers* and way they refer to *students*.

Referring to Designers

The keywords *designers, designer's* and *thinkers* are used to refer to designers. Speakers highlight similarities between designers—they focus on discussing similarities between the ways designers think. Speakers investigate *"the qualitative traits of design **thinkers**"*, note *"the situated, embodied routines of **designers"*** and identify *"The first layer [of Design Thinking] highlights key ways that **designers** think"*. Speakers focus far less on issues which may differentiate some designers from other designers. (I use the term 'local issues' to refer to issues which differentiate designers from one another). A small number of speakers note particular professions when discussing designers: *"**graphic designers** are increasingly asked to design innovative solutions";* "how contemporary ***architects*** express themselves". Speakers do not discuss other local issues, for example the gender of designers or their level of seniority. In keeping with the pattern for not focusing on differentiation, speakers tend not to refer to individuals. The keyword *designer's* (this is the way the term is spelled in the corpus) is used to discuss a group of people: a speaker *"analyse[s] **designer's** thinking behaviours"*, another discusses *"the shift in a **designer's** visual representation of their process"*. Similarly, the non-keyword *designer* is used to discuss to a group of people: *"de-centers the **designer** as the main agent in designing"*.

Speakers therefore appear to construct a general community of designers—one which is framed around a shared ability to practice Design Thinking. Speakers seem less interested in discussing local issues which differentiate designers and influence how different designers may experience their own day-to-day working lives. My findings resonate with claims made by one speaker in the corpus. The speaker argues that Design Thinking theory *"ignores the diversity of designers' practices"*. My content analysis provides more insight into how the corpus frames diversity amongst designers.

Referring to Students

Speakers use the keywords *students*, *students'* and *thinkers* to refer to students. Speakers commonly note specific programmes of study, or levels of study: *"PhD students"*, *"interior design and architecture students"*, *"visual art students"".* In this respect, speakers place more emphasis on local issues when discussing learners than they do when discussing designers. Speakers also focus on the idea that Design Thinking links students, referring to *"multiplistic **thinkers**"* and *"**thinkers** needed in the 21st century"*. The classifications which link students with Design Thinking take priority over those which are associated with specific programmes of study or levels of study. To illustrate, a speaker asks *"educators to prepare students to view themselves as design **thinkers**: problem-solvers first, image-makers second".*

The focus on classifying both designers and students with respect to Design Thinking is not surprising as the Design Thinking data set focusses on Design Thinking. The lack of reference to local issues is surprising as they affect the day-to-day lived experiences of designers and students. In a data set which researches Design Thinking, I would expect to see speakers investigate a range of local issues which may affect how designers and students think.

I have noted that speakers frame Design Thinking as a generally applicable process amongst designers. The classifications of designers and students also involves creation of meta-knowledge: designers and students are constructed as a general body of people who practice Design Thinking. The two ways of speaking appear to be symbiotic, each helping to establish the validity of the other and to sustain the system as a whole. The interdependent system of speaking echoes that seen in Study 1.

Speaking on 'Design' and 'Designing'

With 225 occurrences, *design* is the most commonly used keyword. The dispersion plot (see Figure 29) shows that the term is quite evenly spread across the corpus, indicating that the term is important in creating ways of speaking throughout the corpus[41].

[41] To recall, in Figure 29 the x-axis represents the whole corpus (all 5800 words). Therefore, to illustrate, the 50% mark equates to 2900 words through the data set. The y-axis indicates the number of times the term of under investigation (in this case *design*) appears at a given point in the corpus.

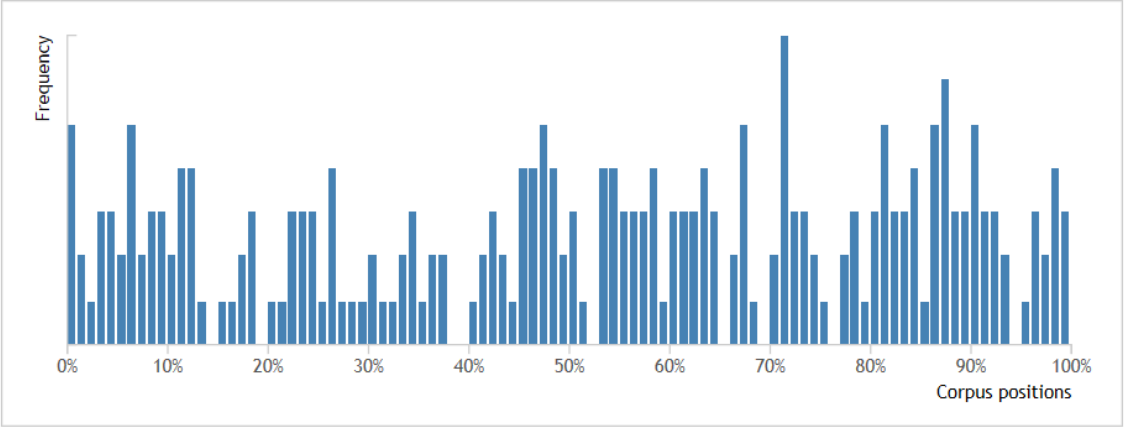


Figure 29: Dispersion plot for the term 'design' in The Wider Corpus

Design-as-Verb

Design is used once as verb. It is used to refer to the act of creating nominal items: *"graphic designers are increasingly asked to **design** innovative solutions"*. This pattern is also seen when speakers use other forms of the verb *to design*. The highly ranked keyword *designing* (present tense) consistently refers to a nominal item: "*a model of **designing"***; *"the different forms of thinking which can be observed in **designing**"*. The same applies to the use of the non-keyword *designed* (past tense). A speaker *"recognizes the materiality of **designed** things"*.

A more complete analysis involves investigating use of words which may be included in place of verb forms of *design*. The verb *to create* is one such term. It has various present and past forms: *create*; *creates*; *creating*; *created*. One of these terms (*creates*) is present, occurring once. The speaker does not use it to refer to the act of designing an object, rather in discussing the *"value [Design Thinking] **creates**"*.

The pattern for referring to the creation of artefacts helps speakers to produce generally applicable knowledge on designing. Speakers therefore create meta-knowledge when discussing *designing*. This tendency to create generally applicable knowledge mirrors the pattern for classifying Design Thinking as a generally applicable process which is practiced by a general body of designers. Ways of speaking associated with *designing* therefore indicate another aspect of a symbiotic system where the construction of given generally applicable classifications relies on the construction of other broadly applicable classifications.

Design-as-Noun

The pattern is for speakers to use *design* as a noun. Speakers use the term to signal a range of aspects as belonging to *design*. It is possible to subdivide the issue of belonging into 3 sub-categories: *conceptual and intellectual* ideas; *practice-related* aspects; *people*. Conceptual and intellectual ideas include *"the **design** process"*, *"**design** ideas"* and *"conceptions of **design**"*. Practice-related aspects include *"**design** disciplines", "**design** professions", "**design** tools"*. People with design-oriented affiliations include *"**design** teams"*, *"**design** experts" and "**design** professors"*.

The practice of claiming aspects which are particular to 'design' may allow speakers to establish or reinforce intellectual territory associated with their domain. The process of sub-classifying key principles and practices helps academic tribes strengthen their claim to intellectual territory, making the field appear more established (Becher and Trowler, 2001). Creating 3 distinct sub-categories may help speakers to strengthen and broaden their claim of ownership of intellectual territory associated with Design Thinking.

Design is Like Another Practice

The corpus contains instances in which speakers associate *design* with other fields. A speaker claims there is a link between design and art education, arguing both can produce the *"innovative, balanced, synthetic creators and thinkers needed in the 21st century."* Another associates *design* with the philosophical theory termed 'pragmatism' noting *"how central concepts in design thinking resonate with the pragmatist philosophy of John Dewey"*. Academic areas with secure intellectual boundaries appear more established than those who do not claim to share intellectual territory with other fields (Becher and Trowler, 2001). In contrast, academic communities which identify with other fields tend to have relatively weak claims to intellectual territory. This is because the intellectual territory is not specifically theirs to defend (ibid). Content analysis of full papers provides further insight into whether the Design Tribe have a sustainable claim to intellectual territory they argue to be theirs.

Speaking on Solving Problems

The terms *problem* and *solving* are keywords[42]. The pattern is for them to occur together, forming the phrase *problem solving*. Speakers frame enquiry into Design Thinking in terms of 'problems' and 'solutions': a speaker investigates how students "design (***problem solving***) methodologies"; another places "special focus […]on the structure and procedure of ***problem solving****"*. Speakers also use the non-keyword *problems* to discuss problem-solving:

> *"Secondary and tertiary students were given a common architectural brief and students' outcomes were compared and contrasted to seek commonalities or differences in their approaches to* ***solving*** *design* ***problems****".*

Discussion of problem-solving helps speaker to classify both Design Thinking and designers. Speakers note "design's unique approach to ***solving problems"***, claim that Design Thinking is "an effective way to creatively *solve* ***problems"*** and argue that people with Design Thinking traits want to engage in ***"solving*** *societal* ***problems****"*. Speakers frame design problems as difficult or complex: *"wicked* ***problems"****; "mostly ill-structured"*; *"induced by continuing population growth"*.

Discussion on problem-solving therefore appears key to constructing intellectual territory on both Design Thinking and designers. The focus on problem-solving amongst speakers is to be expected as Design Tribe literature focusses on the value that Design Thinking can bring to a range of difficult problems (e.g., Cross, 2011; Dorst, 2011). Interestingly, speakers tend to classify problems very loosely, referring to *"societal problems"* or *"wicked problems"* rather than referring to specific problems in particular contexts. The pattern for classifying problems in a generalisable manner resonates with my earlier findings on generalised Design Thinking and generalised designers. Each individual generalised aspect appears to feed the creation of a holistic way of speaking on Design Thinking. Metaphorically speaking, generalised classifications help speakers to claim larger expanses of intellectual territory than do more focused classifications. This strategy enables speakers to construct a sense that the domain of Design Thinking is an established area of research. Generalised classifications are also more difficult for researchers to unpick than classifications with a defined focus. This also potentially increases speakers' claims to legitimacy over their domain.

Ringfencing Intellectual Territory

[42] The terms *problem* and *solving* were not keywords in Study 1. For this reason, I did not focus on ways of speaking associated with 'problem solving' in Study 1.

When making value judgments on the role of Design Thinking, speakers use the terms *problems* and *solutions* (or the associated terms *problem*, *solution* and *solving*) to indicate that design solves problems: Design Thinking leads to "creative ***solutions"***; design practice *"opens up new ideas leading to a new design **solution**"*. Speakers never claim that Design Thinking cannot solve problems, nor do they ever argue that design may create problems. The intellectual boundary associated with problem-solving seems to reject the presence of narratives that may compete with the idea that Design Thinking solves problems. This indicates that speakers frame Design Thinking in an idealistic way.

Examining how speakers discuss both traits possessed by designers and designed objects further highlights the importance of problem-solving in enabling speakers to ringfence intellectual territory. Speakers frame attributes, traits or skills which they claim designers possess as factors which enable designers to solve problems, noting "*the paramount role of visual reasoning in many instances of **problem solving"*** The following illustrates how speakers translate both the skills of a designer and the media s/he uses into the language of the research domain—that of 'problem-solving':

> *"the design thinking process designers have in applying digital media and traditional paper in the early concept development stage was explored. Special focus was made on the structure and procedure of **problem solving**."*

The focus on problem-solving contrasts with a lack of discussion on the merits of designed objects or services. The absence of the terms *object, artefact, form* and *service* from the keyword list helps to illustrate the lack of interest. Indeed, few speakers focus on objects—one discusses "the completeness of ***detail design"***, another *"recognizes the materiality of designed **things**"*. The lack of interest in aesthetics underscores the lack of discussion on artefacts. Terms often used to describe aesthetics (including *beauty*, *beautiful*, *pleasing* and *organic*) are absent. Only one speaker mentions *aesthetics*, *"explores design thinking as an **aesthetic** , inquiry based process".* The incidence does not refer to object aesthetics—rather the speaker classifies Design Thinking.

Design practice often results in the creation of particular objects or services. Because of this, designers tend to focus on discussing the merits of artefacts. The lack of focus on objects and services seen in the Wider corpus suggests speakers frame their intellectual territory as differing from that occupied by design practices. This is not surprising as speakers are engaged in *researching* the ways designers think rather

than *practicing* design. Interestingly however, the idea that speakers frame their intellectual territory as discrete raises the possibility that, for speakers, territory associated with design practice may exist outside of that occupied by Design Thinking. The tendency for speakers to discuss designers and problems in generally applicable terms (rather than specific terms) supports this idea. Ways of speaking therefore seem to suggest that, for speakers, Design Thinking is removed from design practice.

5.2.2 Speaking on Design Thinking

The term *Design Thinking* occurs 83 times[43]. To begin with, I looked for overarching patterns, focussing on whether speakers consistently make positive or critical associations with Design Thinking. The corpus contains 18 instances in which speakers explicitly make positive associations. When speaking positively, speakers claim that Design Thinking can help people to actively create something new. The emphasis is on inspiring positivity: *"gets teachers empowered"; "a powerful way to engage the world*" *"creatively solve problems";* "*long-term innovation capability"; "the value of* ***Design Thinking*** *to decision making at the highest levels"*[44]. Examining how speakers discuss existing research on Design Thinking helps provides an additional lens on the issue of positive associations. Speakers argue that existing research has misinterpreted Design Thinking:

> *"The fullness of* ***design thinking*** *gets channelled into a series of steps, rules of thumb or professional categories, thereby diluting its potency"*.

This suggest that speakers may contrast 'positivity' which results from application of Design Thinking with 'inhibition' or 'dilution' which comes from what speakers argue to be prescribed ways of thinking. Use of metaphorical contrasts may help speakers to create emotionally persuasive narratives which in turn enable them to claim intellectual territory. Content analysis of full papers provides further insight into contrasting ways of speaking on Design Thinking.

Critical Associations

[43] I addition, the keyword *DT* is used as an abbreviation for 'Design Thinking' 13 times. The number of occurrences underscore the high level of focus on this issue in the corpus.

[44] In support of the idea of inspiring positivity, a speaker claims that people with Design Thinking traits are open to opportunities as they evidence *"experimentalism", "optimism"* and *"entrepreneurship"* skills.

There are very few instances (4 out of 83 incidences) in which speakers present criticism of Design Thinking. All the criticisms are attributed to one speaker (across 2 abstracts). The speaker claims, *"there are several issues that undermine the claims made for **design thinking."*** Specifically, the speaker argues that Design Thinking theory *"ignores the diversity of designers' practices"*. The low number of criticisms means that they are not representative of value judgments present in the corpus. The corpus is not therefore markedly concerned with disseminating criticism of Design Thinking. The low number of criticisms further highlights the focus on idealism in the corpus.

Other Associations

Most of the concordances (74 incidences) do not allow definitive insight into whether speakers frame Design Thinking positively or critically. In many of these, speakers discuss research aims. Consistently, speakers aim to classify and sub-classify Design Thinking, by attempting to understand: *"multimodal ways of **design thinking***", *"attributes of **design thinking**"* or "***design thinking** through two layers"*. The focus on classification further highlights the interest amongst speakers in claiming intellectual territory on their domain.

Difficulty in Establishing Interpretation

In some instances, I found text very difficult to interpret. In extreme cases I could not gain definitive insight into value judgements. The excerpt below illustrates an example of text which I could not interpret:

> *"Designers can have an effective thinking process regarding the micro and macro aspects of a design project because of the function of software, enhancing the completeness of the **design thinking** while in traditional pen and paper environment, designers use the synthetic and contrast way to manipulate their idea development"*

The psychologist Steven Pinker (2014) claims that many academics produce poorly written text,

> "prose that is turgid, soggy, wooden, bloated, clumsy, obscure, unpleasant to read, and impossible to understand"
>
> (Pinker, 2014, unpaged).

Pinker claims that often, researchers write in this way as they believe it makes them appear to be serious scholars. Therefore, use of convoluted language helps research trbies claim legitimacy (ibid). Pinker terms this form of language, *academese*. Use of academese

obscures arguments, making them less easy for readers to unpick. The excerpt of text from the Wider corpus included above is an example of academese. The presence of academese was one of the factors which made content analysis of full papers challenging and time-consuming.

5.3 Discussion

5.3.1 Formation of Intellectual Territory (Classification & Forming Boundaries)

Classification

Use of a range of keywords (*reasoning*; *framework*; *criteria; process*; *processes; design; problem; solving*) helps speakers to classify Design Thinking. The emphasis on classification is to be expected as the corpus focusses on Design Thinking. Interesting observations come through reflecting on the way in which speakers classify.

When classifying and sub-classifying, speakers create meta-knowledge—generally applicable classifications—on Design Thinking, design, designers, problems and solutions. Speakers note a *"contingent set of **practices** carried out by professional **designers**"*, claim Design Thinking can tackle *"societal **problems**"* and *"opens up new ideas leading to a new design **solution**"*. Broadly applicable classifications help speakers to increase the span of intellectual territory they can claim, making the tribe appear more established. Speakers use *design* in its noun form to create 3 distinct sub-classifications: conceptual and intellectual ideas (*"the **design** process"*); practice-related aspects (*"**design** tools"*); people (*"**design** experts"*). Sub-classification makes the domain appear more established and legitimate. Both classifications and sub-classifications are framed in *nominal* terms, helping speakers to frame an idea which may be subjective as an objectively valid phenomenon (Billig, 2008). The concepts *the design process* or *design tools* are subjective. Examining practice workflows in my own my own field, *Automotive & Transport Design*[45] illustrates this. Typically, in a vehicle design studio owned by a large manufacturer like Jaguar Land Rover, the complete design process is carried out by many individuals with different specialist skills sets who each work on different aspects of the overall design of a vehicle.

[45] I teach Automotive & Transport Design at both postgraduate and undergraduate levels at Coventry University.

The initial design phase is carried out by specialists who use sketching to undertake a 2D design process. Other specialists then use CAD tools as a high level to create 3D versions of the 2D designs. Therefore, there exists a range of design processes—the characterisation of each is dependent on where the specialist fits in within the overall workflow cycle and which tools he or she uses. Speakers ignore this subjectivity when forming their intellectual territory. The received objectivity associated with nominalisation helps the claims to intellectual territory appear to be more secure than they actually are.

The keywords which I have analysed in this study emerge from comparing the Wider Corpus with a reference corpus comprised of texts from a range of academic disciplines. The practice of nominalisation and the tendency to create meta-knowledge are commonly observed across academic disciplines (Billig, 2008; Kalfoglou et al. 2000). The presence of a host of keywords which help speakers in the Wider Corpus to claim meta-knowledge suggests that speakers may be *particularly* focussed on creating broadly applicable descriptions. This indicates a noticeable focus amongst speakers for attempting to associate their domain with a sense of being established.

Forming Boundaries

Discussing *Design Thinking*, *design*, *designers*, *problems* and *solutions* in broadly applicable terms helps speakers to frame the intellectual space associated with Design Thinking as being different from that occupied by design practices. This is because designers do not create broadly applicable artefacts or services. Designers working in specific professions create specific artefacts or services in response to specific briefs from specific clients. Differentiating Design Thinking from design practices may represent an attempt to elevate the research domain—raising the perceived level of importance of the subject matter and the status of those who research it.

The presence of intellectual aloofness does not make for an optimal breeding ground for creating balanced ways of speaking. Miller (2010) has argued that the push to apply Design Thinking to societal problems has influenced design researchers to try and validate their field: “Design is trying to prove itself, rather than disprove itself” (Miller, 2010, p.5). Miller claims that the lack of criticism is potentially harmful given efforts to

use Design Thinking in creating more effective public policy. My findings confirm Miller's—speakers appear to be trying to prove the value of Design Thinking; they are not attempting to question its value.

5.3.2 How Speakers Frame Design Thinking

Use of contrasting ways of speaking helps speakers frame Design Thinking through a positive lens. Speakers contrast 'positivity' with 'inhibition' or 'dilution'. Design Thinking inspires a positive outlook for it, *"gets teachers empowered"*. In contrast, existing research which misinterprets Design Thinking dilutes the potency of the practice: *"The fullness of design thinking gets channelled into a series of steps, rules of thumb or professional categories, thereby diluting its potency"*. The corpus does contain limited examples of criticism of Design Thinking research: *"there are several issues that undermine the claims made for design thinking."*, but these very much represent a minority voice amongst speakers. The presence of contrasting ways of speaking underscores the idea that the corpus is skewed towards viewing Design Thinking through a positive lens. The content analysis stage allows me to gain further insights into the place that contrasting discourses play in helping speakers to make persuasive arguments.

5.3.3 How Speakers Frame People

Speakers classifying *designers* and *students* as a general group of people who practice Design Thinking. Therefore, the way that speakers construct Design Thinking comes at the expense of ignoring important aspects of designers' lived experiences (e.g., designers' area of work, level of seniority and gender). The concept of generalised designers contributes to a way of speaking which relies on other generalised concepts to sustain it. In the corpus, generalised designers use generalised Design Thinking to create generalised solutions to generalised problems. The generalised concepts of *designers, students*, *Design Thinking*, *problems* and *solutions* all rely on one another to appear legitimate. Their interrelation makes this a symbiotic system of speaking. The system is difficult to critique as each is a nominal concept—and so each comes with a received air of objectivity. The combination of nominals may create a whole picture which is more powerful than the sum of its parts.

The discourse analysts Halliday and Martin (2004) provide insight into why the use of combinations of nominals creates such a sense of authority. Halliday and Martin claim

that readers understand language in terms of how clauses (i.e., shorts snippets of meaning involving a subject and an action) mesh together. A nominal can act as a single clause. For readers, combinations of clauses work together to create an overarching sense of authority:

> "what might be construed as a combination of independent clauses in the spoken mode is reconstructed as edifices of words and phrases in writing. […] This has tremendous implications on the texture of the discourse unfolding […] For one thing, it is less negotiable, since you can argue with a clause but you can't argue with a nominal group".
>
> (Halliday and Martin, 2004, p.43)

The combination of nominals used by speakers in the Wider Corpus may help to explain why ways of speaking on Design Thinking are difficult to critique. This may help to explain the relative lack of criticism in existing literature.

5.3.4 The Collection Code

In disciplines with a strong collection code, researchers frame knowledge as built cumulatively from within the community. The results show there to be high level of cohesion amongst speakers with respect to how they form intellectual territory and frame key concepts (*Design Thinking; design; designers; problems; solutions*).

5.4 Conclusions

The corpus is characterised by speakers' attempts at creating meta-knowledge on key issues. Nominalised, generally applicable classifications of *Design Thinking, design, designers, students, problems* and *solutions* signal attempts to broaden intellectual territory associated with the domain. The move towards broadening territory indicates that speakers are keen on expanding their territory—and possibly the influence of the domain. In my Literature Review chapter, I noted that Design Thinking is commonly framed as tool which professionals in a range of professions can master in order to tackle a wide range of problems:

> "[Design Thinking can enable individuals from] "engineering, medicine, business, the humanities, and education [to collaborate to] solve big problems in a human centered way".
>
> (Meinel and Leifer, 2011, p. xiii)

The pattern for attempting to broaden intellectual territory seen in the Wider corpus tallies with the ambition for establishing an influence across disciplines.

The ways of speaking used to claim territory raise concerns. Nominalised ways of speaking present subjective concepts as being objectively true, masking the need to critique them. The individual nominalised classifications in the corpus appear to combine to produce a whole whose influence is greater than the sum of its parts. What might be termed *the system of speaking on Design Thinking* may rely heavily on nominalised discourse to sustain it. In critiquing the validity of these nominal ways of speaking it is important to ask whether there is such a thing as an abstracted, generalised—and therefore nominalised—designer, problem or solution? Designers working in specific professions create specific responses to specific briefs from specific clients. Speakers frame Design Thinking both as being intellectually detached from aspects of design practice and in an idealistic manner. The idealistic nature of the corpus casts doubts on the validity of the nominalised classifications and thereby the claims to intellectual territory.

The findings of this study led me to create initial categories which I used to begin the content analysis process in Study 3. I discuss these initial categories in Section 5.5 below.

5.4.1 Limitations

As corpus linguistics focusses on the use of particular terms it may not provide insights into broader contexts which are present in texts (Widdowson, 1995). I have reduced the potential impact of this limitation by conducting concordance analysis of a range of keywords. Analysis of the use of non-keywords has provided additional breath. Content analysis of all the full texts in the Design Thinking data set (Study 3) allows me to overcome these limitations and present definitive findings

5.5 Initial Categories

I noted in my Methodology chapter that Study 2 led to the creation of categories that would help initiate the content analysis process (Study 3). Figure 30 shows these initial categories in relation to the findings of Study 2. I have listed the initial categories in accordance to their association with the sub-themes of the research question.

Formation of Intellection Territory (Classification & Forming Boundaries)

Finding: Speakers focus on categorising Design Thinking.

⇩

Category 1: Speaker classifies Design Thinking steps or processes.
Category 2: Speaker does not classify Design Thinking steps or processes.
Category 3: Speaker claims that Design Thinking is not classifiable.

How Speakers Frame Design Thinking

Finding: Speakers frame Design Thinking as a problem-solving process.
Speakers tend not to critique the value of Design Thinking in solving problems.

⇩

Category 4: Speaker discusses the benefits of Design Thinking.
Category 5: Speaker questions the benefits of Design Thinking.

How Speakers Frame People

Finding: Speakers refer to designers in general terms.
There are very few incidences where speakers classify designers either as individuals, with respect to their profession, gender or level of seniority.

⇩

Category 6: Speaker discusses designers either with respect to their profession, gender or level of seniority.
Category 7: Speaker does not classify designers with respect to their profession, gender or level of seniority.

Figure 30: Initial Categories which emerged from the findings of Study 2

Chapter 6

Study 3

Study 3 consisted of a content analysis of all 45 papers in the Design Thinking data set[46].

6.1 The Coding Process

The process began with a round of open-coding, followed by further iterations which enabled me to refine categories. Coding took place between January 12th 2017 and February 25th 2017.

6.1.1 Open Coding

Open-coding raised the need to differentiate between the speaker's voice and those of researchers who he or she is citing.

Differentiating Between the Speaker's Voice and Those of Researchers Who He or She is Citing

All the papers contain references in the body of the text. The papers therefore each contain a range of different voices: the voice of the speaker and those of the many researchers who he or she cites. Differentiating between the voice of the speaker and those of the researchers the speaker cites helped me to understand both how speakers frame Design Thinking and how speakers frame existing knowledge in the domain.

Academic research is built on existing contributions. Therefore, when a speaker refers to an issue, he or she speaks from a position which is informed by other researchers. The idea of extracting the researcher's voice is therefore to some extent an artificial construct. In addition, any attempt at differentiating between voices will be subjective. Both issues present challenges. Engaging in constant comparison between texts enabled a systematic means of differentiating voices throughout the data set, thereby diminishing the effect of the limitation. Systematic analysis involved identifying signposts in the text. Speakers often include the term *"[another researcher] argues"* or words to that effect to explicitly signpost reference to existing literature. (This includes instances in which speakers cite other examples of their own published research). The following excerpt from Paper 52 illustrates this method of signposting:

[46] Appendix 8 – 'The Analysed Data Set' contains the coded versions of the 45 papers in the Design Thinking data set. Appendix 2 – 'Content Analysis Categories' contains the categories which emerged from the Content Analysis.

> *"**Shaffer (2003) suggests** that the 'surface features' of a physical space, which can include 'time, space, resources, and materials' (p. 4), partially form the overall pedagogical experience, and that these features can affect the kinds of activities that the studio can support."*
>
> (Paper 52)

In some instances, speakers use less direct language to refer to existing discussion, but the signpost is still clear:

> *"The current use of the term design thinking within interior and architectural design education suggests a literature synopsis is necessary."*
>
> (Paper 82)

Less Straightforward Instances

Speakers sometimes position their own reflections alongside text in which the speaker refers to existing research. To illustrate, in the excerpt below, the speaker includes existing research in the first portion of text. In the second portion (the sentence beginning with the word *Unfortunately*) the speaker reflects on existing research.

> *"*[…] *Rowe (1987) and Cross (2001a, 2001b), among others, describe design thinking as designers' emphasis on seeking solutions, rather than designers seeking rules to identify solutions. (In contrast, an analytical problem-solving approach focuses on identifying rules that a solution must follow.) The ways that designers think—their logic, perception of problem parameters, and methods for breaking down complexity—are distinctive. **Unfortunately**, the term design thinking is often loosely used to explain design without clarity of meaning or reference to its foundational literature. As a result, the process of design thinking is poorly understood or misrepresented."*
>
> (Paper 17)

To begin with I missed many instances in which speakers differentiate voice in this manner. More experience with coding made it necessary to revisit previously coded text and adjust the categories if necessary. Instances such as these highlight issues with using fixed meaning units and help to justify my decision to use a flexible meaning unit.

In some cases, the process of differentiating voice proved very challenging. In these instances, the speakers did not include a citation. In some instances, speakers revisited existing literature that they had presented much earlier in the paper. The following example comes from Paper 98. Here, the speaker discusses Deleuze and Guattari's concept of *Rhizomes*. The speaker does so sometime after initially outlining the concept and does not include a citation:

> *"Although many aspects of our world work rhizomatically, we have an uncanny ability to make complex processes into linear causal strings. Like the intricate web of relations that link crime, community, punishment, education, economy, culture and individual, one of the key ideas that emerges from a rhizomatic perspective is the very instability of ideas and territories, which suggests progressive experimentation is always necessary in moving beyond what we already know."*
>
> (Paper 98)

Coding these instances correctly requires knowledge of the context of the paper. In some instances, I needed to read portions of papers several times before making contextual connections. This added to the challenge of coding.

Recalling Studies 1 & 2

I did not differentiate between voices in Studies 1 & 2. Corpus Linguistics is useful in analysing short portions of text (it was useful in analysing abstracts in Studies 1 & 2) but provides limited insights into wider context texts. This limitation underscores the importance of augmenting the Corpus Linguistics research with Content Analysis.

The resulting initial categories that emerged from Study 2 were very basic, but they did provide me with a starting point to tackle the daunting task of analysis of all 45 full papers in the Design Thinking data set. The starting point they provided was akin to 'not beginning with a clean sheet of paper'. None of the initial categories remained unaltered throughout the open-coding process. I made minor changes to some and more significant changes to others.

'Design' and 'Design Thinking'

In Studies 1 & 2, I analysed how speakers frame the term 'Design Thinking'. Because of this, the coding protocol for many of my initial categories specifically refer to how speakers frame 'Design Thinking'. However, as I noted in Study 2, researchers do not always use this term specifically when referring to Design Thinking. The open-coding process made it evident that speakers often use the terms 'Design' and 'Design Thinking' interchangeably. This led me to alter many of the coding protocols.

Reflecting on the initial category *'Design is Like Something Else'* illustrates this issue. Figure 31 shows the original coding frame for this category.

Name of Category	Abbreviation	Coding Protocol
Design Is Like Something Else	DL	Design Thinking is like another process Is Like another process

Figure 31: The Category 'Design is Like Something Else'

In the coding process I refined this category to include a more appropriate coding protocol. I also altered the name of the category to reflect its more honed focus (Figure 32).

Name of Category	Abbreviation	Coding Protocol
Design Thinking is Similar to	DE	1) Design Thinking is like another process , practice or theory. 2) Design is like another practice.

Figure 32: The Category 'Design Thinking is Similar To'

Larger Adjustments to Initial Categories

'Criticism of Design Thinking' is the title of another initial category. The coding protocol for this category includes the following: instances in which speakers question the benefit of Design Thinking; instances in which speakers criticise existing Design Thinking research. The open-coding stage led me to conclude that the initial coding protocol is too broad. I split this category into two categories (Figure 33). The resultant categories each contain a more focussed coding protocol and because of this each enables specific insights associated with different aspects of the research question. The first resultant category (*'Criticism of Existing Design Thinking Research'*) allows insight into the Collection Code associated with the data set. The second resultant category (*'Criticism of Design Thinking'*) provides insight into how speakers frame Design Thinking.

Name of Category	Abbreviation	Coding Protocol
Criticism of Existing Design Thinking Research	CR	1) Speaker criticises existing research. 2) Speaker identifies inconsistencies in existing research.
Criticism of Design Thinking	C	Speaker questions whether Design Thinking is beneficial

Figure 33: The Categories 'Criticism of Design Thinking Research' and 'Criticism of Design Thinking'.

New Categories

The open-coding stage produced categories containing ways of speaking which were not highlighted in Study 2. I term these 'new categories' as they emerge solely from the Content Analysis process. The majority of the final categories are 'new categories'.

'Aims, Objectives and Challenges' is an example of a new category (see Figure 34). Meaning units which signpost the aims of the paper are coded into this category.

Name of Category	Abbreviation	Coding Protocol
Aims, Objectives and Challenges	TI	1) The need for knowledge on Design Thinking. 2) Challenges faced by Designers / educators / researchers 3) Aims / objectives of the paper. Questions to be answered in the paper.

Figure 34: The Category Aims, Objectives and Challenges

Commonly in papers, text coded into this category is positioned after a review of existing literature. This category helped me understanding how speakers set up their contribution in the paper. The category therefore provides insight into the *style* in which speakers write. Gaining insight into style is less relevant to this thesis than insight into how speakers frame Design Thinking. Therefore, further discussion of meaning units assigned to this category do not enable me to tackle the research question. The discussion around this category illustrates that not every emergent category in an inductive Content Analysis is useful in answering the research question.

'Threats to Design Thinking' is another new category (see Figure 35).

Name of Category	Abbreviation	Coding Protocol
Threats to Design Thinking	TT	1) Individuals or groups do not understand what Design Thinking. 2) Issues and practices which threaten the use, promotion or advancement of Design Thinking.

Figure 35: The Category 'Threats to Design Thinking'

This category provides insight into how speakers defend Design Thinking. In doing this the category helps to illustrate how speakers construct intellectual territory around Design Thinking. It is therefore appropriate to include meaning assigned to this category when preparing the discussion for this study.

The Unknown Category

At the end of the coding process there were several portions of text which I had not managed to code into categories. In the main, these excerpts were in papers written by

speakers whose first language did not appear to be English. Paper 115 contains an example:

> *"After this, the detail design, form modification, auxiliary graphics and descriptions of Designer D showed many Bw design strategies. In these steps, the conditions were not previously set but refining of the ideas and supplementary details with sophisticated design methods. It can be seen a strategy to add the related design conditions."*
>
> (Paper 115)

Other examples contain abbreviations or jargon. To illustrate:

> *"To assess intellectual development, data were gathered from all participants using the MID and the MOD. These instruments were administered in two independent, untimed sessions each lasting approximately forty-five minutes. The student participants completed the MID while engaged in the first design project of the semester."*
>
> (Paper 19)

I placed these portions of text in the *'Unknown*' category with the aim of coding them in the second iteration of coding.

6.1.2 The Second Iteration of Coding

In the second iteration of coding I adjusted categories to further refine their focus. The aim of this was to facilitate systemic analysis. For some categories, adjustment was limited to further refinement to the coding protocol. To refine other categories, it was necessary to group or split them.

Refining the Coding Protocol

The category *'Threats to Design Thinking'* illustrates the benefit further refining the coding protocol. I initially discussed this category in Section 6.1.1 of this chapter. In the interests of forming a clear narrative I include the coding frame for this category again below (Figure 36).

Name of Category	Abbreviation	Coding Protocol
Threats to Design Thinking	TT	1) Individuals or groups do not understand what Design Thinking. 2) Issues and practices which threaten the use, promotion or advancement of Design Thinking.

Figure 36: Coding Frame for the Category 'Threats to Design Thinking'

In the second iteration of coding I concluded that the coding protocol for this category does not capture the full remit of dialogue on threats to Design Thinking. Some speakers claim

that researchers in some areas misunderstand Design Thinking theory. I concluded that these speakers frame misunderstandings as presenting threats to Design Thinking. I made necessary additions to the coding protocol and renamed it accordingly (Figure 37).

Name of Category	Abbreviation	Coding Protocol
Misunderstandings and Threats to Design Thinking	TT	1) Individuals or groups do not understand what Design Thinking is. 2) Individuals or groups have misrepresented Design Thinking. 3) Individuals or groups ignore Design Thinking. 4) Issues and practices which threaten the use, promotion or advancement of Design Thinking.

Figure 37: Coding Frame for Category 'Misunderstanding and Threats to Design Thinking'

The refined coding protocol will help to provide a more holistic insight into how speakers construct intellectual territory around Design Thinking.

Splitting Categories

The category *'Design Is Beneficial'* illustrates the benefit of splitting particular categories. I initially discussed this category earlier in this document. I include the coding frame for this category again below (Figure 38).

Name of Category	Abbreviation	Coding Protocol
Design is Beneficial	GD	1) Design Thinking is beneficial. 2) Design practice is beneficial. 3) Design education is beneficial.

Figure 38: Coding Frame for the Category 'Design is Beneficial'

A further iteration of coding led me to conclude that this category was too broad to capture the manner in which speakers discuss the benefits of Design Thinking. I therefore split it into 2 categories. This involved further honing the coding protocol for *'Design is Beneficial'*. I named the emergent category *'Exceptional Benefits of Design Thinking'* (Figure 39).

Name of Category	Abbreviation	Coding Protocol
Design is beneficial	GD	1) Design Thinking is beneficial (speaker does not specify benefits). 2) Design practice is beneficial (speaker does not specify benefits). 3) Design education is beneficial (speaker does not specify benefits).
Exceptional Benefits of Design Thinking	A	Speaker describes exceptional benefits of design thinking (e.g. tackling widescale issues in society)

Figure 39: Coding Frame for the Categories 'Design is Beneficial' and 'Exceptional Benefits of Design Thinking'

The inclusion of excerpts illustrates the differences between these 2 categories. In meaning units coded into the category *'Design Is Beneficial'*, the speaker claims that Design is

beneficial without fully specifying the benefit. To illustrate, separate speakers claim *"Designing challenges students to think in new ways and take risks."* (GD. Paper 60) and *"exposure to design thinking […] made a powerful impression upon the groups of design students"* (GD. Paper 84). In meaning units coded into the category 'Exceptional Benefits of Design Thinking', the speaker claims that Design can benefit humans or society in exceptional ways. To illustrate, speakers argue that Design Thinking plays an *"essential role in human development"* (A. Paper 60) and that *"Design can reveal the richness of the world"* (A. Paper 98).

The aim of conducting Content Analysis is to find patterns in ways of speaking. The discovery of subtly different ways of speaking can provide a range of evidence which, when taken together, help to substantiate the presence of patterns. A cohesive narrative in turn enables a researcher to claim representativeness at a descriptive level. Though subtle, the differences between the categories *'Design is Beneficial'* and *'Exceptional Benefits of Design Thinking'*, the differences will help to form cumulative evidence for a pattern associated with how speakers classify Design Thinking.

Grouping Categories

The categories *'Paper Is informed By'* and *'Operational And Contextual Issues'* illustrate the benefit of grouping categories. These categories emerged in the open-coding stage. Figure 40 shows the coding frames for these categories.

Name of Category	Abbreviation	Coding Protocol
Paper Is Informed By	TR	1) Presentation of primary data (e.g. interviews, observations). 2) Discussion of secondary data (e.g. existing research, industry practices, expert opinion).
Operational and Contextual Issues	R	1) Speaker discusses how he/she will tackle the research question (e.g. use of lenses or methods) 2) Discussion of operational issues (e.g. specifics related to data collection / analysis) 3) Discussion of contextual issues (e.g. insight into institution / background of speaker)

Figure 40: Coding Frames for the Categories 'Paper Is informed By' and 'Operational And Contextual Issues'

During the second iteration of coding I concluded that these 2 categories do not accurately represent ways of speaking in the data set. Often, speakers combine aspects which could be coded into each categories in a single sentence. To illustrate, a speaker claims,

> *"Trained raters at the Center for Intellectual Development assigned MID protocols into positions one (dualism) through five (beginning contextual relativism) using*

standardized rating criteria which included structural, attitudinal, behavioral, and language style cues (Brooks, 1998)."

(Paper 19)

I found it difficult to defend the decision to code this portion of text into a single category. This situation does not allow for systematic analysis. Conceivably, one method of resolving this issue could involve coding parts of sentences separately from other parts. This however has the potential of creating a very fragmented analysis, limiting its value.

To resolve the issue, I grouped the categories together into a single category (Figure 41).

Name of Category	Abbreviation	Coding Protocol
Paper Is Informed By	TR	1) Speaker discusses how he/she will tackle the research question (e.g. use of lenses or methods) 2) Discussion of operational issues (e.g. specifics related to data collection / analysis) 3) Presentation of primary data (e.g. interviews, observations). 4) Discussion of secondary data (e.g. existing research, industry practices, expert opinion). 5) Discussion of contextual issues (e.g. insight into institution / background of speaker)

Figure 41: Coding Frames for the Category 'Paper is Informed By'

The resultant category is admittedly broad. However, it more accurately reflects discussion present in the data set than alternatives.

The Unknown Category

A further iteration of reading particular papers in the data set provided further insight into issues such as abbreviations. In addition, more experience of coding and the process of refining categories allowed me to compare uncategorised portions of text with meaning units which are more straightforward to code. Altogether, these practices helped to successfully code the text which I had temporarily assigned to the *'Unknown'* category.

Theoretical Saturation

After analysing the 30th paper during no further new categories emerged from the analysis. At this point I had reached theoretical saturation. Reaching saturation provided an indication that the data set could enable a powerful study (Guest et al., 2006).

6.2 Results

Four themes emerged from the analysis. These are:

6.2.1 Classifying Design Processes and Design Thinking
6.2.2 Framing Design Thinking
6.2.3 Framing Designers and Design Students
6.2.4 How Speakers Frame Existing Design Research and Their Own Findings

Elements contained within the themes overlap. To illustrate, designers practice Design Thinking—therefore speaking on designers often involves speaking on Design Thinking (and vice versa). However, focussing on each theme separately enables me to discuss each in greater depth and provides a clearer narrative.

6.2.1 Classifying Design Processes and Design Thinking

In the Methodology Chapter, I identified 3 types of papers, *pedagogical*, *practice-based* and *theoretical*. Speakers focus on identifying steps and criteria associated with Design Thinking in all 3 types of papers. When classifying, speakers writing in all types of papers claim their findings are broadly applicable amongst designers: *"A designer works not only by analysing and decomposing, but by reorganising the materials he has"* (CD. Paper 71); *"Not all the [Design Thinking] steps are sequential […] but they must take place."* (CD. Paper 50); *"Causal relations play an important role in design thinking"* (CD. Paper 26); *"creative designing rests on a cyclic combination of abductive, deductive, and inductive reasoning processes."* (CD. Paper 86). Classification therefore helps speakers to construct meta-knowledge on Design Thinking.

Speakers in the 3 types of papers often sub-classify Design Thinking steps, resulting in descriptions which contain additional detail. Use of classifications which resemble taxonomies and descriptions which echo mathematical formulae help speakers to describe Design Thinking steps in detail. A taxonomy is "a systematic framework for distinguishing, ordering, and naming types and groups within a subject field" (John et al. 1988, p.172). The system of taxonomy was first applied in biological research by Carolus Linnaeus (1707-1778) (John et al. 1988). Taxonomies allow researchers to both classify elements and relationships between elements in their domain (ibid). To illustrate, in biology, taxonomies enable classification of individual species and the relationships between them. Taxonomies often make use of specialised terminology which is not easy for those outside of the

knowledge community to understand and therefore critique (Latin is still used in contemporary biological taxonomies). Use of detailed, interwoven classification and specialised terminology help research communities to claim full ownership of—and therefore total authority over—their domain (Becher and Trowler, 2001). When classifying Design Thinking, speakers use systems with characteristics which resemble those of the taxonomic style. Speakers in all 3 types of papers use specialised terminology to classify both discrete elements and the relationship between them. To illustrate, a speaker structures his description of Design Thinking "*around four themes: perception of the concept, how it is used, integration of DT with existing product development, and who is using DT."* (CD. Paper 18). Another identifies *"three major themes"* when investigating the design process: Design as Exploring; Design as Connecting; Design as Intersecting (CD. Paper 23). A further speaker differentiates between *"…design practices that address problems within an existing frame (Abduction-1) [and] design practices that involve framing (Abduction-2)"* (CD. Paper 34).

The use of taxonomic ordering provides the impression that the domain of Design Thinking research is well-articulated and established. The content of the classifications however casts doubt on whether this is the case. Classifications differ from speaker to speaker. Speakers vary with regards to the number of themes they explore, describing *"four themes"* (CD. Paper 18) *or "three major themes"* (CD. Paper 23). In addition, the use of terminology is not consistent amongst speakers. Speakers describe the *"first phase"* of the design process (DU. Paper 50 – pedagogical), the idea that designers *"use working-backward strategy"* to solve problems (DU. Paper 57 – practice-based) and *"the domain of fourth-order design thinking"* (CD. Paper 24 – pedagogical).

Speakers often describe how designers move between sub-classifications of Design Thinking. In the following example the speaker uses the terms *working forward* and *working backwards* to describe different Design Thinking steps:

> *"[the designer] tended to choose working-forward strategies to search in a fixed direction. Only when he had trouble in his search would he adopt a working-backward search strategy to evaluate the situation."* (CD. Paper 57 – practice-based)

Another speaker claims that when designers move from considering, *"the immediate problem to a wider consideration beyond the problem",* they engage in,

> *"movement from a solution-focused design approach to one that is problem-focused, and a change in agency for who defined the problem and evaluated the design from others to oneself."* (CD. Paper 1).

Highlighting their ability to understand subtle shifts in Design Thinking helps speakers to underscore their claims to total authority over their domain. Some descriptions of shifts between classifications resemble mathematical equations. To engage successfully in the design process, students should create a 'Point of View Statement': "*The formula for Point of View formula is: User + Need + Insight = Point of View Statement."* (CD. Paper 23). Similarly, a speaker presents the following equation-like description to detail how designers move between Design Thinking phases:

> *"From P -+ Q*
> *and Desirable --7 Q*
> *conclude Desirable ~ P*
>
> *(where "-q' reads 'not')."*
>
> (CD. Paper 43 - pedagogical; original emphases)

The detailed and formulae-like descriptions promote the idea that speakers can pinpoint various stages of Design Thinking. However, just as classifications of Design Thinking differ from speaker to speaker, so too do the descriptions of movements between classifications. These inconsistencies raise doubts over how valid speakers' descriptions of Design Thinking are.

Concerns over methodology amplify the issue of inconsistent classifications between speakers. Methodology used in practice-based papers acutely illustrates methodological concerns: wide-ranging conclusions in the data set tend to come from studies of very small sample sizes. Paper 57 makes broadly applicable claims on how all designers think from observing how 2 designers work; Paper 88 makes wide ranging claims on how all designers think from observing how 3 designers work; Paper 115 argues that universal insight comes from investigating how 4 designers practice[47]. The reliance on small sample sizes calls into question the validity of the universalistic formulae put forward by speakers. The conclusions made by speakers would be more defensible if they were to claim that their findings had uncovered patterns in the way that *some* designers work.

6.2.2 Framing Design Thinking

[47] I provide in-depth discussion on how speakers make broadly applicable claims in Section 6.2.3 – 'How Speakers Frame Designers and Students'

Almost without exception, speakers frame design and Design Thinking as *beneficial*—to designers, in education, to institutions and in society in general. I identify 8 separate ways of speaking used by speakers when they discuss the benefits of Design Thinking. These are:

1) *Speaking with Passion*
2) *Solving Complex Problems*
3) *Professional and Personal Identity*
4) *Design Thinking is Like Other Progressive, Beneficial Approaches or Processes*
5) *Design Thinking is More Effective than Dominant Alternative Approaches or Processes*
6) *Opportunities to Use Design Thinking*
7) *Threats to Design Thinking*
8) *Mitigation*

The narratives of these 8 ways of speaking intersect, making it possible to group them into 5 themes:

Theme 1: Speaking with Passion

Theme 2: Problem-Solving

- Solving Complex Problems
- Professional and Personal Identity

Theme 3: Comparing Design Thinking with Other Approaches or Processes

- Design Thinking is Like Other Progressive, Beneficial Approaches or Processes
- Design Thinking is More Effective than Dominant Alternative Approaches or Processes

Theme 4: Opportunities and Threats

- Opportunities to Use Design Thinking
- Threats to Design Thinking

Theme 5: Mitigation

Theme 1: Speaking with Passion

Ken Hyland (2001)—an investigator of discourse used by academics—argues that research is often mistakenly viewed as being written in a distanced manner. Academic authors aim to persuade readers of the validity of the arguments they make. Use of persuasive language

helps them do this. Authors however must negotiate a fine line: use of language which is too explicit can make it seem that the author's case relies too little on sound research principles and too much on trying to trigger emotional responses in readers. This situation is likely to raise suspicion that the article is of little scholarly value. It may cause reviewers to reject it, or if accepted and published, readers may choose not to build on the arguments made in the article. Hyland argues that authors focus using subtle language—ways of speaking which nudge the reader into accepting the argument. Authors tend to write papers in ways which,

> "requir[es readers] to *note*, *concede*, or *consider* something in the text, thereby leading them to a particular interpretation"
>
> (Hyland, 2001, p.564; original emphasis).

The use of persuasive language is a consistent feature of the Design Thinking corpus—it is seen in all 3 types of papers. Rather than focussing on subtle strategies, speakers use highly emotional terms and explicit ways of speaking to make their point.

Highly emotive terms help to frame Design Thinking as a force which positively transforms both education systems and learners. Terms like *take risks*, *crucial* and *revitalize energies* help speakers in pedagogical papers to suggest that Design Thinking transforms education: *"Designing challenges students to think in new ways and **take risks**."* (GD. Paper 60); Design Thinking both *"meets the **crucial** criteria for effective 21st century learning"* (UDT. Paper 92) and can *"**revitalize energies** devoted to re-thinking"* methods in education. (OA. Paper 54). Terms like *desired, exuberant* and *powerful impression* allow speakers to describe students' positive responses to projects which incorporate Design Thinking: *"this was [the student's] test-tube and he was adjusting its content to produce the exact reaction he **desired**"* (GD. Paper 50); *"[the learner] had just finished an **exuberant** design thinking class"* (GD. Paper 23); *"exposure to design thinking […] made a **powerful** impression upon the groups of design students"* (GD. Paper 83). To recall, I classed 50% of the papers in the data set as pedagogical. The focus on persuasive language in this percentage of the data set provides an indication of the reliance on it in the complete data set.

Speakers in all 3 papers types argue that Design Thinking helps humans to mature psychologically and to aid them in positively transform society. Emotive terms like *essential* and *sophisticated* convey the importance of Design Thinking in human development: Design Thinking plays an *"**essential** role in human development"* (A. Paper 60); *"Design is […] one of the most **sophisticated** human behaviours."* (A. Paper 70). Speakers use emotive terms like *intentional change, radical and transform* to suggest that Design Thinking is a force for good in society, as it can *"initiate **intentional change** in the real world"* (DE. Paper 24), is *"a*

*process for **radical** change"* (FR. Paper 11) and "*has the power to **transform** societies"* (A. Paper 28). For this reason, *"all men and women may benefit from an early understanding of the disciplines of design in the contemporary world"* (A. Paper 15). An explicit focus on altruism and duty accompanies the claims for transformation. Designers and students are duty-bound to make the world a better place: Design Thinking *"improve[s] the lives of those whom [designers and educators] are **meant to serve**"* (A. Paper 54); Design Thinkers *"saw themselves as active change agents*" (A. Paper 23); people with *"design thinking traits […] are more likely to **want to address** opportunities for future generations, environmental degradation, climate change, disease, poverty, and energy"* (A. Paper 12). The concept of finding meaning in life is connected to the idea of 'duty'. Terms like *freedom to dream* and *personal meaning* conjure up the sense of a personal quest for designers: *"In very few fields is there the **freedom to dream** expected in design."* (GD. Paper 82 – a theoretical paper); designers work *"to find **personal meaning**."* (A. Paper 20). Interestingly, a focus on personal meaning also comes to the fore when a lone speaker writing a theoretical contribution (Paper 108) critiques the idea that designers should focus on socially engaged practice. This speaker presents an argument put forward by the Ancient Greek philosopher Aristotle that people fall into one of two camps: they are either innately creative or naturally socially conscious. People rarely possess both traits. The speaker frames designers as naturally creative, and therefore, by and large, uninterested in socially engaged practice:

> *"The reason that designers sometimes seem to be lukewarm about the social impact of their work resides more in the intellectual realm than in the moral one. Something in creativity itself appears to be intrinsically resistant to thinking in terms of social effects."* (CD. Paper 108)

The focus on altruism, transformation in society and personal meaning does not present a complete picture of design practice. Most practice takes place in commercial environments—consultancies aim to generate profit for clients. If consultancies do not produce income they fail. Speakers do not discuss Design Thinking as a tool to create profit. In this light, the use of emotive terms appears idealistic. Studies 1 and 2 highlighted indications of idealism in the data set. I was not able to make definitive conclusions as my studies were limited to investigating abstracts. Analysis of full texts has confirmed that speakers frame Design Thinking as removed from the less idealistic, commercially-driven realities of design practice.

In the previous section I noted marked inconsistencies in classifications of Design Thinking. This contrasts with the consistent use of highly emotive language to narrate the benefits of Design Thinking—both to society and to individual designers. Use of emotive language therefore takes priority over balanced, coherent content in enabling speakers throughout the

data set to create persuasive arguments. The 3 types of papers I have described focus on different aspects of research—some contain a great deal of primary research; others focus exclusively on theoretical reviews. Though diverse in typology, the issue of focussing on emotive language over and above focussing on balanced, coherent content links them. This finding highlights worrying issues associated with Design Thinking research.

Theme 2: Problem-Solving

Speakers in all 3 types of papers focus on the idea that both contemporary working life and personal life are *complex* and that Design Thinking helps to negotiate these complexities. To illustrate, *"design problems are seldom fully defined"* (DU. Paper 28 – a pedagogical paper); Design Thinking offers *"great value to teams dealing with complex, ill-formed problems"* (PS. Paper 82 – a theoretical paper); "*teachers [can use] design thinking […] as a problem solving tool for the design challenges they face every day."* (PS. Paper 104). Beyond its use in professional domains, Design Thinking can help people to solve commonly occurring problems in their everyday lives—in "*the increasingly complex world of the twenty-first century"* (A. Paper 23). The focus amongst speakers on framing Design Thinking as a tool which can solve complex problems helps them to construct the identity of designers and design students: designers are framed as professional *problem-solvers*; students as would-be *problem-solvers*.

Speakers in every paper type argue designers are intellectually agile. This trait allows designers to focus on both wider issues and problem specifics. Designers can comprehend *"the dynamic and varied contextual scope of problems"* (PS. Paper 117 – theoretical), "approach[]complex phenomena in a holistic constructivist manner" (UDT. Paper 92 - pedagogical) and "*keep[…] the big picture in mind while focusing on specifics"* (GD. Paper 82). The mental agility of designers lets them envisage entirely new ways of seeing the world. Speakers use terms such as *unchartered territories, new model and entirely new* to underscore this point: "*Design thinkers are expected to constantly challenge the boundaries of known solutions and venture to* ***unchartered territories*** (CD. Paper 51 – pedagogical)*"*; *"By integrating design, the Vectors team has created a* ***new model*** *for scholarly production."* (A. Paper 16); designers envisioned *"****entirely new*** *services, for example a genetic test data bank."* (GD. Paper 64 – practice-based).

Speakers compare the intellectual agility of designers with the problem-solving skills of individuals working in more established professions. In all paper types, established fields are

framed as stayed: *"Design thinking is in many ways the obverse of scientific thinking."* (CD. Paper 82 - theoretical); designers' decision-making processes are *"Unlike traditional decision making"* processes (DU. Paper 24 - pedagogical). Traditionally, designers have created 2D or 3D artefacts and more recently commercial services. The agility of designers means that they can work more broadly: *"The notion of design as a credible and valuable way of thinking to deal with contemporary problems is being pursued within a widening domain"* (PS. Paper 24). Domains include: "*professions, most notably Information Technology […] and Business"* (PS. Paper 34 - theoretical). The intellectual agility of designers means that they can create policy alongside professionals from more established professions: *"the characteristics of design and science thinking form a set of complementary thought processes able to add considerable strength to the advisory task."* (IC. Paper 82 - theoretical). Indeed, designers can contribute to policy at the very highest levels in an *"an advisory capacity to governmental and institutional leaders"* (OA. Paper 82).

Framing designers as professional *problem-solvers* (rather than creators of 2D/3D form and services) who can work at the highest levels raises the status of the design professions. The idea that they can solve complex problems enables designers to be perceived as equals (or betters) to professionals from other disciplines; designers are not merely creating 2D/3D form in accordance to briefs set by professionals from more established disciplines.

Returning briefly to the Design Thinking theory of the Early and Middle Decades of the 20th Century allows an opportunity to reflect on the idea of professional status. Creators of earlier Design Thinking theory argued that raising the status of designers requires them to think like professionals from more established professions. To illustrate, Gropius claimed that designers should think like mathematicians—designers should be guided by "impersonal [mathematical] standard[s]" (1935, p.26); Le Corbusier argued that designers should think like engineers: "The engineer, inspired by the law of Economy and governed by mathematical calculation, puts us in accord with universal law" (1931, p.11). The discussion amongst speakers on raising the status of designers takes a noticeable diversion from the philosophy seen in Gropius' and Le Corbusier's texts. Speakers claim that *thinking like designers* helps designers to stand shoulder-to-shoulder with individuals from more established professions. In this way, Design Thinking allows designers to be equal with individuals from more established professions *on their own terms*. This issue highlights the clear division between narratives associated with Contemporary Design Thinking & Design Thinking of the Early and Middle Decades of the 20th Century.

Reflecting on shifts in UK university funding models provides an opportunity to discuss the idea that designers can stand shoulder-to-shoulder with professionals from more established professions. In the last few years, the UK government has focussed on funding more established STEM subjects (STEM is an acronym for Science, Technology, Engineering and Mathematics). The government began this course of action by removing all funding to universities which do not teach STEM subjects (Prince, 2010). Building on this strategy, it allocated an additional "teaching capital fund" of £200million in the 2015-16 academic year to universities to further promote teaching and research in STEM subjects (Higher Education Funding Council for England, 2015, unpaged). High level government officials have consistently re-iterated their support for STEM subjects. When in post, the one-time Education Secretary Nicky Morgan argued the rationale for supporting STEM subjects is clear:

> "the subjects that keep young people's options open and unlock the door to all sorts of careers are the Stem subjects".
>
> (Morgan, cited in Paton, 2014)

In contrast to the positive effects of studying a STEM discipline, Morgan argues that the prospects for those studying arts-based subjects (like design) may be quite limited—in some cases it may hold people back for the rest of their lives (Paton, 2014). The focus on funding more established subjects makes it apparent that the UK government does not believe that designers can stand shoulder-to-shoulder with other professionals. Ways of speaking used by speakers indicate a pattern for constructing an idealistic representation of the professional identity of designers.

When discussing transformative aspects of Design Thinking, speakers, make claims which stretch beyond the professional realm. Speakers argue that Design Thinking is integral to success in one's *personal life*. This ways of speaking is particularly common in pedagogical papers. Design Thinking "*can reveal the richness of the world"* (A. Paper 100 - pedagogical). In keeping with the link between Design Thinking and an individual's personal life, speakers associate Design Thinking with the personal identity of designers. Designers work *"to find personal meaning."* (A. Paper 20) and have a *"solution-focused nature"* (PS. Paper 24 - pedagogical). Speakers therefore construct both the professional and personal identifies of designers around Design Thinking. The complete construction of designers around the research domain helps speakers to maximise their claim to ownership of the intellectual space associated with it. However, as I noted in my summary of Theme 2, the claims on problem-solving are based on the production of inconsistent descriptions of Design Thinking and reliance on methodological errors. The move to raise the status of designers therefore

takes priority over balanced, coherent content in enabling speakers to create their intellectual territory.

Theme 3: Comparing Design Thinking with Other Approaches or Processes

When discussing the qualities of Design Thinking, speakers sometimes compare it with other approaches to problem-solving. Exclusively, speakers claim that Design Thinking shares attributes with other progressive approaches to solving problems. The shared attributes centre around ideas of intellectual *agility* and seeing in new ways ("*reframing"* or "*making connections"*). In contrast, speakers consistently claim that Design Thinking is more effective than traditional, dominant alternative models. Dominant models are framed as restrictive, "*rigid"* ways of seeing the world. This ways of speaking is found in all 3 types of papers. Several speakers make comparisons between design domains (research, education or practice) and other approaches. The approaches originate in fields which are external to design domains. Some of these external fields are closely related to design domains, others are more distant to them.

Fields which are closely related to design include *Arts Education* and *New Media Education*. Speakers argue that Design Thinking and initiatives in both Arts Education and New Media Education share progressive traits as they enable learners to *make connections*, either in terms of understanding wider contexts ("*connection-making"; "multimodality"*) or working with others (*"collaboration"*). A speaker claims that Design Thinking and progressive Arts Education both encourage:

> "***connection-making****, and self-direction are encouraged to enhance students' thinking skills within the context of critical, creative, and practical modalities"* (DE. Paper 104 - pedagogical)

Equally, another speaker draws similarities between the way tutors teach Design Thinking in design education and the way tutors practice progressive New Media Education. Both models have:

> *"championed similar abilities such as constructive thinking, problem-solving,* ***collaboration****, and* ***multimodality****, to name a few…"* (DE. Paper 16 - pedagogical).

In the data set, fields which are more distant to design domains include the philosophical construct termed *Pragmatism* and progressive *Spinal Surgery*. Speakers argue the practice

of reframing ideas (*"rethink"; "allow his or her imagination free reign"*) provides intellectual connections between design domains and more distant external domains.

In Paper 29, the speaker aligns Design Thinking with pragmatism. Pragmatism was established as a progressive movement in the field of philosophy by John Dewey in the 1930s (Dalsgaard, 2014). A pragmatic viewpoint requires individuals to value human experiences over taken-for-granted judgments (Dalsgaard, 2014). The speaker claims the benefits of pragmatism lie in its ability to enable actors to take fresh perspectives on fundamental issues: *"the subject may gain richer understandings of the situation and rethink the evaluation criteria"* (Paper 29). The speaker moves on to associate pragmatism with Design Thinking,

> *"pragmatism can inform and inspire (and to some extent already has informed and inspired) the discourse and practice of design."* (DE. Paper 29 - pedagogical)

In another article (Paper 26), a speaker makes connections between Design Thinking and progressive spinal surgery. (The author of the paper is a Design Thinking researcher who collaborated with spinal surgeons to design better experiences for patients). In contextualising the connection between Design Thinking and progressive spinal surgery, the speaker distinguishes between non-progressive and progressive spinal surgery, claiming the latter approach is more beneficial to patients. This is because progressive surgeons see the world in new ways,

> *"Innovative surgeons see what other surgeons have seen, but think what most others have not thought or acknowledged. They have curious, open and inquisitive minds, preferably not swayed by prejudice."* (DL. Paper 26 – practice-based)

The speaker then connects progressive surgery with Design Thinking:

> *"Causal relations play an important role in design thinking because they afford the surgeon a way to represent how he or she thinks and acts, and because they allow his or her imagination free reign in considering how the world could or would be if changes were made in his or her design thinking."* (DL. Paper 26 – practice-based)

Earlier in this chapter I noted that speakers frame designers as being *agile* problem-solvers. This agility allows designers to see problems in news ways: designers' decision-making processes are *"Unlike traditional decision making"* processes (DU. Paper 24). The practice of associating Design Thinking with other agile, progressive approaches helps speakers to

reinforce the idea that Design Thinking is an agile problem-solving method which enables people to see the world differently.

In all 3 papers types, speakers frame Design Thinking as better than alternatives at facilitating problem-solving. In the data set, the alternatives are framed as being *established* methods or approaches. This way of speaking is particularly noticeable in education-focussed papers. Speakers use it when comparing Design Thinking to more established pedagogical models. Speakers criticise the rigidity of traditional models for incorrectly teaching students "*to find one right answer rather than challenging them to find answers to difficult problems through multiple solutions."* (Paper 104). The use of terms like *squashed* illustrate the idea that traditional pedagogy stunts creativity in learners: *"creative thinking seems to get* ***squashed*** *in the secondary [education] system"* (TR. Paper 28 pedagogical). In contrast to being established, Design Thinking is *"Less well known"* (PS. Paper 82 - theoretical) to those working outside of design domains and *"provides a powerful alternative"* (DS. Paper 23) to traditional models.

Speakers also claim that contemporary Design Thinking is more effective than Design Thinking of the Early and Middle Decades of the 20th Century. In the 1960s, the Design Methods movement claimed that innate human fallibility prevented designers from successfully solving wide-ranging problems. The movement attempted to find a generally applicable reproducible process which could solve wide-ranging problems as:

> "generalist techniques [are more] applicable to the larger problem that arise today".
> (Jones, 1971)

In keeping with the aims of the Design Methods movement, the philosopher Herbert Simon (1996) tried to create numerical formulae which would inform computer programmers as to how to replicate the design process in code. The aim was to remove designers completely from the creative process:

> "If the steps in a designer's processes could be identified, examined, and understood, they could be improved, or corrected and in the best circumstance, the designer could be replaced by a mechanical process or a machine – the then emerging computer."
> (Downton, 2003, p. 41)

Paper 70 claims that Simon's universalism did not acknowledge the uniqueness of design practice and design problems:

> "[Herbert] Simon's search model, a general model for human problem-solving, is applied to solve a design problem without any further adaptation for the unique characteristics of design such as graphic representations of both design knowledge and products in the design processes." (OD. Paper 70 – practice-based)

Paper 70 argues that, primarily, Simon fails because he does not acknowledge the value of the way that designers think. The phrase *"great number of possibilities"* indicates that Design Thinking allows designers to be open-minded:

> "Designers can effortlessly see a great number of possibilities from the graphic representation of any states of the human design process" (OD. Paper 70 – practice-based)

Computers, in contrast, are far less open to alternatives as their searches are more limited:

> *"current computer-aided design systems fail to recognize and then to consider these possibilities because of their limited pattern-matching techniques."* (OD. Paper 70 – practice-based)

The concept of Design Thinking of the Early and Middle Decades of the 20th Century is linked to ideas of 'science' and 'rationalism', which are, historically speaking, more established than the concepts that support contemporary Design Thinking theory. The move to claim contemporary Design Thinking is more effective than Design Thinking of the Early and Middle Decades of the 20th Century can therefore also be seen as an attempt to argue that the former is better than traditional or established methods or approaches to problem-solving.

It is evident that speakers in all 3 papers types create a dichotomy when discussing the benefits of Design Thinking. The dichotomy is between *agility* associated with Design Thinking and *rigidity* linked to alternative, more established, models or processes. Dichotomies simplify issues, casting them in contrasting tones of black and white, ignoring murky grey areas that may lie between. Dichotomies are therefore commonly used when people try to construct highly persuasive arguments. Indeed, the presence of dichotomy resonates with the reliance on highly emotive terms in the data set. The dichotomy appears to be influenced by the aforementioned inconsistent classifications of Design Thinking and the presence of broad generalisations from small samples. These issues call into question the validity of the dichotomy.

Theme 4: Opportunities and Threats

Speakers highlight opportunities to make use of Design Thinking and warn of threats to the problem-solving process. In line with the emerging dichotomy, the pattern is for speakers authoring all 3 types of paper to view Design Thinking as a progressive way of seeing the world and dominant models as rigid and limiting.

Speakers claim that appropriate conditions are necessary to integrate Design Thinking in to various environments. To successfully introduce Design Thinking into the classroom, educational programmes should *"devote more time and effort to [student] explorations"* (OA. Paper 51); educators should create conditions in which *"collaboration is […] explicitly valued"* (OA. Paper 23). In line with the emerging pattern, use of terms like *"explorations"* and *"collaborations"* help speakers to underscore the link between Design Thinking and mental agility and making connections.

Speakers claim that to create the necessary conditions, professionals must challenge existing dominant assumptions. Business leaders must understand how Design Thinking *"will fit within larger streams of consideration and existence"* (OA. Paper 117 - theoretical); governments *"must be convinced that policy design synthesis is […] valuable"* (OA. Paper 82); implementing Design Thinking into spinal surgery routines can only occur when the *"surgeon challenges both existing assumptions and the validity of their constituent elements."* (OA. Paper 26 - practice-based). The connotation is that only progressive professionals can use Design Thinking successfully. Those who are not progressive will be left behind, stuck practicing rigid ways of thinking.

Speakers claim threats to Design Thinking come both from areas which lie outside of design domains, and, also from within design domains. Educational papers claim that dominant general pedagogical models limit adoption of progressive Design Thinking. Pre-tertiary systems "*that prioritize[] standardized test scores"* (TT. Paper 41 - pedagogical) and shift emphasis *"from stories to facts, from speculation to specifics"* (TT. Paper 23 - pedagogical) limit students' ability to practice Design Thinking effectively. Equally, dominant general educational models cause learners to mis-use the problem-solving process:

> *"Students with primary/secondary educational backgrounds founded in scientific method and representational thinking are primed to alter the fluidness of design thinking to fit with the linear causal schemas that they have been brought up on."* (TT. Paper 100 - pedagogical).

Terms like "*linear"*, *"standardized"* and *"specifics"* help speakers to illustrate that dominant models cause people to unquestioningly follow a taken-for-granted path. Speakers juxtapose these terms with words like *"speculation"* and *"fluidness"* which they associate with agile Design Thinking. Such is the influence of dominant models, speakers note the difficulties educators have when introducing Design Thinking within the confines of established pedagogies: *"Graphic design educators are now struggling to devise new pedagogy that efficiently incorporates design thinking in the classroom"* (TT. Paper 41 - pedagogical).

Threats to Design Thinking are found in more widespread sources. Design Thinking is the subject of a great deal of interest in many research fields and within the popular press. In all 3 types of papers, speakers argue that some of this attention misrepresents Design Thinking as it ignores research conducted by the Design Tribe. Management literature does not consider "*the rich intellectual dialogue that emerges from more than 50 years of design thinking scholarship."* (MS. Paper 81 - pedagogical). Similarly, *"popular accounts of design thinking ignore the extensive research on designers' ways of working over previous decades"* (MS. Paper 63 - theoretical). Descriptions of Design Thinking are skewed as they are informed solely,

> *"from the internal reflective practice of a design firm (IDEO, in the case of Brown, 2009) or from a selection of interviews with design principals by management educators"* (MS. Paper 102 - theoretical).

Ill-informed descriptions in the popular press threaten Design Thinking as they disseminate false information on it: "*confusion about both the nature and the merit of 'Design Thinking' […] This confusion has now reached a crisis point…"* (TT. Paper 34). Discussion on threats to Design Thinking underscore the tribal nature of discourse on Design Thinking. Threats from wider sources include ones associated with human nature. Use of the term *"follow suit"* aligns with the pattern observed in this study—that dominant models encourage people to blindly follow established principles:

> *"When human beings think and act…they are often induced to follow suit without questioning the prevailing assumptions and practices. Such rigid and unquestioning adherence can serve to stifle originality."* (TT. Paper 26 - practice-based).

Speakers claim that design domains threaten Design Thinking in a range of ways. In line with the emerging dichotomy, Speakers criticise the rigidity of aspects of dominant design domains (in design education, research and practice). Speakers use terms like "*unreflectively", "conceal"* and *"mechanistic"* in claiming that dominant design models cause

people to follow blindly. Design education works to *"**unreflectively** […] naturalize us"* to accept certain aesthetics as being pleasing (TT. Paper 102 - theoretical); the focus on making in design education can limit students' understanding of contextual issues:

> *"…in basic education, the construction of these artefacts is often perceived as the primary focus of learning activities, rather than as a way of supporting the rationale directing the design practice." (TT. Paper 60)*

Similarly, dominant practices in design research threaten to *"**conceal**[] the way in which designing"* affects social process (TT. Paper 102 - theoretical); professional design practice relies on *"an adherence to "rigid 'methods'"* (TT. Paper 51 - pedagogical); *"**mechanistic** reductivism"* (TT. Paper 100 - pedagogical) in design practice limits designers' ability to do what they do best—to solve complex problems.

In claiming that aspects of design practice, research and education threaten Design Thinking, speakers separate facets of design domains from the domain of Design Thinking. In the data set there is one speaker whose observations parallel mine. The speaker (Paper 63) argues that Design Thinking research often separates Design Thinking from real world design practices:

> *"accounts of design thinking often rest on a dualism that makes a distinction between 'thinking' and 'doing' and between designers and the worlds they do design in"* (CR. Paper 63)

My findings build on those highlighted in the above quote by showing that speakers separate Design Thinking from aspects of design domains which they perceive to be a threat to their domain of investigation.

Speakers claim that the design community must work with urgency to tackle threats to Design Thinking. Use of the phrase *"locked in"* once again illustrates the rigid nature of threatening models:

> *"But designers must act quickly; in a few short years, formats and applications may be adopted and '**locked in**' before designers and scholars have had the chance to fully develop and assess the long term implications of new models."* (*TT. Paper 16*)

My discussion on 'Opportunities and Threats' has provided more insight into the dichotomy between *progressive* Design Thinking and *rigid* dominant models. The discussion shows how speakers use terms to create coherent ways of speaking across the data set—i.e., the

use of these terms is not limited to any particular type of paper. Speakers use *"explorations"*, *"speculation"* and *"fluidness"* to refer to the agile nature of Design Thinking. Equally, the term *"collaborations"* signals the idea that Design Thinking helps people to make connections. These terms suggest that Design Thinking allows people to be *active* actors. In contrast, speakers construct threats to Design Thinking as limiting human experience. Threats make humans into *passive* actors: dominant models *"unreflectively […] naturalize us"* to accept ideas and *"conceal[] the way in which designing"* affects social processes (TT. Paper 102). Established models which "*prioritize[] standardized test scores"* (TT. Paper 41) and shift emphasis *"from stories to facts, from speculation to specifics"* (TT. Paper 23) make humans adhere to limited ways of thinking and acting, *"induc[ing people] to follow suit without [allowing them to question[…]] the prevailing assumptions and practices* (TT. Paper 26). The passivity people are left with dilutes Design Thinking *"to fit with the linear causal schemas that [humans] have been brought up on."* (TT. Paper 100). It is clear that the terms "*unreflectively", "conceal", "locked in*", *"follow suit*", *"mechanistic",* "*linear"*, *"standardized"* and *"specifics"* help speakers contrast progressive Design Thinking with rigid dominant models.

Previously in this chapter I noted that speakers use terms like *"revitalize energies", "exuberant" and "freedom to dream"* to indicate that Design Thinking is a potent, quick-fix practice. Reflecting on the 'Opportunities and Threats' section has allowed me to understand that speakers frame Design Thinking as providing a potent, quick way of enabling people to become active when they are faced with rigid situations which force them to be passive. Unpicking how all these terms are used has allowed me to understand how speakers create a language—a discourse—of Design Thinking. This discourse is a characteristic feature of *designerly ways of speaking*.

It is important to unpick some claims which allow speakers to form *designerly ways of speaking*. The idea that dominant models in design domains (education, research and practice) threaten Design Thinking suggests there is a level of *purity* associated with Design Thinking which is sullied by the real world of design. The idea that human nature is a threat to Design Thinking underscores the claim to purity:

> *"When human beings think and act…they are often induced to follow suit without questioning the prevailing assumptions and practices."* (TT. Paper 26)

Idealism may help to account for the pattern for emotive, dichotomous ways of speaking which permeates the data set. Idealism may also have helped to inhibit speakers from presenting critical reflection on Design Thinking. The idea that dominant design domains

(and human nature) threaten Design Thinking suggests that speakers are very protective of their domain. The separation between Design Thinking and other design domains supports a point I made earlier in this study—that, for speakers, Design Thinking exists *outside* of intellectual space occupied by design territories. This situation further highlights a lack of critical reflection in the data set.

Theme 5: Mitigation

I use the term *'mitigation'* to refer to narratives used by speakers when their findings potentially run contrary to the dichotomous pattern observed in this chapter. Mitigation helps speakers to view their findings through a lens which maintains the dichotomy.

Paper 23 includes an example of mitigation. The article contains findings which potentially allow the speaker to claim that Design Thinking does not enable people to be *agile* and *make connections*. The findings instead suggest that Design Thinking promotes *rigid* ways of thinking. This way of framing Design Thinking runs against the dichotomous pattern I have observed. The speaker does not follow this path. Instead, the speaker argues that the findings have been skewed by unfavourable conditions. The speaker claims that more appropriate study conditions would produce findings which maintain the dichotomy.

The paper in question (Paper 23) describes a study in which the speaker (a design researcher) introduces Design Thinking into a junior school Geography class. Neither the teacher nor the students were familiar with Design Thinking before the study. The speaker uses feedback from students and their teacher to argue that Design Thinking is better than the dominant model which is normally used in the classroom: *"'I really liked using my imagination. I haven't used it for a long time.'"* (TR. Paper 23). The teaching initiative described in Paper 23 is not completely successful. The speaker claims there to be important connections between Geography and Design Thinking. However, the speaker argues that many students did not make the connection:

> *"Students seemed unable to make clear connections between design and geography, and there appeared to be confusion about connecting geography, mapping and design thinking as well."* (C. Paper 23)

The speaker illustrates this point by including quotes from learners. The quotes reflect what the affected students feel they have learnt about geography during the Design Thinking initiative:

"Geography? Nothing really.
Geography? That's the study of the earth, right?…
mmm. I don't know.
Geography? I forgot.
I didn't really learn that much." (TR. Paper 23)

The feedback from learners could enable the speaker to claim that Design Thinking may not help people to make connections. The speaker does not make this claim. Instead, the speaker argues that the study conditions have not been ideal. The speaker suggests that to increase the success of similar pedagogical initiatives, teachers need to be fully briefed before participating in it. This will help teachers to understand that Design Thinking can help people to make connections:

> *"It is essential to have teachers see the value of design thinking in their classrooms, and the connection between design and the academic goals of the classroom needed to be obvious to them."* (OA. Paper 23)

Mitigation allows the speaker to foreground truths which are acceptable to the Design Tribe. This instance of mitigation again shows that, for speakers in the data set, the imperative to create discrete intellectual territory associated with Design Thinking overrides a need for criticality. The incidences of mitigation are limited, but when added to the evidence gathered in this chapter, they further highlight the pattern for dichotomous ways of speaking in the data set.

Framing Design Thinking: Summary

Speakers frame Design Thinking as a progressive model which provides a quick, powerful way of dismantling intellectual shackles associated with dominant models. A range of terms help speakers to maintain this dichotomy. These terms contribute to the creation of *designely ways of speaking*. The idealism inherent in the dichotomy lacks criticality. Speakers maintain the dichotomy at all costs, despite being in possession of findings which contradict it. The focus amongst speakers on creating discrete intellectual territory associated with their domain (and therefore control over the domain) outweighs a need to contribute balanced research on it.

6.2.3 Framing Designers and Design Students

The high level of reference in the data set to designers and students provides an opportunity to focus in greater depth at how speakers discuss these individuals. The high level of focus necessitates the need to clarify my use of the term *design student*. Speakers discuss different categories of learners: those enrolled on university design programmes; students who are not enrolled on design programmes but evidence Design Thinking skills; learners who have been exposed to Design Thinking in research trials. My use of the term *design student* takes all these learners into account.

The pattern is for speakers to claim that designers who work in different disciplines share ways of thinking. Terms like *"all"* and *"many"* help speakers to highlight the commonality. Ways of thinking are shared *"across **many** design disciplines"* (DU. Paper 28 - pedagogical); *"design judgements can be applicable to **all** design disciplines"* (DU. Paper 24 - pedagogical). Specifically, speakers claim that designers share the ability to use Design Thinking:

> *"The idea of 'design thinking' has typically represented what designers understand about design and how they go about the act of designing"* (DU. Paper 1 - pedagogical).

Earlier in this chapter, I argued that speakers frame Design Thinking as forming both the professional and personal identities of designers. The idea that Design Thinking is common across design disciplines provides additional evidence to support my claim on the way speakers construct designers. Framing both the professional and personal identities of designers around Design Thinking helps speakers to claim ownership of the domain.

In the previous section I noted that speakers claim Design Thinking allows people to be active, agile thinkers who can make connections. Given this pattern, I would expect speakers to frame designers (as practitioners of Design Thinking) as being active, thinkers who can make connections. Analysis shows this to be the case. Speakers argue these traits to be key to the success of designers. Speakers use the terms *"alterness*" and "*reflecting"* to signal intellectual agility*; "feedback seeking"* refers to an active mental approach; "*transform societies"* evidences the idea that designers make connections. Designers demonstrate agility by showing *"an intellectual **alertness** to life around them"* (UD. Paper 54) and possess *"the key skill[] of **reflecting**"* (DU. Paper 24). Their active mindset means they are *"**feedback seeking**—asking questions and looking for input"* (DU. Paper 12) and go *"beyond intramental (i.e., "in the head") activities"* (DU. Paper 28[48]; original emphasis) as they turn

[48] I have spelled "*intramental"* as it is used in Paper 28.

their thoughts into real-world actions. The ability to make connections helps designers to benefit users: designers *"take a human-centered approach, one in which people come first"* (DU. Paper 54); "*…for exceptional designers [the ability to design] has the power to* ***transform societies*** (A. Paper 28). Examining how speakers frame similarities amongst designers has provided another lens though which to show how speakers form intellectual territory on the domain of Design Thinking.

Many professions can be classed as design disciplines. It is therefore valuable to examine how speakers refer to designers who work in different professions. Some reference is made to professionals who work in particular professions—speakers discuss coders, "*Java designer's"* (TR. Paper 83) and *"service designers"* (TR. Paper 64). Given the sheer amount of discussion on designers in the data set, it is interesting to note that there are relatively few incidences in which speakers refer to specific design professions or professionals working in a particular field. Reference to designers who work in a specific design profession is most common in papers which focus on the role of Design Thinking in education. Speakers tend to introduce these individuals as experts in their field—the expert provides opinion on the research process. To illustrate, Paper 60 discusses a project in which learners are required to design a lamp. The speaker asks an *"interior designer specialised in lamp and light designing"* (R. Paper 60) to review the design outcomes.

Practice-based papers tend to analyse ways of thinking of designers working in particular fields. Speakers tend to frame these ways of thinking as applying to designers in general. As noted earlier in this chapter, speakers arrive at their conclusions through working with very small data sets. Paper 88 analyses the role that designers' bodies play in Design Thinking. To do this the speaker investigates the practices of 3 designers, *"an experience designer […] an interaction designer, […] a design ethnographer"* (TR. Paper 88 – practice-based). Through studying how the designers practice, the speaker claims that the gestures these designers make with their bodies play an important part in facilitating their Design Thinking,

> "the bodily engagement of the designers is central to their way of interacting and working as they understand and solve the design problem at hand" (FR. Paper 88 – practice-based)

The speaker argues that this way of thinking is used by *all* designers. In illustrating this universalism, the speaker uses the term *"a designer's"* to mean *designers in general*:

> *"The conclusion to our study is that the lived body is actively engaged in the sensemaking process and functions as the foundation for a designer's interaction and thinking on several connected levels."* (CD. Paper 88 – practice-based)

It is interesting to note that the speaker frames the bodies of the participant designers as being *"actively engaged"*. The focus on the active body provides a further facet to the pattern of focus on Design Thinking as an *active* process in the data set. It is unlikely that observation of just 3 designers can allow insight into the actions of all designers, especially when design practices are so varied across the many different design disciplines. The speaker does not mention these limitations in the study.

In another example, Paper 115 (practice-based) analyses problem-solving methods used by 4 designers. The speaker notes that the participants practice in different fields, *"their design profession and media are different"*, but does not mention what each does for a living. (The closest the speaker comes to providing specifics is when noting that one of the participants had studied *"furniture design"* at university.) Clearly, the speaker does not believe what each participant does for a living is important enough to comment on. The speaker argues that the particular skill sets and ways of working of the 4 designers influence how they each go about tackling design problems:

> "designers build up their design problem structure by their technique and know-how as well as the design characteristics set by their subjective points of view" (CD. Paper 115 – practice-based)

However, despite the differences, overall, the 4 designers share ways of thinking:

> *" Though their design profession and media are different, they applied the same policy to search for the design problem."* (UD. Paper 115 – practice-based)

From concluding that the 4 participants share ways of thinking, the speaker extrapolates that all experienced designers share ways of thinking:

> *"It has been found in this study that designers have similar searching procedure in searching design strategy in applying digital and traditional media. The reason is probably that designers with years of experience have the same problem solving procedure in their design activity. No remarkable differences are found between different design tools or between design professions."*

Again, it is unlikely that studying 4 designers can allow insight into the actions of all designers. The speaker does not mention this issue in the study. It is evident that speakers are engaged in constructing a community of designers who are linked by their use of Design Thinking. Notably, the priority to construct this community outweighs the need to reflect on the appropriateness of the research process and the claims that speakers make.

There are a very limited number of instances in which speakers discuss other differences amongst designers. When speakers discuss differences, they tend to frame idiosyncrasies negatively. To illustrate, in Paper 33 (theoretical) the speaker notes differences between working methods used by different designers. (The paper is a theoretical review—the designers are hypothetical, not participants in a study). The differences relate to the use of sketching when designing an artefact. The speaker claims that sketching is an important aspect of the design process: designers work *"very often by means of sketching"* (CD. Paper 33). The speaker notes that some designers make less use of sketching than other designers: a particular designer *"doesn't need a large quantity of sketches"* (ID. Paper 33). This strategy can hold a designer back, for a designer who does not sketch very much *"has no accurate record of his own thinking and hence gets into difficulties in explaining clearly how his thinking proceeds"* (ID Paper 33). The inference here is that acting in an idiosyncratic manner causes a designer to be less agile in making connections between various aspects of the design process. It is as though the speaker ostracises the idiosyncratic designer for acting differently from the community of designers that the speaker has constructed.

In the data set there is one speaker whose observations parallel mine. The speaker (Paper 63) criticises Design Thinking research for ignoring the diversity of design practices. In-so-doing, the speaker claims that Design Thinking theory is commonly *"Decoupled from any one field or discipline of design"* (TR. Paper 63). Given the sheer range of design disciplines and professions, the speaker questions whether it is possible to form a single theory of Design Thinking:

> "Attending to the diversity of designers' practices and the institutions in which they work makes it questionable to generalize about a unified design thinking exhibited across all of them." (CR. Paper 63)

This criticism of ways of framing designers which are used in Design Thinking research stands alone in the data set.

In addition to working in a range of different disciplines, professional designers work at different levels of seniority. These are associated with different levels of responsibility. To illustrate, my own experience as a designer and design educator with many contacts in both Industrial Design and Automotive Design has taught me that, typically, a design manager will be responsible for the outputs of less senior staff. A junior designer will typically not have this

level of responsibility. In the data set, there is very little discussion on levels of seniority amongst designers. Paper 57 discuss this but focusses on the idea that they share Design Thinking in common. The speaker compares the approaches to problem-solving used by 2 designers (one a professional, the other a student). The speaker notes that the two participants (termed 'subjects' in Paper 57) divide problems into sub-problems at different stages in the design process:

> "We can observe that the different problem-solving strategies lead the two subjects to create subproblems at different stages of designing"
>
> (DN. Paper 57)

The speaker argues that the differences mean that the professional designer is more adept at detailing the design outcome than the novice. However, despite the difference in seniority and the level of outcome, both participants ultimately tackle sub-problems similarly:

> "Both novices and experts tend to handle design subproblems in the same way"
>
> (DN. Paper 57)

The speakers concludes that designers of different seniorities share access to Design Thinking. Design Thinking is therefore something that designers across disciplines can engage in:

> "Previous studies [22-24] suggest that the ability to systematically a problem is a remarkable skill in architectural design. This study suggests that the ability to recompose subproblems of design details is also a remarkable skill in industrial design"
>
> (FR. Paper 57)

In summary, ways of speaking found in pedagogical, practice-based and theoretical papers all contribute to the construction of a community of designers who practice Design Thinking. The way speakers construct designers echoes the way that speakers construct Design Thinking: designers are *agile*, *active* thinkers who make *make-connections*. Constructing a community of designers is therefore another aspect which helps speakers to construct Design Thinking as a progressive model. Speakers chastise designers whose practices differ from those used by the community: these designers are framed as less agile and less good at making connections. The use of chastisement therefore echoes the use of *mitigation*—both strategies help to maintain the idea that Design Thinking is a progressive model. Difficult-to-justify universal claims made by speakers make it questionable whether

the community of designers that speakers refer to exists beyond their research. The way in which speakers construct designers illustrates another instance in which the need to create discrete intellectual territory on Design Thinking outweighs a need to conduct rigorous research.

As many of the papers focus on design education, it is not surprising that the data set contains a great deal of discussion on design students. Speakers frame students as Design Thinkers. In-so-doing, speakers refer to students as *agile* thinkers who *make connections*. When signposting agility, speakers refer to students as demonstrating *"complex thinking"* (CD. Paper 104) and showing *"increased levels of intellectual development when compared with average undergraduate data"* (DL. Paper 20). When signifying the capability to make connections, speakers refer to the ability to comprehend users: "*students exhibited empathy in relation to understanding human needs"* (A. Paper 23).

Interestingly, the practice of criticising the intellectual abilities of design students provides an opportunity for speakers to maintain the now-familiar dichotomy between progressive Design Thinking and rigid dominant models. One speaker claims that non-design students may be more agile (*"more open vantage point"*) thinkers than design students:

> *"The higher mean scores for innovation by nondesign students may suggest willingness to look at problems from a more open vantage point."* (C. Paper 81)

This speaker suggests that his findings may be due to the negative influence of dominant models in education. Incorporating Design Thinking in to the curriculum will make design students more agile thinkers:

> *"design educators can use design thinking to structure design curriculum and to develop courses with broader applicability […] Secondary education that focuses on design thinking process (rather than product) should also be considered." (OA. Paper 81)*

Characteristically, design education is administered in subject areas at undergraduate level, meaning that learners study particular fields, like Fashion Design, Graphic Design or Industrial Design. In keeping with this paradigm, speakers make frequent reference to learners who are studying on a particular programme, discussing *"graphic design students"* (Paper 41); *"interior design and architecture students"* (Paper 20); *"ID (Industrial Design students), ARCH (Architecture students)"* (Paper 51). Speakers do not however frame design students primarily with regards to the subject they are studying. Learners are principally discussed with respect to their use of Design Thinking. Speakers argue that

learners studying on different courses think in the same way when tackling design problems. Analysis of Papers 51 and Paper 20 illustrates this pattern.

Paper 51 investigates how undergraduate students from 2 design programmes (Industrial Design and Architecture) solve design problems. The speaker sets the students a design brief and observes their responses. The speaker reports that both groups have a similar approach to tackling the design problem:

> "Undergraduate participants started the process with a short study of the brief; then most of them engaged in one information soliciting activity, followed by thinking about solutions and sketching them." (TR. Paper 51)

Paper 20 investigates similarities and differences between how Architecture students and Interior Design students think. The speakers find that students on both courses show the same level of Design Thinking:

> "[there are] no significant differences between the groups were found in terms of design thinking" (UD. Paper 20)

This way of constructing students—as, first and foremost, practitioners of Design Thinking rather than practitioners of a particular discipline—follows the pattern seen when speakers construct professional designers.

In addition to being administered in subject areas, design education is characteristically structured into year-based levels. Acknowledging this, speakers refer to *"secondary and tertiary participants"* (FR. Paper 28), *"Sophomore and junior design student"* (Paper 21), *"Undergraduate"* students (Paper 20), learners studying on "postsecondary design" programs (RI. Paper 81) and *"Design PhD candidates"* (Paper 51). Speakers claim that learners studying at higher levels are more efficient problem-solvers than those studying at lower levels: decisions made by university students entail *"lower cognitive costs"* (DN. Paper 28) than those made by pre-tertiary learners; undergraduates are less effective problems-solvers than PhD students as they *"have fewer fixed routines"* (DN. Paper 51). In keeping with this hierarchical pattern, speakers claim that professional designers are more efficient problem-solvers than students: professionals *"approach the design problem directly at its goal state"* (DN. Paper 57); students are less effective as they *"typically did not elaborate parts of the whole"* of the design challenge (DN. Paper 81).

The manner in which differentiation between expert and novice seen in the data set echoes that commonly seen in Design Thinking literature. To illustrate, Bryan Lawson differentiates between:

> "how really expert designers work and how this might be different from the way novice designers work."
>
> (Lawson, 2005, viii)

The findings on cognitive efficiency illustrate the first sustained evidence of speakers constructing differences between design students, and between design students and design professionals. On initial analysis, this focus on difference runs contrary to the pattern for creating a community of designers described in this chapter. Further analysis however shows that this is not the case. The speakers who discuss difference also argue that when necessary, designers can think like students and vice versa. When analysing design problems, students can tackle them like professionals: *"[the student designer] could pass to the goal state and perform as experts to search for proper knowledge to solve the problem."* (DU. Paper 57). Equally, designers can think like students in professional practice: *"an expert can be regarded as 'a novice' when tackling problems […] from a new perspective"* (DU. Paper 57). This interesting situation shows that speakers construct professional designers and students as linked by their ability to practice Design Thinking. The validity of this link is highly questionable for it is inconceivable that undergraduate students can perform like individuals with many years of experience in professional practice.

Interestingly, the link between the way that students and professionals think is present in the existing design literature. 2 paragraphs above, Lawson (2005) argues that novices and experts work in different ways. However, concurrently, Lawson claims that a particular approach to problem-solving is used by designers of different levels. Professional designers understand design problems as they go about working to solve them:

> "It seems more likely that design is a process in which problem and solution emerge together."
>
> (Lawson, 2005, p.48)

Lawson also claims that students can work like professional designers as their understanding of problems emerge through the process of trying to solve them:

> "[Students] learned about the problem through attempts to create solutions rather than through deliberate and separate study of the problem itself."
>
> (Lawson, 2005, p.44)

My analysis on how designers and design students are framed in the data set has shown that speakers construct a community of people who practice Design Thinking. I term this *the Community of Design Thinkers*. The emphasis on Design Thinking is not surprising given the fact that the data set focusses on this problem-solving tool. The range of strategies which speakers use to construct the community is, however, of interest. In creating the community, speakers background the issues of disciplinary difference as well as levels of seniority. Resultantly, speakers create an abstract idea of a community. Underpinning the construction of the community are bad research practices as speakers create what they claim to broadly applicable commonalities between designers from observations of very small data sets.

It is valuable to reflect on why speakers may be reticent to discuss difference. Focussing on difference—either between designers, or between design students, or between designers and design students threatens to undermine the concept of the Community of Design Thinkers. This in turn would call into question the validity of the domain that the researchers are trying to claim ownership over. The reticence to explore difference may help to explain why speakers both chastise designers who do not belong to the community and create difficult to justify connections between design students and professional designers.

My observations on how speakers frame designers and design students extend the findings of Study 2. Content analysis of full papers has given me in-depth insight into both the idea of the Community of Design Thinkers and the problems which are inherent in its construction.

6.4 How Speakers Frame Existing Design Research and Their Own Findings

Reference to existing research accounts for a considerable portion of the articles. In addition, speakers authoring both pedagogical and practice-based papers often discuss their own findings at length. This is because both types of papers contain primary research. I identified 4 themes which are associated with these issues:

Theme 1: How Speakers Frame the State of the Field
Theme 2: Speaking on Existing Research
Theme 3: Speaking on Research Processes and Findings
Theme 4: Mitigation

Theme 1: How Speakers Frame the State of the Field

The pattern is for speakers to claim there is an established history of research on the domain. Investigation on Design Thinking *"has been the subject for design research for some time."* (LH. Paper 88); "*Researchers have long been interested in design thinking"* (LH. Paper 13); *"design thinking has been the center of much attention in recent years"* (LH. Paper 29). In all paper types, speakers argue key principles in the domain are established. Design Thinking theories have *"gained momentum"* (LH. Paper 50 – pedagogical); *"Many in the Design Thinking community [see the value of] design methods and cognition in the face of global-scale challenges"* (LH. Paper 16 – pedagogical); In acknowledging the dynamic and varied contextual scope of problems, design thinking is significant" (PS. Paper 117 theoretical).

Claiming a long history of investigation and the presence of established principles helps speakers to claim authority over their domain. The fact that classifications differ between speakers however suggests that the domain is far from established. Therefore, despite their claims, the evidence suggests speakers in all paper types do not have authority over their domain.

Speakers rarely note differences of opinion within the community. When they do, they use terms like *"embraced"* and "*rich and varied"* to suggest that differences should be celebrated. Phrases like "*a constant definition is not necessarily needed, or even desirable"* and *"a varied understanding of a very complex human reality" and "resists reduction"* point to the idea that Design Thinking may be too complex to adequately classify:

> *Just as there are various terms for design thinking, there are multiple definitions for each of these terms (Blizzard & Klotz, 2012; Charnley, Lemon, & Evans, 2011; Coley & Lemon, 2009). This ambiguity should be embraced; a constant definition is* ***not necessarily needed, or even desirable****."* (TR. Paper 12 - pedagogical)

> *"Multiple models of design thinking have emerged […], based on widely different ways of viewing design situations and using theories and models from design methodology, psychology, education, etc. Together, these streams of research create a rich and* ***varied understanding of a very complex human reality****."* (EA. Paper 34 - theoretical)

> *"Despite efforts to discover the foundations of design thinking in the fine arts, the natural sciences, or most recently, the social sciences,* ***design eludes reduction*** *and remains a surprisingly flexible activity"* (CR. Paper 15 - theoretical)

Terms like *"very complex human reality"* elevate the status of Design Thinking, and by association, the research community. To illustrate, one speaker argues that researchers need to *"have the wit to discover what is useful in each other's work [so that they can construct] their own vision of design thinking"* (TR. Paper 15). Focussing on complexity also highlights the difficulty of the domain, mitigating the lack of agreement on classifications and reframing disagreements as healthy. The strategy foregrounds a sense of harmony amongst speakers and backgrounds signs of divisions. Focusing on the complexity of Design Thinking also helps speakers to maintain the dichotomy between *progressive* Design Thinking and *rigid* dominant models.

Theme 2: Speaking on Existing Research

Much of the existing research found in the data set comes from within the field of design research. When speaking on existing design research, the pattern is for speakers authoring all types of papers to evidence their agreement with existing design research. Terms like "*widely recognized*" and *"reveal"* signal the consensus within the tribe on key ideas:

> *"While there may never be agreement on a single definition of design thinking, the need for design thinkers is* ***widely recognized*** *(e.g., (Brown, 2008; Charnley et al., 2011; Coley & Lemon, 2009; Dym, 2008; Dym, Agogino, Eris, Frey, & Leifer, 2005))."* (TR Paper 12 – pedagogical)

> *"Lloyd and Scott 16* ***reveal*** *that experienced designers seem to use localized strategies to decompose and recompose the design problem, while less experienced designers seem to use global strategies to solve the problem."* (TR Paper 57 - theoretical)

The focus amongst speakers for agreeing with existing research underscores the prerogative for creating a research community which appears coherent. This enables speakers to claim discrete intellectual territory.

Speakers commonly claim there are gaps in knowledge in Design Thinking research. Claiming the presence of gaps is normal practice in all academic fields as it legitimates the need for speakers' research. (Claiming gaps in my Literature Review Chapter was a fundamental step in allowing me to conduct the analysis in this thesis!). In every instance, in every paper type, claiming gaps enables speakers to make contributions. The practice of claiming gaps in knowledge is fundamentally different to that of claiming there are inaccuracies or discrepancies in existing research. The practice of claiming gaps is therefore not evidence of criticism of existing research. Speakers rarely criticise existing design

research. When doing so they focus on aspects which threaten the now-familiar dichotomous ways of speaking on Design Thinking. To illustrate, in Paper 51 the speaker uses the term *"flexibility of thought"* to construct Design Thinking as an agile practice:

> *"[designers'] processes are expected to be systematic but not rigid and* ***flexibility of thought*** *and exploration are key concepts."* (CD. Paper 51 – pedagogical)

The speaker uses the term *rigid* to claim that some existing design research misrepresents the agile nature of Design Thinking:

> *"Textbook methods (e.g., Birkenhofer, 2011; Pahl & Beitz, 1984; Roozenburg & Eekels, 1995; Ullman, 1992/2003) are on the* ***rigid*** *side."* (FR. Paper 51 – pedagogical)

In another instance, a speaker aims to understand how designers solve problems. The speaker criticises the rigidity (*"not only a"*) inherent in some existing models which attempt to explain how designers solve problems:

> *"designing is* ***not only a*** *general search as Simon described it or the seeing-moving cycles that Schon describes"* (CR. Paper 70 – practice-based)

The speaker argues that Design Thinking is more *"complex*", and designers are more agile than some existing research supposes:

> *"design knowledge may involve* ***complex*** *performances embedded in design thinking; these are much more sophisticated than the procedure of pattern-matching/rule application which is relatively straightforward."* (TI. Paper 70 – practice-based)

In a further example, a speaker (Paper 64) attempts to construct a theory of Design Thinking. The speaker argues that existing Design Thinking theory has a limited view of the design process. Design Thinking theory is limited as it focusses on how designers work when solving problems. Often Design Thinking theory:

> *"rel[ies] predominantly on [investigating] the agency of designers to understand design"* (TR. Paper 64 – practice-based)

The speaker claims that the tendency for existing research to focus mainly on how designers work limits researchers from being able to understand the complex *("messy, contingent combination")* nature of design:

> *"[to form a better understanding of Design Thinking, researchers must] switch the unit of analysis from individual actors or society and its norms, to a **messy, contingent combination** of minds, things, bodies, structures, processes, and agencies."* (CR. Paper 64 – practice-based)

Ways of speaking which are used when criticising existing design research echo the approach that speakers take when describing the state of the field. The imperative is for speakers to maintain the familiar dichotomous way of speaking on Design Thinking—to focus on the complexity of Design Thinking whilst rejecting theories that limit the tendency to focus on its complexity.

A relatively small proportion of existing research comes from areas which lie outside of design domains. Speakers concur with existing non-design research when it highlights the complexity of Design Thinking. This pattern is seen in all 3 types of paper. In one instance (in Paper 100), the speaker discusses the concept of *Rhizomes* as developed by the philosopher Gilles Deleuze and the semiotician Felix Guattari. The speaker claims a rhizomatic perspective asks humans to question the value of rigid perspectives and to appreciate more open-minded ones (*"unexpected ways"*). A rhizomatic perspective:

> *"Requires a diverse range of activities and encounters that bring together our world and our experiences in **unexpected ways**."* (TR. Paper 100 - pedagogical)

The speaker claims that the rhizomatic perspective helps researchers to better understand that Design Thinking facilitates an open-minded approach to seeing the world. Below, the term *"multiple, ever-changing understandings and perspectives"* highlights the agile nature of Design Thinking; the phrase "*everything is connected to everything else"* underscores the idea that Design Thinking helps people to make connections; the term *"vagaries and compound causal relations"* emphasises the complexity of Design Thinking:

> *"Deleuze & Guattari's rhizome allows a visualisation of **multiple, ever-changing understandings and perspectives**. It reminds us that there is no right way to proceed except not to proceed; **everything is connected to everything else**. In this way, the rhizome helps to highlight the value of **vagaries and compound causal relations** that are constantly occurring during the process of design."* (TR Paper 100 - pedagogical)

In another example, a separate speaker discusses the Anthropologist, Claude Levi-Strauss' concept of *Bricolage*. The word *bricolage* describes a world view used by what can be thought of as jack-of-all-trades craftsmen (termed *bricoleurs*). In the following quote, the term *"redefines the means that he already has"* highlights the intellectual agility of the bricoleur.

The phrase "*an inventory of semi-defined elements"* underscores the complexity of bricolage:

> *"The bricoleur* ***redefines the means that he already has****. He uses* ***an inventory of semi-defined elements****: they are at the same time abstract and concrete. They carry a meaning, given to them by their past uses and the bricoleur's experience, knowledge and skill, a meaning which can be modified, up to a point, by the requirements of the project and the bricoleur's intentions"*
>
> (TR. Paper 71 - theoretical)

The speaker claims that comparison with bricolage helps researchers to better understand Design Thinking:

> *"We have analysed the satisfaction a well-designed artefact gives to the beholder. The affective aspect of the design process allows us to explain its complement: the satisfaction a well-designed artefact gives to its designer."* (TR. Paper 71 - theoretical)

Associating bricolage with Design Thinking therefore allows the speaker to highlight the agility and complexity inherent in Design Thinking.

Speakers criticise existing non-design research when it challenges the association between Design Thinking and the concepts of agility and complexity. This allows another lens by which to understand how speakers maintain the dichotomy. Analysis of discussion of *visual thinking* in Paper 50 highlights an example of this form of criticism. The speaker argues that Design Thinking primarily occurs through *visual thinking*—a process where designers use sketching to solve problems:

> *"a look at what visual thinking means to the designer, and specifically to the architect. The need for visualization is recognized by almost all designers in diverse fields"* (TR. Paper 50)

Constructing a comparison with computerised problem-solving allows the speaker to highlight the complexity of visual thinking:

> *"No sophisticated tools such as the computer era provides us with can bypass creative visual thinking […]* visual thinking is in no way inferior to other modes of cognition" (AE. Paper 50)

The speaker criticises non-design research for diminishing the value of visual thinking. The speaker claims that non-design research does not recognise the complexity of Design Thinking. Instead non-design research frames it as *"rudimentary"*:

> *Thinking in pictures is seen as developmentally **rudimentary**, a prelinguistic phase of cognitive functioning, befitting the young and the inexperienced. In the words of a leading cognitive scientists [sic]: 'children have pictures where the adults have words' (Fodor 9, p 64)."* (TR. Paper 50; original emphases)

The speaker frames this belittling viewpoint of Design Thinking as presenting the dominant ("*mainstream"*) perspective in non-design research:

> *"Thinking is, in **mainstream** contemporary cognitive science, strongly identified with language: its acquisition, production and development* (TR. Paper 50)

This section has shown that both concurring with, and criticising, existing non-design research enables speakers to maintain dichotomous, *designerly ways of speaking*.

Theme 3: Speaking on Research Processes and Findings

Speakers use existing literature and feedback from primary sources to reflect on the appropriateness of their research process and the nature of their findings. Speakers also reflect on their own merits as researchers.

In all 3 paper types, speakers consistently claim that their findings are in accordance with principles or observations established in existing Design Thinking research. Use of terms like *"align"* or *"in line with"* underscore this point: a "*case study therefore **aligns** itself with the design theory covered at the beginning of the article"* (FR. Paper 24 – pedagogical); *"results are **in line with** Sawyer's (2012) findings"* (FR. Paper 60 – pedagogical); *"**quite similar as** reported in Akin's study"* (FR. Paper 57 – practice-based). This trend further enables speakers to construct the idea of consensus amongst Design Thinking researchers, helping to present the domain as established.

When speakers note that their findings disagree with existing research, speakers tend to claim that the existing research presents overly-rigid representation of Design Thinking. To illustrate, a speaker claims that findings demonstrate that existing research is overly prescriptive when recommending steps in design practice:

> *"*These findings converge to show that in open-ended design tasks and under time constraints, methodological prescriptions should be eased" (FDR. Paper 51)

Some speakers collect primary data in the form of opinion from experts. Experts include designers, exhibition directors and teachers. In every instance the speaker claims that the expert corroborates the effectiveness of the speaker's research process. In addition, in every instance, the speaker's research process highlights the progressive nature of Design Thinking. Speakers use emotive terms such as *"challenging and exciting"*, *"harnessing the voice"* and *"immense difference"* to illustrate their point: *"**Harnessing the voice** and power of students was important to the teacher and she saw design work as a process for doing that."* (FR. Paper 23); *"an **immense difference** becomes apparent: The mood of [students groups taught using another educational] drops drastically while that of Design Thinking coaches takes off."* (FR. Paper 92); *"The Museum Executive […] recognizes these expanded student skills as an indication of what new designers will be bringing to the profession"* (FR. Paper 41).

Use of secondary and primary sources to reflect on findings provides another avenue to enable speakers to claim that the research community is established and in agreement on key issues. It also allows a further avenue for speakers to construct the dichotomy between progressive Design Thinking and rigid threats to it.

When speakers reflect on their merits as researchers they discuss the validity of their hypothesis and the choice of research method. Speakers consistently claim that their findings confirm the validity of their hypothesis:

> *"As hypothesized, there were distinct differences between the practice and the outcomes of the secondary and tertiary participants."* (FR. Paper 28)

> *"the misrepresentation of the chronological order of events in [the particpant's] memory matches our theory"* (FR. Paper 50)

Similarly, when reflecting on their findings, speakers highlight the effectiveness of their methods:

> *"On average all three groups rated the difficulty of the task as 3 on a scale of 1-5, which confirms that the brief was appropriate for this sample of designers."* (TR. Paper 51).

Confirmatory self-reflection allows speakers to claim they are established researchers. The trend therefore is for speakers to view themselves as established researchers within an established domain. This pattern helps to deflect from the trend for uncritical and idealistic ways of speaking seen in the data set and the lack of coherence amongst speakers. Further insight into the lack of criticality comes from discussing instances of mitigation.

Theme 4: Mitigation

There are instances when speakers report findings which either do not mirror observations present in existing Design Thinking research or are not in keeping with the hypothesis which the speaker presents in the paper. When faced with these issues, speakers view their findings though an alternative lens. The lens helps speakers to claim either that their findings mirror expectations present in existing Design Thinking research or that the underlying hypothesis is valid. Mitigation allows speakers to claim the community has a coherent understanding of the domain and to disseminate the agility and complexity of Design Thinking.

Mitigating Findings Which do not Mirror Observations Present in Existing Research

The practice of mitigation is Paper 57 analyses designers' problem-solving processes by observing practitioners at work. The speaker begins by noting classifications of Design Thinking steps present in existing research. The speaker focusses on the way in which designers break down design problems (the speaker terms this process *problem-decomposition*):

> *"Previous studies indicate that designers use **problem-decomposing** strategies to decompose ill-structured problems into subproblems[8,10]"* (Paper 57)

When reflecting on the primary data, the speaker claims that the results do not concur with the classifications present in existing research:

> *"However, we see no obvious problem-decomposing strategies in the whole set of [the participant designer's] protocols."* (Paper 57)

Conceivably, the findings could lead the speaker to criticise existing Design Thinking research for inaccurately classifying problem-solving steps used by designers. The speaker

does not follow this path. The speaker argues that, if viewed another way, the findings can be thought of as being in line with observations present in existing research. The speaker's argument centres on the way in which the participant designer communicates his problem-solving strategies. The speaker differentiates between *explicit* and *implicit* modes of communication. If the designer communicates *explicitly* when he decomposes the design problem into sub-problems, the results can be deemed to confirm observations present in existing research. The speaker claims that rather than communicating explicitly, the participant designer acts *implicitly ("'implicit problem-decomposing strategies'"*). The implicit processing means that the findings are, after all, in line with observations present in existing research:

> *"Nevertheless, if we represent [the participant designer's] procedure of search according to the level of abstraction of each design element, we can still find that there exists a tree structure (Figure 7) in the problem space. The design problem was still decomposed into several subproblems to be dealt with. We can therefore say that there are still some problem-decomposing strategies existing in [the participant designer's] design process. In other words, [the participant designer] defined the node of each subproblem and created the structure of the problem step by step depending on his search path. Therefore, this study refers to these strategies as 'implicit problem-decomposing strategies.'"* (Paper 57)

Mitigation allows the speaker to underscore the sense of harmony and consensus in Design Thinking research, whilst deflecting signs of division amongst researchers. At the same time, framing Design Thinking steps as *implicit* rather than *explicit* helps the speaker to claim that Design Thinking is more complex than previously thought. To underscore the focus on complexity, the speaker claims that additional research is needed to understand Design Thinking:

> "in order to further increase the designer's ability in managing complex problems, further research focusing on the relationship between problem-decomposing strategies and working memories, and on how knowledge proceduralization[7,6] affects the search strategies should be conducted." (AN. Paper 57)

Mitigating Findings which are Not in Keeping with the Speaker's Hypothesis

Paper 12 investigates traits of students who exhibit Design Thinking skills and the future aspirations of these learners. The speaker argues that students who exhibit Design Thinking skills evidence the following traits: collaboration, experimentalism, optimism, feedback-seeking, and integrative thinking. These agile, progressive traits echo traits identified in existing research:

> *"The traits […] align closely with the literature (Blizzard & Klotz, 2012; Brown, 2008; Dym et al., 2005)."* (Paper 12)

The speaker hypothesises that students who possess these traits will pursue environmentally sustainable lifestyle choices. Testing the hypothesis involves analysing qualitative data gathered from the participating students. Analysis suggests that in all but one of their lifestyle choices, learners with Design Thinking traits do indeed want to promote environmental sustainability. Students however do not engage with environmentally sustainable food choices:

> *"Counterintuitively, design thinking was a negative predictor of considering the energy or ecological impact of food choices"* (C. Paper 12)

The issue of students' food choices therefore potentially runs against the hypothesis outlined in the article. The speaker mitigates the effects of this finding by claiming that students with Design Thinking traits may not fully understand the link between food choices and environmental concerns:

> *"…perhaps because this an action not well understood or not as closely identified with sustainability as some of the others."* (C. Paper 12)

Mitigating the issue of food choice enables the speaker to both align their findings with existing research and prove the validity of the hypothesis. In-so-doing, the speaker both signals coherency and stability in the research community and underscores the agility associated with Design Thinking.

6.3 Summary of Findings

I present the summary of findings as they relate to the 4 sub-themes of the research question. I then provide figures showing the intellectual territory and the lexicon which drives *designerly ways of speaking*.

6.3.1 Forming Intellectual Territory

Speakers are highly focussed on classifying Design Thinking. This demonstrates that speakers value the practice of claiming ownership over their domain. This aspect is not

surprising, as academic tribes thrive by claiming ownership over their area of specialism (Becher and Trowler, 2001). What is interesting however is the way speakers try to claim ownership. Speakers use natural science-derived, taxonomic-style descriptions and ones which resemble mathematical formulae. Association with these long-established ways of claiming knowledge provide speakers with a sense of legitimacy. However, closer inspection shows that classifications vary from speaker to speaker, suggesting that the intellectual territory is not as established as it first appears to be. In papers which contain primary research, broadly applicable classifications of Design Thinking steps tend to emerge from investigating very small data sets of designers. These examples of bad research practice cast doubt over the legitimacy of classifications. The imperative to classify and form intellectual territory therefore takes priority over the need for good research practice.

Interestingly, some speakers reject the need to classify Design Thinking. Dichotomous ways of speaking underpin the reticence to classify: the idea that Design Thinking is too *complex* to describe effectively and the fear of associating the domain with *rigidity* are key:

> *"design knowledge may involve complex performances embedded in design thinking; these are much more sophisticated than the procedure of pattern-matching/rule application which is relatively straightforward."* (TI. Paper 70)

There is therefore an interesting friction between the impetus to classify (and be taken seriously as an academic tribe) and the need to reject classification. I speculate on what may drive this friction in the Discussion Chapter (Chapter 8).

The use of stark dichotomy also cements the process of boundary-formation. Speakers associate the domain with other approaches or philosophies which they frame as being *agile* and *progressive*. Terms like *open, inquisitive*, *collaboration* and *multimodal* are used to associated Design Thinking with approaches including New Media education, innovative spinal surgery and bricolage:

> *"[New Media educators] have championed similar abilities such as constructive thinking, problem-solving,* ***collaboration****, and multimodality, to name a few…"* (DE. Paper 16).
>
> *"[Innovative surgeons] have curious,* ***open*** *and* ***inquisitive*** *minds, preferably not swayed by prejudice."* (DL. Paper 26)

In contrast, speakers separate their domain from approaches which they perceive as being *dominant* or *rigid*. Established approaches which speakers distance their domain from

include traditional models used in primary and secondary education, and aspects of design practice, research or education which focus on form development to the detriment of facilitating the advancement of problem-solving skills. Terms including *standardized, rigid and follow suit* are used to describe less effective existing traditional models:

> *"[established education systems] that prioritize[] **standardized** test scores"* (TT. Paper 41)
>
> *"[established education models make people […] follow suit without [allowing them to question[…]] the prevailing assumptions and practices* (TT. Paper 26).

The act of separating Design Thinking from some aspects of design which they perceive as being detrimental suggests that speakers view their domain in an idealistic manner. Design Thinking is framed as *pure*, unsullied by less virtuous aspects of other design domains. The idea that Design Thinking is *actually* separable from other design domains is difficult to justify. This adds to my argument that, for speakers, the push to create intellectual territory overrides the need to engage in good research practice. It also shows that use of particular terms helps speakers to create the questionable dichotomous territory.

6.3.2 Framing Design Thinking

Speakers frame Design Thinking as a highly potent problem-solving tool which can tackle difficult issues both across disciplines, and in people's professional and personal lives. In view of this, Design Thinking is framed mainly as a socially engaged practice. Again, framing Design Thinking as *agile*, *progressive* and *complex* helps speakers to make their point. Terms such as *essential*, *crucial* and *revitalize energies* help speakers to create this frame:

> *"[Design Thinking plays an] **essential** role in human development"* (A. Paper 60)
>
> *"[Design Thinking can] **revitalize energies** devoted to re-thinking"* (OA. Paper 54).

In creating the frame, speakers do not discuss commercially-driven aspects of design practice. They background the fact that much design practice takes place in environments like consultancies which need to generate income to remain sustainable. The focus on social engagement appears to be a frame which helps speakers to claim the domain of Design Thinking belongs to the tribe and not to design practitioners. The method of framing Design Thinking is another aspect of the idealistic and uncritical way in which speakers discuss

Design Thinking. The issue of *Framing Design Thinking* again highlights the place that specific terminology plays in allowing speakers to create the dichotomy.

The issue of mitigation provides a distilled example of the reliance on idealistic and uncritical ways of speaking. The move to frame Design Thinking as *agile* and progressive when the speaker's findings suggest Design Thinking could be framed as *rigid* underscore the importance of dichotomous ways of speaking in facilitating idealistic and uncritical narratives in the data set.

Of note, speakers use highly emotive language to argue the benefits of Design Thinking. This focus on emotive language differs from the language which is normally used in academic research. Emotive terms may help speakers to background poor research practice and idealism, further underscoring the place that terminology plays in constructing the dichotomy. The terminology represents the *designerly ways of speaking* which help to establish the Design Tribe.

6.3.3 How Speakers Frame People

Speakers make use of dichotomous ways of speaking to framing designers as successful the successful problem-solvers. Designers are framed as *agile* in contrast to professionals from other, more established disciplines who are not. Again, use of specific terms helps speakers to create the dichotomy. Terms including *alterness*, *alterness* and *reflecting* signal intellectual agility:

> *"[designers show] an intellectual **alertness** to life around them"* (UD. Paper 54)
>
> *"[designers possess] the key skill[] of **reflecting**"* (DU. Paper 24).

Speakers use terms including *unlike* and *obverse* to signal that designers are more effective problem-solvers than professionals from more established backgrounds:

> *"Design thinking is in many ways the obverse of scientific thinking."* (CD. Paper 82)
>
> *[designers' decision-making processes] are "Unlike traditional decision making" processes* (DU. Paper 24).

The UK government's support of natural science subjects over and above subjects like design demonstrates the way speakers frame designers as being idealistic and uncritical.

This issue provides another lens with which to highlight the important part that specific terminology plays in constructing difficult to justify dichotomous ways of speaking

Construction of the *Community of Design Thinkers* is key to enabling speakers to frame designs and students. Ways of speaking which are key in creating the community background difference to create abstract collection of individuals. The inference is that discussing difference would destabilising efforts made by speakers to construct the idea of a ways of thinking (Design Thinking) that links all designers and design students. Foregrounding difference would therefore cast doubt over the validity of the intellectual territory.

6.3.4 The Collection Code

The focus on agreement on key issues and downplaying of disagreements helps to suggest the presence of an established and rigorous research community. I have however noted that the presence of incoherent classifications suggests that the tribe is not as established as it would like to be perceived. The familiar dichotomous narrative drives how speakers discuss existing research: speakers agree with existing findings which suggest Design Thinking is *agile*, *complex* or *progressive*; speakers criticise existing research which present Design Thinking as *rigid*. Specific terms including *methodological prescriptions* help speakers to construct the idea that Design Thinking should not be made into a *rigid* process:

> *"These findings converge to show that in open-ended design tasks and under time constraints, methodological prescriptions should be eased"* (FDR. Paper 51)

Use of mitigation maintains the dichotomy when speakers' results suggest that it could be critiqued. The use of mitigation in constructing the Collection code therefore echo how this strategy is used when speakers frame Design Thinking.

6.3.5 The Intellectual Territory

Ways of speaking found within the data set which narrate the *complexity*, *progressiveness* and *agility* of Design Thinking while describing the *rigidity* and *dominance* clearly indicate the presence of a dichotomous intellectual territory. Speakers do not raise any grey areas which

may blur the dichotomy. The lack of discussion on grey areas in the data set helps me to confidently claim that the dichotomy exists.

Figure 42 shows key aspects of the intellectual territory speakers associate with Design Thinking. Figure 42 illustrates the dichotomy between territory speakers associate with Design Thinking and that which speakers link with models that are *not* Design Thinking (here termed, *non-Design Thinking*.)

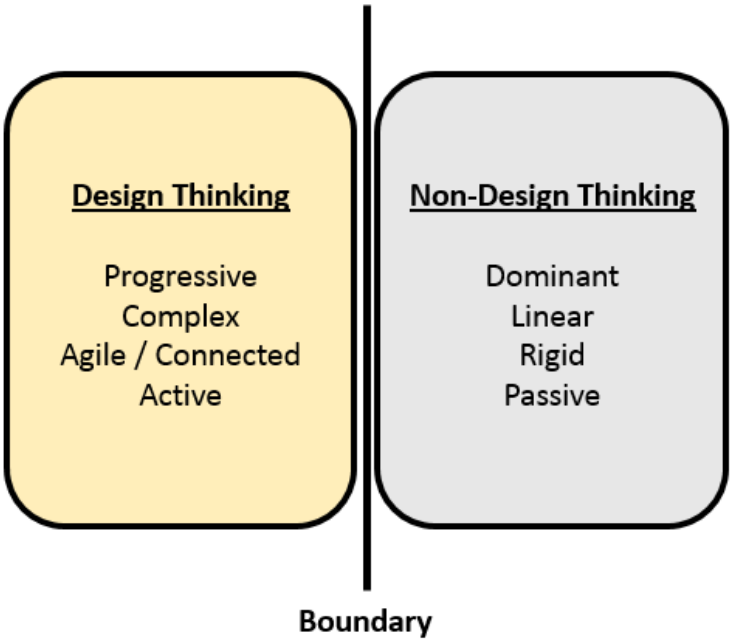


Figure 42: The Intellectual Territory Speakers Associate with Design Thinking.

I have noted that use of particular terminology allows speakers to create the intellectual territory. Figure 43 illustrates some of the terms that I have noted in this chapter. The table does not include every term used in all 45 papers in the data set, for this reason it is not exhaustive. Figure 43 is therefore an *emerging lexicon* of terms used by speakers in their attempts at establishing the intellectual territory. I term this *An Emerging Lexicon of Design Thinking*:

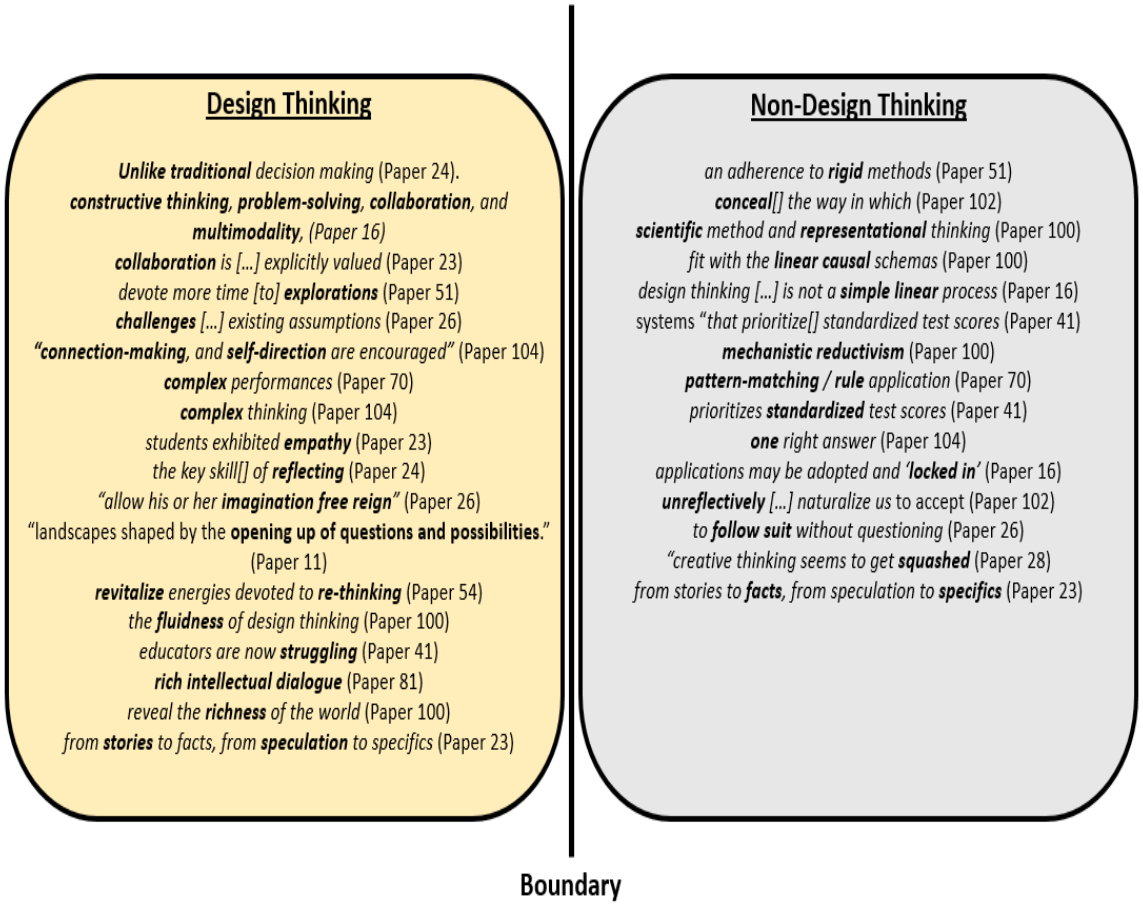


Figure 43: An Emerging Lexicon of Design Thinking

As I have noted in this chapter, the Lexicon of Design Thinking allows speakers to write the intellectual territory—with its reliance on methodological flaws, incoherent classifications, ideological and uncritical narratives—into existence.

6.3.6 The Contribution to Knowledge

I am not the first to describe dichotomous intellectual territories in design research. Maciver et al. (2016) present differences between *Technologists* (non-designers / scientists) and *Designers* in a dichotomous format (Figure 44)[49]:

[49] This figure first appeared on page 40 of this thesis, there it was numbered as *Figure 12.* In Figure 42, I have swapped the positions of the 'Arts' and 'Sciences' columns to make the graphical format align with and that of my lexicon (Figure 43).

Arts	***Sciences***
Creativity, language	Mathematics, physics, engineering
Intuition, subjectivity	Logic
Right brain	Left brain
Holistic, chaotic, divergent	Linear, sequential
Naturalistic enquiry	Reductionist enquiry
Interpretive forms, subjective expression	Facts, figures, formulae
Many solutions	One correct answer
Designers - product designers, interface designers, design researchers, graphic designers…	***Technologists*** - computer scientists, software engineers, information science experts, coders…

Figure 44: A comparison between traits associated with 'technologists' and 'designers'. Adapted from Maciver et al. (2016, p.3)

My description of ways of speaking parallels Maciver et al.'s. To illustrate, the phrase ***subjective expressions*** in the Designers' territory in Maciver et al.'s dichotomy mirrors the terms ***stories*** *and* ***speculation*** in the Design Thinking terrain in my lexicon. Equally, the terms ***linear*** and ***sequential*** in the Technologists domain in Maciver et al.'s dichotomy parallel the phrase ***fit with linear, causal schemas*** in my lexicon. I cannot therefore claim that my description of dichotomous intellectual territories is an original contribution to knowledge on Design Thinking. Maciver et al. take it for granted that the dichotomous territory is valid. Other researchers have attempted to unpick aspects of the territory. New and Kimbell (2013) argue that Design Thinking researchers commonly create a false dichotomy between the way that designers think and the way that scientists think. New and Kimbell claim that researchers maintain the false dichotomy by creating a skewed caricature of the way scientists think. The way that designers think is:

> "repeatedly characterized in opposition to a caricature of rationalist, analytical 'orthodox' approaches"
>
> (New and Kimbell, 2013, p.139; original emphases)

Similarly, Farrell and Hooker (2013, p.683) argue that influential work on Design Thinking is "fundamentally flawed" in its depiction of the way scientist think. Farrell and Hooker claim that design theorists construct an erroneous dichotomy between design and science which propagates a myth that scientific problems are not wicked. Farrell and Hooker argue that, contrary to the beliefs of design researchers, scientific problems are indeed wicked. Furthermore, Farrell and Hooker (2013, p.701) suggest the existence of an intrinsic relationship between the way designers and scientists think, for both are the "product of a

common core cognitive process". Both New and Kimbell's (2013) and Farrell and Hooker's (2013) arguments result from literature reviews of a small selection of existing research. Neither New and Kimbell's, nor Farrell and Hooker's arguments result from the use of methods designed for analysing ways of speaking. I have used methods which are specifically designed to investigate ways of speaking to unpick the way that speakers present the dichotomous territory. My use of content analysis in particular has demonstrated that the consistent pattern for uncritical and idealistic ways of speaking combined with reliance on flawed research methods makes the territory unsound. I have shown that the emerging dichotomy—and the resulting *designerly ways of speaking*—allows speakers to effectively write the domain of Design Thinking into existence. This is an important, original contribution to Design Thinking research.

Chapter 7

Discussion

I discuss the results as they relate to the 4 issues which are central to my research question. The issues are:

7.1 Formation of Intellectual Territory
7.2 How Speakers Frame Design Thinking
7.3 The Collection Code
7.4 How Speakers Frame People

Use of critical theory from the post-structuralist thinkers Giles Deleuze and Felix Guattari (2004) allows me to discuss issues which may sustain ways of speaking found in the Design Thinking data set.

7.1 Formation of Intellectual Territory

7.1.1 Classification and Boundary-Formation

The design historian Adrian Forty (2000) argues that modernist design which dominated the Early and Middle Decades of the 20th Century is synonymous with a distinctive lexicon. Designers and architects used the lexicon when discussing modernist principles:

> "Modernist architecture, as well as being a new style of building, was also a new way of talking about architecture, instantly recognizable by a distinctive vocabulary: Wherever two or more of the words 'form', 'space', 'design', 'order', or 'structure' are found in company, one can be sure that one is in the world of modernist discourse".
>
> (Forty, 2000, p.19, Original Emphases)

Terms like *form, order* and *structure* represent ways of seeing the world which are highly defined. They underscore the value that leading figures like Walter Gropius placed on repeating, mathematically-defined aesthetics (*forms*) as a means of creating social cohesion (*order*). In the following quote from Gropius, use of the term *order* helps to convey the idea that modernist design will create a better future for humankind:

> "Mechanisation can have only one object: to abolish the individual's physical toil of providing himself with the necessities of existence in order that hand and brain may be set free for some higher **order** of activity."
>
> (Gropius, 1935, p.25; my emphasis)

Such is the importance of these ways of speaking, Forty places their influence above that of the colossal architectural achievements of the Early and Middle Decades of the 20th Century. In-so-doing, Forty argues these ways of speaking remain the *"most 'real' aspect"* of the modernist era (Forty, 2000, p.20; original emphasis). Similarly, Bearn (1992) underscores the significance of the modernist lexicon, claiming the ways of speaking provided the associated architectural schemes with a sense of legitimacy:

> "…modernism was not […] a set of buildings; it was more basically a body of documents defining modernism and interpreting those buildings."
>
> (Bearn, 1992, p.228)

Post-modern design (such as the Memphis movement of the 1980s) has sought to critique and replace modernism. Forty (2000) argues that post-modernist movements have not succeeded in doing this. Writing in the year 2000, Forty, argued that modernist ideologies dominated all the way through the 20th Century and will continue to do so in the 21st: "modernism drove out all previous vocabularies, and there is none to take its place" (Forty, 2000, p.20). My findings suggest that Forty may not be correct in his assumptions on the make-up of 21st Century *designerly ways of speaking*.

In Study 3, my illustration of the intellectual territory (Figure 42) summarises the idea that speakers in the Design Thinking data set reject highly structured, ordered (*"linear";* "*standardized"*) ways of seeing the world as being blinkered and too rigid to tackle the wide range of problems facing societies. Speakers instead claim progressive, agile (*"collaboration"; "explorations"; "challenge"*) approaches are more effective in allowing people to create a better society. Terminology associated with Design Thinking therefore actively seeks to replace the lexicon of the Early and Middle Decades of the 20th Century. My lexicon (which I presented in Figure 43) highlights the idea that, in the data set, the emerging lexicon has successfully driven out terms representing modernist philosophy. My lexicon therefore illustrates the terms that help speakers to distance Contemporary Design Thinking from Design Thinking of the Early and Middle Decades of the 20th Century. Comparing my findings with those contributed by the design historians Forty (2001) and Bearn (1992), contributes a valuable distillation of the meta-movements in Design Thinking theory over the last 100 years. Traditionally and commonly, design research is perceived as being *practice-led* (Zimmerman, et al., 2007; Niederrer, 2013; Rust et al., 2007). I have used a lens which investigates the importance of *language* in design research. My distillation of meta-movements indicates of the value of using a language-based lens.

I have shown that contemporary researchers use specific terminology in attempting to distance Contemporary Design Thinking from Design Thinking of the Early and Middle Decades of the 20th Century. However, despite this, connections remain. The way in which speakers choose to classify Design Thinking provides an interesting link between the two eras. Influential figures (including Walter Gropius and LeCorbusier) responsible for creating the Design Thinking theory of Early and Middle Decades of the 20th Century claimed that designers should adopt ways of thinking which are used in professions with long-established intellectual traditions. The established ways of thinking are associated with what are now termed STEM subjects ((Natural) Science, Technology, Engineering, Mathematics). In contrast, Contemporary Design Thinking theory is influenced by philosophies which question the use of STEM-derived ways of thinking. Cross (2001) sums up the impetus for Design Thinking research to break free from the influence of the Early and Middle Decades of the 20th Century:

> "Following Schön and others, many researchers in the design world have been realising that design practice does indeed have its own strong and appropriate intellectual culture, and that we must avoid swamping our design research with different cultures imported either from the sciences or the arts."
>
> (Cross, 2001, p.54)

Cross claims that the best way for the Design Tribe to affect this disassociation is to create intellectual territory which the community can lay claim to. Cross urges the community to engage in:

> "Building our own intellectual culture, acceptable and defensible in the world on its own terms".
>
> (Cross, 2001, p.54)

Cross' position as the long-serving chair of the Design Research Society makes his call influential in the Design Tribe. Discussing how speakers classify design processes and Design Thinking and construct intellectual boundaries allows me to reflect on how speakers create and reinforce intellectual territory.

Cross (2001) notes that Contemporary Design Thinking research is a relatively young area. Cross claims that to create discrete intellectual territory, Design Thinking researchers must use investigative practices developed by more established domains. Demonstrating rigour in this way is key in enabling the Design Thinking research community to underscore the legitimacy of the territory it claims:

> "[more established research cultures] have much stronger histories of enquiry, scholarship and research than we have in design. We need to draw upon those histories and traditions where appropriate […] We have to be able to demonstrate that standards of rigour in our intellectual culture at least match those of the others."
>
> (Cross, 2001, p.54)

The use of taxonomic and mathematical-like classifications shows that speakers borrow a sense of academic rigour from established STEM-related areas as a means of being taken seriously on a global research stage. The use of styles of classifications which are synonymous with STEM subjects is interesting given the fact that the Design Tribe aims to separate itself from territory occupied by Design Thinking of the Early and Middle Decades of the 20th Century. Indeed, recognition of the importance of STEM ways of thinking provides an interestingly link between the 2 eras.

Study 3 identified that classifications of Design Thinking differ from speaker to speaker. Use of STEM-style classifications masks a lack of cohesion amongst speakers on steps associated with Design Thinking. Content analysis has allowed me to 'see behind the mask' and to demonstrate that the classifications—and the intellectual territory—are less established than they at first appear to be. The lack of coherence in classification echoes existing criticisms of Design Thinking research. Kimbell (2011, p.292) argues that despite sustained investigation, researchers have yet to "generate[] a definitive or historically informed account of design thinking". Kimbell's (2011) conclusion follows a literature review of a small selection of Design Thinking research. Kimbell's conclusions are very limited as they do not emerge from the use of methods which are designed for analysing ways of speaking in textual data. My thesis represents the first attempt to use established methods designed for analysing ways of speaking to investigate a rich, thick corpus of data which focusses on Design Thinking research. This is an original contribution to Design Thinking research.

Commonly, speakers claim to make universally applicable classifications of Design Thinking from observing the practices of a very small number of designers. To illustrate, classifications in Paper 88 come from analysing 3 designers; classifications in Paper 57 result from analysis of 2 designers. The wide range of design practices makes it impossible to justifiably claim broadly applicable conclusions from investigating how very small numbers of practitioners work. Speakers do not discuss the limitations associated with making such claims. Existing literature notes concerns with methods of investigation used in Design Thinking research. Hassi and Laakso (2011) argue that methods used to identify Design Thinking steps and criteria are characteristically unreliable, so much so that it is often

impossible for investigators undertaking primary analysis to "determine whether or not design thinking is [taking place]" (Hassi and Laakso, 2011, p.2). Hassi and Laakso do not note the issue of small sample sizes as negatively affecting study reliability. In raising the issue of sample sizes, my thesis builds on their work.

In Study 3, I noted that, in addition to forming classifications, speakers criticise the practice of classifying Design Thinking. Speakers consistently emphasise the intricacy of Design Thinking, claiming it is *"a very complex human reality"* (EA. Paper 34). Some claim that Design Thinking is too complex to describe as "*a constant definition is not necessarily needed, or even desirable"* (TR. Paper 12). Speakers also criticise existing classifications as not taking into account the full scope of Design Thinking:

> *"design knowledge may involve complex performances embedded in design thinking; these are much more sophisticated than the procedure of pattern-matching/rule application which is relatively straightforward."* (TI. Paper 70)

In critiquing the value of classification, speakers frame Design Thinking as being beyond description by methods used in STEM domains. This helps speakers to distance intellectual territory associated with Contemporary Design Thinking from that associated with Design Thinking of the Early and Middle Decades of the 20th Century. It also serves to distance the intellectual territory associated with Contemporary Design Thinking from that which speakers claim is occupied by STEM subjects. I noted in the Literature Review chapter that Design Thinking is consistently framed as being oppositional to the problem-solving processes used in STEM subjects. Speakers commonly apply the same frame in the data set:

> *"Design thinking is in many ways the obverse of scientific thinking."* (CD. Paper 82)

However, at the same time, speakers use STEM-like ways of classifying Design Thinking. The presence of both the impetus to classify and moves to reject the value of classification indicate a *frictional narrative* in the data set. The frictional narrative appears to revolve around ideas of *legitimacy* and *identity*: the Design Tribe needs to borrow some concepts (or, more precisely, ways of working) from STEM subjects in order to be taken seriously; however, too much association with the STEM-like impetus to classify threatens to jeopardise the discrete intellectual territory speakers claim belongs to the domain of Design Thinking. Indeed, the process of aligning Design Thinking with what speakers claim to be other *progressive*, *agile* approaches (for example, Pragmatism and Bricolage) may be a strategy to reinforce a boundary between Design Thinking territory and STEM territory.

The combination of incoherent classifications and the use of bad research methodology may have a particular effect on the research culture of the Design Tribe. It may *normalise* both within the tribe. The practices of broadening and deepening the intellectual territory may therefore be inherently linked to the normalised use of bad research practice which leads to yet more classifications which differ from speaker to speaker.

7.1.2 A Definition of Design Thinking?

The term ‘Design Thinking’ was coined over 30 years ago (Dorst, 2010). For much of this time, the Design Tribe has been searching for an agreed definition of ‘Design Thinking’ (Design Research Society, 2016). Proposing a definitive definition would therefore fill a gap in the knowledge and make for a very valuable contribution to Design Thinking research. Conceivably, it may be possible to use the emerging lexicon that I have identified to create a definition. This definition would be valuable as it would result from analysing how members of the community refer to Design Thinking. With reference to Figure 43 it may be possible to define Design Thinking as *“a collaborative process which facilitates problem-solving through enabling self-directed thoughts and actions”.* Equally, I could describe it as “a *complex performance which reveals the richness of the world* through enabling people to tell *stories*”. It may also be possible to define Design Thinking as a “*fluid* model which facilitates the generation of *empathy* in people, allowing them to engage in *multimodal* thinking and activities”. Using the lexicon would allow for many more permutations of definitions. The idea that they all result from analysing how speakers construct intellectual territory on their domain means that none of these can ever be any less or more valid than alternatives. In addition, the lexicon is *emerging*—I cannot claim it is exhaustive. Therefore, there may be many more combinations of definitions to explore. The emerging nature of the lexicon has a powerful influence on Design Thinking research: it has, so far, prevented investigators from being able to create a fixed definition of Design Thinking. Similarly, the lexicon prevents me from proposing a definition of Design Thinking.

7.1.3 Further Speculation: How the Intellectual Territory Sustains Design Thinking

The lack of a definition of Design Thinking has its advantages for the Design Tribe. It facilitates the need for more researchers to make more contributions to the intellectual

territory in the aim of filling this gap in knowledge. (Indeed, as a Design Thinking researcher, I have both attempted and failed to present a definition of Design Thinking). The accumulation of contributions results in more and more terms being added to the lexicon, which in turn helps the intellectual territory broaden and deepen, making the domain appear more established. The incoherence of the classifications put forward by speakers makes it difficult for researchers to compare which descriptions best describe Design Thinking. Equally, the emerging nature of the lexicon makes the process of critiquing Design Thinking extremely difficult. To make an analogy, the practice of critique involves trying to 'knit clouds' which appear, disappear and then re-emerge in a different guise (a different classification incorporating different terms). Ways of speaking used in a book recently written by Kees Dorst (2015) illustrate the idea that critiquing Design Thinking is like knitting clouds. Dorst is a key figure in the Design Tribe. In his book, Dorst argues that some design consultancies and business writers have incorrectly applied aspects of Design Thinking. Design academics like those based at the Designing Out Crime centre (located at Dorst's place of work, the University of Technology, Sydney, Australia), on the other hand, have made more appropriate use of Design Thinking methods:

> "some 'design thinking' techniques that have been developed in companies and business schools utilize elements of "framing". But […] the Designing Out Crime centre have evolved a more comprehensive approach in which these design practices are combined to great effect"
>
> (Dorst, 2015, p.73; original emphases)

Dorst's argument resonates with those of speakers in the data set who claim that business writers have mis-represented Design Thinking:

> "*confusion about both the nature and the merit of 'Design Thinking' […] This confusion has now reached a crisis point…"* (TT. Paper 34).

Dorst's criticism of writers in the business research community underscore the tribal nature of Design Thinking research. When focusing on what he claims to be the essential benefits of design practice, Dorst refers to a process which he terms 'frame innovation' (the title of Dorst's book). Dorst's description of frame innovation includes terms (*open*, *complex*) that are found in the lexicon that I have identified.

> "[design practice] can provide a new angle for approaching […] **open**, **complex**, dynamic and networked problems […]
>
> (Dorst, 2015, p.73)

In highlighting the value of designers in tackling wide-ranging issues, Dorst focusses on their ability to understand various aspects of problems. It is this designerly approach which underpins the usefulness of frame innovation:

> "design practices are well positioned to help us develop the problem situation, consider a broader context, build a deeper understanding of the underlying factors behind the problem, and most importantly, to then create a new approach (or frame) to the problem situation. It is not hard to see how adopting these design practices could be useful in alleviating the syndromes that prevent organizations from moving forward".
>
> (Dorst, 2015, p.73)

Dorst's description of the wide-ranging benefits of frame innovation also parallel those claimed by speakers in the Design Thinking data set:

> [designers can comprehend] *"the dynamic and varied contextual scope of problems"* (PS. Paper 117),

> [designers can] "*keep[…] the big picture in mind while focusing on specifics"* (GD. Paper 82).

Despite the similarity with Design Thinking, Dorst rarely uses the term 'Design Thinking'. Dorst's reclassification of Design Thinking as *frame innovation* moves the goalposts for any investigator aiming to critique Design Thinking research as it requires them to adjust the scope of their enquiry. The emerging nature of the lexicon would suggest that in the future, another influential researcher will seek to replace *frame innovation* with another term(s). This would further compound the difficulty of unpicking Design Thinking. (Or for that matter, *frame innovation*…). The continual production of new terms may help to explain why the literature contains few examples of investigations into ways of speaking in Design Thinking research. The relative lack of these investigations helps the domain to flourish relatively unchecked. The concept of *frame innovation* allows me an opportunity to reflect on my data collection and filtering strategy. To recall, I collected only papers which have the term 'Design Thinking' in the title. My strategy has allowed me to contribute an emerging lexicon. It has also provided a core reference point with which to be able to discuss movements in *designely ways of speaking*, including the production of new terminology. Including papers which contain terms such as 'frame innovation' instead of Design Thinking may not have enabled me to spot and analyse shifts in use of terminology. To this extent, I may not have been able to recognise the place that production of new terms plays in helping to maintaining the domain. These points underscore the validity of my data collection and filtering strategy.

7.1.4 The Design Thinking Trap

In Study 3, I noted that when speakers in the data set criticise existing models of Design Thinking, they claim that these models do not account for the *complexity* of Design Thinking:

> *"Textbook methods (e.g., Birkenhofer, 2011; Pahl & Beitz, 1984; Roozenburg & Eekels, 1995; Ullman, 1992/2003) are on the rigid side."* (FR. Paper 51)

> *"[to form a better understanding of Design Thinking, researchers must] switch the unit of analysis from individual actors or society and its norms, to a messy, contingent combination of minds, things, bodies, structures, processes, and agencies."* (CR. Paper 64)

The process of claiming that existing texts are too *rigid* (Paper 51) and do not account for the *messy* nature of Design Thinking (Paper 64) helps to reinforce the dichotomy between *progressive* intellectual territory linked with Design Thinking and *rigid* non-Design Thinking territory. Therefore, critiques of Design Thinking theory work to further broaden and deepen the claim to intellectual territory. Ironically, critiques of Design Thinking research help to strengthen the intellectual territory which the community claims it occupies. I speculate that Design Tribe researchers are so immersed in the dichotomous ways of speaking, that they tend to fall into the 'trap' of perpetuating them, whether praising the benefits of Design Thinking or critiquing their domain. I term this '*The Design Thinking Trap'*.

7.1.5 Application of Critical Theory: Deleuze and Guattari's Philosophies of Science

A function of *critical theory* is to interpret ways of speaking used by discourse communities. Because of this, the use of critical theory can provide an additional lens for researchers to reflect further on content analysis findings (Blythe and Cairns, 2009; 2010). In their difficult and provocative book, *A Thousand Plateaus*, the poststructuralist critical theorists Gilles Deleuze (a philosopher) and Felix Guattari (a semiotician) (2004) claim there are two contrasting models of science—*Royal Science* and *Minor Science*. These models interpret all aspects of their worldviews (including how they frame space, time and matter) in dichotomous ways. Royal science orders and homogenises space. In-so-doing, royal science classifies all matter. Deleuze and Guattari's term for this process is 'striation': royal science "striates all of space in all of its directions" (*ibid*, p. 408). Royal science classifies and homogenises everything within its domain in order to construct universal laws which

attempt to describe space and matter. In contrast, minor science works with heterogeneous space and does not attempt to create universal laws which describe matter. Minor science therefore occupies territory without classifying it:

> "[In the minor scientific model] it is not exactly a matter of extracting constants from variables but of placing the variables themselves in a state of continual variation. If there are still equations, they are adequations, inequations, differential equations irreducible to the algebraic form and inseparable from a sensible intuition of variation."
>
> (Deleuze and Guattari, 2004, pp. 407-408)

The tendency for minor science to reject classification leads Deleuze and Guattari to characterize the intellectual territory occupied by this model as being *smooth* (as its space remains unmarked by striations). Deleuze and Guattari claim that natural scientific fields like Chemistry work in the royal scientific tradition. Artisanal fields—"itinerant bodies of the type formed by masons, carpenters, smiths, etc." (ibid, p. 406)—engage in the minor scientific tradition. Royal and minor science do not share equal statuses. Royal science is the more dominant (hence the name) as it "continually imposes its form of sovereignty on the inventions of [minor] science" (ibid, p. 400). In its dominant position, royal science, attempts to eliminate the autonomy of minor science, "depriv[ing…minor science] of [its] own model, submit[ting it] to its own model" (ibid, p. 411). The history of models of architectural construction in France in The Middle Ages serves to illustrate how royal science dominates minor science:

> "Let us return to the example of Gothic architecture for a reminder of how extensively the [minor scientific] journeyman travelled, building cathedrals near and far, scattering construction sites across the land, drawing on an active and passive power (mobility and the strike) that was far from convenient for the State. The State's response was to take over management of the construction sites, merging all the divisions of labor in the supreme distinction between the intellectual and the manual, the theoretical and the practical, modelled upon the difference between 'governors' and 'governed'"
>
> (Deleuze and Guattari, 2004, p. 406; original emphases)

The example of construction protocols illustrates that, for Deleuze and Guattari, fields often emerge as minor sciences. The process of classification transforms fields into royal sciences.

The Design Thinking data set contains 1 instance in which a speaker makes a link between Deleuze and Guattari's ideas and contemporary Design Thinking[50]. It is possible to speculate the presence of a wider link between ways of speaking seen in the data set and Deleuze and Guattari's philosophies of science. The *agile*, *complex*, *progressive* intellectual territory which speakers associate with Design Thinking is comparable to the *heterogenous* and *smooth* space linked with minor science. Terms present in the emerging Design Thinking lexicon reinforce the link between Design Thinking and minor science. Speakers emphasise freedom from constraints dictated by dominant models: "*the* ***fluidness*** *of Design Thinking"* (Paper 100) is "***unlike traditional*** *decision making*" (Paper 24), *"allow[ing] his or her* ***imagination free reign****"* (Paper 26). In contrast, in the data set, *dominant*, *rigid* and *passive* non-Design Thinking intellectual territory is similar to the *homogenised*, *striated* space of royal science. Speakers emphasise the machine-like tendency of dominant models to classify and constrain: *"****mechanical reductivism****"* (Paper 100); *"****prioritises standardized*** *test scores"* (Paper 41); *applications may be adopted and '****locked in****'"* (Paper 16). Just as the duty of itinerant construction workers of The Middle Ages was to inconvenience The State, the role of Design Thinking is to fight the supposedly constrictive powers of the STEM domains.

The domain of Design Thinking cannot however *completely* reject the influence of the royal scientific model. Use of STEM-like taxonomies and mathematical-like classifications help speakers to affiliate their research with a sense of royal scientific rigor. At the same time, speakers cannot overly-associate themselves with royal science as this will prevent them from claiming a link with ideas of *agility* and *progress*. The domain of Design Thinking therefore walks a precarious tightrope: it needs to be both classifiable and appear too complex to ever define at the same time. A lens provided by Deleuze and Guattari has helped me to speculate on what sustains the frictional (and paradoxical) narratives which I noted earlier in this chapter. In summary, a lens provided by Deleuze and Guattari has allowed me to speculate on what sustains *designerly ways of speaking*.

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[50] The speaker (Paper 100) compares Design Thinking to Deleuze and Guttuari's concept of *Rhizomes*. The speaker does not discuss the concepts of royal science and minor science *explicitly*. Indeed, neither term is present in the paper. The speaker discusses the concept of *rhizomes*. The heterogenous worldview of minor science manifests itself through the production of intellectual rhizomes:

> *"Deleuze & Guattari's rhizome allows a visualisation of multiple, ever-changing understandings and perspectives.[…] the rhizome helps to highlight the value of vagaries and compound causal relations that are constantly occurring during the process of design."*
>
> (TR Paper 98)

Because of this, it is evident that the speaker, whether knowingly or otherwise, is referring to Deleuze and Guattari's contrasting models of science.

Deleuze and Guattari often use the terms *nomad science* and *ambulant science* in place of minor science. The terms *nomad* and *ambulant* highlight the idea that minor scientific territory must keep moving to evade capture by royal science. Deleuze and Guattari's (2004, p. 406) description of ways of working used by stonemasons in the Middle Ages underscores this concept, for these "journeym[e]n travelled, building cathedrals near and far, scattering construction sites across the land". Metaphorically speaking, constant travel allowed the masons to take both their intellectual and physical territory with them to safeguard it from the royal scientific State. The concept of a mobile minor science allows me to speculate further on how speakers use the ideas of *agility* and *progress* to construct their domain. I have argued that the perpetual creation of new terminology prevents the domain of Design Thinking from being pinned down for long enough for researchers to critique it in sufficient depth to unpick it. In this way the domain is 'intellectually' *agile*. However, the concept of a mobile minor science infers that the domain of Design Thinking is also 'physically' *agile*. Metaphorically speaking, the domain must remain *agile* or ambulant to keep 'outrunning' attempts by royal science to hold it down and classify it out of existence. The terms *agility*, *fluidity* and *progress* may therefore be key in helping speakers to create both intellectual *and* physical aspects of Design Thinking territory.

Ways of speaking which are present in research which falls outside of the data sample suggests the possibility of there being a broader link between Design Thinking and minor science. In his book on frame innovation, Dorst (2015) claims there is a trend amongst designers and users for systematising Design Thinking. Dorst's critique centres on the Design Thinking Method Cards created by the international design consultancy, IDEO (Figure 45).

Figure 45: IDEO Methods Cards. Please see, https://www.flickr.com/photos/mdxinteractiondesign/2318390956

The IDEO Method Cards provide individuals aiming to solve design problems with possible ways of working. Dorst argues that the IDEO cards have incorrectly promoted the idea that Design Thinking is a readily operationalizable process. Dorst suggests that, instead of using these standardised cards, designers should make their own:

> "The IDEO method cards are publicly available, and although there is a temptation to adopt them wholesale and piece together a project by connecting the cards, one should be aware that they are in themselves an open-ended and nonsystematic set, based on the practices that were available in the firm at a moment in time. Also, the very brief descriptions on the cards stand for a lot of implicit professional knowledge in the organisation. The best way to profit from the concept of method cards is to create your own set."
>
> (Dorst, 2015, p.169)

Viewed through a lens created by Deleuze and Guattari, Dorst's decision to link the IDEO cards with the practice of systematisation can be read as move which underscores the danger of allowing royal scientific processes to influence the minor scientific domain of Design Thinking. Dorst's suggestion that users should create their own cards underscores the non-operationalisable nature of frame innovation. It invites designers to work in an itinerant manner—to reject the temptation to work within the rules set by royal science. Dorst's suggestion that designers should create their own set of cards means that every individual can carry their intellectual territory with them, transporting it on their daily travels. The dispersion of this territory makes it impossible for critics to pin it down in order to either unpick it or classify it.

7.2 How Speakers Frame Design Thinking

The idea that Design Thinking can help a wide range of people (students, teachers, designers, governments, businesses, society at large) solve complex problems enables speakers to broaden the intellectual territory, potentially expanding the influence of the domain across disciplines. (Indeed, a Google search for the term 'Nigel Cross + Design Thinking' produces 6,470,000 results. A Google search for 'Kees Dorst' produces 459,000 results—less influential than Cross, but still a sizeable number of results). Society is comprised of a wide range of people. Therefore, widening the intellectual territory with claims that Design Thinking can help a range of people helps speakers to frame Design Thinking as a socially engaged model. Focusing on the idea that Design Thinking is a remedy for problems that everyone experiences on a daily level: (*"solve everyday challenges"* (PS. Paper 17); *"revitalize energies"* (OA. Paper 54)) helps speakers to underscore the socially engaged nature of Design Thinking. Some speakers even refer to the value of Design Thinking in terms which evoke a sense of civic duty:

> "[Design Thinking] *"improve[s] the lives of those whom [designers and educators] are meant to serve"* (A. Paper 54).

The focus on describing Design Thinking as a socially engaged practice masks a skewed narrative: speakers tend to ignore commercial aspects of design practice. Most practice takes place in commercial environments—consultancies aim to generate profit for clients. In the main, design practice is therefore *not* a socially engaged process. Speakers do not discuss Design Thinking as a tool to create profit. The lexicon of Design Thinking therefore helps speakers to frame intellectual territory associated with Design Thinking as being distinct from that associated with design practice. Maintaining this separation helps speakers to write Design Thinking into existence.

The focus on social engagement allows me to speculate on why uncritical and idealistic ways of speaking are such a prominent feature of the data set. To maintain the idea that Design Thinking is socially engaged, speakers need to claim that Design Thinking benefits a wide range of people. If a speaker were to criticise the idea that Design Thinking can benefit any particular group of people, the speaker would jeopardise the link between Design Thinking and social engagement. This would in turn dilute the discrete intellectual territory of

the domain—it would effectively associate Design Thinking with design practice, a tool which makes profit for the few whilst keeping many people in a cycle of debt. Speakers are therefore forced to maintain uncritical *designerly ways of speaking* to maintain the domain. This is another aspect of the Design Thinking Trap which speakers find themselves in when constructing the domain.

There is evidence of the pattern for constructing a separation between Design Thinking and design domains beyond the data set. For some time, researchers have highlighted the link between design domains (practice and education) and environmental damage. In an early, well-known, fierce critique, the theorist Victor Papanek (1984, p.ix) claimed that when it comes to damaging the natural environmental "There are professions more harmful than industrial design – but only a few of them." Many researchers have since built on Papanek's argument. In a critique which is influential at a national level, the UK Design Council claim that designers seduce users into perpetuating environmentally unsustainable levels of consumption:

> "Our wish to upgrade to the next model [of mobile phone] is fuelled by tantalising ads and seductive designs. Would this be such a problem if we designed the phone so all the materials could be separated out?"
>
> (UK Parliament, 2011, unpaged).

Criticism of unsustainable practice extends to design education. Calvelli (2009) claims that educators focus on teaching methods of creating non-sustainable artefacts and services, thereby perpetuating the issue of environmental damage. Criticism is particularly evident in fashion design literature. Farrer and Fraser (2011, p.5) criticise the focus amongst fashion designers for "obsolescence and constant engagement with the new" as fostering unsustainable consumerism. Similarly, Niinimäki and Hassi (2011, p. 1876) highlight the influence of fast-moving fashion trends in creating environmental damage: "products are designed and produced according to regularly changing trends that enable quick profit". An argument made in a journal paper which is not present in the data set indicates how ways of speaking found in the sample resonate with those which occur in the wider field of design research. The article is written by the Vicki Lofthouse, a prominent design-for-sustainability researcher. Lofthouse argues that Design Thinking facilitates a sustainable approach to design practice. Despite this, a range of design industries ignore the need to implement Design Thinking:

> "Despite the examples [I have presented] and a growing body of research interested in engaging designers in sustainability (Brezet, 1997; Lofthouse, 2006; Lofthouse, 2004; Simon et al., 1998), there is little evidence of any great sea change across the

> design industry (Sherwin, 2012; Short, Lee-Mortimer, Luttropp, & Johansson, 2012; Stevenson, 2013). Although there is often an appetite for sustainable design thinking among individual designers, the opportunity to actively engage with the issue is often not there."
>
> (Lofthouse, 2017, p.13)

In Lofthouse' article, the phrase *"appetite for sustainable design thinking among individual designers"* highlights the idea that Design Thinking is a socially engaged model. Similarly, speakers in the data set claim that designers are socially engaged people who want to create positive change in the world:

> "[design students] *want to address opportunities for future generations, environmental degradation, climate change, disease, poverty, and energy"* (A. Paper 12).

Lofthouse's use of the phrase *"the opportunity to actively engage with the issue is often not there"* indicates that established practices prevent designers from implementing beneficial Design Thinking. Similarly, speakers in the data set claim that dominant practices prevent people from using Design Thinking to create positive change in the world:

> "[humans are] *induced to follow suit without [allowing them to question] the prevailing assumptions and practices"* (TT. Paper 26).

Lofthouse's focus on dominant practices conspiring to limit the use Design Thinking effectively disassociate Design Thinking from the negativity linked with design practice. Lofthouse's narratives therefore resonate with the *designerly ways of speaking* found in the data set. Lofthouse's narratives indicate that my findings resonate with ways of speaking in the wider field of design research.

7.2.1 Solving Problems: Design Thinking and Solutionism

The term *Solutionism* was coined by the architectural researcher Michael Dobbins (2009). Dobbins reflects on design philosophies which influenced the creation of Modernist city infrastructure. Dobbins claims that Modernist city planning was driven by the desire to create solutions that can, in one fell swoop, tackle a range of complex social and technical problems. Dobbins terms this mindset "the 'magic bullet' model to solv[ing] problems" (ibid, p.182; original emphasis). Aspects of a 'magic bullet' approach to problem solving are evident in the Design Thinking of the Early and Middle Decades of the 20th Century. Walter

Gropius argued that architecture which is designed from a series of repeating forms solves complex problems associated with civic disobedience:

> "it is a commonplace that the repetition of the same things for the same purposes exercises a settling and civilizing influence on men's minds"
>
> (Gropius, 1935, pp.26-27)

Dobbins argues that when using the magic bullet model, professionals risk underestimating the complexity of problems they face. In the design of modernist infrastructure, this meant that "problems were dumbed down to meet the solutions offered" (Dobbins, 2009, p.182), often resulting in designs which could not meet the needs of growing and diverse populations. Gropius' philosophies, when adopted in cities across the world, did not create the level of social cohesion that Gropius claimed they would. The "social decay, drug use and family breakdown" (Dobraszczyk, 2015, unpaged) linked with the Park Hill estate (Figure 46) in Sheffield evidence the problems associated with the homogenised infrastructure that Gropius' philosophies promoted.

Figure 46: Park Hill Estate, Sheffield when newly constructed.
Accessed: https://twitter.com/RIBA/status/969560500756451329

Building on Dobbins' work, the sociotechnical researcher Evgeny Morosov (2013) criticises contemporary Human Computer Interaction literature which claims that design can be used to tackle complex social problems. Morosov uses the example of *BinCam* to illustrate his position. BinCam is a technologically-enabled, game-like project designed to reduce the amount of household waste going to landfill (Figure 47).

Figure 47: BinCam. https://openlab.ncl.ac.uk/things/bincam/

Morosov argues that the aims of the project are unrealistic:

> "A weekly score is calculated for each bin, and as the amounts of food waste and recyclable materials in the bins decrease, households earn gold bars and leaves. Whoever wins the most bars and tree leaves wins. Mission accomplished; planet saved!"
>
> (Morosov, 2013, p. 2)

Morosov claims that the desire to create a magic bullet solution to tackling the issue of reducing household waste comes at the expense of ignoring the range of factors which drive different people to dispose of their waste in different ways. Morosov (2013-b, unpaged) terms this type of design strategy an "intellectual pathology" because it assumes that complex social problems are both transparent and can be readily solved. Morosov's argument applies to the ways of speaking present in the Design Thinking data set. Speakers frame Design Thinking as an accessible, quick-fix to complex social problems—a progressive *magic bullet* which works when rigid dominant approaches have failed. The following excerpt from Paper 24 reads like Morosov's parody of BinCam. Here, the speaker discusses the merits of a new service for disposing of hazardous household waste:

> *"South African society lacked an awareness of such environmental issues […] the student proposed a household battery disposal system created for the safe and correct disposal of hazardous batteries."* (GD. Paper 24)

Complex social and environmental problems however are not eminently solvable. (If they were, issues like inequality and global warming may have been eradicated by now.)

Discussing the fact that these problems are intractable would potentially jeopardise the link between Design Thinking and social engagement. Speakers are therefore trapped into putting forward uncritical ways of speaking on problem-solving to sustain the domain of Design Thinking.

Reflection on solutionism enables further insight into the intellectual territory which speakers associate with Design Thinking. I have noted that the emerging lexicon of contemporary Design Thinking helps speakers to disassociate this model from intellectual territory occupied by the Design Thinking of the Early and Middle Decades of the 20th Century. Indeed, terminology found in the emerging lexicon has replaced terms which are associated with Design Thinking of the Early and Middle Decades of the 20th Century. Despite this lexical severance, the issue of solutionism provides a poignant link between the 2 models. The issue of solutionism therefore provides another lens through which to question the validity of the intellectual territory speakers associate with contemporary Design Thinking. The issue of solutionism also underscores the power of the lexicon in both presenting the *appearance* of a distinct intellectual territory and enabling speakers to write contemporary Design Thinking into existence.

In Study 3, I noted that speakers use highly-emotional language to describe the benefits of Design Thinking. Statements which claim that Design Thinking *"[plays] an **essential** role in human development"* (A. Paper 60), is *"a process for **radical** change"* (FR. Paper 11) and "*has the power to **transform** societies"* (A. Paper 28) help to construct the idea that Design Thinking is a magic bullet solution. Reflecting on Hyland's (2001) work on academic discourse has allowed me to highlight the idea that use of highly-emotional phrasing makes *designerly ways of speaking* noticeably different to those commonly practiced in academia. Highly emotional *designerly ways of speaking* facilitate the formation of solutionistic narratives as they mask idealism and a lack of criticality. Comparing *designerly ways of speaking* with language used to market a commonly-used product which claims to provide solutions to a range of complex issues provides an additional lens to inspect narratives employed by the Design Tribe. The purpose of marketing material is to sell a product or service, not to present a balanced discussion. The analogy with promotional text highlights a lack of balance in the Design Thinking data set.

Berocca is a brand of over-the-counter nutritional supplement which is produced by the German pharmaceutical giant *Bayer.* Berocca is available as an effervescent capsule and in tablet form. *Berocca's* maker claims the supplement boosts physical and mental energy in users (see Figure 48).

Figure 48: Berocca marketing material. See http://www.berocca.co.uk/

The phrases *"revitalize energies"* which is found in the Design Thinking data set echoes the the focus on *energy release* and *mental performance* seen on the Berocca packaging in Figure 48. Berocca marketing material focusses on the value of the supplement in tackling complex issues in the lives of users. Figure 49 shows a screenshot from a recent Berocca advert. The phrase *'Big Days start with Berocca'* provides an indication of the complexity of life.

Figure 49: Screenshot from a Recent Berocca Advert. See, https://www.youtube.com/watch?v=zqRC-bKM14U

The advert's main protagonist is a male who seems to be in his 30s. The complexities he is faced with include life at work—represented by the need to give presentations of complicated material to colleagues. In Figure 50, the protagonist (standing on the step ladder) uses Berocca to help him contribute effectively to a Design Thinking-style brainstorm in front of his peers.

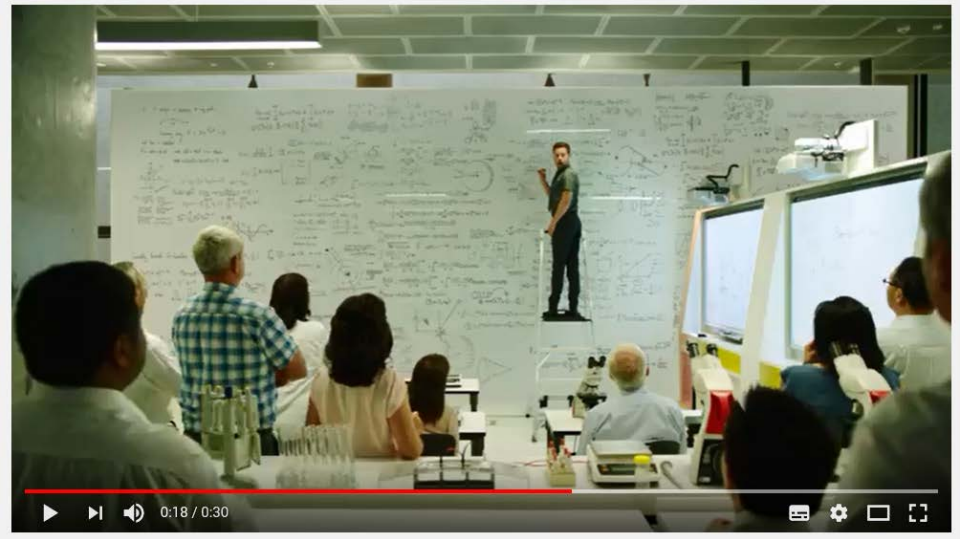

Figure 50: Screenshot from a Recent Berocca Advert. See, https://www.youtube.com/watch?v=zqRC-bKM14U

Complexities associated with his personal life include the need to perform well at sport in front of his peers. Figure 51 shows that Berocca helps him do so by helping him to play football effectively. He scores a goal and is embraced by his peers.

Figure 51: Screenshot from a Recent Berocca Advert. See, https://www.youtube.com/watch?v=zqRC-bKM14U

Much like the marketing material for Berocca, speakers frame Design Thinking as a tool which people can use to solve a range of problems in both their professional and personal lives. Paralleling the Berocca strap line, the take home message associated with Design Thinking could be, *'Big Days Start With Design Thinking'*.

It is possible to expand on the analogy between Design Thinking and Berocca. Trained individuals (scientists) created the formula for Berocca in a specialised environment (a laboratory). Similarly, trained individuals (designers) practice Design Thinking in a specialised environment (a design studio). Berocca contains a series of ingredients with complicated names (see Figure 52)—only specialists (scientists) really understand what these are. Design Thinking contains a series of steps classified with complicated terminology—only specialists (Design Thinking researchers) really understand what these are. Berocca consumers do not need to worry about the science that goes into creating Berocca when using the product. Similarly, non-designers do not have to be trained as designers to use Design Thinking effectively. The analogy with marketing material for Berocca suggests that the papers in the data set read more like emotive advertisements for Design Thinking and less like balanced academic appraisals of this problem-solving process.

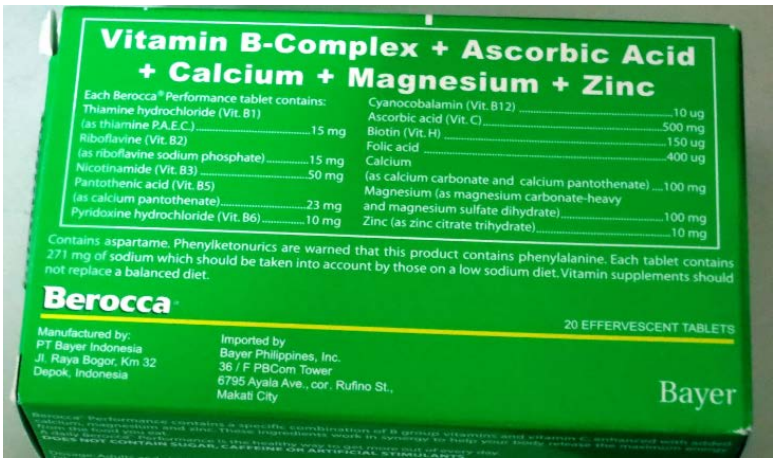

Figure 52: Berocca Ingredients. See http://www.glennong.com/2012/10/five-reasons-to-love-berocca.html

This is extremely worrying given the fact that *designely ways of speaking* are validated by the process of peer review. The comparison between solutionistic *designely ways of speaking* and narratives used to sell a popular over-the-counter nutritional product shows how my findings are applicable to informing journal review boards of the skewed nature of *designerly ways of speaking*. Highlighting this issue may help to inform reviewers when they are tasked with deciding which submissions to recommend as valid, balanced academic research.

7.2.1 Further Speculation: How the Way that Speakers Frame Design Thinking Sustains the Domain

There have been decades of research in STEM areas into solving wide-scale problems like global warming. Despite this, issues like global warming remain unsolved. This allows a space for perspectives on problem-solving which researchers frame as being alternatives to those offered by mainstream subjects. Design Thinking is one such alternative model, promising *hope* in the face of *rigid* dominant—and unsuccessful—STEM approaches to problem-solving. When speakers frame Design Thinking, they indicate that this problem-solving practice provides hope for everyday people in a world ruled by stifling, dominant approaches to thinking:

> *"Design can reveal the richness of the world"* (A. Paper 100)

'Hope' is, by its very nature, an idealistic concept. Adoption of *hope* requires an individual to *reserve judgment* as judgment implies a level of critique which may kill hope stone dead. Narratives associated with reserving judgment are present in the data set. In the following quote, a speaker claims that *"deferment of judgment"* is a key aspect of Design Thinking brainstorming sessions:

> *"[A participant] might table a topic for consideration and discussion. This serves as an initial stimulus. Any one of the group members can cognitively nest this into a context to arrive at new idea. This idea, in turn, can become a stimulus to another member, who can then contextualize it and arrive at another idea; and so on, initiating an idea chain. Within this dynamic, the deferment of judgment is useful because it allows members to continue nesting new ideas as stimuli to subsequent ideas, a process which judgment might interrupt or divert."* (TR. Paper 116)

Metaphorically speaking, ideas and solutions which emerge through a process which *reserves judgment* remain *mobile*. The solutions coming from application of Design Thinking therefore refuse to be tethered by *rigid* ways of thinking. The concepts of *hope* and *reserving judgment* are therefore key aspects of the *agile* territory which speakers associate with Design Thinking. Critiquing an agile idea would rigidify it: "*judgment might interrupt or divert [the idea]"* (TR. Paper 116). Once interrupted, the idea is diverted outside of the intellectual territory occupied by Design Thinking. In the dichotomous world of Design Thinking research, the space beyond this intellectual territory is profane. The idea would then have to be disregarded as it would be seen as being conceived from STEM ways of thinking. The link between Design Thinking and *hope* helps to account for the observation that uncritical, idealistic ways of framing Design Thinking feature prominently in the data set.

Ways of speaking which associate Design Thinking with *hope* in the data set resonate with those found outside of the data set. The prominent design-for-sustainability researcher Vicky

Lofthouse argues that although the value of Design Thinking is currently not recognised by dominant industry forces, educators should continue teaching it to students:

> "it is valuable to provide students with a range of skills that support sustainable design thinking, even if they are not currently required by the design industry because doing so turns the students into informed individuals with the potential to lead the next generation of design practitioners."
>
> (Lofthouse, 2017, p.1)

Lofthouse's (2017, p.1) use of the term "potential to lead the next generation of design practitioners" indicates that she associates Design Thinking with *hope* for a more socially engaged future in which designers defeat dominant models. The implication is that both teachers and students should continue to have *hope* in the value of Design Thinking. Lofthouse expands on her strategy for facilitating design-for-sustainability in a co-authored book. Here, Bhamra and Lofthouse (2016) argue that currently, designers facilitate unsustainable consumption by creating products with limited life cycles. To work more sustainably, designers should instead create products which aim to fulfil human needs. This shift requires designers to reject the dominant global Capitalist system:

> "The [unsustainable] life cycle approach tend to encourage designers to think within the current paradigm. The other approach is a needs-focused approach, where the customer's needs are central to the brief […] Taking a needs focus encourages new ways of thinking but is in many ways at odds with the capitalist model in which most western designers work. For a needs-focused approach to be established within the industry, it would have to be recognised at a strategic level."
>
> (Bhamra and Lofthouse, 2016, pp.59-60)

The idea that it is possible, at a global level, for strategy-makers to reject the global capitalist system on which their economies rely is wholly uncritical and idealistic. (The sense of uncritical idealism is particularly ironic given that the title of Bhamra and Lofthouse's book is *Design for Sustainability: a practical approach*). Despite (or perhaps because of) their uncritical and idealistic nature, it is difficult to criticise ideas which are associated with hope. Doing so makes a researcher appear cynical, snarky and unhelpful. (My reference to the title of Bhamra and Lofthouse's book is a case in point...) The idea that speakers associate Design Thinking with social engagement and 'hope' makes it easy to dismiss criticisms of Design Thinking as cynical and unhelpful. This helps to sustain solutionistic *designerly ways of speaking*.

The Relationship Between Minor Science and Royal Science

Turning again to Deleuze and Guattari's (2004) philosophies of science enables further speculation into ways of speaking which sustain Design Thinking. Dominant royal science does not always succeed in its attempt at nullifying minor science. In these instances, royal science allows minor science to operate semi-independently within its overarching jurisdiction. In effect, royal science offers minor science a seat at its table:

> "There is always a current preventing the [minor] sciences from being completely internalised in the reproductive royal sciences. There is a type of [minor] scientist whom royal [scientists] are forever fighting or integrating or allying with, even going so far as to propose a minor position for them within the legal system of science and technology"
>
> (Deleuze and Guattari, 2004, pp. 411-412).

Speakers in the Design Thinking data set commonly evoke the idea that minor scientific Design Thinking can successfully hold its own within royal scientific fields:

> *[Business leaders must understand how Design Thinking] "will fit within larger streams of consideration and existence"* (OA. Paper 117)
>
> *"the characteristics of design and science thinking form a set of complementary thought processes able to add considerable strength to the advisory task."* (IC. Paper 82)

The above quotes present a 'one sided' narrative as they are written from a minor scientific viewpoint. More complete insight into the seat at the table that royal science gives Design Thinking comes from reflecting on how royal scientists view this approach to problem-solving. The data set contains few examples of interviews with royal scientists. Paper 26 is one such article— it includes quotes from a spinal surgeon. The surgeon's quotes support the argument made in the paper—that Design Thinking can create better surgical routines:

> *"The world is fast-changing, and we need to change also. Without innovation, the standard of patient treatment will remain as that of 20 to 30 years ago. If an idea can create value for surgical processes and outcomes and attend to patients' needs, then it is a good innovation." (TR. Paper 26)*

The phrase *"fast-changing, and we need to change also"* allows the royal scientific surgeon to evoke an association with the valuable qualities of *agility* and *progressiveness* which are linked to Design Thinking. These qualities benefit the surgeon's domain without threatening its dominant royal scientific status. The surgeon therefore allows Design Thinking a seat at

the royal scientific table. In return the domain of Design Thinking benefits from the credibility associated with the surgeon.

The example above suggests the presence of an ongoing interdependent relationship between Design Thinking and royal scientific institutions. To maintain credibility, Design Thinking researchers must use some royal scientific ways of speaking (taxonomies; mathematical-like formulae). Design Thinking researchers also benefit from accreditation from royal scientific institutions. In return, royal scientific institutions use *designely ways of speaking* to fend off potential criticism associated with being outmoded. The relationship however relies on the ability of both domains to keep one another at arms' length for fear of losing their discrete intellectual territory. The emerging lexicon of Design Thinking is key to enabling the domain of Design Thinking to keep royal science from engulfing it. Deleuze and Guattari (2004) describe the ongoing interdependent, yet frictional, relationship between royal science and minor science:

> "No sooner do we note a simple opposition between [royal and minor scientific] space than we must indicate a much more difference by virtue of which the successive terms of the oppositions fail to coincide entirely. And no sooner have we done that than [sic] we must remind ourselves that the two spaces in fact exist only in mixture: [minor scientific] space is constantly being translated, transversed into a [royal scientific] space; striated space is constantly being reversed, returned to a [minor scientific] smooth space […] We must therefore envision a certain number of models, which would be like various aspects of the two spaces and the relations between them."
>
> (Deleuze and Guattari, 2004, p. 524)

Strictly speaking therefore, it is not possible to frame Design Thinking simply as a minor scientific domain. More accurately, it is *mostly* a minor scientific domain from which some royal scientific territory constantly emerges. The opposite situation describes fields like spinal surgery. The future prosperity of the domain of Design Thinking lies in the precarious grey area between Deleuze and Guattari's polar opposites. Further research—which is beyond the remit of this thesis—would help me to form a more complete picture of this grey area.

7.3 The Collection Code

The term *Collection Code* describes the level of coherence an academic tribe shows when constructing its intellectual territory (Becher and Trowler, 2001). Communities with a strong collection code claim that knowledge accumulates in a coherent manner from *within* the

tribe. They tend not to readily accept the influence of knowledge which emerges from outside of the tribe. A strong collection code makes the discrete intellectual territory claimed by the tribe appear more stable. Becher and Trowler (ibid, p.71) claim “hard pure” fields like the natural sciences and some areas of mathematics evidence a strong collection code. Becher and Trowler describe communities which show a high level of coherence as *tightly knit*. Tribes with a weak collection code produce classifications in a more jumbled and disparate manner and readily accept knowledge from outside of the tribe in building their intellectual territory. Some areas of humanities research such as human geography evidence a weak collection code. *Loosely knit* communities appear less coherent—and therefore credible—than those with a strong collection code.

I have noted that speakers in the Design Thinking data set consistently construct knowledge in ways which maintain the dichotomous intellectual territory which I outlined in Figure 40. In this aspect, speakers are tightly knit. Becher and Trowler argue that tightly knit communities behave in characteristic ways when faced with radically new ideas. Drastically new ideas do not tend to emerge from incremental accumulation of knowledge from within an academic tribe. Tightly knit communities therefore tend to reject radically new ideas as their influence can destabilise the tribe’s intellectual territory:

> “In closely [knit] knowledge areas, revolutionary theories may have the effect of overthrowing and replacing the current orthodoxy”
>
> (Becher and Trowler, p.71)

Speakers in the Design Thinking data set reject some radically new ideas which would threaten the domain: they mitigate findings which suggest that Design Thinking is not beneficial. Speakers also reject attempts at producing new classifications of Design Thinking. These aspects provide further indication that speakers are tightly knit. These tightly knit traits initially suggest there to be a strong collection code amongst speakers.

The pattern for incoherent classifications amongst speakers however shows the collection code to be less strong than initial indications suggest. More loosely knit domains are open to absorbing radically new ideas:

> “in [more loosely knit] domains (because, one might say, there is not clear orthodoxy to replace) [radically new ideas] tend rather to be absorbed into the more organic, amorphous conceptual structures, which are in their very nature not readily amenable to being superseded”
>
> (Becher and Trowler, p.71)

In the Design Thinking data set, speakers introduce new ideas from diverse areas including: New Media Education (Paper 104), the philosophical concept of Pragmatism (Paper 29), Bricolage from the field of Social Anthropology (Paper 71) and Spinal Surgery (Paper 26) into the intellectual territory they claim ownership over. Speakers absorb these ideas into the domain without them threatening the dichotomous intellectual territory. To the contrary, their absorption strengthens the dichotomy. By way of illustration, claiming a connection between Design Thinking and Bricolage allows the speaker in Paper 71 to contrast design with science:

> *"And since design is a form of bricolage, its logic is the same with the logic of science. But whereas science applies its logic to the abstract, i.e., to concepts, design applies its logic to concrete objects carrying meanings, i.e., to signs."* (DU. Paper 71)

The introduction of new ideas from diverse areas affects the capacity of researchers wishing to critique the domain. Conceivably, it may be possible for a researcher to critique the link between Design Thinking and any one external concept. However, the sheer influx and range of them compounds the difficulty for anyone who may wish to critique the link to all of these.

Speakers in the Design Thinking data set therefore evidence valuable elements of being both tightly knit and being loosely knit. Combined, these elements keep the domain both stable and flexible at the same time. This combination of traits contributes to other aspects I have identified (the emerging lexicon; the relationship between minor and royal science) in making it difficult to 'pin down' the domain of Design Thinking in order to unpick it. My discussion on the collection code allows me to underscore the idea that the very mobility (or instability) of Design Thinking sustains it.

7.4 How Speakers Frame People

The pattern is for speakers in the data set to focus on the successful nature of designers: designers envisioned *"entirely new services, for example a genetic test data bank."* (GD. Paper 64); designers can act in *"an advisory capacity to governmental and institutional leaders"* (OA. Paper 82). It is true that some designers are extremely successful. Designers like Philippe Starck and Thomas Heatherwick are well-known for designing iconic products which inspire a great deal of discussion. Starck created the iconic *Juicy Salif* lemon

squeezer; Heatherwick's consultancy (*Heatherwick Studio*) designed the *New Routemaster* (Figure 53), the 2011 replacement for London's world famous *Routemaster* Bus.

Figure 53: Heatherwick's New 'Routemaster' Bus.
Accessed: http://www.focusfeatures.org.uk/2013/12/the-new-routemaster-another-tfl-route.html

Starck and Heatherwick have had long and lucrative careers. Their story is the exception and not the rule as design disciplines—like many creative subjects—are notoriously competitive fields. To understand a fuller picture of career prospects for designers, it is valuable to examine those for individuals who have studied fashion design. The sociologist Angela McRobbie (2016) claims that fashion design graduates often experience long periods of unemployment or lowly paid employment (Mcrobbie terms lowly paid employment, *under-employment*). McRobbie argues that employment uncertainty is so normal that, for graduates, it is an *institutionalised* way of thinking about working life:

> "Institutionalised long-term under-employment […] serves to suspend the periods of 'rest', or the time between projects, as true employment"
>
> (McRobbie, 2016, p.151)

Institutionalised under-employment perpetuates a culture in which fashion graduates continue to accept low pay as the norm. Engaging in cycles of internships and preparing portfolio projects helps graduates to claim that they are contenders in the professional world of fashion design:

> "while [portfolio] projects signal to the outside world a confident buzz of endless activity, they are significantly under-remunerated and so frequently hardly count as paid work at all. But still, busy under-employment bears no stigma, and the constant

> stream of [portfolio] projects serves a kind of social face-saving function [for graduates].”
>
> (McRobbie, 2016, p.151)

Discussion on the limited prospects of design graduates is not confined to academics like Angela McRobbie. I have noted that the UK government argues that studying design subjects can hinder the career prospects of young people. The former Education Minister, Nicola Morgan claims:

> “the subjects that keep young people’s options open and unlock the door to all sorts of careers are the Stem subjects”.
>
> (Morgan, cited in Paton, 2014)

Official figures back up the UK government’s claim. The Office for National Statistics (2017) reports that salaries for graduates from STEM subjects are the highest amongst individuals with degrees (see, Figure 54). In contrast, those with arts-based undergraduate degrees have the lowest incomes (Figure 54, circled).

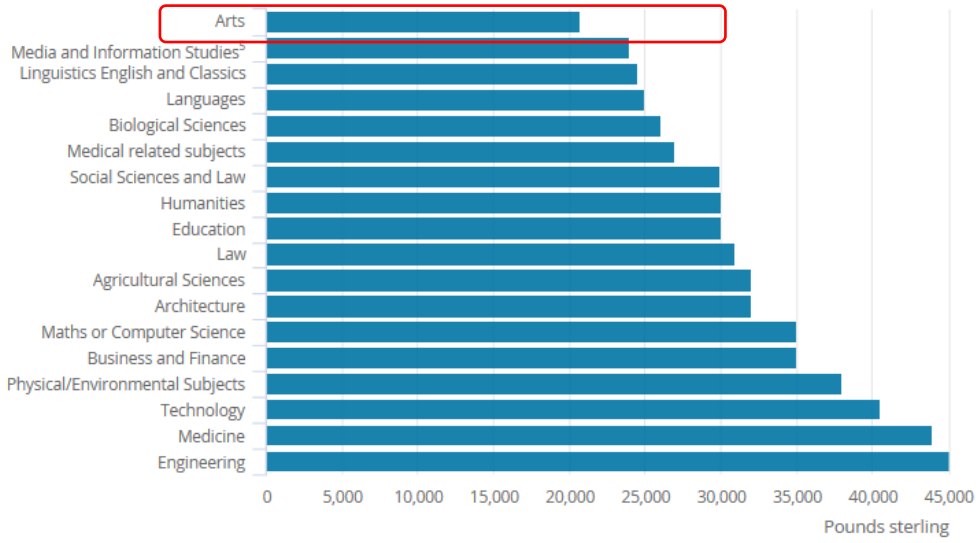

Figure 54: Average Gross Annual Pay for Graduates with Undergraduate Degrees by the Subject of their Degree. Taken from Office for National Statistics (2017, unpaged)

In addition to low pay, graduates with a range of design degrees must also negotiate a marketplace with a low number of jobs in creative areas. The UK government’s Department for Business, Innovation and Skills (Williams et al., 2015) reports fewer graduate job openings in creative areas than in any other area (Figure 55, circled).

Detailed sector (2-digit SIC)	Broad sector	Recruited graduate	Not recruited graduate	Total establishments (Weighted N=)
85 Education	Education	37.6	62.4	57,500
72 Scientific research and development	Business services	34.2	65.8	1,100
75 Veterinary activities	Business services	31.9	68.1	4,700
59 Motion picture, video and television programme production, sound recording and music publishing activities	Transport/ communications	30.7	69.3	7,100
73 Advertising and market research	Business services	27.9	72.1	15,100
21 Manufacture of basic pharmaceutical products and pharmaceutical preparations	Manufacturing	27.5	72.5	500
58 Publishing activities	Transport/ communications	24.8	75.2	5,800
66 Activities auxiliary to financial services and insurance activities	Financial services	23.2	76.8	6,000
62 Computer programming, consultancy and related activities	Transport/ communications	23.1	76.9	31,000
70 Activities of head offices; management consultancy activities	Business services	22.8	77.2	46,200
63 Information service activities	Transport/ communications	21.6	78.4	2,400
60 Programming and broadcasting activities	Transport/ communications	20.8	79.2	1,700
74 Other professional, scientific and technical activities	Business services	20.6	79.4	35,600
84 Public administration and defence; compulsory social security	Public admin.	20.4	79.6	21,400
90 Creative, arts and entertainment activities	Other services	20.2	79.8	5,600

Figure 55: UK Sub-sectors with Highest Proportion of Graduate Recruiting Establishments in the Year 2013. Taken from Williams, Tassinari and Ball (2015, p.34)

In the Design Thinking data set, speakers completely ignore the negative association between design domains and employment. The closest speakers come to talking about employment is when they discuss graduate futures. When doing so, speakers frame graduate futures not in terms of *employment*, but in terms of *problem-solving*. The way that speakers discuss provisions which may improve graduate futures follows the dichotomy that has been a key feature of this study. By way of illustration, in the following quote, the speaker (Paper 51) claims more focus on progressive methods (*"explorations"*) and less emphasis on rigid methods (*"normative methods"; "rigid prescriptions"*) in design education can help students fulfil their potential as problem-solvers (*"strategic players"*):

> *"It seems that we should encourage our students to devote more time and effort to explorations, and certainly not focus so much attention on preparing final presentations (especially in very compressed exercises). Should we teach methods? We definitely should, but it must be emphasized that* ***normative methods*** *are to serve as general guidelines, check lists perhaps, rather than* ***rigid prescriptions****, and the order in which activities are undertaken is often flexible and context-related. It is reassuring that even a most limited experiment of the kind we have conducted allows us to reach a conclusion of such magnitude. If we want designers to merit the credit they are given today even outside of the world of design as* ***strategic players***

> *in the forefront of innovative initiatives, we should prepare them accordingly."* (OA, Paper 51).

Framing the discussion on graduate futures in terms of the familiar dichotomy helps speakers to maintain the idea that Design Thinking is distinct from everyday methods which teachers use in design education. More succinctly, the process helps speakers to disassociate Design Thinking from design education. To illustrate, in the above quote from Paper 51, the speaker claims that tutors should focus on teaching problem-solving methods over and above teaching specific design skills (*"not focus so much attention on preparing final presentations"*). Other speakers follow this pattern. Paper 81 argues that non-design students are better problem-solvers that design students as the former see *"problems from a more open vantage point."* (C. Paper 81). In claiming this, the speaker frames non-design students as being more *agile* thinkers than design students. The speaker suggests that dominant education models have negatively affected the ability of design students to think with agility. Focussing less on teaching design skills and focussing more on incorporating Design Thinking into the curriculum will make design students more agile problem-solvers:

> *"design educators can use design thinking to structure design curriculum and to develop courses with broader applicability […] Secondary education that focuses on design thinking process (rather than product) should also be considered."* (OA. Paper 81)

Framing the discussion on graduate futures around problem-solving (rather than design skills) helps speakers to maintain the idea that Design Thinking is separate from design practices. Ways of speaking which separate Design Thinking from both design education and design practice have specific connotations. They help speakers focus on suggesting methods of transforming graduates into strategic leaders as the expense of discussing how to facilitate better graduate employability. In-so-doing, these ways of speaking ignore a large chunk of the career of design graduates—the time between leaving formal education and becoming a strategic leader; graduates may take decades to become leaders in their chosen industry. Instead of focussing on the range of complex issues that affect graduate employability (including, CV-writing skills; interview skills; the issue of emotional and financial stress associated with undertaking periods of institutionalised underemployment; economic factors including prosperity in global markets) speakers suggest that Design Thinking is a magic bullet for design students. Abstract ideas of intellectual *agility* juxtaposed against equally abstract concepts of mental *rigidity* are key in allowing speakers to skew the conversation away from focussing on these realities. Ways of speaking on graduate futures

therefore illustrate a further example of the reliance on solutionistic narratives in the Design Thinking data set.

Chapter 8

Conclusion

8.1 Summary of Aims

In 1982 the design researcher Nigel Cross coined the term *designerly ways of knowing* when calling for more research into how designers think. Since Cross' call, there has been a huge amount of investigation in this area. The idea that designers have a unique, discernible style of thinking (termed 'Design Thinking') is key to contemporary design research. The concept of Design Thinking is also extremely influential outside of design research. The huge amount of interest in Design Thinking is linked to the idea that it can solve a range of difficult problems, both in business and in society. There are disagreements between communities of researchers over who has most authority to claim knowledge on Design Thinking. This thesis has aimed to uncover ways of speaking which enable *one* community of researchers—the '*Design Tribe' of researchers*—to produce knowledge on Design Thinking. To this extent my research question was: ***How Does the Design Tribe Speak on Design Thinking?***

There are very few existing studies which have investigated ways of speaking in Design Thinking research. Studies which have (New and Kimbell, 2013; Farrell and Hooker, 2013) analyse small samples of literature without employing methods specifically designed for investigating ways of speaking in texts. This has left a significant gap in knowledge into what constitutes ***designerly ways of speaking***. This PhD contains the first study which subjects a data set of peer-reviewed Design Thinking articles to methods specifically designed for investigating ways of speaking. The methods are *corpus linguistics* and *content analysis*.

8.2 Contributions

8.2.1 Answering the Research Question

Speakers use dichotomous narratives to create intellectual territory on Design Thinking, contrasting *progressive,* Design Thinking with *dominant* models. A distinctive lexicon is key in allowing speakers to construct the narratives—and so to create *designerly ways of speaking***.** For researchers, Design Thinking is: *agile, complex, fluid, multimodal, collaborative, dialogic, facilitates problem-solving*. In contrast, dominant models *conceal*, *standardize*, *lock in*, are *rigid* and *linear*, *squash* and *reduce*. The lexicon is emerging—it is not exhaustive.

A range of research practices underpin the intellectual territory. These practices are characterized by:

- Inconsistency associated with descriptions of Design Thinking.
- Broad generalisations from analysis of very small data sets.
- Uncritical and idealistic methods of framing both Design Thinking and individuals who practice Design Thinking (Design Thinkers).

These practices:

- Highlight the part that a distinctive lexicon plays in allowing speakers to construct and maintain the domain.

Therefore, while there is little evidence to suggest a distinctive Design Thinking, there is certainly a distinctive and coherent form of discourse, ***designerly ways of speaking***.

8.2.2 Methodological Contribution

This is the first time that tools (corpus linguists and content analysis) which are designed for conducting investigation into ways of speaking have been used to analyse ways of speaking in Design Thinking research. In addition, this is the first time that corpus linguistics methods have been used to investigate ways of speaking in Design Thinking research. By demonstrating the value of these methods, my thesis provides an additional set of tools for investigators aiming to further analyse ways of speaking in Design Thinking research.

8.3 Representativeness

My aim when beginning the investigative work was to create findings that could represent ways of speaking used by the Design Tribe of researchers at a descriptive level. To claim representation at a descriptive level it is necessary to present a coherent narrative which describes ways of speaking (Larsson, 2009). The narratives I have presented on the ways in which speakers construct intellectual territory, Design Thinking, existing research and designers & students provide coherent evidence of a system of speaking. The coherence of these narratives means that I am able to provide other researchers with enough information to allow them to recognise when and where patterns in ways of speaking occur in the texts written by the Design Tribe of Design Thinking researchers. I can therefore claim that my

findings represent ways of speaking used by the community of Design Thinking researchers who publish in design journals—*the Design Tribe*. Therefore, I can claim that the *designerly ways of speaking* I have identified are representative of ways of speaking used by the Design Tribe at a descriptive level.

8.4 Implications

All discourse communities create ways of speaking which shape how they claim knowledge on their domain. The implications of the ways of speaking that members create depend on the influence of the tribe and its aims. *Designerly ways of speaking* provide an academic seal of approval on 'Design Thinking'—a concept, which, for over 2 decades, has underpinned design research and pedagogy worldwide. As gatekeepers in the peer-review process, academics have an important duty in deciding which knowledge is validated as socially approved in any given research community. All the papers I have analysed in this study have passed the peer-reviewed process. Because of this, the process of peer-review has been important in helping to create and sustain *designely ways of speaking*. Highlighting this issue will help to inform reviewers when they are tasked with deciding which submissions to recommend as valid, balanced academic research. Ultimately, creating a more rigorous peer-review culture will help the Design Tribe contribute a far higher standard of research on design theory, education and practice in the future.

Disseminating my findings in peer-reviewed design journals and conferences will help me to communicate my contribution to design researchers and educators. This will be an important step towards creating a more rigorous peer-review process.

8.5 Limitations

8.5.1 Qualitative Research

Qualitative research is interpretive and therefore produces subjective findings. I have followed the following steps to reduce the impact of this issue:

- Following established process associated with the research methods
- Inviting an independent expert to participate in the inter-reliability process.

8.5.2 Personal Lens and Confirmation Bias

The term *personal lens* is used to refer to a researcher's experiences, ambitions and prejudices which he or she brings into the study (Fusch and Ness, 2015). The personal lens can prompt a researcher to both include data which helps confirm their prejudices and to interpret findings in ways which result in biased conclusions. I have published on Design Thinking in the past. My list of publications prior to writing this thesis include peer-reviewed research in which I have attempted to unpick claims made by both design academic researchers and leading commercial designers associated with Design Thinking. In this research I used the following media, *stand-up comedy*, *poetry*, *photography* and *graphic design* to critique existing research on Design Thinking (Ghassan 2013, 2013a). My previous articles have helped to colour my personal lens—which, from the outset, has been sceptical on the value that researchers associate with Design Thinking.

In addition, the issue of *confirmation bias* is relevant to this thesis. Confirmation bias occurs when researchers "seek[] or interpret[] evidence in ways that are partial to existing beliefs, expectations, or a hypothesis in hand" (Nickerson, 1998, p.175). This thesis has aimed to uncover ways of speaking in with Design Thinking research. I have therefore been actively looking for narratives. Because of this my investigation is prone to confirmation bias. I have taken steps to limit the effect that my personal lens has on the research and to reduce the likelihood for confirmation bias:

- I have rigorously justified the strategy for collecting data.
- I have used appropriate research methods.
- I have reported my research process in a transparent manner through using clear language. I have written in plain English, avoiding as best I can the convoluted way of structuring sentences which Pinker (2014) claims many researchers are prone to using.

8.5.3 A Small, Narrow Data Sample

My data sample is small and narrowly defined, representing a tribe of academics which make up only a small portion of the huge number of individuals who investigate or claim to use Design Thinking. This limits the contributions I am able to claim to the Design Tribe.

8.5.4 Language Issues

As I have only analysed texts written in English, my claims of representativeness are limited to research published in English language journals.

8.6 Speculation and Future Research

8.6.1 A Regime of Truth?

The philosopher and historian Michel Foucault (1980) used the term *regime of truth* to describe the all-encompassing and pervasive knowledge creation, dissemination and filtering system used by knowledge communities. Proof of the presence of a regime of truth requires analysis of varied types of data from a range of sources. To illustrate, when analysing how institutions frame madness, in addition to investigating official documents, Foucault analysed ways of speaking produced and disseminated in media such as case notes made by minor clerics (Rabinow, 1991). In this thesis, I have only analysed peer-reviewed papers. It would be valuable to conduct further research on a broader range of data—for example, university promotional material, teaching notes, interviews with design academics and students. This would help me to understand whether *designerly ways of speaking* apply more broadly amongst the Design Tribe. Ultimately, this form of analysis would provide insight into whether there exists a *regime of truth* associated with ways of speaking in design academia.

8.6.2 A Diachronic Study into Designerly Ways of Speaking

Use of critical theory has allowed me to speculate that the emerging lexicon of Design Thinking enables the domain of Design Thinking to remain an agile territory, continually outmanoeuvring attempts to pin it down for sustained criticism or to transform it into a royal science. A comparison between current *designerly ways of speaking* and those which will exist in a future time frame (for example between 2020 and 2030) will allow me to analyse how the territory has shifted. A *diachronic study* (the term used to describe a comparative analysis of ways of speaking which occur in 2 time-frames (Baker, 2006)) will also provide

insight into movements in use of the terminology which underpins *designerly ways of speaking*. In the future, it will be valuable to research whether research communities have stopped using the term ‘Design Thinking’ altogether. It will be interesting to unpick new terms which describe minor scientific challenges to dominant approaches to problem-solving.

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