Unpacking the Complexity of Packaging Design Interaction:
Developing a Packaging Knowledge Tool for Design Practitioners

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The abstract

This thesis presents the development of an online informational resource for packaging designers to better understand how consumers respond to their packaging designs. This resource, entitled the unpack knowledge tool, aims to literally ‘unpack’ the complexity that surrounds consumer response to packaging by making the theory accessible to design practice. The development of the unpack knowledge tool is comprised of three phases, the knowledge, the process and the outcome. The first phase, the knowledge, brings together the literature in the area and then proposes a conceptual framework around consumer response and packaging design. The second phase reports on the development of the unpack knowledge tool. This includes establishing an industry context, proposing a design strategy, developing the content and then synthesizing this into an interactive informational resource. The development of the tool required a series of research methods, including discussions with packaging industry leaders, interviews with packaging consumers as well as the application of design practice processes, including iterative design development, information design and interface design. The third phase, the outcome, presents the final tool prototype as well as the findings of a preliminary evaluation on how well designers can use and comprehend the tool. A series of recommendations for revising the tool are proposed based on the testing results. In conclusion, applications for the unpack knowledge tool as well as future research opportunities are discussed.
Acknowledgements

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Declaration

This thesis is an original work and contains no work that has been accepted for any other academic award. Two conference papers were published out of this thesis, these are declared below.

Emily J. Wright

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Chapter 1: Introduction

Overview

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Why does one person at the shelf choose one bottle of water over another when there is little difference in the actual product? In the market place of today there is little difference between products beyond price point; all function to a similar standard. According to Jordan (2000) it is the appeal or the pleasure factor that is the key variable that the consumer uses to differentiate between products. In an age where the choices available in consumer products can be overwhelming, how do consumers choose what product suits their needs? As consumers can not use the product until after purchase, they are left with the product’s visual appearance, the product packaging to determine what product is right for them. In the area of packaged products particularly Fast Moving Consumer Goods (FMCGs), the packaging is even more vital as many consumers make impulse purchase decisions at the point of sale (Connolly & Davidson, 1996). In the retail environment the product’s packaging is clearly the “salesman on the shelf” (Pilditch, 1972).

This thesis examines the knowledge surrounding consumer impressions of the interface between the consumer and the product, the product packaging. In an effort to bring together the disparate knowledge around this important area, two conceptual frameworks are proposed. This information is visualised, then synthesised into an online informational resource for packaging designers, the unpack knowledge tool. The goal of the unpack knowledge tool is to literally “unpack” the theoretical concepts behind consumer response to packaging design in an effort to make theory practical and accessible to practice. The contribution of this thesis, the development of the unpack knowledge tool, aims to bridge the research/practice gap by making new research knowledge accessible to the design practitioner.

This first chapter presents the motivation behind this research, the research approach and provides an overview structure for the subsequent thesis chapters. The research motivation reviews the area of investigation; packaging design, consumer research and design practice. It then clarifies the research gap, contribution and terminology used throughout the thesis. The research approach reviews the methodological issues related to the thesis. The thesis structure clarifies the project phases and summarises each chapter.
1.1 Research motivation

Areas of Investigation

This section reviews the areas of investigation within this thesis. These include packaging design, consumer research and how consumer research is applied within packaging design practice.

Packaging design

The packaging of a product serves a number of functions. It protects and houses the product during its life cycle. It provides a functional interface for the consumer to operate whether opening, decanting or storing a product. It also communicates both product and brand attributes to the consumer. This thesis examines how consumers respond to packaging. The product’s packaging serves as an interface between the consumer, product and the product brand. The packaging should communicate the product’s brand proposition and personality to build relationships with the consumer, encouraging repeat purchases (Rettie & Bruwer, 2000). Thus the consumer’s impressions of the product packaging are an integral part of the human–product interaction experience. Then packaging is considered so vital to how a product is perceived that a common saying in the packaging design industry is, “the package is the product” (Southgate, 1995). The design of a package including the colour, typography, graphic and illustrations impact communication and thus consumer response (Ampuero & Vila, 2006).

Consumer research

How consumers respond, interact and ultimately choose various product brands is an area of much investigation (Garber, 1995; Fournier, 1998; Coates, 2003; Norman, 2004). In the area of consumer response to packaged products the knowledge is drawn from various intellectual traditions, including the social sciences, engineering and business. These three key areas encompass a number of sub-disciplines that contribute to the literature. Firstly, within the social sciences, recent advances in psychology are relevant, including aesthetics and affect or emotion, as well as semiotics and product semantics, stemming from sociology. Secondly, from the area of business comes marketing, studying consumer response and behaviour as well as branding. Thirdly, engineering offers human–computer interaction (HCI) and human
factors with the use of products, and then moves to a more integrated view of the product interaction experience. Given the diverse perspectives of the various disciplines there is a lack of common understanding and terminology surrounding the area of consumer response to products. There exists no accepted overall framework for the knowledge in the area. While there have been attempts to propose integrated frameworks (Bloch, 1995; Crilly, Moultrie, & Clarkson, 2004; Crozier, 1994), there remains a lack of clarity.

The literature not only crosses disciplines but also is drawn from both the academy and industry. Both have sought to answer how consumers respond to products and have contributed to the area in important, yet different ways. In recent years, practice has sought out research methods to support design outcomes, while in turn researchers are keen to test their findings in practical settings. Both are important, yet a substantial gap remains between design research and design practice (Friedman, 2002). Rogers (2004) argues practitioners rely on methods they are most comfortable with rather than keeping abreast of new theoretical knowledge, methods and instruments. Norman (2010) argues while design researchers may be able to make some recommendations from evidence-based research, it does not ensure design success in the marketplace. In practice, how consumer research is applied within the design process can be problematic. Others concur, McDonagh & Denton (1999) argue that designers need to participate in the user research process and develop methods, instruments and techniques that are appropriate to the needs of the design process. These areas are reviewed within Chapter 2 and 3, the literature review.

**Consumer research in design practice**

Researching the user or consumer and involving them in the design process is an emerging trend within design research. Movements within design that adopt this user-centered approach include user or human-centered design, inclusive design, emotional design, participatory design, and contextual design to name just a few. In recent years, this trend has extended to design practice, with designers taking a more user-centered approach to the design process by recognising the importance of the user’s feedback to a successful design outcome. There are barriers, however, to the real-world application of these user research methods in design practice. Many companies do not employ
comprehensive user research within the design process because of the expense. While it may be expensive, there is a move towards investing in consumer research in the packaging design sector (Young, 2002). Nevertheless, leading companies such as IBM, Apple, Sony, Phillips and P&G who have a commitment to design, currently use user research methods to support design, particularly new product development (Cagan & Vogel, 2002). These larger companies can afford the initial investment in this sort of research as better understanding the consumer can lead to better sales in the future. How to measure the impact of design on a product’s sales success, however remains an issue of debate. Unlike engineering or logistics, it is more difficult to quantify how design can add value to a company’s bottom line. In the past, measuring consumer response to proposed designs has been used to provide evidence to support investment. However, it is difficult to measure design success given the complexity of the design process and the diversity of consumers.

The research gap

Interpreting and successfully applying consumer research within the design process can be problematic. Often research is conducted without the input of the design team, which results in design parameters that can hinder innovation. An additional problem is that the consumer research findings are often not translated into a form that is accessible to the design practitioner (McDonagh & Denton, 1999). Hanington (2003) argues that designers need to be involved in user research so the results can be better contextualised to the design process. This is particularly true in the realm of packaging design, where user research is increasingly becoming the way to quantify the design contribution to the bottom line (Young, 2006). In order for designers to influence how user research is applied in the design process, it is argued there needs to be a clearer understanding of human–product interaction concepts. This thesis explores the barriers to the application of consumer research within the packaging design process and argues a shared understanding of consumer research applications within packaging design would support design success.
The research contribution

There are two contributions of this research. The first contribution is to bring together the disparate knowledge around the area of consumer response to packaging design. This was achieved through reviewing the literature, multidisciplinary as well as both theoretical and practical, in the area of consumer response to packaging and mapping it into two conceptual frameworks. The goal was to make this knowledge accessible to the design practitioner. The second contribution, is the design development and testing of the unpack knowledge tool. The unpack knowledge tool becomes the vehicle with which the first contribution, the knowledge, can be shared and disseminated. It is argued that the development of the unpack knowledge tool concurs with the OECD definition of research and demonstrates a “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications” (OECD, 2008).

The unpack knowledge tool seeks to facilitate a more comprehensive understanding of how people interact with packages and the various aspects of consumer response, including the cognitive, emotional and behavioural. This tool aims to give packaging design practitioners a better understanding of the complex factors that exist when a consumer interacts with a packaging design artefact. This knowledge will empower the design department to better contribute to consumer research and packaging design testing discussions. This should provide the design team with a larger role in participating and interpreting the consumer testing results, so that this can be appropriately applied to the design development process and thus lead to greater design success.
The terminology

As this research as well as the literature is multidisciplinary, terminology needs to be defined. There are three terms that need clarification, “design”, “consumer” and “response”.

The term “design” occurs frequently in this thesis. The term is used in multiple ways, as both a noun and a verb. Firstly, the term is used to describe the discipline of design, including design research, design practice and design education. This research draws upon both design practice and design research knowledge and plans to test the research with design practitioners in future. Secondly, the term indicates an active process, i.e. “to create, fashion, execute, or construct according to plan” (Merriam Webster, 2010). The process of design is employed in various stages of this research, specifically in the design development of the *unpack knowledge tool*. Thirdly, the term is used to indicate sub-disciplines within design including “iterative design”, “information design”, “interface design” and “visual communication design” or “graphic design”. These terms are not only discipline areas but also design processes. For example, the tool design and development process employed, iterative, information, interface as well as graphic design processes.

When referring to “people” within the thesis, various terms are used depending on the context and the supporting literature. While the term “consumer” occurs often in this thesis, “user”, “audience” and “target market” are also employed. The term “consumer” is preferred within the psychology and marketing science literature as the initial context of the package design experience is primarily consumption-oriented. However after product purchase, the interaction becomes focused on the “use” of the package and thus the term “user” is appropriate. The term, “user” stems from the engineering and ergonomics literature and deals with the product in use and concerns that arise in this process, such as functionality and usability. User-centred design is a design method approach that focuses on the needs of the user and involves testing with users to refine design outcomes. The terms “audience” and “target market” also appear within the thesis, as these terms are present in the design practice literature. Stemming from marketing and advertising, these terms are often used in industry when discussing packaging and branding.
To describe the process of a person responding, using, or interacting with a package is also an area that necessitates various terms. Firstly, as the term “consumer” is often used, it follows that the term “consumer response” is also preferred. Secondly, the term “packaging interaction” is also used, as this is a broader term that includes all aspects of the sensory experience a person encounters when they see, choose and use a packaged product. Thirdly, the term “experience” is also found in the literature and is a growing area in design research, i.e. Desmet and Hekkert (2007) propose a “Framework for Product Experience” while Crilly (2005) proposes a “Framework for Consumer Response to the Visual Domain in Product Design”.

1.2 Research approach

Methodology

As the research area involved a real world problem it was difficult to address it with a single research approach. The research necessitated the application of various areas of knowledge across the disciplines as well as methods of investigation, i.e. stemming from design research and design practice, in order to reach its goal. The project reported applies multiple methods drawn from design practice. The research component of the project drew on two approaches to research; design research and empirical research.

From design research, this thesis draws upon Frayling’s (1993/1994) design research framework with “research through design” as well as “research for design”. The first, “research through design”, recognises the design practice component of the tool development which is described in chapter 4, 5 and 6. The second, “research for design”, recognises the tool’s contribution to packaging design practice to support better design outcomes.

Within design research, practice-based research is becoming more common within the discipline often drawing upon Schön’s (1983) notion of reflective practice. Nevertheless, practice-based research within design is still new and thus methodology is not often addressed within the area (Blessing & Chakrabarti, 2002). Yet in recent years, more work in the area has emerged
and this thesis draws upon this new knowledge in its research approach. Employing design practice as a component of data collection is becoming an accepted method within design research (Evans, 2010, Rust, Mottram and Till, 2007). Evans (2010) outlines a five phases methodological approach for research undertaken with a practice-based approach which he terms “researcher practice”. This approach has also been termed evidenced-based practice research as used in nursing research (Leach, 2006). However, it is important to acknowledge not all creative practice can be considered research and creative practice should meet standards of research quality (Archer, 2004).

From empirical research, evaluation methods were applied to test if designers could understand and use the tool. This included a comprehension test as well as measuring perceived usability and satisfaction. Evaluating the design outcome, the tool, led to a series of recommendations to improve the tool for future use.

**Method and analysis**

As the goal of this research was to develop a practical resource tool for design practitioners, it was difficult to achieve this goal utilizing a single research approach. As stated above, methods from design practice and design research were employed. Once the tool was developed an empirical approach was used to evaluate it. This section reviews the various methods of investigation and visualises these in a table, see Figure 1.1., to better understand what and when various methods were carried out and the subsequent goals of each. For the sake of clarity, the overarching method employed to develop the *unpack knowledge tool* was “Iterative Design Development” method (Boehm, 1988).

**Iterative design development**

Iterative design method can encompass a variety of other methods, such as prototype testing, usability testing and user testing, depending on the scope and needs of the particular project. How these areas are tested and what methods are employed can also change per project, i.e. user testing could be carried out with various methods including usability testing, interviews or ethnography (Kuniavsky, 2003). The notion of iterative design has been attributed to Boehm (1988) within HCI (Human Computer Interaction) when he
proposed the “Spiral Development Method” for software development. This approach is further described in Chapters 4, 5 and 6 of the thesis.

Iterative design was initially used for software development and is defined as a cyclical process, where the design development is prototyped, tested, analysed, then refined further. An iterative design approach is commonly used when not all parameters of a design project are defined at the beginning of the process. This allows for new information to be incorporated into the design development process as it arises (Thomke, 2003). In light of this iterative approach, method and then analysis are implemented throughout various stages of the project.

The project reported here starts with the use of methods drawn from design practice and research. Figure 1.1 visualises the application of methods and analysis throughout the project. First, discussions with professionals from the packaging design industry were undertaken to clarify what challenges may exist in applying consumer research in the packaging design process. This informed the scope of the project. Second, interviews were carried out with consumers to gauge responses to packaging. This information assisted in development of the tool’s content, specifically the scenarios. The knowledge diagrams and frameworks, presented in the Literature Review, were also central to the tool’s content. Third, design practice methods were used including information design, interface design and prototyping. Fourth, evaluation of a series of prototypes was carried out with digital media designers throughout the design development of the unpack knowledge tool. This feedback was used to refine each subsequent tool prototype design. The methods undertaken during this phase of the project focused on “relevance” to the practical project at hand as opposed to “rigour” as argued by Schön (1995). The number of participants involved were relatively small in each instance. Finally, the tool was formally evaluated for user comprehension and perceived usability. These findings are discussed and a series of recommendations for refinement of the tool are presented.
### Figure 1.1: Methods

<table>
<thead>
<tr>
<th>1. Literature review</th>
<th>&gt; to propose a conceptual framework</th>
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<tr>
<td>2. Tool Development</td>
<td>&gt; to inform the scope and strategy of the tool</td>
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<td>3a. Discussions with packaging design industry</td>
<td>&gt; to inform the scope and strategy of the tool</td>
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<td>3b. Interviews with consumers</td>
<td>&gt; to inform the content development of the scenarios</td>
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<td>3c. Iterative design development</td>
<td>&gt; to build tool prototypes</td>
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<td>&gt; design process methods utilised include: information design, interface design, visual communication design</td>
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<td>&gt; heuristic evaluation with designers</td>
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<td>3. Evaluation of the tool</td>
<td>&gt; to test comprehension and usability</td>
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1.3 Structure of the thesis

The thesis is structured into chapters as well as phases to assist in clarifying the overall research approach and outcomes.

Project phases

The development of the thesis project is comprised of three key phases. These include the first phase: the knowledge, the second phase: the process and the third phase: the outcome. See Figure 1.2, Thesis project phases.

The first phase, termed the knowledge, establishes the lack of a shared understanding across the multidisciplinary area of applying consumer research in design practice. This literature is then developed into a series of conceptual frameworks which visually map the knowledge in the area across both the design industry and the academy. The second phase, termed the process, involves all aspects of the unpack knowledge tool development including establishing project scope and strategy, content development, and then design, development and informal testing. The third phase, termed the outcome, features the final prototype, the formal testing and recommendations for proposed revisions to the tool.
**Figure 1.2: Thesis project phases**

| Phase 1: The knowledge         | Chapter 2: A critical review of the literature  
|                               | Chapter 3: A framework for consumer response to packaging |
| Phase 2: The process          | Chapter 4: The scope and strategy development  
|                               | Chapter 5: The content development of the tool  
|                               | Chapter 6: The design development of the tool |
| Phase 3: The outcome and testing | Chapter 7: The tool and testing |
|                               | Chapter 8: Conclusion |
Thesis Chapters

The thesis chapters resemble a traditional thesis structure, i.e. starting with a literature review, presenting method, analysis and then the result. Within this thesis, different terms are used for these stages of the research given the practical context of the development of the unpack knowledge tool. For instance, the first section of this thesis which reviews the knowledge in the area is presented within “phase 1: knowledge”. The methodology, method and analysis aspects of the research are housed within “phase 2: the process” while “phase 3: the outcome” reviews the result and discussion of the research, the unpack knowledge tool.

Chapter 1: Introduction
This chapter defines the project scope, object of study and thesis structure. It discusses the aims and outcomes of the thesis as well as background literature that support the relevant research area.

PHASE 1: THE KNOWLEDGE

Phase 1 presents the knowledge around this area and is divided into two chapters. Chapter 2 provides an overview of the area from various disciplinary perspectives, while Chapter 3 becomes more specific, presenting a framework for how people respond to packaging design.

Chapter 2: Literature review
This chapter reviews the relevant literature that will support the content development of the tool. This includes knowledge from various disciplines such as Business, Social Science and Engineering as well as from both the academy and the design industry. Each discipline uses terms in different ways and therefore the intended use is clarified in relation to the literature.

Chapter 3: The frameworks for packaging design interaction
This chapter explores the literature in more detail, reviewing the relevant models and frameworks surrounding consumer response to products. An argument is presented for the building of a conceptual framework
that incorporate aspects of several key models and is relevant to packaging design. Rather than focus on the validity of one model as opposed to another, two alternative views of the frameworks are proposed. These are featured in the *unpack knowledge tool*.

**PHASE 2: THE PROCESS**

Within Phase 2: the process, there are three aspects which are divided into Chapters 4, 5 and 6. These include establishing the scope and strategy, developing the content and the design as well as development and testing.

**Chapter 4: Establishing the scope and strategy**

This chapter clarifies the scope of the project as well as the strategy for its implementation. The strategy and scope are informed by discussions with the packaging design industry. Discussions were conducted with industry expert packaging design practitioners to establish how consumer research is currently applied in design practice.

**Chapter 5: The content development**

This chapter details the development of the content for the *unpack knowledge tool*. The content for the tool included diagrams of the literature review as well as the series of three conceptual frameworks. How to best visualise the frameworks is also explored through the use of visual communication and information design processes. However upon user testing the visualisation outcome, it was found that the conceptual frameworks were complex and difficult to understand. It was suggested a more practical application of the conceptual frameworks could aid understanding. This led to the development of the packaging interaction scenarios, which demonstrated how the theory within the conceptual frameworks could be applied to a real-world situation. This included interviewing consumers about packaging and using this data to develop scenarios around various consumers responding to packaged products. The scenarios are displayed as movies within the unpack tool that feature four consumers responding to three different types of products.

**Chapter 6: The design and development**

This chapter presents the design development of the *unpack knowledge tool*. 
tool. This includes the design, development and testing of the unpack prototypes. The initial prototype incorporated information design, interface design and visual design methods. Each of the prototypes was tested with users and thus an iterative design approach was employed, designing, testing and then redesigning based on feedback.

**PHASE 3: THE OUTCOME**

Phase 3 presents the outcome of the thesis in detail with supporting explanation and discussion where necessary.

**Chapter 7: The tool and testing**

This chapter features the final prototype displaying each screen in detail. This includes the sections of the tool, the project, the knowledge, the frameworks, the scenarios and the feedback sections. Next it shows the formal testing undertaken and presents a series of recommendations for design revisions.

**Chapter 8: Conclusion**

In conclusion, future work includes testing of the *unpack knowledge tool* with a series of case studies as well as interviews with designers who use the tool in the design process. Potential contexts for the case studies and interviews include both the design industry as well as design schools. This will provide feedback from established design practitioners as well as emerging designers. The aim of the study is to see how useful the tool is when applied to the design process as well as to further refine the unpack tool for practical use in design practice.
Conclusion

This first chapter has presented an overview of the thesis including the areas of investigation, the research approach and the structure. The next section, entitled Phase 1: The knowledge, is comprised of two chapters that review the literature used to develop the *unpack knowledge tool*. 
PHASE 1: THE KNOWLEDGE

Chapter 2: Critical review of the literature

Chapter 3: Frameworks for packaging design interaction
Chapter 2:  
Critical review of the literature

Overview

2.1 The academy and the industry
The academic and industry perspective
Lack of common understanding
A framework for consumer response to packaging

2.2 Design research contribution
The social sciences
Business
Engineering

2.3 Design practice contribution
Research in practice
Industry research
Market research
Design practitioners

Conclusion
Overview

Chapter 1 established that there is a gap in the area of design knowledge related to suitable tools for design practitioners in evaluating consumer response to design products. The research undertaken in this project was designed to address this gap by developing a knowledge tool suitable for design practice. This chapter presents a critical review of some of the theories, methods and techniques that have been proposed in the literature related to consumer responses to the design appearance of packaging. This literature is drawn from both academic scholarship as well as the design industry. The academic literature is used to highlight key areas across a number of disciplines, including social science, business, engineering and design. In order to develop an understanding of what knowledge is applied in practice, the design practice knowledge provided by the packaging industry is also reviewed. It is argued that both knowledge domains, design research as well as design practice are needed to build an integrated framework around the area of consumer response to packaging. Figure 2.1 provides an overview of the literature, featuring the design research and design practice literature. This literature review lays the foundation for the frameworks proposed in Chapter 3.
Figure 2.1: Literature review
2.1 The academy and the industry

The academic and industry perspective

Both the academy and industry have sought to gauge consumer impressions of products and they have contributed to this in different ways. Jeamsinkul and Sawasdichai (2002) state that methods employed by design research and practice inform one another and in some cases it is difficult to distinguish between the two. In recent years, practice has sought out research methods to support design outcomes, while researchers are keen to test their findings with practical outcomes.

A gap exists between design research and design practice. Rogers (2004) reports on a study completed with HCI design practitioners and argues that few design practitioners apply recent theoretical knowledge in their practice. The study showed the HCI design practitioners relied on more practical design methods, such as storyboards, scenarios, prototyping and focus groups rather than more complicated methods such as contextual design, predictive modelling and software engineering methods. Stolterman (2008) terms these practical methods of design practice, “designerly tools”. He argues that the successful dissemination of new knowledge among design practitioners, be it a model, method or tool, can be predicted by its “designerly” nature. It has been argued that designers need to participate in the user research process and develop methods, tools and techniques that are appropriate to the needs of the design process. Following on from these arguments, this thesis presents a framework that encompasses both theoretical and practical knowledge and seeks to bridge this gap by making theory practical and accessible to practice. The framework will then be applied to a knowledge tool for designers to use in packaging design practice settings. Provided the tool is successfully used in education and practice it would fit Stolterman’s definition of – a designerly tool (Stolterman, 2008).
Lack of common understanding

The literature draws from both research and practice and encompasses a variety of perspectives in the area. Design research is a new discipline and, having grown out of and drawn upon more established disciplines' knowledge, including the fine arts, social science, engineering and business, by its nature it is cross-disciplinary. While design draws upon other knowledges, it is argued that design has its own unique knowledge as distinct from other disciplines (Cross, 2000).

The multidisciplinary approach taken in design research can lead to the lack of a shared terminology within a research area with the various disciplines using preferred terms in relation to a design problem. This is evident in the area of consumer response to products as this area brings many disciplines together, including psychology, business, engineering and design. Thus there are many perspectives in this area and perhaps understandably a lack of shared understanding and terminology.

As this is a problem in the research domain, it follows that the lack of a shared understanding of the area is a problem in practice as well. Packaging design development teams are often multidisciplinary, being comprised of engineering, finance, marketing as well as design. The lack of a shared understanding of the area of how consumer research should be applied in design is most obvious in practice where these various stakeholders’ perspectives, knowledge and agendas must be negotiated to ensure innovation in the design development process (Reinmoeller, 2002). However, the lack of a shared understanding or terminology can also benefit industry as it can differentiate an organisation’s services within the market place. In this way research knowledge becomes proprietary rather than shared in order to build a common understanding of the area. The competitive climate makes the issue of a shared understanding of products in terms of research, methods and techniques difficult. This supports the need for an open-source knowledge tool that would be available to design practitioners and thus, the proposed Knowledge Tool.
A framework for consumer response to packaging

Despite recent work in the area, there remains a lack of clarity. No one common terminology or accepted overall framework exists. While there have been attempts to propose integrated frameworks, see (Crozier, 1994; Bloch, 1995; Creusen & Schoormans, 2005; Crilly, 2005), these have focused on products in general rather than packaging. The next sections will review the literature in the area surrounding consumer response to packaging design, both in research and practice. This literature will provide the foundation for an integrated framework for packaging design. This will be demonstrated in Chapter 3.

2.2 The design research contribution

Design research is a multidisciplinary area. As mentioned above, the foundation of this area shares a number of different discipline perspectives. This section will provide an overview of these and clarify the relative contribution of each. Refer to Figure 2.2 for a visualisation of this review.
Figure 2.2. Design research literature
This section will first cover the area of social science as its emphasis is on people and how they interact, process and make sense of the world. Within the social sciences, the disciplines of psychology and sociology are reviewed, including aesthetics and emotion, as well as semiotics and product semantics. Secondly, business brings us marketing, studying consumer response and behaviours as well as branding. Thirdly, engineering offers human–computer interaction (HCI) and human factors with the use of products and then moves to a more integrated view of the product interaction experience. For the sake of this literature review, the knowledge is grouped by discipline; however overlaps within the knowledge areas exist. For instance, user-centered design may have stemmed from HCI practice but also relies on social science methods, while consumer research draws upon the areas of marketing and psychology. All of these areas inform design research, and researchers often publish across the discipline boundaries.

The social sciences

The disciplines of psychology and sociology have impacted upon the development of this research area in a number of ways. From psychology, aesthetics as well as the notion of emotion in consumer response are important. From sociology, semiotics and product semantics also add to the knowledge in this area.

Aesthetics

Defining aesthetics can be a contentious task. Derived from Ancient Greece, the term originally connoted knowledge that came from the senses. However, by the 18th century, Baumgarten notably used the term to mean taste or beauty (Rée, 1999). This notion of aesthetics as beauty was taken up in philosophy and art. Psychological research investigated why certain paintings, films and later products were considered beautiful or appealing to the viewer (Fechner, 1876; Berlyne, 1974; Crozier, 1994). Recent work has also included the aesthetic appeal of digital artefacts, such as websites (Tractinsky, 1997; Lindgaard & Whitfield, 2004). These investigations seek an answer to the age-old question, “Does a universal aesthetic exist?” as professed by the Modernists typical of the Bauhaus and other such movements (Itten, 1975) or “Is beauty in the eye of the beholder?” Crozier (1994) states that aesthetic
appeal is not inherent to the object but rather is a perception that can change given the individual and the context of the interaction. Hekkert (2006) argues that the term “aesthetic” is often confused with the notion of beauty. Hekkert, concurring with the original Greek meaning of the term, argues that “aesthetic” encompasses all sensorial experience one would have with a design artefact, including not only sight, but the other senses as well. While the public may think of aesthetics as the “styling” of an artefact (Smith & Whitfield, 2005), Whitfield (2007) argues that aesthetics appraisal was essential to our ancestors’ survival. This notion of aesthetics as pre-linguistic knowledge is a neuro-evolutionary perspective. For the sake of this thesis, the notion of aesthetics will be confined to sensorial experience.

**Emotion**

Psychology has been influential in its research on emotion. Over the last decade, findings in neuroscience have shown emotion plays a much larger part in human brain processing than previously thought (LeDoux, 1996). While the cognitive science perspective, “the brain as a computer”, saw cognitive processing as more important than emotion, research has shown emotion plays a vital role in human decision-making (Demasio, 1994). While the cognitive and affective (or emotional) aspects of human response are discussed as different concepts, both are needed for humans to function in the world. Norman (2004) proposes that the cognitive side of the brain “makes sense of the world” while the affective side “makes the judgments.” It follows that both cognitive and emotional response influence a person’s decisions. Decision-making is vital to how we interact with the world around us and, importantly, the design artefacts with which we choose to surround ourselves.

In recent years the study of emotion in relation to product and other design artefacts has become a growing area for design research. Established in 1999, the goal of the Design and Emotion Society is to raise “issues and facilitate dialogue among practitioners, researchers and industry, in order to integrate salient themes of emotional experience into the design profession” (Design and Emotion Society, 2006). Notions of product pleasure (Jordan & Green, 2002), emotional design (Norman, 2004), product emotions (Desmet, 2002) and Kansei engineering (Nagamachi, 1996) are just a few that examine the importance of human emotions in the product interaction scenario. Each of
these areas puts forward models and/or tools and techniques to examine consumer response to products. The most relevant models will be reviewed in more detail in Chapter 3.

**Semiotics and product semantics**

Sociology offers an interesting perspective to the literature. Design artefacts are situated within human activity and society and thus have inherent meaning. Forty (1986) asserts that the visual aesthetic of a design artefact can have a symbolic communication; i.e. look elegant, youthful or contemporary. Vihma (1995) proposes that by applying a semiotic lens, the design artefact functions as a sign, communicating through its appearance. Krippendorf and Butter (1984) propose the notion of product semantics, which they define as the meaning people attribute to products. Dittmar (1992) suggests that the ownership of a product can express the identity of its owner to society and to themselves. Csikszentmihalyi and Rochberg-Halton (1981) concur that a person’s possessions have meaning and help consumers differentiate themselves from others. In this way, design artefacts can communicate and have social as well as symbolic meaning.

**Business**

As design projects are situated within a market context, it is important to consider the literature of business. Within the larger discipline, the areas of consumer research, design management and branding are most relevant as they need to be integrated to ensure design success.

**Consumer research**

Researching the consumer has traditionally been the area of marketing and market research. In the past, marketing research tended to focus on consumers’ purchase patterns, but in the last decade extensive work has been devoted to how the design of a product impacts this process. In response to this, Bloch (1995) proposed a conceptual framework on consumer response to product design appearance. Others have followed suit (Crilly et al., 2004; Creusen & Schoormans, 2005) and these are critically reviewed in more detail in Chapter 3. In terms of research into packaging specifically, there has been research into the overall package appearance (Rettie & Bruwer, 2000; Orth &
There has also been research into how consumers respond to certain aspects of packaging design appearance, such as colour, shape and surface materials (Berkowitz, 1987; Garber, 1995; Henson, 2003).

In recent years, companies have been changing how they conduct consumer research (Rhea, 1992). Many have put in-depth consumer research on the agenda as a necessary step for innovation (Suri, 2003; O’Connor, 2004). In the area of new product development (NPD) this in-depth approach to consumer research is vital. While many design projects are asked to redesign or improve an existing product, NPD has the difficult task of developing ideas for completely new products. Henry Ford is often cited as the example of consumers and new product ideas when he famously stated that if he asked people what they wanted for better transportation they would have said “a faster and stronger horse” as quoted in (Millman & Bainbridge, 2008). It follows that traditional consumer research can have its limitations when dealing with new products. Cooper and Evans (2006) propose that newer qualitative consumer research methods, such as ethnography, scenarios and future trends research, are the way to find out more about the consumer’s needs. Cagan and Vogel (2002) concur with this approach by proposing a series of consumer research methods through which companies can identify the “unmet needs and desires of the consumer”. They argue this information must be determined before the design process begins to ensure a new product design’s success. This consumer research, along with marketing, manufacturing and logistics, supports a better chance of the product design succeeding in the market place.

**Branding**

Branding is also an important area of knowledge for both packaging design research and practice. From a practice perspective, packaging design was one of the first areas in which clients referred to their products as “brands”. In the twentieth century, packaged consumer goods brands included Quaker Oats, Kellogg’s Corn Flakes, Nabisco Animal Crackers and Procter & Gamble’s Ivory Soap (Klimchuk & Krasovec, 2006). By the mid-century, Landor and others promoted the idea that the packaging was not merely another part of the marketing mix, but more vital than advertising and promotions as it was the interface for a product’s brand communication (Meyers & Lubliner, 1998). It
follows that many design and advertising agencies are now called “brand strategy” consultancies rather than design firms. This is most evident in the naming of the large multinational conglomerate advertising and design agencies, Interbrand, Futurebrand, Corebrand and a newer addition, The Brand Union. Lead practitioners in branding and strategy practice have published books in this area, including On Brand, The Brand Gap and Emotional Branding (Gobé, 2001; Neumier, 2003; Olins, 2003).

At first heralded by industry, the area of branding has been researched extensively in academic circles as well. In the realm of consumer research, there have been studies conducted on the relationship between a brand and the consumer (Aaker, 1997; Fournier, 1998; Orth, 2005).

**Design management**

As argued above, launching a successful package design is dependent on getting many things right. This includes the consumer research, brand proposition, design process and much more. Design management is the discipline that brings these things together and has emerged out of the need to better manage the complexity of the design process. Dumas and Whitfield’s (1989) study with UK companies showed that design is difficult to manage. Borja de Mozota (2003) proposes that design can add value in a number of ways, including as a differentiator, integrator and transformer to strengthen the brand and foster innovation. Chapter 4 will expand upon the unique challenges that emerge when consumer research is integrated within the design process. This chapter features interviews with packaging design practitioners and their attitudes towards these challenges.

**Engineering**

The discipline of engineering has contributed a large body of knowledge to this area as well, with human factors engineering, user research and Kansei engineering of note.

**Human factors and usability**

Human factors engineering can be defined as the “science dealing with the application of information on physical and psychological characteristics to the design of devices and systems for human use” (Encyclopædia Britannica,
Human factors engineering is considered a discipline, a process and a profession and is closely related to ergonomics. “Human factors” has also been extended to the area of human–computer interaction (HCI) in its pursuit of usability. Norman’s The Psychology of Everyday Things first raised the notion that products should be above all usable (Norman, 1988). As more products became digital, HCI focused on the notion of usability. However, it has now progressed to the notion of user experience as a whole (Alben, 1996; Forlizzi & Ford, 2000) and includes emotional engagement as a part of product experiences (Norman, 2002). Carroll and Mentis (2008) argue that usability and user experience, like cognitive and affective responses, are not mutually exclusive concepts but rather are intertwined. Schifferstein and Hekkert (2008) propose that Carroll and Mentis demonstrate HCI’s user experience has enriched the knowledge base in product interaction and consequently human factors by taking it beyond the notion of usability. Both usability and user experience have currency in the realm of packaging design, as the integrity, functionality, usability and desirability of a package are vital to its success in the market.

User research
It follows that as HCI focuses on usability, “user research” is the preferred term as distinct from “consumer research”, with its focus on consumption. User research focuses on use of the product or rather how a person interacts with a product. This area is also termed “human–product interaction”. “User-centered design” (UCD), proposed by Norman (1988), puts the person or user at the centre of the design process. UCD, like human factors, takes into account a person’s capabilities and needs and applies that within the design process. Design researchers prefers “human-centered design” as a term as it keeps the context of the person more neutral connoting neither use nor consumption (Hannington, 2003). Other movements associated with UCD include “inclusive” and “universal” design (Clarkson, Coleman, Keates, & Lebbon, 2003), which take the focus on the user to another level by including marginalised populations such as the young, elderly and disabled. “Codesign” (Sanders, 2000), “Co-experience” (Batterbee & Koskinen, 2005) are also methods that are related to UCD, inviting the user or consumer to actively participate in the design process by cooperating with the design team. These methods are being used increasingly throughout the entire design process in an integrated
fashion; not just at the beginning in the form of demographics information and the end, final evaluation testing (Suri, 2008).

Packaging design needs both types of research: user and consumer. Packaging must fulfill its function by housing and protecting a product. In the case of FMCGs, the package may need to dispense the product over time, making the usability of the package important as well as matters of portability and storability. Bad packaging design can lead to injuries, mainly due to people opening packaging with knives or other sharp objects. To counter this, Gough (2004) proposes a model of inclusive design for packaging that is based on extensive user research to see how people buy, use and store packages in their homes. Gough’s model is further explored in Chapter 4 where it is useful in developing packaging design interaction scenarios.

Kansei
Kansei is a Japanese concept and has been defined in a variety of ways. The clearest way is it to consider Kansei’s counterpart, Chisei, meaning logical and rational. In contrast, Kansei is defined as emotional and subjective and is often associated with aesthetic or sensorial experience. Nagamachi (1996) is credited with the development of Kansei engineering, and defines it as embedding the customer’s feelings towards a product brand into the design of the product itself. Kansei science is a method applied to various fields of study. However, its application to the design and engineering fields are most relevant to this research. The method involves linking physical aspects of the design artifact to consumer response often using semantic differential scales. Kansei engineering has been applied to product design and more recently to packaging (Barnes, Childs, Henson, & Lilford, 2008). Barnes et al (2008) describe a toolkit that can better support packaging design outcomes. To illustrate this in practice, Childs et al (2003) describe a series of case studies of how Kansei engineering or “affective design” are used in practice in a number of large Japanese companies including those who produce packaged products, Asahi Breweries and Shiseido Company, a global cosmetic manufacturer.
2.3 The design practice contribution

As this project will have a practical application, it is important to review how consumer research is applied in packaging design industry practice. There are a number of contributions in this area, ranging from the academic to the practical. This section reviews the work of industry research, of market research agencies and best practice from packaging design practitioners. See Figure 2.3.

Figure 2.3. Design practice literature
Research in practice

Research methods applied in practice function differently than in the academy. Not only is the context of the research different, but the goals and parameters of the research differ. Research applied in practice functions within the market context and often is implemented to test a design outcome to determine its potential ROI (return on investment). Given these market constraints, research applied in industry rarely has the time or budget for systematic inquiry. It is argued this can lead to weak research outcomes, as there is no time to conduct studies that qualify as rigorous. Research methods in practice have been criticised for this lack of rigour or seemingly ad hoc approach. For example, Dourish (2006) argues that in HCI, the difference between “quick and dirty” and “real” ethnography is not always understood and could be problematic in its implication for design practice. Given extensive research can slow down a new product launch, in some cases the true litmus test for a product’s success is once it has reached the consumer.

However, it is argued that scientific method is not always appropriate to the needs of the design process (Krippendorf, 2006). For example, the scientific experiment must have the parameters of the study defined, whereas in design problems these parameters can be difficult to clearly identify. This is what Rittel and Webber (1973) term “wicked problems”; i.e. complex problems that are unique and cannot be reduced to a number of controllable variables. Recent work in the new product development area (Cagan & Vogel, 2002; Design and Emotion Society, 2006) suggests this ill-defined design problem space that occurs at the beginning of a design project, the “fuzzy front end”. In design projects, research can help define the “fuzzy front end” and help clarify the parameters of a design project. Suri (2008) proposes that there are three types of research methods for the design process: generative, evaluative and predictive. Yet these methods are not necessarily used in a sequential order. The iterative nature of the design process necessitates a more flexible approach to the use of research methods in any given design project.
Industry research: Applying design research in practice

While leading innovation companies like Apple and Sony have long invested in design and research, more companies are now following suit. Jane Fulton Suri (2008), a managing partner and creative director of IDEO, states Hallmark, Herman Miller, Intel, Motorola, Procter & Gamble and Whirlpool are among the many that are now investing in design research methods to support innovation and to better understand consumers. IDEO specialises in designing experiences and seeks to gain an “empathy” with a product’s target audience through research. While consumer durables companies have been employing research methods in product evaluation for some time, when it comes to shorter life cycle products such as FMCGs, the uptake of newer academic research methods has been slower. Nevertheless, some consumer packaged goods companies, such as A.J. Lafley CEO at Procter & Gamble, have realised that investing in design research is vital to succeeding in design innovation (Bedford et al., 2006).

Industry and academy relationships

A leading research consultant group in the packaging industry is the Faraday Packaging Partnership based in Leeds, UK. They advise the consumer packaged goods, health care and pharmaceutical industries. Faraday’s research and development focuses on “increasing consumer value, improving packaging usability and functionality, enhancing brand communication and integrating emotion and other senses” (Faraday Knowledge, 2008). Recent work in packaging includes empirical studies from consumer research. Orth and Malkewitz (2008) concur that little research exists to help support design decisions in the packaging design process.
Market research:
Testing packaging with consumers
Most companies do not have the capacity to do consumer testing in-house. Therefore, they commission market research firms to carry out packaging design testing. Market research firms’ methods range from quantitative to qualitative as well as from generative to evaluative depending on the research goals. For example, a new product launch will require different testing than an incremental packaging design change to a well-known brand. Relying on both qualitative (focus groups, interviews and observation) and quantitative (surveys, T-scope, eye tracking and neuromarketing) methods, market research firms are increasingly offering a variety of packaging testing services.

Types of packaging testing
There are a variety of ways to test packaging design depending on the goal of the research. Gold (2004) proposes three goals when testing packaging design appearance, including image, visibility and memorability. Thomas (2007) of Decision Analyst states attention value, purchase interest, uniqueness or dissimilarity to competitive packages and fit to or compatibility with the brand. Pradeep (2010) cites more specific areas based on the Neurometrics™ approach including novelty, purchase intent, awareness/comprehension, attention, memorable and engagement. While packaging testing terminology may differ between companies and academics depending on discipline background, there tends to be broad agreement when looking at the types of testing that are possible even if different terms are used. The testing approaches reviewed in the next section include visibility, memorability, novelty/typicality, image/message and engagement (see Figure 2.4).
Figure 2.4. Types of packaging testing
Visibility
Visibility can be defined as how visible a package is on the shelf to a consumer and is often used interchangeably with “shelf impact”. Shelf impact can be tested with a tachistoscope (T-scope) as well as eye tracking. T-scope testing involves showing the consumer images, in this case of a package, for a short exposure of time, then testing how accurately the consumer can “recall” a certain package. As most purchase decisions are quickly made at the shelf, the shelf impact of a package is vital to success. Aaron Keller from Capsule Lab, a package testing agency, states, “The direct impact of change [to shelf impression] on sales is more measurable than advertising and PR” (as cited Weston, 2004 p. 1). Therefore many clients when commissioning research with a packaged product brand will test the package design with consumers before implementing a radical change to the design. Achieving effective shelf impact involves both visibility as well as memorability.

Memorability
Testing what people recall or remember is also termed memorability or “saliency”. This technique has traditionally been used in advertising for testing the memorability of certain brands. However, Young (2006) argues that brand saliency does not necessarily translate to consumer purchase. Just because a consumer can remember what they see on a shelf does not mean they will want to buy it. Young’s company, Perception Research Services, proposes that eye tracking is more effective than T-scopes, as it investigates what people are looking at specifically when they see a package. However, this approach has its limits, as it can be difficult to determine why someone is looking at a particular package, and if that translates to consumer purchase. Another drawback with eye tracking is that it is often confined to a laboratory environment, quite different to how a person would see a package on the shelf while shopping. Lab testing is also limited to geographic location and not as accessible to a variety of consumers as, say, an online delivery of such a testing tool.

Novelty
Novelty and typicality are interdependent concepts, or rather opposites. What
is considered typical or novel can be subjective and depends on the context of the package and the consumer. In the case of packaging, typicality is important as it refers to how closely the package form relates to other competitor packages in the product category. Studies have shown that people prefer what they are familiar with; see the preference for prototypes theory (Whitfield & Slatter, 1979). However, other research (Berlyne, 1974; Coates, 2003) has shown that people prefer things that are typical enough to be categorised into the correct product category, while maintaining enough novelty to catch or hold their interest. Novelty can be defined as how different or unique the package form is in relation to other competitor packages in the product category. If a package is very novel, it may not be recognised as part of the product category and therefore not considered for purchase. However, without some novelty, all packages would look the same, leaving little room for differentiation amongst products. Loewy (1951), a famous industrial designer, puts forward the concept “most advanced yet acceptable” (MAYA) as a helpful way to balance the two concepts, novelty and typicality respectively.

Pradeep (2010) of Neurofocus, in his book, The Buying Brain, asserts that the brain prefers new things or more specifically likes “novelty”. While without the new, the design industry would be out of a job, the debate between what the brain prefers be it “novel” or “typical” has been an object of research on both sides of the argument. When considering FMCGs, studies show that a package must be typical enough to be recognised as part of the product category (Garber, 1995). The rapid communication scenario of purchasing FMCG could contribute to this as the consumer often makes a purchase decision quickly (Rettie & Bruwer, 2000). Given the short amount of time, the recognisability (relating to visibility and memorability) and appropriate categorisation (relating to typicality and novelty) of products is vital to purchase decisions (Connolly & Davidson, 1996). After these initial consumer response concepts have been processed, more complex messaging can be processed.

Image

Imagery tests capture consumer impressions of packaging. This could include testing of the intended communication of the package, i.e. is the pack communicating the necessary information? This includes product information as well as brand communication. This communication is not limited to just
messages in the written word but also to visual communication elements such as imagery, pack shape, material, typography and use of color. Questions explored here could include: Does the consumer understand the product offering and register the brand name? Does this package communicate the appropriate brand messages or is it “on brand”? This involves asking consumers what they think about packages and can be tested through interviews, surveys and focus groups. When testing for brand qualities, like traditional or youthful the use of semantic differential scales are often used.

Young & Asher (2010) propose simplicity in messaging is important in packaging and can be successful at ‘breaking through shelf clutter’. The reason this is important is prioritizing messaging is vital as they claim the consumers only can process a few elements when responding to packaging appearance. They go on to state, (2010, p. 22) “PRS Eye-Tracking studies have shown that shoppers typically ‘take in’ only three or four elements when first viewing packages. Therefore, adding claims doesn’t typically improve communication: It only creates clutter and divides shoppers’ limited attention more narrowly”. This can be a difficult thing to achieve in packaging as there are so many messages that must be communicated within such a small space.

Engagement

Emotional engagement or affective consumer response is complex and has been investigated from a variety of perspectives (Desmet, 2003; Hekkert, 2006; Jordan, 2000; Nagamachi, 1996; Norman, 2004). Affective response can be positive, negative or indifferent as well as weak or strong. This depends on the arousal factor, i.e. the degree of emotional response a person feels towards the package. The use of semantic scales have been used to gauge emotion but a newer approach is to apply biometric methods, i.e. measuring physiological responses such as heart rate and eye tracking in conjunction with brain scans, such as EEG or fMRI.

The next section reviews four different packaging testing tools offered by several leading global market research agencies. The tools demonstrate how the types of testing (visibility, memorability, novelty, image and engagement) can be applied to packaging design.
Testing tools

This section reviews packaging testing tools common within the industry and reviews four different packaging testing tools offered by several leading global market research agencies. This review is by no means an exhaustive list as various market research packaging testing tools exist with each company proposing their own proprietary version.

Three out of the four testing tools reviewed here are offered online. In comparison with testing in a laboratory with simulated shopping shelves, testing consumers online can provide large samples, quick results and are reasonably cost-effective compared to other methods as mentioned above. They are much quicker, easier and cheaper than running laboratory or site-specific testing that requires the physical presence of the study participants. They also lend themselves well to the use of immersive multimedia technology such as the use of motion and three-dimensional graphics.

Firstly, Harris Interactive’s Shelf Impact is reviewed. Harris Interactive is a large market research consultancy that advises a variety of industries, including consumer packaged goods. Its packaging design test tool called Shelf Impact focuses on three packaging criteria: impact (standing out on the shelf), findability (can the consumer recall where the package is placed on the shelf) and imagery (what is the emotional message of the package’s appearance). See Figure 2.5 for further explanation.

Testing packaging with tools such as Shelf Impact provides “numbers” or empirical data and thus can appear to be the most significant research outcome for design decision-making. The online delivery allows large sample sizes at a reasonable cost. However, while this testing is quantitative it can only test what a consumer notices and recalls, not what impression the consumer has of the package nor does it address the nuanced communication aspect of packaging that is comprised of various communication elements including product and brand messages.
Figure 2.5. Packaging testing tool, *Shelf Impact*

This figure features two screen shots of the *Shelf Impact* software interface. The first screenshot (a series of products on the sales shelf) is shown to the user or study participant for a short period of time. The second screenshot gives the user a series of product choices. The user must select which products they recall seeing by highlighting the button to the left of each product. This aims to measure the memorability or visual impact of the packaging.
Secondly, ACNielsen is a branch of the largest market research firm with offices worldwide. ACNielsen offers marketing insight across a number of areas, including branding and packaging. It supports the consumer package goods industry with consumer research. Like Harris Interactive, Nielsen has a comparable online tool to test key performance indicators of packaging design, packs@work. A point of difference is that rather than Shelf Impact’s two-dimensional graphics, it simulates three-dimensional models of packages that can be manipulated by consumers. This allows alternative views of the package, such as the side and back of the package. Figure 2.6 details the packs@work evaluation criteria, termed “E.P.I.C.” This measures empathy, persuasion, impact and communication of the packaging.

This tool states it measures impact (similar to Shelf Impact) but in addition measures persuasion (purchase intent), communication and empathy by simulating an online shopping scenario. The specifics of how this is achieved is not revealed on the website. It is argued the best way to test is in the actual shopping context. Young (2002) proposes various principles for effective packaging testing and the first, most importantly is to test the packaging with the consumer in the shopping context, i.e. on the shelf next to the product’s competition. Keeping the consumer in the real shopping context tends to provide more accurate data and avoids consumers becoming “art directors” by choosing between proposed packaging designs.

Young (2002) goes on to caution against the reliance on “one number” from only one testing method that can appear to simply quantify design’s impact on ROI. While some testing such as simulated shopping may appear to tell the full story, gauging consumer’s reaction to packaged products is complex and often necessitates a variety of testing approaches over time to get the full story.
This figure shows three screenshots of the software. The first two screenshots demonstrate the packaging characteristics that are measured, i.e. E.P.I.C (Empathy, Persuasion, Impact and Communication). The second screenshot shows how these measures are used to visualize the data analysis. The third screenshot features the interface the user or study participant would see, i.e. product choices and the opportunity to purchase them, bin them or put them back on the shelf.
Thirdly, Affinnova is the company that has commissioned the IDEA™ (Interactive Design by Evolutionary Algorithm) technology (Affinnova, 2003). IDEA™ was first developed for packaging design testing, but has been extended to other applications. The IDEA technology utilises algorithmic software that generates countless combinations of design variables and then surveys multitudes of consumers online. These parts of the package design or design elements, such as colour, typeface and graphics are called “panel features”. See Figure 2.7. for an example. These panel features categories may have five to 10 options. These various random designs are then tested with consumers online to see if a favoured combination is found. Companies such as Procter & Gamble and Cadbury-Schweppes have commissioned the tool to help with design decisions (Wallace, 2005).

This tool focuses on features of a package rather than the package design as a design whole. This method is an example of an atomistic as opposed to a holistic approach. This could be problematic, as the package design as a whole has not only aesthetic factors, such as colour, shape, material and size, but also brand communication and social meaning. The package design in a real-world setting is seen in context with other competitors at the shelf. These are aspects this testing tool does not address, but rather compares packaging design variations and measures consumer preferences to these in isolation. This testing approach can be contentious as packaging design elements are assembled randomly by a software program rather than by a packaging designer.
This figure shows two screenshots of the IDEA software. The first screenshot features the package that is being tested (in this case Tampax tampons) and the variables being measured including logo, claim, count, etc. The second screenshot demonstrates the eight design options for each variable. Each of these options can be combined in innumerable ways using the IDEA computational algorithm and the resulting packaging designs can be tested with consumers for preference.
Lastly, Neurofocus, a Nielsen Company is reviewed as it is one of the largest global providers of neuromarketing testing. Pradeep (2010) in his book, *The Buying Brain* states Neurometrics™ is an approach capable of testing multiple areas including novelty, purchase intent, awareness as well as attention, memorability and engagement. This includes all the areas of testing outlined in the previous section. Figure 2.8 features the company’s website and shows an example of a consumer being tested with an EEG headset.

**Figure 2.8. Packaging testing tool, Neurofocus**

![Figure 2.8. Packaging testing tool, Neurofocus](http://www.neurofocus.com/index.htm)

This figure shows an image from the company website demonstrating a consumer wearing a brain imaging measurement instrument.

Ariely & Berns (2010) state the benefits of brain imaging for marketing includes revealing hidden information that the consumer may not be aware of consciously. Marketers also hope that the method can eventually be more cost effective than more traditional methods. As with any method, its success relies on the context of its application. Neuromarketing's ability to reveal the consumer’s response from how the body responds be it via the skin, face or brain rather than relying on what people say they prefer is the main benefit of the testing approach. However there are no shortage of critics that are
concerned with the ‘hype’ surrounding this area with issues around transparency, regulation and ethics of the approach (Ariely & Berns, 2010). The next section reviews the knowledge from packaging design practitioners and provides the designer perspective on how consumer research is applied in practice.

Design practitioners:
Best practice from packaging designers

This section details packaging design industry leaders’ writing on their experience and knowledge gained from practice. Key firms in the US, UK and Australia include Landor, Wallace Church, Gerstman & Meyers, Cato Purnell Partners, Enterprise IG, Interbrand and Futurebrand. These firms mainly work with multinational consumer packaged good companies, such as Nestlé, Procter & Gamble and Unilever. While there is much research on packaging, it is through the perspective of practice that we can see the complex relationship between packaging, branding and consumer research emerge.

Packaging designers’ knowledge

Various packaging design practitioners have written about their practical experience in this area and present their client work as case studies (Pilditch, 1972; Southgate, 1995; Meyers & Lubliner, 1998; Wallace, 2001; Vogler, 2002; Meyers & Gerstman, 2005). With reference to packaging design history, Pilditch (1972) first proposed in his book, *The Silent Salesman*, that packaging was the salesman of the supermarket shelf. Another key figure, Walter Landor, started as a packaging designer in the 1930s and is considered a pioneer in brand strategy and consumer research for the design industry. He proposed that the brand was essential to the success of a product: “Products are made in the factory, but brands are created in the mind,” (quoted in Meyers & Lubliner 1998, p 22). In the case of fast moving consumer goods (FMCG), the packaging is often the main communicative interface for brand communication. Southgate (1995) in his book details the package design’s ability to communicate the brand proposition, personality and equity through its formal attributes that go far beyond a product logo. Attributes such as shape, size, surface, colour and imagery are all vital to the “total branding” of a pack. The original Coca-Cola bottle is a strong example of how shape and structure
factor into a product brand. The curvy glass bottle was found to have such brand saliency that it has been reinterpreted as a core graphic in Coca-Cola’s brand identity. The glass bottle package is still a vital part of Coca-Cola’s brand today and has recently been relaunched in the market. In the case of this famous soft drink package, the package truly is the product. The iconic bespoke Coke bottle is the ultimate example of how packaging can define the product brand (Robinson & Marengo, 2010).

While packaging history offers an important perspective, recent years have shown a renewed interest in packaging amongst the wider design community. Contemporary packaging design practice is increasingly being documented online and these communities allow designers, marketers and manufacturers to share knowledge immediately. Most notably of these, Andrew Gibb’s the Dieline is a global packaging design resource established in 2007 that has grown to be considered the leading packaging design resource and now receives 3.5 million hits per month (Shear, 2013). The Dieline runs annual design competitions as well conferences that bring together packaging industry leaders from around the world.

Meyers and Lubliner (1998) emphasise the vital importance of the brand in successful packaging design by proposing that there are two aspects to consider in the consumer’s mind, brand equity and brand identity. There are various elements of the packaging design that must be considered and designed well to be successful including considering the life cycle of the package. This includes the manufacture, distribution, product containment and protection, product identification, brand messaging, visual appeal and shelf impact, the usage experience as well as environmental impacts. Clarke (2009) argues balancing these factors is the challenge and the key to good packaging design, “…it is important to look beyond the label and appearance and consider its purpose. Did it achieve what it was meant to do? Is it an effective tool for people and the business? The true art of packaging design may very well be in the systematic processing of the myriad of details along with the high stake challenges that go into creating the perfect package”. The next section provides designers’ perspective on balancing these factors and how consumer research is applied in practice.
Consumer testing from the designer’s perspective

While shelf impact is often tested, there is more to good packaging design than how visible or memorable it is on the shelf. Calver (2004) argues that just because a package is bold and eye catching does not mean it will translate to design success. Calver concurs with other practitioners that the package must first communicate the brand proposition of the product as well as differentiate itself from the category’s competitors. Wallace (2001) proposes that design simplicity is the most successful approach with package design. Wallace, like the previous authors, agrees that having a clear hierarchy of information and brand messages is essential for package design success as it is easy for a package design to be cluttered with too much information.

The designers mentioned above agree that managing consumer research in the design process can be problematic. Southgate (1995, p. 153) has some clear ideas about what sort of evaluation should take place to ensure a package design success: “There is a depressingly frequent abuse of qualitative consumer research which involves putting in a whole raft of different design concepts and asking the consumer to ‘pick a winner’.” Further to this point, Young (2002, p. 11) states “Moreover, almost by definition, quantitative researchers speak a different language than design professionals, which makes it easy for them to come across as adversarial, particularly when they are transforming packaging designs into a series of numbers and data tables. To be sure, some researchers have provided solid grounds for concern through their misguided attempts to reduce packaging design to a mathematical equation (that is, “take the most-favored logo and put it with the highest-scoring color…”). These factors have all contributed to the familiar refrain of ‘research kills creativity.’” Millman and Bainbridge (2008) concur: “There is a group of brand consultants and cultural anthropologists alike that believe now that it is not the actual research itself that is the problem. It is rather about how research is often misused, what type of design concepts and stimulus are tested, and how data are analysed that is most often at fault. When used correctly, research shouldn’t stifle creativity but rather offer designers stronger inspiration and focus.” Furthermore, it can be difficult for designers to use research results as a catalyst for creative ideas. For example, in Brueseberg and McDonagh-Philip (2002), designers reported that it was difficult to relate to market research data to their design process.
In conclusion, more cooperation between the design team and market researchers is needed to support the successful application of research to the design process. As with any consumer testing the context and the appropriate application of results to the design process are vital to its success. As Asher (2012, p8) of Perception Research points out, “Research is not only NOT the enemy, it is the designer’s staunchest ally...keeping appropriate concepts alive – even if daring and dispelling unwarranted directives (bigger logo, more claims, etc.)”.

**Conclusion**

This chapter has reviewed literature from both the academy and industry across number of areas, including the social sciences, business, engineering, design research and packaging design practice. The literature reviewed encompasses both the theoretical and the practical in an effort to bring present an integrated framework to better understand consumer response to packaging design. The next chapter presents this framework.
Chapter 3: A framework for consumer response to packaging

Overview

3.1 Existing frameworks

Bloch
Crilly
Creusen and Schoorman
Desmet and Hekkert

3.2 Proposed framework

Consumer response
Cognitive response
Affective response
Behavioural response

3.3 Alternative views

Interdependent
Simple

Conclusion
Overview

Chapter 2 reviewed the various disciplines that have contributed to the area of consumer response to packaging. Firstly, this chapter expands this by highlighting the literature in more detail, specifically reviewing the relevant models and frameworks surrounding consumer response to products. The review identifies the contribution and gaps within the area. These gaps underpin the rationale that was used to build the proposed integrated framework, “Consumer response to packaging design”. Secondly, an argument is presented for the building of a framework that incorporates aspects of various key frameworks and models relevant to packaging design. Rather than focus on the validity of one model or framework as opposed to another, the framework proposed here brings together the breadth of existing knowledge into one integrated framework. Each concept within the framework is described in detail. Thirdly, as the proposed framework was found to be complex two alternative views of the framework are also proposed.

3.1 Existing frameworks

There have been various attempts to propose an integrated conceptual framework or model that deals with how consumers interact with products. Nevertheless, several gaps remain. Firstly, there is no consensus on what constitutes the vital aspects of the product interaction experience. A series of frameworks are reviewed here and it is apparent that each one offers a different perspective on the phenomena. Secondly, much of the literature in the area focuses on durable goods as examples rather than packaging, which has its own unique attributes. There are factors unique to packaging that are distinct from products. These include a shorter life cycle, the rapid communication scenario at the point of purchase as well as the impact of various brand and product communication messages. Thirdly, the knowledge proposed by the framework, has not been successfully applied to professional design practice. This is the goal of this thesis, i.e. to develop a practical resource that disseminates new knowledge in the area and makes it accessible for application within design practice. The next sections will review four of the existing models or frameworks.

Bloch

Bloch’s (1995) “Model of consumer responses to product form” indicates how a consumer responds to a product, focusing on the consumer’s psychological response. Referring to Figure 3.1., the product form is a result of design goals and constraints as defined by the project and client. The consumer then interacts with the product form and this interaction has a series of “moderating influences”, which are comprised of individual tastes, preferences and situational factors. The consumer’s interaction with the product form leads to a psychological response. This psychological response can be divided into cognitive and affective responses. Finally, this processing leads to a behavioural response from the consumer, either approaching or avoiding the product form.

Bloch’s model is a conceptual model and while has not been tested empirically it is recognised throughout consumer research literature. The next framework in this review (Crilly, 2005) builds upon Bloch’s work.
Figure 3.1. A model of consumer response to product form

Crilly

Figure 3.2. details Crilly’s (2005) “Framework for consumer response to the visual domain in product design”. The work of Crilly in the area of consumer response to product appearance provides a comprehensive model drawing broadly from the literature in the area, including Dittmar (1992), Bloch (1995), Mono (1997), Coates (2003), Desmet (2003) and Norman (2004). Considering consumer response to products as a process of communication, this framework is based on the communication model proposed by Shannon and Weaver (1949). Crilly breaks down the consumer response into three key areas: cognitive, affective and behavioural. He asserts the cognitive can be divided into aesthetic, semantic and symbolic aspects, drawing from Berlyne (1974) as well as Coates, Mono and Dittmar respectively. The relevant areas of this framework are highlighted including the product, the senses and the resulting consumer response. The consumer response is then broken down into cognition, affect and behaviour. See Figure 3.2.

Crilly proposes an amended framework that was adapted in response to interviews with practicing designers. In this way, theoretical ideas are reviewed and discussed within the context of design practice. Crilly also includes design practice-focused literature (Coates, 2003; Mono, 1997) that demonstrates the insight of the practicing designer, which make this contribution valuable to the practical context of this research.
Figure 3.2. A framework for consumer response to the visual domain in product design

Figure 3.2. Reproduced from "Seeing things: consumer response to the visual domain in product design" by N. Crilly, J. Moultrie & P.J. Clarkson, 2004, Design Studies, 25, p. 555.
Creusen and Schoorman

The Creusen and Schoorman (2005) model is based upon the testing of six aspects of product appearance. The model, “The Six Roles of Product Appearance for Consumers” presents the six aspects including aesthetic, attention drawing, categorisation, functional, ergonomic and symbolic. See Figure 3.3. The study found most interview respondents reported aesthetic and symbolic factors as underlying their purchase decision. As the study was based on self-report interviews, it is possible that aspects such as attention drawing and categorisation were not well reported as they are not considered consciously.

These two aspects are thought to be more influential for food products than for consumer durable goods (Olshavsky & Spreng, 1996). This concurs with the packaging industry literature and the focus on shelf impact as a common testing. Garber (1995) found that a package’s attention-drawing ability impacts upon the propensity of consumer purchase. As was discussed in Chapter 2, the review of market research packaging testing tools, attention drawing is also known as visibility and categorisation links directly to balancing novelty and typicality. While these aspects where determined with testing products, the concepts are also useful when considering consumer response to packaging.
Figure 3.3. The six roles of product appearance for consumers

<table>
<thead>
<tr>
<th>Appearance Role</th>
<th>Influence on Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention Drawing</td>
<td>Draw consumer attention in-store</td>
</tr>
<tr>
<td>Categorization</td>
<td>Influence ease of categorization Offer possibility for differentiation from the product category</td>
</tr>
<tr>
<td>Functional</td>
<td>Show features/functionality Serve as a cue for features/functionality Serve as a cue for technical quality</td>
</tr>
<tr>
<td>Ergonomic</td>
<td>Show parts for consumer-product interaction Show consequences of use of overall appearance aspects (e.g., size, roundedness)</td>
</tr>
<tr>
<td>Aesthetic</td>
<td>Serve as a basis for aesthetic appreciation Fit with home interior and other products owned</td>
</tr>
<tr>
<td>Symbolic</td>
<td>Serve as a basis for symbolic product associations Communicate brand image</td>
</tr>
</tbody>
</table>

Desmet and Hekkert

Desmet and Hekkert (2007) argue that user-centred design has shifted focus from cognition to affect, or the emotional aspects of the user experience with a design artefact. They propose a simpler framework of product interaction experience that includes three aspects, aesthetic experience, experience of meaning and emotional experience. Note that these three aspects work together to make up a person’s interaction experience with a product (see Figure 3.4.).

To simplify into these three categories, all sensorial experience has been grouped into “aesthetic” including visual perception as well interaction that would include physical interaction or use of the package utilising senses such as touch. The emotional experience is also emphasised and frames the consumer or user’s interaction with the designed artifact. This perspective moves beyond the debate of cognitive versus affective, which comes first and which is more important in decision-making. This approach can be useful for considering the extended life cycle of the package (Gough, 2004) and considering how a consumer’s “experience” with a packaged product changes over time.
Figure 3.4. Framework of product experience

Figure 3.4. Reproduced from "Framework of Product Experience" by P.M.A Desmet & P. Hekkert, 2007, International Journal of Design, 1, p. 58.
In conclusion, this section has reviewed four of the existing frameworks and models concerning consumer response to products. The next section presents the proposed integrated framework and describes the relevant concepts.

### 3.2 Proposed Framework

This section presents the rationale for the proposed framework that focuses on how consumers respond to packaging. In the absence of consensus on the knowledge in the area, the framework, see Figure 3.5., maps the various theoretical concepts in the literature. While much of the knowledge overlaps in some areas and not in others, the proposed framework presents the breadth of the literature in the area rather than privileging one theory over another. The framework by no means represents all of the existing literature but does present key thinkers in the relevant areas.

### Consumer response

The notion of consumer response is used as a conceptual as well as visual structure to group the various literature into one integrated framework. The three aspects of consumer response include cognitive, affective and behavioural response. It is generally accepted that a consumer’s psychological response to a designed artifact is comprised of both cognitive and affective responses that then lead to a behavioural response (Bitner, 1992; Bloch, 1995). Within the framework, see Figure 3.6, the cognitive and affective response are visualised with a connecting line leading with an arrow to the behavioural response (Mehrabian & Russell, 1974). While for the sake of this framework the cognitive and affective are visualised as separate entities, they are thought to be interdependent. The processing that takes place within the brain cannot be separated into two discreet areas. Rather, cognitive and affective are concepts that result in an action, approach or avoid, leading to the behavioural response.

In recent years there has been much debate about how cognitive and affective response interact; specifically which comes first. Lazarus (1999) argues that cognition precedes emotion, while many now argue the opposite (Damasio, 1994; LeDoux, 1996; Zajonc, 2000). For further reading into the contentious relationship between cognitive and affective response see (Dagleish, 2004; Storbeck & Clore, 2007).
The structure

The framework uses the three aspects of consumer response (the cognitive, affective and behavioural) as a structure to group the various knowledge into segments. The larger circles are comprised of cognitive and affective and these result in a consumer’s behavioural response. While processing in the brain cannot literally be broken up into cognitive and affective parts, these concepts are useful to group various theoretical concepts. The visualisation of the framework is based on a concentric circle nesting or tree map. The size of the circles indicates hierarchy, with the three largest circles housing cognitive, affective and behavioural response. The next largest circles represent the next level of information and so on.

The next sections describe in detail each area of the framework. Firstly, the three main section headings review cognitive, affective and behavioural aspects of consumer response. Secondly, the next level of the framework is explored under each subsequent area, i.e. under “cognitive” the three areas, “aesthetic”, “semantic” and “symbolic” are described. Thirdly, the next level is presented. For example, “aesthetic” is described and then the concepts related to “aesthetic” which are “contrast, typicality, novelty, unity in variety and order” are described. The following section reviews “semantic” and the supporting concepts including “description, expression, exhortation and identification” and the next describes “symbolic” and so on. Figures are used throughout this section to highlight the area of the framework described.
Figure 3.5. Proposed consumer response to packaging design framework
Cognitive response

There are various concepts grouped under the “cognitive” side of the framework. Figure 3.5.1. visualises how these concepts relate to one another. Crilly (2004) argues that the literature (Crozier, 1994; Cupchik, 1999; Norman, 2004) supports cognitive response being divided into three distinct areas including aesthetic, semantic and symbolic. The next section describes this area of the framework in more detail.

Figure 3.5.1. Detail of the cognitive branch
**Aesthetic response**

Aesthetic response is comprised of perception as well as sensorial aspects. From the literature, this corresponds with Norman’s (2004) “visceral” level response, Cupchik’s (1999) “sensory/aesthetic” response and Crozier’s (1994) “response to form”. Others argue that aesthetics is more than just sensory experience, but rather is hard-wired into the brain as a form of pre-linguistic knowledge (Whitfield, 2007). For the sake of this framework, aesthetics is defined as perception and sensory experience and is divided into the following concepts: “contrast”, “typicality”, “novelty”, “unity in variety” and “simplicity”.

**Figure 3.5.1.1 Detail of the aesthetic branch**

![Diagram of aesthetic response concepts: contrast, typicality, novelty, unity in variety and simplicity](image)

**Aesthetic response concepts:**
contrast, typicality, novelty, unity in variety and simplicity

**Contrast**
The concept of “contrast” relates to perceptual qualities and indicates how disparate elements contrast with one another. In the case of the whole package, this needs to contrast with its surroundings, i.e. other packages on the shelf. This is important so the consumer notices the package among the competition. In the realm of packaging, this is often termed “shelf impact”. Shelf impact can be measured by determining which package stands out on the shelf at point of purchase (Young, 2006). This concept of contrast also applies within the package design, in that the various elements within the design need to contrast with one another. For instance, the typography,
imagery and use of background colour need to contrast with one another so each element is recognisable.

Typicality and novelty

“Typicality” and “novelty” are interdependent concepts, or rather opposites. What is considered typical or novel can be subjective and depends on the context of the package and the consumer. In the case of packaging, typicality is important as it refers to how closely the package form relates to other competitor packages in the product category. Studies have shown that people prefer what they are familiar with; see the preference for prototypes theory (Whitfield 2000). However, other research (Berlyne 1974, Coates 2003) has shown that people prefer things that are typical enough to be categorised into the correct product category, while maintaining enough novelty to catch or hold their interest. Novelty can be defined as how different or unique the package form is in relation to other competitor packages in the product category. If a package is very novel, it may not be recognised as part of the product category and therefore not considered for purchase. However, without some novelty, all packages would look the same, leaving little room for differentiation amongst products. Loewy (1951), a famous industrial designer, puts forward the concept “most advanced yet acceptable” (MAYA) as a helpful way to balance the two concepts, novelty and typicality respectively.

Unity in variety

The notion of “unity in variety” is important to aesthetic considerations in packaging design. This notion is as old as the ancient Greeks, and emphasises the importance of aesthetic balance between a sense of order and chaos. It is believed that humans generally look for an underlying system to all things, including design artefacts (Hekkert, 2006). When there is order within a design the various aspects of the package design seem to relate to one another, as if part of a unified whole. There remains, however, variety within the elements, as they cannot all be the same. This notion relates to the perceptual Gestalt principles: i.e. symmetry, proximity, similarity, continuance, repetition and closure, which were popular with the Bauhaus school (Itten, 1975).

Simplicity

The concept of “simplicity” is an important one for design and has been supported by the Modernist maxim, ‘form follows function’. The maxim
emphasises that design form should not be merely decorative but also serve a useful function. In the case of package design, this could mean every design element serves a purpose, or rather nothing extra or superfluous is added. Hekkert (2006) proposes a similar idea to simplicity with his “maximum for minimum”. This is defined as getting the maximum effect for minimum means or, rather, one element could serve more than one purpose. Hekkert asserts this tendency towards the simple over complex applies across all things, not just design artefacts. While arguing from an evolutionary psychology perspective, Hekkert’s notion is also useful for design, as it emphasises efficiency in the use of design elements. He argues that people prefer efficiency and are drawn towards things that make sense in an accessible way. While simplicity would support each design element to serve a purpose, ‘maximum for minimum’ would go further by having those design elements serve more than one purpose and getting the maximum effect for minimum means. Nevertheless, the notion of simplicity, like all of the aesthetic concepts, is subjective, the interpretation being dependent upon the package design and the person responding to it.

In conclusion, when considering FMCGs, studies show that a package must be typical enough to be recognised as part of the product category (Garber, 1995). The rapid communication scenario of purchasing FMCG could contribute to this as the consumer often makes a purchase decision quickly (Rettie & Bruwer, 2000). Given the short amount of time, the recognisability (relating to contrast) and appropriate categorisation (relating to typicality and novelty) of products is vital to purchase decisions (Connolly & Davidson, 1996). After these initial consumer response concepts have been processed, more purely aesthetic judgments such as unity in variety and simplicity are considered to impact upon preference (Creusen & Schoorman, 2005).
Semantic response

The semantic or meaning communication of a product is thought to be about the product qualities, how it would function and should be used (Crilly et al., 2004). Packaging designers need to consider the semantic communication in the design process, so it is clear how a package should be opened, decanted, stored and generally used. This interpretation of “semantic” corresponds with Norman’s (2004) notion of “behavioural” response, Cupchik’s (1999) “cognitive/behavioural” response as well as Crozier’s (1994) “response to function”. This differs from Krippendorff and Butter’s (1984) definition of “product semantics” which includes all meanings associated with the design artefact, including utilitarian as well as symbolic or social meaning.

Figure 3.5.1.2 Detail of the semantic branch

Semantic response concepts:

description, expression, exhortation and identification

Crilly (2005) cites Monô’s (1997) categories which include “description, expression, exhortation and identification” as well as Norman’s (1988) “affordances, constraints and mappings” as useful for considering the semantic aspect of consumer response to products. Mono defines “description” as how a product or package describes itself to a consumer giving clues how it would be used. Norman’s “affordances, constraints and mappings” add further clarification to “description”. Norman’s “affordance” refers to how a design communicates cues to its mode of use. “Constraints” help define these formal cues by limiting or constraining how a person can
interact with a design artefact. Norman describes how the design of a pair of scissors demonstrate these two concepts. The holes in the scissors afford or allow the fingers to operate the scissors, yet the size of the holes offer constraint on how many fingers can be used within that space (Norman, 1988). “Mappings” refer to the mental model needed for a person to understand a design. While both Monō’s and Norman’s models are useful, for the sake of this framework Monō’s is preferred as the terminology is more accessible and may be better understood by a design practitioner.

Description
This refers to how a package looks like it should be used. For example, if a bottle closure is a twist top, it should look like a twist top and not a pop top. Appropriate description supports usability, as then the consumer has more clues of how to use the package.

Identification
This concept refers to how the package can be categorized by a consumer. This applies to the product category as well as brand identification.

Expression
This refers to the communicated qualities of the package’s form and materials. For instance, does the package look fragile or sturdy, heavy or light? Ideally the package design should express or communicate the correct quality; i.e. if the pack is sturdy, it should look sturdy.

Exhortation
This refers to the extent to which a product communicates its mode of use. For example, when a handle is designed into a large juice bottle.
Symbolic response
Beyond format and functional qualities, a package also has symbolic meaning. The packaged product a consumer purchases can symbolise something about the consumer (Csikszentmihalyi & Rochberg-Halton, 1981). Goffman (1959) first proposed that people actively present an image they want to project to the world. In this way, a person’s consumer choices become a presentation of that intended image.

This area of symbolic meaning relates quite closely to brand communication. Elliott & Wattanasuwan (1998) amongst others (Giddens, 1991; Levy, 1959; McCracken, 1988) argue that the consumption of brands communicate symbolic meaning and assist in constructing the identity of the consumer. Testing these propositions is the area of consumer research (Fournier, 1998). Lash & Urry, (1994) cite consumers are reflexive in this consumption process and make choices consciously. As it relates to packaging, the symbolic meaning of the branded package product is key to differentiating between various product choices in the market place.

Figure 3.5.1.3 Detail of the symbolic branch

Symbolic response concepts: self-expressive, categorical
While much work has been done in the area, Dittmar’s (1992) work around the meaning of material possessions provides a useful distinction amongst symbolic meaning. He proposes two aspects, “self-expressive” and “categorical” meaning. These are described below.
Self-expressive:
This relates to how a consumer’s package purchase expresses something about them, for example, personality traits, values and attributes. For instance, buying an upmarket bottled water like Evian could symbolise the appreciation of luxury while purchasing a home brand bottled water could have the opposite symbolic communication, i.e. being thrifty.

Categorical:
This concept refers to when a consumer purchases a certain packaged brand to feel a part of a social group. For instance, certain market segments tend to buy similar product brands. Taking the water bottle analogy further, the Evian consumer may feel the purchase lends an elite status. In contrast, the home brand consumer may feel apart of a group that avoids branded product purchases.

Affective response
Affective is a complex area of the framework as it encompasses a number of concepts. Affective or emotion is the feeling side of responding to a package. For instance, does the person like the package or not. Affective response can be positive, negative or indifferent. This depends on the arousal factor: How much emotion does the person feel towards the package? The proposed framework draws upon four different models. These include Nagamachi’s (1996), “kansei engineering”, Jordan’s (2000) “product pleasure”, Desmet’s (2003) “product emotion” and Norman’s (2004) “emotional design”.

In recent years there has been a move within design research to better understand the emotional or affective side of human–product interaction (Design and Emotion Society, 2006). This emphasis on the emotional aspect of experience with a product was a reaction to previous scholars focusing on the utilitarian aspect or functional and usable aspects of a product experience. The argument that is put forward is as product design processes become more sophisticated it is taken for granted that functionality is a given, as to a lesser degree usability. The third elusive quality to a successful product design is desire, or as Jordan terms it, “pleasure” with the product. Desmet (2003) proposes a "model of product emotions” while Nagamachi’s (1996) work with
Kansei engineering has been applied to product and packaging design exploring how emotive words can help the design process.

**Figure 3.5.2. Detail of the affective branch**

Affective response concepts
- emotional design, product emotion, product pleasure, kansei
Emotional design
Norman’s emotional design model is comprised of three parts: visceral, behavioural and reflective responses.

**Figure 3.5.2.1 Detail of emotional design**

Visceral response
The visceral is defined as the gut-level response or the immediate reaction a consumer has when they react to the aesthetics of a product. This probably precedes conscious thoughts, and may way well be a simple emotional response, such as, “I like it or I don’t like it”.

Behavioural response
This response requires more time than visceral. It is the emotional response a consumer has to the use of the package. Does it appear to function well? Does it appear usable? Does it appear pleasant to use?

Reflective response
The reflective emotional response takes more time and relates to the symbolic aspects of a purchased packaged product. This shows how a consumer’s choice of product reflects upon them as a person.
Product pleasure
Jordan’s notion of “product pleasure” includes four ways of looking at consumers’ emotional response to products.

Figure 3.5.2.2 Detail of product pleasure

Physio-pleasure
Physio, refers to the body and this pleasure response comes from the sensual aspects of a product, such as the look, touch, taste and smell associated with a package.

Socio-pleasure
This is related to the social context of a product. The pleasure that is derived from a package facilitating sharing, for instance, between two consumers.

Psycho-pleasure
This is related to cognitive processing or usability of a package. A pack that is easy to open and use is more pleasurable than one that is difficult to use.

Ideo-pleasure
This is the pleasure response associated with the ideological, or the values a packaged product may possess. For instance, a sustainable product may give more ideo-pleasure than a non-sustainable one.
Product Emotion
Desmet’s (2003) “Model of product emotions” focuses on the affective or emotional side of a consumer’s response. The model identifies five types of emotions that are commonly associated with responses to products. These include instrumental, aesthetic, social, surprise and interest which are expanded below.

Figure 3.5.2.3 Detail of product emotion

Instrumental emotion
This product emotion relates to how useful or instrumental a product is to the consumer. Examples of instrumental emotion include disappointment or satisfaction.

Aesthetic emotion
This product emotion relates to how much a product delights or offends the consumer. Examples of aesthetic emotion include disgust and attraction.

Social emotion
This product emotion relates to how a product fits in with social mores or standards. Examples of social emotion include indignation or admiration.

Surprise emotion
This product emotion relates to how novel a product is to the consumer. Examples of surprise emotion include amazement.
Interest emotion

This product emotion relates to how interesting a product is to the consumer. Examples of interest emotion include boredom or fascination.

Kansei

Kansei means emotion in Japanese, which is the opposite of Chisei or logic. Kansei engineering is a process of establishing emotion-based qualities that best fit a design artifact (Nagamachi, 1996). It has been successfully applied to packaged products including Asahi’s dry beer range as well as other iconic Japanese brands (Childs et al., 2003).

Figure 3.5.2.4 Detail of kansei

Kansei
Behavioural response

This is how a person reacts to the package and then acts upon that reaction. For instance, is the consumer drawn to or repelled by the package or is the package not noticed at all? Consumers’ behavioural response towards a package can be observed and recorded (Howard & Sheth, 1968). Recording consumer behavior, known as ethnography, at the point of purchase by video is a common testing method (Elliott & Jankel-Elliott, 2003).

**Figure 3.5.3. Detail of the behavioural branch**

![Figure 3.5.3. Detail of the behavioural branch](image)

**Behavioural response concepts**

Approach and Avoidance

**Approach response**
This happens when a person is drawn towards a package.

**Avoidance response**
This is indicative a person being repelled by the package.

In conclusion, this section has presented an integrated framework for consumer response to packaging. The next section reviews the strengths and
weaknesses of the proposed framework and discusses an alternative framework for consideration.

3.3 Alternative views

It is important to review the strengths and weaknesses of the proposed framework and to consider if it will meet the goal of the thesis, i.e. to make consumer research knowledge accessible to design practice. To explore this, the framework was shown to a number of designers within the university environment to gather opinions about the framework. Gathering feedback was not intended to evaluate the knowledge represented within the framework but rather to gauge general reactions to the visual appearance of the framework and the terminology used. Testing the framework formally with packaging designers is an area for further research, but was outside the scope of this work.

Strengths identified from the feedback included that the designers were interested in the framework as well as the purpose of the project, i.e. to better understand how consumer research is applied to packaging design. However, the feedback that was gathered also identified a number of potential problems. Firstly, the framework looked quite complex due to the number of concepts presented. The amount of the information could be overwhelming and thus deter engagement with the framework. Secondly, the terminology used within some of the theoretical concepts presented in the framework was inaccessible to designers as many of the terms stemmed from psychology, sociology and engineering rather than design. Thirdly, the structure of the framework itself was a point of confusion as by structuring the concepts into “cognitive” and “affective” aspects implied that these areas were mutually exclusive when in fact they are interdependent. For instance, when a consumer responds to a package in regards to “aesthetic” or “symbolic” factors, this involves both “cognitive” as well as “affective” processing within the brain. The two are intertwined, however the visual structure of framework could suggest they are separate entities. Some designers also linked the “cognitive” and “affective” to
the idea of left and right brain processing, which was not the intended communication message. In an effort to address these potential problems with the framework, a more simple, alternative framework is suggested in the next section of the thesis.

**Interdependent**

The next two sections, interdependent and simple, provide an alternative view on the framework and are proposed by the author. In order to address the weakness as stated above, the first task was to address the interdependencies of the concepts within the framework. The rationale employed here was to identify the overlaps or interdependencies within the knowledge and omit the redundant concepts. In this way, the framework could be simplified. The simplified framework would present fewer concepts making it less complex, as well as utilise more accessible terminology. To achieve this concepts within the framework that were interdependent were categorised using a colour-coding system. See Figure 3.6. From this analysis, four aspects emerged. These include the process of identifying a package, the sensorial aspects of a package, the mode of use as well as the social meaning of the package. The next section proposes a simplified alternative framework based on this analysis.
Figure 3.6. Interdependent framework analysis
Simple

The four aspects identified as being interdependent include the notion of “identify”, “sense”, “use” and the “social”. As reviewed in the literature, see Chapter 2, packaging is often tested for successful product and brand “identification”. Identify involves visibility, memorability as well as shelf impact so thus initially it made sense to separate “identify” from “sensory” as different aspects. Given “identify” is considered a part of “sense” or sensory perception, for the sake of simplicity, the two concepts were combined.

Nevertheless, one important factor appeared to be missing, i.e. “communication”. By structuring the framework by aspects of consumer response, it is only implied that “communication” is taking place. The consumer is responding to a design, and thus various messages are being communicated to the consumer (Bloch, 1995; Crilly, Moultrie, & Clarkson, 2004). The consumer response is taking place as an act of communication, but it is not explicitly represented. This is the area that packaging design practice focuses on, i.e. what are the appropriate messages and how to design for this intended communication. Much of the “communication” for packaging focuses on clarifying the various messages that need to exist on any given package including sponsor brand, product brand, product information, product variant information and how the product differentiates from the competitors. See Figure 3.7 for the proposed simplified framework. Thus “communication” was added to make this concept more explicit.

It is important to state what has been left out in this view the framework. While Bloch (1995) and Crilly (2005) divide consumer response into cognitive and affective aspects, it is argued they are interdependent and are not in fact separate. The model proposed by Desmet and Hekkert (2007) avoids this distinction and the “simple” view of the framework proposed follows this rationale.
Figure 3.7. Proposed simple framework
Conclusion

This chapter has reviewed the relevant literature and proposed a conceptual framework around consumer response to packaging. In addition, two alternative view of the proposed framework is discussed for potential use within the *unpack knowledge tool*. Testing of both the proposed framework and the alternative views of the framework with designers has been identified as an area for further research. Given the scope of this research, the next phase was to move onto how the frameworks could be applied to a tool that could be accessed by designers. The next section of the thesis, entitled, “Phase 2: The process”, reviews the scope, strategy, design and development of the *unpack knowledge tool* project.
PHASE 2: THE PROCESS

Chapter 4: Scope and strategy development

Chapter 5: Content development

Chapter 6: Design development
Chapter 4:
Scope and strategy development

Overview

4.1 Establishing the context
Discussions with industry
Discussion participants

4.2 Discussions
Research applied in the design process
Designers in the research process
Challenges of multidisciplinary teams

4.3 Insights
The strategy
The scope

Conclusion
Overview

Phase 2: the process is comprised of three chapters that present the development of *unpack knowledge tool*.

The first problem was to ascertain whether professional designers perceived that applying consumer research in the design process was problematic. To do this discussions were undertaken with leaders in the packaging design industry. This chapter presents these discussions, which enabled the development of the scope and strategy for the tool. The rationale and selection of participants is presented in the first section, *Establishing the context*.

The second section of this chapter deals with outcomes of those discussions. This is presented under the heading of three themes that were identified during the discussions: 1) Research applied in the design process, 2) Designers in the research process, and 3) Challenge of multidisciplinary teams.

The third section presents the insights drawn from those themes and how these shaped the strategy and scope of the *unpack knowledge tool* project.

### 4.1 Establishing the context

**Industry discussions**

As the tool was intended to ultimately support packaging design practice, the context of this practice needed to be further explored. The primary audience for the tool was design practitioners that would be familiar with the use of research within the design process. While many design firms may work with packaging design, the aim was to contact organisations who focused solely on packaging as opposed to working with a variety of design outcomes. To get a variety of perspectives, packaging manufacturers, consumer product brand owners and
Packaging design firms were contacted. Representatives of three organisations were able to participate one in Australia and two in the United States. Within these organisations, discussions were undertaken with five people, four males and one female ranging from 30 to 50 years of age.

While the number of discussions is obviously limited, the goal of this inquiry was to explore the context of packaging design practice by getting industry leaders' opinions on how they apply research in the design process. A clear limitation of this undertaking is that it does not represent the packaging community as a whole, but provides only a view into three types of organisations that work with consumer research and packaging.

The discussion questions addressed a number of themes surrounding the professionals' experience with consumer research and the packaging design development process. Refer to Appendix A for more detail.

Discussion participants

Packaging manufacturer
The first organisation is an Australian packaging manufacturer. It is a conglomerate of many smaller businesses producing plastics, paper and polymers. The company has traditionally focused on manufacturing with design work offered as a value-added service that differentiates it from its manufacturing competition. Discussions with the design team showed that the company was looking for ways to leverage design innovation to remain competitive in the marketplace.

Consumer product manufacturer
This company, headquartered in the USA, is a large fast-moving consumer goods manufacturer with brands in the grooming, household and consumable product sectors. This company is also well known for its development in brand management strategies and its commitment to R&D as well as consumer research. As this was a large organisation, there was an opportunity to have discussions with several employees from different areas within the organisation including design, management and the research divisions.

Packaging design firm
This organization is a design firm focused on packaging in the USA. The firm is
an award-winning brand and packaging design agency and works with consumer goods manufacturers on a variety of brands.

4.2 Discussions

Through the literature reviewed in Phase 1: The Knowledge section of the thesis, it is clear that a number of problems exist in this area surrounding implementing design decisions in the product development process. The discussions with industry professionals generally supported this view. From these discussions a number of common themes became apparent. The following groups the discussions by theme relating to the design’s industry perspective on design process and research in practice. These included how research is conducted and applied to the design process, the designer’s involvement within this process and the lack of a common understanding about research and design process in general. This thesis argues that these problems stem from a lack of clear communication about how research informs the design development process.

Research applied in the design process

Young (2006) argues that consumer research needs to be applied more successfully in the packaging design development process. How research is conducted and applied within the design process is a complex matter. Participant A, a designer researcher and director working with the organization, echoes this sentiment by noting that often the research conducted is not asking the right questions, in the right way or at the right time. This could make the successful application of research within the design process difficult.

This was an important point that had come within his experience, as his organisation employs research and favours evaluative research that can give the business side quantifiable evidence for the design decision-making. He noted that theoretically researchers can measure anything, but the question was whether it should be measured. The key was to consider the what, when, why and how design testing should be carried out. This was vital to the success of the project, as the wrong testing at the wrong time or too much testing can hinder the design process and impede a speedy time to market.
Participant A offers his view on the concept of ‘design metrics’, a term used to sum up various research approaches that can evaluate design outcomes. Participant A questioned the notion of ‘metrics’ in regards to design, warning that they could be used inappropriately. He gave the example of adding gold foil to a package. This could be tested to see if consumers preferred the gold foil package over the same design without gold foil. After all, anything can be tested, but it is the contribution or insight the research can add to the design process that is of value. In contrast to the ‘metric’ approach, Participant A advocated that the research needed to be holistic and most importantly in the real world context.

In other words, test the package design in its entirety, not just one aspect such as colour, shape and image alone; and always test in the real context; i.e. on the shelf in the shopping experience. Barnes et al. (2008 p.377) concur: “Through our work with industry, design managers have expressed concerns about the validity of the assumption that assembling a set of ‘optimal’ attributes will result in an appealing whole pack.”

**Designers in the research process**

Hanington (2003) argues that designers should be involved in the research process. With designers having input into the process, this could lead to better design solutions. This view was supported by discussions with a senior design practitioner, Participant B at a leading packaging design firm. The firm is an award-winning brand and packaging design agency and works with consumer goods manufacturers on a variety of brands. Participant B’s perspective was valuable as she could offer insight from design practice. The context of this design practice was more common than the in-house design team, as it was a design agency that worked external to the client. Participant B would be a potential user of the tool, a design practitioner working within a design agency. Participant B stated she had little direct experience with consumer research as often the client and the marketing team had completed the process before they became involved. However, her design team had good experience with focus groups, where the design team was able to observe part of the research. She shared that by observing the focus group, the team was able to see firsthand how some people were using the product that wasn’t considered. This opened up avenues for some interesting ideas. This experience, however, was unique for
Participant B, as most often the design team was not involved with the consumer research.

**Challenges of multidisciplinary teams**

The last theme that emerged from the discussions was the challenge of working with multidisciplinary teams and that this could lead to a lack of a common understanding of how design and research work together among key stakeholders within the design development process.

Product development teams are often multidisciplinary. Each discipline has its own knowledge, perspective and terminology, making it difficult to reach a shared understanding of how research is applied within the design process. Often various stakeholders will have differing agendas or concerns when it comes to decision-making. In some cases, they may use jargon or different terminology and the barrier to a consensus is a breakdown in communication; i.e. not speaking the same language. For instance, the term ‘aesthetics’ may be interpreted differently depending on whether one is a consumer researcher or a graphic designer. Bridging this gap is a challenge, but a worthwhile one, as coming to a mutual understanding is vital to good decision-making within the design process and can support innovation (Folsom, 2006).

Participant C, a design manager at the executive level, supported these claims by stating that the major problem in managing design was the challenge of interdisciplinary collaborations between different stakeholders within an organisation. Participant C thought designers need to learn business language in order to successfully contribute to the design decision-making discussion. The literature supports this on the lack of input and training designers have in decision-making on a project (Cooper, 2006). Participant C also emphasised the idea that designers need to realise that they are not the only creative ones in the process. The literature supports this with Gorb and Dumas’s (1987) ‘silent design’, which states that design activity carried out in organisations is not recognised as design. It is the collaboration of all perspectives (engineering, finance, marketing, sales, design, etc.) that leads to design innovation.

The second point that emerged was the unpredictable nature of the design process and its tendency to lead to problems in the understanding of research and the design process. The design process, unlike a scientific experiment, often
cannot often be replicated to test for reliability. The parameters within a design project are difficult to define, fuzzy and can change over time. The benchmarks or key decisions made within a design process can be led by intuition and difficult to verify by research findings (Rhea, 2003). Design as a practice-based, emerging discipline is still defining its knowledge, processes and terminology. Often designers do not have a shared understanding of research and the design process, as there exists no professional accreditation that ensures consistency across education. Thus articulating a rationale for design decisions to other stakeholders can prove difficult.

Participant C noted the design process is often not fully understood. The attitude that design is creative and difficult to explain can be a blocker in seeking common ground. Participant A echoed this sentiment and found that by structuring the informal research processes that the design team goes through facilitated a clearer understanding of the design process to the other branches of the organisation. Getting everyone on board, or rather cooperation between the various branches, was often a challenge and ultimately determined the success of a project.

### 4.3 Insights

From the discussions with the packaging industry three themes emerged and must be considered in the scope and strategy of the unpack knowledge tool. Firstly, the application of consumer research within the design development process can be problematic. Secondly, the interview respondents confirmed that the involvement of the design team in the consumer research process could be helpful. Thirdly, there existed a lack of understanding between various stakeholders in the packaging design process including those from the business, research and design arms of the organisation. Finally, it was identified that designers needed to have a better understanding of business and research to make an impact at the decision-making level.

### The strategy

The interview process and themes that emerged led to reconsidering how the content of the tool would be developed. How the knowledge or information was presented in the tool would be important. The theoretical concepts needed to be
applied so that they could be understood. The tool needed to facilitate a shared understanding among stakeholders around consumer response and packaging interaction concepts. As the goal was for understanding, the presentation of the information needed to be carefully considered and tested with the intended audience.

The scope

A project’s scope translates the strategic goals into requirements or deliverables. As stated above, the goal of the *unpack knowledge tool* is to be a repository of knowledge that is accessible to designers. Therefore housing the project as an online information resource would be ideal. Being online would allow the information to be updated, amended and added to as needed. The use of animation or Flash programming may also assist with understanding the complex information. A working prototype would need to be developed so the users, i.e. the designers, could interact with it and explore the different areas of knowledge. Given the complexity of the proposed framework, as identified in Chapter 3, an interactive information presentation could allow the user to isolate areas of the information by only focusing on parts of the framework at any given time. This would also allow the users to explore what areas they found relevant and could revisit later to find out more.

Conclusion

In conclusion, this chapter has presented the context for the *unpack knowledge tool* as well as defining a strategy and scope for its development. The next chapter presents the content development for the tool as well as the challenges with visualising the content into an interactive information resource.
Chapter 5: Content development

Introduction

5.1 Visualising the framework

Information design
Information design applied
Interactive information

5.2 Developing the personas and scenarios

The literature
Developing the personas
Interviews

5.3 The proposed scenarios

Conclusion
Overview

As discussed in Chapter 4, drawing upon industry interviews the context of the use of consumer research within industry was established. From this the parameters of the project including the scope and the strategy could now be defined. The scope and the strategy emphasised the importance of the content development of the *unpack knowledge tool* and the need for clarity and accessibility in the content. This chapter details the content development process of the tool.

The first section, visualising the framework, highlights the points taken from the industry interviews in regard to the lack of clarity of the proposed packaging framework. A review of information design and visualisation principles was employed to put forward a strategy to better clarify how the tool could communicate more clearly to the intended audience. The second section, developing scenarios, responds to this need by proposing a series of scenarios where consumers interact with packages. The goal of the scenarios was to apply the theoretical knowledge from the framework to a real-world situation. The third section presents the development of a series of personas and scenarios that showcase consumers responding to packaging.

5.1 Visualising the framework

After the discussion with design professionals, see section 4.3, it became clear that the visualisation of the framework appeared complex and could lack clarity. As these designers were a potential audience for the tool, their comments were important. Accordingly, consideration was given to the structure of the information and how it could be represented in a clearer, more accessible manner. It also became apparent that not only was the visualisation a problem but the terminology used within the framework was problematic as well. Information design and data visualisation literature were reviewed in order to shed light on this problem. Outlined below is a list of themes that emerged from this review of the literature.
Information design

A review of the literature in the area uncovered a list of useful criteria with which the visualisation or information design of the framework could be assessed. The following outlines these criteria, the interaction mode of information, the importance of iterative development and the role of the designer/researcher within this process.

Interaction with information

Spence (2001) proposed there are three ways to interact with information, be it a passive, active or dynamic interaction experience. An example of a passive information piece would be a train map on a wall. You can interact with that map by looking at it, but you cannot alter its structure. An active example would be a spreadsheet in which you can control categories of the information using the sorting functions, such as by date, category or alphabetically. Dynamic interaction allows for the information to change in its structure, with an example being a website. The proposed tool will utilise dynamic interaction allowing the user to not only change the structure of the information but allowing it to be changed or updated once it is online.

It must be noted that since the invention of the computer, it is a given that the audience of the information will be able to interact, rearrange the information to better understand it. This is not to say that interaction does not occur when one unfolds and cross-references different information on a road map, but to a certain degree the paths of interaction are inflexible, not changeable. In a human–computer interaction experience, the viewer can affect not only the presentation but how the information is selected.

How the user interacts with the information is very important. Spence (2001) outlines five key aspects including: scale and dimensionality, rearrangement, interaction and exploration, externalisation (visual presentation), mental models (internal construction) and invention, and experience and skill. All of these aspects will be considered in the design process for the visualisation of the framework. The notions of rearrangement, exploration and interaction with information are important concepts that will be necessary for the design of the framework and ultimately the tool. The user will be able to navigate through the information, constructing a different journey each time.
Iterative representation of information

Cleveland (1985) argues that the iterative representation of information can allow new insight into the information. This notion impacts upon this process in two ways: it not only describes how the user will interact with the tool, but also describes the development process of the tool itself.

In the case of the unpack knowledge tool, the intention was to visualise the complex framework into an interactive knowledge tool for the designer to better understand packaging interaction concepts. By constructing the information into a dynamic interactive prototype, the user can create their own path through the information each time it is used, uncovering new aspects of knowledge.

The process of representing the information was an iterative process, with each attempt potentially uncovering a new perspective within the information itself. Bertin (1981 p.16) concurs with this notion but terms it construction: “A graphic is no longer ‘drawn’ once and for all: it is ‘constructed’ and reconstructed (manipulated) until all the relationships which lie within it have been perceived ... a graphic is never an end in itself: it is a moment in the process of decision making.” This concept of construction and reconstruction are important aspects of the development process of the proposed packaging framework and the unpack knowledge tool.

The role of the designer and researcher

Spence (2001 p.12) asserts the following: “But in the great majority of situations the design of a new visualisation tool is a craft activity, the success of which depends upon the designer’s understanding of the task for which the tool is intended, as well as the designer’s possession of many and varied skills ranging from visual design to algorithm design.”

Spence’s argument that designing information is a craft activity that necessitates designer’s knowledge, experience and skill echoes Evans’ (2010) researcher practice methodology as well as the work of Schön (1983). This thesis argues that the role of the designer/researcher was vital in contextualising the knowledge and then synthesising this into an accessible resource for practice. These activities involved skills of both the researcher as well as the communication designer. This chapter presents how the knowledge was synthesized as well as visualised through information and interaction design.
Information design applied
This section presents the visual design and information design techniques employed to support the most appropriate visualisation of the frameworks and *unpack knowledge tool* interface.

Hierarchy of information
The original framework was based on a concentric circle nesting approach or tree map. The size of the circles indicates hierarchy, with the three largest circles housing cognitive, affective and behavioural response concepts. The next largest circles nominate the next level of information. For the cognitive branch these are aesthetic, semantic and social. The behaviour branch houses the avoid and approach responses. Affective, the most complex, encompasses a number of concepts from kansei, emotional design, product emotion and the notion of product pleasure. The third level of information, the smallest circle, adds to the complexity, further detailing various contributions from the literature. Figure 4.1. illustrates the simplified framework and each stage of complexity.

Use of animation
This shows the framework at it builds in successive complexity.

Use of typography
Type is used to label the subsequent areas of knowledge, matching the scale or size of the type to the appropriate level of information. The type also serves to represent another element of information, the terminology used in design practice.

Use of line and linking
The use of line links together the cognitive and affective aspects that lead to the behavioural response.
**Figure 5.1. Use of animation**

The text within the diagram is not intended to be read at this small size.
Use of colour

The colour application was next considered in an effort to highlight interdependencies within the framework. See Figure 5.2. The knowledge was categorised into the following groupings that covered emotion, use or utility, identify, sensory and social aspects of the experience. The colour-coding categorisation added another dimension to the information. This could be useful in the tool’s design.

While the colour-coding added another dimension, it seemed that the concentric circle visualisation needed to be reconsidered. Perhaps there was too much information displayed in the framework itself.
Interactive information

The complexity of the framework necessitated that the content be separated into layers of information. An interactive tool would be able to feature this complex information in different ways. The layers of information to be displayed include categories of knowledge, the connections of that knowledge and their hierarchical relationships, as well as the overlaps within the knowledge, particularly between the theoretical and the practical terminology. The use of interactivity within the framework enables the user to highlight each concept circle within the framework and a further explanation comes up in the grey box offering more in-depth information (Figure 5.3).

In conclusion, unpacking the complexity of the framework was a challenge, and it was clear that the theoretical concepts behind the framework would be difficult to grasp without relevant applications as explanatory examples. With this end in mind, scenarios were considered as a viable way to apply the knowledge to real-world situations that the design practitioner would understand. The scenarios feature a series of characters reacting to packaging designs and their subsequent responses. The next section outlines this development.
**Figure 5.3.** Use of interactivity in the framework

**Aesthetic**

Is there an underlying system that holds the design elements and/or various aspects of the package design together? For example, are certain shapes, colors, or textures repeated throughout the design?
5.2 Developing personas and scenarios

This section reviews the background literature on scenarios and personas. It then presents the interviews that were carried out to inform the development of the final personas and scenarios presented within the unpack knowledge tool. Four personas and four scenarios are presented at the end of this chapter.

The literature

Scenarios and personas are techniques used by the design team to explore how a proposed design may be used by the consumer or user in a real world situation. For the sake of this project, the consumer or user is a ‘persona’ and the situation or ‘scenario’ is the purchase and use of a package product. For instance, a consumer sees a package and reacts to it with a verbal response such as, ‘I like that package. The colour is nice.’

The use of personas, or fictional users, was first proposed by Cooper (1999) in his book on the challenges of software design, *The Inmates are Running the Asylum*. Though the idea of creating an archetypal consumer profile based on demographic data originated in marketing (Moore, 1991), the description in personas is more in-depth than merely demographic data such as age, marital situation, employment, education, etc. Personas tell stories about the background of a consumer as well as the needs and goals of that group of consumers.

Scenarios, like personas tell a story about a situation. A scenario can be defined as an account of a projected action, event or situation. Scenarios are used in design to help determine the situation surrounding a designed object and the interaction a person may have with that designed object. Scenarios help identify aspects of this intended use, which can then be translated to criteria or goals for the design process (Carroll, 1995). A number of sub-disciplines in design, such as interaction design and web design have used scenario building as a tool in the development process. Other disciplines such as business and futures studies use scenarios in a more in-depth way, particularly with a task of determining future opportunities or threats, termed ‘scenario planning and
analysis’. However, for this project the aim was not to predict a future situation, but rather to illustrate the theoretical knowledge in a practical context by representing a consumer’s responses to a packaging design.

**Developing the personas**

To inform the development of the personas and scenarios, interviews were conducted with five female participants aged 28 - 36 surveying a particular product category, tampons. In the second group of interviews, two male and three female participants, aged 19 – 62, responded to bottled water. Refer to Appendix B for a list of the interview questions. Both of the products, the tampons and bottled water, were chosen because their differentiation within the marketplace depends almost entirely on the packaging. Without the packaging, the differences between the water would be difficult to distinguish. In this case, this could demonstrate the idea that ‘the package is the product’ as is stated in the packaging design industry. See Figure 5.10. and 5.11. for a visualisation of the data analysis.

The personas were developed based on the data from the interviews, including the demographic data and the insights that were gained about how people respond to packaged products. From this information, four personas were developed to represent different market segments of the population. Figure 5.6. shows the four different personas that were developed. Each persona was based loosely on the interview participants themselves being male and female and ranging in ages from young to older. The characters chosen were a teenage boy, a young woman, a middle aged man and an older woman. Each persona is visualised with an illustrated face that aims to represent the personality of the fictional person. Then each persona is put in a scenario with a packaged product and makes several statements about this product. It is important to note, these statements are not taken directly from the interview data. See the following figures, Figure 5.4. – 5.4.3, for images of the personas and their consumer profile information.
Figure 5.4. Persona 1: Jordan

Jordan
Jordan, age 19, is a university student. He still lives with his parents and has an income of $10,000.

Packaged product purchases: convenience foods
As Jordan is a university student, he is often on the go between home, work and school. He buys packaged products including drinks and snacks from convenience stores regularly. As he still resides in the family home, all other packaged products he may consume are purchased by his mother. He is on a budget so often only buys what is on special or sale in store.

Figure 5.4.1 Persona 2: Katherine

Katherine
Katherine, age 32, is a freelance journalist. She lives with her partner and earns an income of $80,000.

Packaged product purchases: convenience foods
Katherine works mainly from home so purchases packaged snacks and beverages from the supermarket or from a café when she is out and about. She doesn’t buy often but when she does will spend more on upmarket products, such as specialty foods.
Figure 5.4.2 Persona 3: David

David
David, age 45 is an IT consultant. He lives alone and has an income of $120,000. **Packaged product purchases**: convenience foods
David tries to bring his lunch to work but often forgets as he doesn’t do much cooking. As there are no cafes near his workplace, he often purchases his lunch from the local convenience store. He tends to be habitual in the products he purchases. This includes sandwich and a can of soft drink.

Figure 5.4.3 Persona 4: Anne

Anne
Anne, age 62, is married and lives with her husband. She is a primary school teacher with an income of $50,000. **Packaged product purchases**: convenience foods
Anne habitually brings her lunch to work from home. She purchases packaged foods and beverages only occasionally such as, if she is out with friends on the weekends. She doesn’t like to pay premium for the same things you can get in the supermarket for less than half the cost.
The description in the personas were used as a starting point to develop the scenarios within the tool. Figure 5.5. shows an example of how these four personas may react differently to the same product, in this case an unusual bottled water. You can see the responses next to each persona. Each response is fairly different and corresponds with that target market or group of consumers. The teenage boy thinks the bottle looks ‘cool’ while the middle-aged man thinks the bottle looks hard to use. The young woman thinks that this must be an upmarket branded water, while the older woman thinks the bottle resembles perfume rather than water. The final personas and scenarios are presented in the following section at the conclusion of this chapter.

**Figure 5.5. Personas and consumer responses**
Interviews

The following presents a few of the consumer responses to the two packaged products, tampons and bottled water.

Results

Product 1: Tampons

“The use of white makes me think of medicine”

“These are the ones my boyfriend would buy me if I asked him to buy me some!”

“It does seem a bit too girly for me”

“Why would I buy tampons in a tin more than once, what will I do with all those tins!”

Product 2: Bottled Water

“I don’t like that, it looks gaudy.”

“I try not to buy too much of this stuff.”

“The sporty one is better.”

“Who would buy French water?”

Discussion

While the interview data were used primarily to inform the development of the unpack knowledge tool’s personas and scenarios, the data were also analysed against two different packaging interaction models to look for themes. The first model proposed by Gough (2004) explores the life cycle of a package (Figure 5.8.). Gough’s work with packaging focuses on the life cycle of the packaging interaction experience ranging from purchase to disposal. This is a particularly useful model as it maps the duration of a packaging interaction scenario from when the shopper first encounters a packaged product, purchases it, opens, uses and disposes of the package. The circular charts starts with ‘shop & select’ concluding with ‘dispose & recycle’.

The second model used was Norman’s (2004) ‘emotional design’ comprising visceral, behavioural and reflective response (Figure 5.9.). By analysing the interview responses against each model, interesting themes began to emerge.
By colour-coding and categorising the interview responses, the data could visualise the findings in different ways. Figures 5.10. and 5.11. show how the responses could be mapped across these two different models. From the interviews, the responses mainly are located in the ‘shop & select’ part of the chart. A reason for this could be because the interview questions were focused on the experience of seeing the package in a shopping situation.

Figure 5.11 maps the interview response data by analysing the responses and comparing them to Norman’s (2004) ‘emotional design’ model, visceral, behavioural and reflective response. Below you can see the five packaged products shown to the respondents which are colour-coded and the three grey columns that represent the three types of response, be it visceral, behavioural or reflective. Visceral is first Norman describes this as the immediate gut feeling, while the reflective response occurs after a longer engagement with the package brand. The Y axis shows the social aspect of the interaction as to whether the response is related to the respondent’s internal or external circumstances. Each product is colour-coded to show the relationship between the package and the corresponding responses.
Figure 5.8. The life cycle of a package

Figure 5.9. Emotional design model

Figure 5.9. Reproduced from “Emotional design: why we love (or hate) everyday things” by D. Norman, 2004, Basic Books, New York.
Figure 5.10. Interview responses analysed with Gough’s model

The text within the diagram is not intended to be read at this small size.
Figure 5.11. Interview responses analysed with Norman’s model

The text within the diagram is not intended to be read at this small size.
This analysis of consumer responses to packaged products assisted in developing the scenarios for the unpack knowledge tool. The next section presents the content developed for the scenarios.

5.3 The proposed scenarios

As discussed in the previous section, a series of fictional consumers or personas were developed as well as a fictional scenario in which each consumer responds to a different packaged product. Each of the four personas (Jordan, Katherine, David and Anne) responded to three different products. The products chosen were intended to be common purchases from the FMCG category. These included bottled water, deodorant and chewing gum. There were twelve scenarios developed in total and the scripts for the first product, bottled water is shown below in Figures 5.13 to 5.16. Figure 5.12 demonstrates how the scenarios could look in the unpack knowledge tool interface.

Figure 5.12. Scenario: Katherine and Perrier
Figure 5.13. Scenario 1:
Jordan responds to the bottled water, Pump.

**Jordan:** I buy Pump, it's good for on the go.

**Narrator:** Jordan responds to the useful aspect of the package. He can drink it anytime as he goes about his daily activities.

**Jordan:** It's cool and sporty looking.

**Narrator:** These are brand personality traits that are being communicated.

**Jordan:** The other guys buy this too.

**Narrator:** This speaks to the social aspect of Pack Experience. Drinking Pump could make Jordan feel a part of a group, in this case his young, male peers.
**Figure 5.14.** Scenarios 1b:
Katherine responds to the bottled water, Perrier.

**Katherine:** I buy this for special occasions.

**Narrator:** Katherine responds to the ‘Use’ aspect of the pack experience, as she explains when she would purchase Perrier.

**Katherine:** It’s all class and oh so very french.

**Narrator:** In this case, Katherine responds to the ‘communicate’ aspect of the pack experience, specifically the ‘brand’. Associations such as ‘upmarket and french’ are an important part of the Perrier brand.

**Katherine:** I love the look of it, as well.

**Narrator:** This relates to the ‘sense’ aspect of the pack experience, in other words the aesthetic or look.

**Katherine:** I suppose I prefer quality things.

**Narrator:** This is the ‘social’ aspect of the package experience. Katherine’s response indicates that buying Perrier reflects something about her, in this case her preference for quality things.
Figure 5.15. Scenarios 1c:
David responds to the bottled water, Mount Franklin.

David: That’s the one I usually get.

Narrator: David responds to the ‘sense’ or aesthetic aspect of the package. He indicates that he sees and recognizes the product by how the package looks.

David: I reckon I buy it out of habit

Narrator: David could be considered a brand loyal consumer as he buys Mount Franklin habitually. This coincides with the ‘brand’ aspect of the package communication.

David: After all, it’s only water...

Narrator: David clarifies his response by implying his choice is not that important. This statement refers to the social aspect of pack experience. David doesn’t see himself as someone who is concerned over bottled water purchases.
Figure 5.16. Scenarios 1d:
Anne responds to the packaged water, Pureau.

Anne: I don’t usually buy bottled water, I don’t like being wasteful!

Narrator: In this response, Anne is referring to her own personal beliefs about being wasteful. This indicates her response refers to the social aspect of packaging and more specifically, the ‘self expressive’ aspect.

Anne: I suppose I do buy it in summer, when camping for instance. Last summer I got that new one, the bag in a box.

Narrator: This relates to the ‘use’ aspect of the packaging experience.

Anne: I like it better. It is easier to carry, use and even recycle.

Narrator: This relates to the ‘ergonomic’ aspect of the packaging experience.
Conclusion

This chapter has reviewed the industry context and content development for the *unpack knowledge tool*. This process was iterative and developed further with each new refinement. The next chapter reviews this design process in more detail.
Chapter 6: Design development

Overview

6.1 The approach: design process
User centred design
User experience elements

6.2 The application: user experience elements
Strategy
Scope
Structure
Skeleton
Surface

6.3 Iterative development: the prototypes
Prototype 1
Prototype 2
Prototype 3
Reflection

Conclusion
Overview

This chapter reviews the stages of the tool’s design development process. It reviews three aspects of this process; the design approach, the design application and then reviews the prototyping process. Firstly, the design approach is presented, drawing upon iterative design development (Boehm, 1988) as the overarching method as well as a Garrett’s (2003) user-centred design approach for the design of the tool’s interface. Secondly, the design application shows how this design approach was applied in the tool’s design development. Thirdly, the iterative design phases of the project are shown with various prototypes. Aspects reviewed include how the framework evolved into an interface, and alternative approaches for the development of the scenarios. As this design development process is iterative, the analysis is embedded into each step of the design development, providing the rationale for the next stage of the process.

6.1 The approach: design process

Choosing the appropriate design process approaches for this project was important. As stated in the introduction chapter, iterative design development was chosen as the overarching method for given the complexity of the overall project. The iterative design development method allowed for multiple methods within the project including user interviews, usability testing, prototyping and then testing with users. This overarching method also included the information design work presented in Chapter 4 as well as interface design and visual communication design work presented in this chapter. To develop the unpack knowledge tool interface Garrett’s (2003) ‘user experience elements’ were used to structure the project phases. The next section reviews this process.
User centred design

While various design processes exist for designing interfaces, Garrett’s (2003) user experience elements: user centred design approach was chosen for several reasons. Firstly, it was originally developed for website design projects, which suits the unpack knowledge tool as it is interactive. Secondly, the approach is user centred, requiring research of the intended audience of the tool. Thirdly, the approach caters for information-rich projects that draw upon information design principles in order to develop, clarify and control content. This defines the content aspect of the project, how the information is defined, designed and understood by the user or reader. This is a vital part of an information-rich project, as clarifying the content, the information, the design and visualisation as separate stages supports clear communication.

User experience elements

Garrett’s (2003) ‘user experience elements’ was developed out of web design practice. It draws upon user-centred design principles by considering the importance of the user in the design process. The User Experience Elements are visualised as a scaffold of various stages of a project (see Figure 6.1.) and Garrett terms each of these elements. It begins with the “element” of the project, which is the strategy. Progressing to the next element is the scope of the project, then the structure, the skeleton and the surface. These are explained in more detail below. Figure 6.1. illustrates the scaffold of elements and note the vertical arrow, which represents how the project moves from abstract to concrete or rather from the intangible to the tangible when moving from the bottom element to the top element. For example, the strategic goals of a project are intangible until they are realised in a visual form, which is tangible.
6.2 The application: user experience elements

This section presents the development of the *unpack knowledge tool* using the ‘user experience elements’. The section is structured with headings that align to Garrett’s (2003) model. The five user experience elements are strategy, scope, structure, skeleton and surface. Each of these are described below.

**Figure 6.1. User experience elements**

![Diagram of user experience elements]

*Figure 6.1. Reproduced from “The elements of user experience: user-centered design for the web” by J.J. Garrett, 2003, American Institute of Graphic Arts, New York.*
Strategy

The strategy element reviews the goals, the intended audience, user profiles and scenarios that demonstrate how the unpack tool could be utilised.

The goal

The goal of this project is to facilitate a better understanding of consumer response to packaging design. The unpack knowledge tool unpacks the complexity of this area, making the information accessible to the design practitioner.

The users

The general audience or users for the unpack knowledge tool could be anyone who is interested in how people respond and interact with packaged products. From this broad audience two more specific user groups were identified. The primary user group would be an expert group, those involved in decision-making and management of the design development process. This would include design and marketing managers, design directors and those involved in research including R&D and consumer research. The needs of this expert user group were investigated in Chapter 4 in discussions with leaders in the packaging industry. This discussions helped clarify the user’s perceptions, attitudes and experience with applying research within the design process, as well as reveal the needs of the user group and how the tool could be applied in industry.

The secondary user group is defined as a novice as opposed to expert. This extends to the novice packaging designers which includes design students who are newer to the field and thus working within the constraints set by consumer research can seem daunting. This also includes those in the packaging industry that would be novice to design and/or its relationship to consumer research.

Below is an expansion of this audience research as it can be applied to user profiles. User profiles, similar to the concept of personas as reviewed in Chapter 5, are often used in software development and web design projects to detail aspects of a segment of an audience or user group. A user profile details how a person might interact with a proposed design, detailing the user’s needs, desires, abilities and preferred method of use (Garrett, 2003).
User profiles

Needs:
In order to determine a user’s needs, how the user will interact with the tool must be considered. Questions such as under what circumstances will the tool be used must be explored. As the tool is an information-rich knowledge tool, navigating through the information is important. The structure of the information needs to be clear and this is a challenging task as the framework itself is complex. In order to allow for the user to see the entire framework as well as to view the detail of the framework, two views of the framework must be made available. The tool can be used repeatedly as a resource to explore and learn more about the area as determined by the user.

Desires:
The interface should be easy as well as intuitive to use. The friendly look of the interface and illustration was intended to assist the user in feeling comfortable, rather than being overwhelmed by the information. Ideally the user could feel empowered by using the tool, broadening the user’s knowledge of the area.

Abilities:
All of the user groups are familiar with the interactive technologies, such as the internet, and use it for various tasks from research to entertainment. The primary user group has an understanding of what consumer research is and how it is used in the design process, as well as an understanding of general concepts associated with consumer response. The secondary and tertiary user groups may not have basic understanding of consumer research, and therefore terminology as well as the use of technical language must be considered to ensure the information is accessible.

Method:
Both user groups are familiar with accessing the internet daily and use mobile devices to access information. They are accustomed to organising their lives in a digital medium.
Scenarios

A scenario, as described in Chapter 5, shows the context of use or rather how the tool would be used in a situation. Here are three scenarios of how each user group would use the unpack knowledge tool.

Expert user group: Sarah, a design manager
Sarah, a design manager, uses the tool to better understand theoretical terminology associated with consumer response, which was previously the marketing manager’s territory. She has an understanding of what kind of tests the marketing/consumer research branch had carried out and how they fit into the big picture. She also is pleased to see how design/practical language fits in with the research/theoretical language. She notes that the aesthetic side of things, with which she and her team are most familiar, is clearly an important part of the tool’s information.

Expert user group: Steve, a marketing manager
Steve, a marketing manager, uses the tool to better familiarise himself with the latest research in consumer response. He keeps up with packaging design industry journals as well as user research. He likes the way the tool highlights how the design aspect fit into the big picture. He is excited by the prospect of his colleagues (design, engineering, finance) using the tool as well, and being able to better understand what his team contributes to the design development process. He hopes this will put an end to the design manager going off and hiring research companies on her own, and that they will work together to set agendas for the use of consumer research within the product development process.

Novice user group: Nicole, a packaging design student
Nicole is working as an intern at a local packaging design firm. While she has worked with target markets in design briefs at school, she hasn’t done so in practice. Nicole presents her ideas and her manager tells her that her design ideas are outside the brief and don’t fit in with the consumer research data. Nicole wonders how the data were gathered, she thinks her ideas would work. She would like to learn more about how consumer or user research is carried out so that she can better design for the people who use her designs.
Scope

The scope of the project details its parameters. This clarifies what information and resources are used for this project, such as content including text, image, sound and video. It identifies the medium that was used and the functional specifications for the project.

Content

The content features the background of the project, the knowledge maps, the frameworks, the scenarios and a mechanism for feedback. The knowledge maps detail the multidisciplinary literature in the area. The frameworks feature various models from the literature, including a description of terms, as well as highlighting the relationships within the knowledge. The scenarios demonstrate the framework applied to a real-world context; i.e. a person reacting to a packaged product and the subsequent response. The feedback form asks the user of the unpack tool a series of questions to gain information for further revisions.

Function

Functional needs include interaction with a variety of media, including text-based information, visual maps, animation, sound and video. To meet these needs, the prototype was programmed in Flash as this software supports the needed multimedia and will be hosted online to allow for greater accessibility.

Structure

The structure is the information architecture of a project or rather how chunks of information are accessed through the tool. A common method of visualising an information structure for an interactive project is a site map. Figure 6.2 visualises the site map for the tool. Site maps are often visualised through the tree structure of information, showing a hierarchy of pages within the information piece. On the first level there are five main areas of content, the project, the knowledge, the framework, the scenarios and the feedback. The second level shows more detail in each section.
Figure 6.2. Sitemap
Skeleton

The skeleton refers to the structuring of the various parts of an interface including the information, blocks of text, navigation buttons, etc. In web design this is also referred to as a wire frame or content schematic. For instance, a content schematic or wire frame would show where the navigation buttons would be placed as well as information and visual elements, including text and images. Clarifying the best placement for these items is vital for an interface’s usability. Keeping this in mind, a traditional layout for the interface was used with the top bar housing the navigation and the text information aligned to the left column. Several iterations were explored for the skeleton (see Section 6.3).

Surface

The surface refers to all visual or sensory aspects of the interface including the use of imagery, colour, typography and layout. This could also include style of animation and the use of sound. When designing the surface of the unpack knowledge tool interface, it was important that the website seemed accessible and friendly. The goal was to communicate that the tool was a helpful resource for designers. It should look simple to navigate, but provide in-depth information. To achieve this, a simple, friendly visual approach was employed. The logotype, ‘unpack’ used a bold lowercase sans serif typeface, Myriad. The illustrations of the personas or fictional consumers were executed in a hand drawn style. The colour palette was limited to white, grey and black for the text. This allowed the packaging examples featured in the scenario section to be the focus and not compete with a background colour in the interface.

This section has detailed the five user experience elements and how they apply to the unpack knowledge tool project. The next section shows the iterative design development through a series of prototypes.
6.3 The prototypes

The development of the prototypes was an iterative process with each prototype assessed by digital media designers and revisions were made in response to this feedback. This iterative approach follows on from the method outlined in Chapter 1, as iteration was utilised throughout all aspects of this project. Each prototype shows two screens from the framework and the scenario sections. These sections were selected as they house the most information as well as have further interactive media content.

The assessment undertaken during the design development was limited to three digital media design lecturers at Swinburne University of Technology. While these people were potential users of the unpack knowledge tool, (as they were designers that may work with packaging as well), they were consulted during this phase of the project for their expertise in interface design and usability. As they were considered experienced practitioners in this area, they could give advice on how to improve the prototype. This approach of consulting experts for feedback is termed expert evaluation. It argued that iterative design development is best supported by evaluating the prototype often as possible to identify potential problems. This way obvious problems can be identified and resolved before investing in large-scale, formal user testing (Nielsen, 1993).

Nielsen (1993) argues that user testing with no more than five users will identify the majority of problems with the prototype. However, before user testing is undertaken, an expert evaluation is often conducted. One of the methods for this expert evaluation is to benchmark the proposed prototype with guidelines for good usability in the interface design. Nielsen (1994) has termed this process, “heuristic evaluation” and has developed 10 heuristics for usability. These include:

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation

The feedback from the expert evaluation is discussed in context to the prototype testing in the next sections. Then it is benchmarked against the 10 usability heuristics.

Prototype 1

Expert evaluation
Upon reviewing the tool, several problems were identified with the design. Firstly, there was difficulty in reading the detailed information within the framework section (see Figure 6.3). There was a concern older users would have difficulty reading the small type size. Nevertheless, the *unpack knowledge tool* should be accessible to all ages of users. The overall complexity of the framework was also a concern. This was simplified and presented with Chapter 4 through the information design process.

Secondly, within the scenario section, the navigation between the personas and the packaging was also not clear. This feedback was important since navigating through the four personas and four packages is a focus of the tool. Thirdly, the overall navigation system, i.e. the global and sub-navigation bars, also needed to be resolved. Feedback confirmed the left panel navigation buttons didn’t match the style of the global navigation buttons. Both of these concerns, relate to the heuristic, “Visibility of system status: The system should always keep users informed about what is going on, through appropriate feedback within reasonable time” (Nielsen, 1995, “Ten Usability Heuristics for User Interface Design” para 2).
Figure 6.3. Prototype 1

The text within the figure above is not intended to be read at this small size.
Prototype 2

Expert evaluation

The second prototype was designed based on the feedback from prototype 1. Here the information is clarified further. The framework is simplified as well and users appeared to be able to navigate the sections more easily. This concurs with the heuristic, “Aesthetic and minimalist design: Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility” (Nielsen, 1995, “Ten Usability Heuristics for User Interface Design” para 9).

There was also feedback concerning how the pop-up window covered part of the framework. This could obscure some of the screen and could potentially become an annoyance over time. This applies to the heuristic, “User control and freedom, Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo” (Nielsen, 1995, “Ten Usability Heuristics for User Interface Design” para 4). Within the scenario section, feedback confirmed this prototype was more usable than the previous version. However, the sub-navigation system remained unresolved.

Navigating between the packaged products as well as the personas was identified as a point of confusion. It was not clear which area to highlight first, the people or the packaging. This applies to the heuristic: “visibility of system status” as above.
Figure 6.4 Prototype 2

The text within the figure above is not intended to be read at this small size.
Prototype 3

Expert evaluation
The third prototype showed various sections of the tool, including the knowledge maps and the scenarios. The menu utilised a drop-down menu for sub-navigation and the bottom bar provided a third level of navigation. This was an improvement from the last iteration but problems identified included lack of flexibility in the interface to display the interactive diagrams, i.e. the complex framework. The space available for the animated diagram was too small to allow the text within the image to be large enough for legibility. For this reason, this interface could not be used as the interactive framework is an important aspect of the tool.

Reflection
All three prototype interfaces had both strengths and weaknesses. From the expert evaluation feedback it was clear the interface needed to be intuitive, flexible, as well as accessible. The final prototype incorporates the strengths from each prototype and is presented in the next section.
Figure 6.5. Prototype 3

The text within the figure above is not intended to be read at this small size.
Conclusion

This chapter has reviewed the design development of the *unpack knowledge tool*. This included the approach, application and iterative prototyping process. The next chapter presents the third phase of the thesis, entitled, “The Outcome” which presents each section and individual screen of the final *unpack knowledge tool*. 
PHASE 3: THE OUTCOME

Chapter 7:
The tool and testing
Chapter 7: The tool and testing

Overview

7.1 The tool

Project
Knowledge
Frameworks
Scenarios
Feedback

7.2 The testing

Method
Pilot study
Formal test results
Discussion

7.3 The recommendations

Design revisions

Conclusion
Overview

This chapter presents the finalized working prototype. The final prototype is described including all five sections, i.e. the project, the knowledge, the frameworks, the scenarios and the feedback sections. Screenshots are shown of the key areas within the tool to demonstrate how the interactivity takes place. This is relevant with the framework section as well as the scenario section.

The prototype is live and available for viewing at the following url: http://unpackknowledge.com/unpack.html.

7.1 The tool

This section is comprised of screenshots of the unpack knowledge tool shown in Figures 7.1 to 7.5.
Project

Figure 7.1. Project page: main page
Figure 7.1.1 Project: about page
Figure 7.1.2 Project: scope page

The online information resource was developed over the course of a doctoral study at Swinburne University, Melbourne, Australia. The Unpack Knowledge Tool (UKT) is accompanied by a thesis document that details the development process including the literature review, method, analysis, and results.

The UKT feature interactive information allowing the user to explore the theory that underpins consumed research. Use the framework section as well as see the theory applied in real-world scenarios (See the Scenarios section).
Figure 7.2.1 Knowledge: overview page
Figure 7.2.2 Knowledge: research page
Figure 7.2.3 Knowledge: practice page

As the application of consumer research to a packaging design project is a challenge that exists in design practice, this area of knowledge is reviewed in-depth. There are a number of contributions from design practice including industry research bodies as well as best practice from packaging design communities.

First, the work of market researchers was investigated by reviewing the available research on the market. However, the combination of industry research not being addressed was identified.

As the design practice cannot be unpacked...
This framework presents the knowledge from unpack and feedback. The framework consists of several interconnected nodes, including Social, Experience, Use, Community, and Simple. Each node is further divided into subcategories such as Social, Experience, Use, Community, and Simple. The diagram illustrates the interdependencies between these categories, emphasizing the complex nature of the framework. The key points in the framework include understanding the product, experience, and community, which are essential for effective knowledge transfer and feedback.
Figure 7.3.2.1 Framework: complex page: interaction detail 1

The framework presents the knowledge domain from a psychological perspective by structuring the interactions between users and the system. It is designed to accommodate different levels of interaction complexity.

The framework includes the following components:

1. **Complex**
   - The complex framework encompasses a variety of interaction scenarios.

2. **Unpack**
   - The unpack section provides detailed insights into the interaction mechanisms.

3. **Simple**
   - The simple framework offers a basic overview of the interactions.

4. **Interdependent**
   - The interdependent framework highlights the interconnections between different aspects of the interaction.

5. **Knowledge**
   - The knowledge section provides a comprehensive understanding of the interaction principles.

6. **Framework**
   - The framework integrates all the aforementioned components to offer a holistic view of the interaction process.

The framework is designed to facilitate the understanding of complex interactions by breaking down the process into manageable components. It is used to guide the design of user interfaces and the development of interactive systems.
Figure 7.3.2.2 Framework: complex page interaction detail 2
Figure 7.3.2.3 Framework: complex page: interaction detail 3

[Diagram showing complex interaction framework with labels for behavior, affective, cognitive, and semantic domains.]

The framework illustrates the interconnection of behavioral, emotional, and cognitive aspects in complex interactions. Each domain interacts with the others, influencing behavior. The diagram highlights the complexity of understanding and designing effective interactions.
Figure 7.4.2 Scenarios page: product 1: persona 2, Katherine
Figure 7.4.3 Scenarios page: product 1: persona 3, David
Figure 7.5 Feedback page

- Did you find the information useful?
- Is the layout easy to navigate?
- Did you find any sections unclear?
- Is the text too long or too short?
- About the layout and design:
  1. What is your job title?
  2. Do you work with customer service?
  3. Do you work with technical support?
  4. Did you find the feedback form easy to fill out?
  5. If you have feedback, please share it.
7.2 The testing

This section reviews the formal user testing of the *unpack knowledge tool*. The tool was tested to ensure that the intended user group, designers, could comprehend the content within the tool as well as testing the usability of the tool.

First, in order to test the comprehensibility of the content, a series of 10 tasks were developed (see Appendix D). The participants were asked to use the tool to answer the task questions. Three things were measured from this activity including correctness of the answers, the number of clicks used to answer each question and the time to complete each question.

The questions were divided into two groups. Five questions were considered easy to answer and five questions were complex, more difficult to answer. In order to find the easy answers, two clicks were necessary when starting from the main page. To find the hard answers took five clicks from the main page.

The number of correct answers was used to measure participants’ performance as well as the number of additional clicks. Clicks were scored by deducting the number necessary to complete the task correctly from the total number of clicks in each task. In addition, any incorrect moves were counted. All of these were used to compare user performance. *(Please see Appendix E for the researcher’s score sheet).*

Three hypotheses were tested. Hypothesis 1 predicted that participants would answer more easy questions correctly than hard questions. Assuming that participants were trying hard to find the correct answer, Hypothesis 2 predicted that participants would click fewer times when answering a question correctly than when giving an incorrect answer. Relying on the same argument as for Hypothesis 2, Hypothesis 3 predicted that participants would provide correct answers in shorter times than incorrect answers.

Second, in the post-test phase designed to test the perceived usability of the tool, two usability-related questions were asked. *(See Appendix F).* A six-point scale was used to measure participants’ perceived “ease of use” and “satisfaction” when using the tool. Then two open-ended questions followed to
indicate what the participant “liked most” and “liked least” about the tool. The researcher also observed and took notes on how each participant used the tool. For the tool to be acceptable, it was decided that an average score of 4.0 (somewhat usable, somewhat satisfied) should be achieved on the two questions. In terms of performance, it was expected that participants would solve an average of 9/10 (90%) of the tasks correctly.

Method

Participants
A sample of 13 participants comprising 7 male, 6 female, aged 19-23 years were able to participate. They were either 1st or 2nd year undergraduate design students enrolled at Swinburne University of Technology.

The selection criteria included design students who were not taking a class with the researcher nor had they taken a class with the researcher in the past. They also had not taken the packaging design class before and had not been introduced to the unpack knowledge tool.

The participants were recruited via email (see Appendix G). The participants were unpaid volunteers. These were tested in individual sessions taking 20 to 30 minutes.

Materials
The study took place in a small quiet office. A task booklet comprising 10 pages displaying one question per page was prepared. Three types of questions comprised the 10, including true/false (T/F) (3), multiple choice (5) and written answers (2) as shown in the table below.

<table>
<thead>
<tr>
<th>types of questions</th>
<th>easy</th>
<th>hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/F</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Multiple choice</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Written answer</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Another sheet with the perceived usability-related questions was also prepared. Easy and hard questions were randomized, but all participants received the questions in the same order. After the participant finished the 10 questions, the usability-related questions were answered with pen and paper.
Design
The data collection was monitored by the researcher with note-taking as well as using a stop-watch to measure task-completion time. Each task was measured for time from the user returning to the main page until they had completed writing the answer. The participants wrote the answer into the task booklet and these were assessed for accuracy after the study.

Procedure
Upon reading and signing the informed consent form and the instructions (see Appendix C), participants attempted to complete the tasks, one at a time, until all 10 tasks had been attempted. To assess comprehension, the researcher observed each participant’s task performance throughout. Upon completion of all the tasks, the usability-related questions were given. This included rating perceived usability and satisfaction as well as giving their opinion on the best and worst aspects of the tool. Finally, the participants were thanked for their time and excused.

Pilot study
To test the method, a pilot study was carried out first with three participants (2 female, 1 male, all aged 19-22 years). All were first or second year design students at the Faculty of Design, Swinburne University of Technology. The test revealed five problems leading to the following minor amendments:

One question at a time
The ten questions were given to the participants on a single page. The problem with this was that two participants went back to answers they had given, or they skipped and then changed their answer. While this demonstrated that they learned something while using the tool, it was then not possible to test the correctness of each answer. Each question was therefore placed on a separate sheet of paper.

Counting clicks
While participants were asked to return to the main page after answering each question, they did not always do so. When this occurred it was not possible to count the clicks from the main page or to measure the task-completion time. Written instructions were therefore given in addition to the verbal instructions, stating that participants must return to the main page after each question. The
researcher also verbally reminded participants to return to the main page throughout the test if they forgot.

**Beginning immediately**
Two participants explored the tool for several minutes before answering the first question. This included clicking throughout the interface and reading various sections. When this occurred it was not possible to measure the accuracy, time or number of clicks correctly. To avoid this, both the written and the verbal instructions asked participants to begin the tasks immediately and not to explore the tool first.

**Reasonable amount of time**
One participant became frustrated when he could not locate an answer. Therefore, it was made clear in the written and verbal instructions that participants should only spend a reasonable amount of time looking for an answer and that question could be skipped if needed. To avoid undue frustration, it was also clearly stated that the tasks were designed to test the tool and not the participant’s ability and that some questions were more difficult than others.

**Transition animation**
A transition animation between the sections was a point of confusion for some participants. Between each section the transition animation featured the various diagrams within each subsection. Participants tried to read the diagrams in the animation rather than clicking within the sub-section. From the feedback, this was frustrating for the participants. To avoid this, a hint was given to participants in the formal study.
Formal test results

1. Task performance

Accuracy

In order to test Hypothesis 1, the mean number of correct answers was calculated separately for the easy and the hard tasks. As Figure 7.7 below shows, there were more correct answers for the easy than for the hard tasks. The Student $t$-test conducted to assess the magnitude of this difference, was highly significant, $t(12) = 6.44$, $p < .001$. Hypothesis 1 was therefore supported. By the same token, the figure also shows that the performance goal of $9/10$ (90%) correct answers was clearly not met. Possible reasons underlying this are discussed later.

Figure 7.7: Mean number of correct answers to the easy and the hard tasks
Excess clicks

To test Hypothesis 2 predicting that fewer additional clicks would be needed for correct than for incorrect answers, a t-test was conducted on the mean number of clicks for correct and incorrect answers, collapsed across all participants. Figure 7.8 below appears to support that contention. However, the test was not significant ($t < 1.2$). Hypothesis 2 was thus not supported.

**Figure 7.8:** Mean number of additional clicks for correct and incorrect answers

Task time completion

To test Hypothesis 3 predicting that it would take less time to provide correct than incorrect answers. Figure 7.9 below suggests support for the Hypothesis. However, the t-test conducted on the mean time for correct and incorrect answers, was not significant ($t < 1$). Hypothesis 3 was therefore not supported.

**Figure 7.9:** Mean amount of time for correct and incorrect answers
Task types and accuracy

As discussed earlier, three types of questions comprised the 10 tasks given to the participants. Displayed in Figure 7.10, is the accuracy of the task performance, showing the percentages of questions answered incorrectly, and distributed across the different type of tasks into the "easy" and "hard" groups.

**Figure 7.10:** Distribution of accuracy across task type

<table>
<thead>
<tr>
<th>types of questions</th>
<th>Easy (n)</th>
<th>incorrect</th>
<th>Hard (n)</th>
<th>incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/F</td>
<td>3</td>
<td>12/39 (30.77%)</td>
<td>0</td>
<td>n/a</td>
</tr>
<tr>
<td>Multiple choice</td>
<td>1</td>
<td>3/13 (23.07%)</td>
<td>4</td>
<td>37/52 (71.15%)</td>
</tr>
<tr>
<td>Written answer</td>
<td>1</td>
<td>4/13 (30.76%)</td>
<td>1</td>
<td>4/13 (30.76%)</td>
</tr>
</tbody>
</table>

2. Post-test questions

In order to test the perceived usability and satisfaction, the criterion for acceptance was a mean score of 4/6.

Perceived ease of use

Unfortunately, the mean score obtained was only 3.15. Therefore, the criterion was not quite met for perceived usability. This concurs with the user performance on the hard tasks, see Figure 7.6. The following participant comments point to issues underlying this result.

“The website was easy but it was hard to find information. Possibly too much writing?” Participant 2

“I didn’t read first so didn’t know where to look.” Participant 1

“While the information was there it was unclear in which section to find it.” Participant 11

The interface design appeared to be conventional and simple to use, but finding the information remained a challenge for participants particularly for the hard tasks. Some participants mentioned there was too much writing, however reading theory descriptions were necessary to answer the tasks, particularly the hard tasks.

“It looked simple but finding info was annoying and the graphs distractng. I forgot about reading text.” Participant 3

“Hard to scan pages, images were distracting, only started reading half way through.” Participant 4
Even though the transition animation of diagrams was explained in the instructions, it appeared to frustrate some of the participants. Participants needed to understand the diagrams as well as the descriptive text to answer questions and link the two together.

“I didn't know which way to move next and didn't know about the hovering over diagrams to see more information.” Participant 5

“There were buttons that I didn't realise were present, but overall it wasn't too hard to navigate.” Participant 12

This was important feedback as it relates to the interactive framework diagram as well as the scenario videos. Only six participants were able to locate these two sub-sections and then only two grasped how to navigate these sections fully. This issue is discussed in the Discussion section.

Satisfaction

For satisfaction, the mean score was exactly 4.0, “somewhat satisfied”, thereby meeting the criterion. Some typical participant responses are shown below:

“It represents and simplifies complex theories. A great reference.” Participant 2

“I actually learnt some things about packaging design that I didn't know.” Participant 10

“…the tool was a good means to understand product packaging and the thinking behind it.” Participant 7

The following are comments from the participants who gave scores of 2 or 3, “dissatisfied or somewhat dissatisfied”. The comments reflect that the participants could have felt frustrated when they couldn’t find the correct information quickly in order to answer the questions.

“It has all the info but unless I was familiar with the concepts it's hard to find the needed information”. Participant 4

“I wasn't able to find all the answers and it took longer than I liked.” Participant 6

“I have no idea what was going on” Participant 3

Finally, participants were encouraged to state what they liked the most and the least about the tool.
Liked

“The scenario videos, the mind maps, they easily summarise what would have been paragraphs of information.” Participant 13

“I like the diagrams as I’m a visual person,” Participant 10

“The mind maps were good in visually presenting the information and made it a lot clearer.” Participant 7

“The scenario-based examples,” Participant 2

Disliked

“The changing diagrams, the info wasn’t clear, the videos spoke at me, I would prefer to read info instead” Participant 3

“Slides flicking as it became annoying, rather it be static” Participant 8

“The navigation was dodgy, the audio played on the video without consent” Participant 11

“The inability to notice the buttons, etc.” Participant 12

Discussion

To investigate the possible reasons underlying incorrectly answered questions four factors were considered. These were the study instructions, the design of the tool or the user interface, the tasks, and any problems concerning the participants. These are discussed next. Problems that apply to the tool are shown as annotations to visuals of the various screens within the tool along with recommendations, see the next section, 7.3. Recommendations.

Possible reasons underlying incorrect answers

With respect to the instructions given to participants, problems were identified in the pilot and were amended prior to the formal test. No new problems emerged.

Because of the anticipated use of the tool, problems involving the tool included the transition animation between sections as well as users not locating some of the content including interactive diagrams and videos. This is discussed in more detail in the perceived usability section as well as in the recommendations at the end of this section.
It should be noted that the data confirmed the division of questions into easy and hard. However, an important lesson learned is that the nature of both true/false and multiple-choice questions lend themselves to guessing. For true/false questions, the probability of guessing correctly is 50%, and with multiple-choice questions, it is 25%. Since eight of the 10 questions belonged to these two categories, the propensity for guessing was very high. Of the three true/false questions, 12/39 (30.77%) yielded incorrect answers, and of the multiple-choice questions, a sizeable percentage (39/65, 60%) of the answers were incorrect. In order to avoid that in a future test, it would be better to eliminate these types of questions and instead only to design tasks that require participants to find information in the tool. In addition, the number of same-type of tasks labeled easy and hard should be evenly distributed.

In order to answer two of the multiple-choice questions correctly, participants needed to go to the third level of the interactive framework. Only two of the thirteen participants found that level. The correct answer was “all of the above”. However, because the other two possible answers were located in other areas of the tool, some participants may have mistakenly selected one of these options that, although being correct, did not comprise the correct answer to the two questions. For the first of these questions, no participant found the answer and only two would have been able to find the answer. For the second question, six participants found the answer, suggesting that four participants guessed correctly for this question.

The sample of participants was as homogeneous as possible with respect to age and level of design education. Anecdotal observations during the test suggested that some participants were more engaged with the tool’s content than others. Indeed, prior to the data analysis, two participants’ were excluded due to fatigue and lack of concentration during the study. Three of the participants finished the last two questions in a noticeably shorter time than the other eight questions. This suggests that they could have become less engaged and wanted to finish the study. The goal concerning participant performance was not reached, primarily due to the problems with the multiple-choice questions. However, the problems that were identified in the test will enable the design of the tool to be improved. These improvements are discussed later. It is also noted that the average scores for perceived usability and for user satisfaction did reach the
criterion of 7. Therefore, it is safe to conclude that the tool, although still needing some improvements, was perceived to be usable and satisfactory.

Post-test user feedback
The perceived usability feedback was useful and supported the discussion around problems with the task performance. These problems are described below and visually shown in the next section.

1. Locating and using the interactive framework
This was a significant problem as mentioned above, only two participants found the third level of the framework and only six located it at all. Several comments made about what they liked about the tool, relies on finding this part of the tool, “It represents and simplifies complex theories. A great reference”.

2. Interactivity of diagrams
Because the first diagrams in the “knowledge” section are not interactive, it may be confusing that within the “framework” section, the “complex” framework is interactive. A solution to this would be for all diagrams to have a rollover text box, that would add further description and also provide a consistent mode of navigation.

3. Limiting the text and linking the diagrams to the text
Several comments were made about the need to read ‘too much text’ as a concern. To resolve this, sentences could be re-written as bullet points. Linking to the text to the diagrams, as stated above in rollovers, could assist comprehension.

4. Locating and using the scenario videos
Information found from the videos was not included in the test design as it could not be measured by number of clicks. However it was interesting to find that some participants did not locate the videos at all, and those that did find the videos gave feedback about the experience in the usability section. For example, a few participants liked the videos, “The scenario videos, the mind maps, they easily summarise what would have been paragraphs of information.” However, two participants did not like the videos, “the audio played on the video without my consent” and “the videos spoke at me”. Allowing the users to control the playback of the video has been identified as a design revision. In this way, users
can decide if they want to watch it and how they watch it, controlling the audio and playback. It was observed by the researcher, that some participants found the audio on the videos too loud or too soft, as the audio levels do need to be equalized. Eight participants watched the videos. Of these, four participants watched all three videos, two participants watched two videos and two watched only one.

5. Removal of the animated diagram section transitions
This was found in the pilot study and a hint was given to the participants in the formal study as how to navigate this problem, but it was still identified repeatedly as a point of confusion and/or frustration from the feedback. Several participants expressed their dislike of “the diagram animation as a default”

In conclusion, a number of lessons were learned and those that apply to the tool are proposed as recommendations for amendments to the tool. These are presented in the next section.
7.3 Recommendations

Design revisions

1. Locating and using the interactive framework

The interactive framework below can only be accessed if the user hovers over the diagram long enough to see the roll over text. The user also must click to access each level of the framework. Several changes are recommended to make this clearer. First, a directive in the text block, “click on the diagram” could be emphasised in the text. Second, this directive could also be repeated next to the diagram of the framework to show the three levels that are present. Third, a demonstration of how this works could be shown as a quick animation as the user clicks into the sub-section “complex”.

Figure 7.11: Interactive framework recommendation
2. Interactivity of diagrams and

3. Limiting the text and linking the diagrams to the text

Adding roll over text boxes to all diagrams will create a consistency across the navigation. It will also assist in linking the diagrams to the text-based information. User feedback indicated that some participants did not like to read blocks of text. The rollovers could serve as an alternative to reading the blocks of text and provide more detailed information where necessary. This could help the user link the diagram to the information. This would apply to all pages within the Knowledge and Framework sections, an additional five pages.

**Figure 7.12: Interactive diagram recommendation**
4. Locating and using the dynamic content within the tool, i.e. the scenario videos.

User feedback pointed to the lack of user control over the playback of the videos. This would include the standard controls of play, stop, rewind, forward as well as audio level control.

Figure 7.13: Video recommendation

5. Removal of the animated diagram section transitions

This is present in the Knowledge and Framework sections and will be removed.
Conclusion

This chapter has presented the final working prototype, the *unpack knowledge tool* as well as the formal testing and recommendations for refinement. The next phase of the research will include testing the tool with designers in project work. How well did they understand the knowledge in the tool? Could they apply the knowledge to the design process? Could the tool facilitate a shared understanding of consumer response in multidisciplinary teams? These questions are expanded upon in Chapter 8, the conclusion.
Chapter 8: Conclusion

Overview

8.1 Contribution
8.2 Applications
8.3 Further work

Conclusion
Overview

This chapter firstly reviews how the proposed work speaks to the research goals identified in Chapter 1 and the contribution to new knowledge. Secondly, it reviews the applications for the work, including both design practice and design education. Thirdly, it discusses further research opportunities for the *unpack knowledge tool*. Finally, a brief conclusion is presented.

8.1 Contribution

This section presents the three contributions of this doctoral research. Firstly, it reviews the multidisciplinary literature in the area of consumer response to products and then proposes a conceptual framework that maps the knowledge in the area. This contributes to new knowledge in the area of how people respond and interact with packaging design.

Secondly, this knowledge is then adapted into an online informational resource, the *unpack knowledge tool*. The tool is a resource that designers can use to better understand how consumers interact with packaged product designs. By unpacking the complexity of this area, the *unpack knowledge tool* makes the theoretical accessible and thus provides a platform for theory to be applied in practice. A better understanding of the multidisciplinary knowledge, concepts and terminology in this area of inquiry can support a better application of consumer research within the design process and thus better design decisions.

Thirdly, the research methods undertaken in this thesis is also a contribution. The development of the tool employed “research practice” methodology (Evans, 2010). This approach demonstrates how the researcher utilised design practice as well as design research to produce a “designerly tool” (Stolterman, 2008) for use within design practice.
8.2 Applications

Potential applications for the *unpack knowledge tool* includes both design practice and design education. Within design practice there are a number of possibilities for application, ranging from small design firms to larger multidisciplinary firms to in-house design teams within a larger organisation. The first of these, the small firm, is less likely to be actively involved in the application of consumer research within the design process as they are often commissioned as external consultants that carry out the design direction later in a project. Exploration of consumer research within a design brief needs to be developed in the early stages of a project. Nevertheless, the tool could make incorporating consumer research more accessible through providing a simple, cost-effective mechanism to smaller firms. The needs of a small firm are quite different to other design practices so this context could be explored further in future. The second type of firm mentioned above, the packaging design firm, is more likely to be familiar with consumer research and its applications, as consumer research is a common aspect of packaging design projects, particularly in the fast moving consumer goods market. The *unpack knowledge tool* would be beneficial in streamlining the integration of consumer research into design work. It may also perhaps provide new insights in consumer research by referencing a wide range of multidisciplinary knowledge. The third type, the in-house design team within a larger packaged product manufacturer, also presents an interesting context for application. This environment, as detailed in Chapter 4, the industry context of the tool, is multidisciplinary and presents unique challenges. As the development of package products involves multidisciplinary teams, a common understanding of consumer research and the design process is vital to successful design decision-making. The tool could be applied in this context to see how it better facilitates this common understanding around how consumer research should be implemented within the design process.

Regardless of the size of the design firm, an important user group for the tool is design managers. This is explored in Chapter 6, which describes the user profiles and scenarios for how the tool could be used in design practice. The design manager not only oversees the design project but also gives strategic direction to the design team. Thus the design manager has access to the consumer research findings and guides how these would be applied to the
design project. It follows that the design managers would first use the tool and then could guide the use of the tool within the design team.

Design education provides a range of different applications for the *unpack knowledge tool*. As the tool unpacks the complexity of this area, it could be used to teach theoretical concepts behind how people interact with packages. This could involve better understanding of consumer response and the role of the cognitive and the affective or emotional. It could also focus more on the design process in general, and use the various frameworks to consider different aspects of a consumer's experience with a package, be it sense, social, communication or use. See the simple framework proposed in Chapter 3. Thus the tool could be used for demonstration within the classroom as well as a resource that students can go back to and explore further. In this setting, the user groups would include the design educator as well as the design student.

### 8.3 Further Work

This section addresses the limitations to the research so far and suggests further research that could be undertaken to develop the tool for practice. At this stage of development the tool is a working prototype that has only been tested with novice designers. The results of this project make it impossible to claim that this tool is currently adequate or appropriate for the needs of professional design practice.

The results of the formal testing of the prototype suggested that the comprehension of the content and usability could be improved. This would comprise the first stage of further work, implementing the recommendations presented in section 7.3. To test the user comprehension further, the user experience of using and understanding different types of information within the tool could be explored. As was stated in Chapter 3, testing the conceptual framework and the alternative views of the framework for relevance and usefulness with users could be useful. The interactive framework and the scenario videos could also be tested to gauge if they are useful in supporting user comprehension of the tool's content.
The second stage of the future research would be testing the *unpack knowledge tool* in an industry setting, i.e. a packaging design firm. The tool can be tested in a design practice setting and its impact on the design process gauged. The testing could be carried out within various design practice settings from smaller designs firm to larger organisations that work with multidisciplinary teams.

The third stage of further work involves design education and how well the tool functions within the learning environment. The tool could be used during design projects in the classroom and its impact measured.

Finally, further work could include adapting the *unpack knowledge tool* to other designed artefacts, be it products, spaces or experiences. The tool could be theoretically applied to various designed artefacts, be it products, services, interactive systems, interior spaces or the built environment. This could then be tested within these specific design practices or educational contexts as well. For example, *the tool* could be tested with product design firms and industrial design education.

**Conclusion**

This thesis has presented the development of an online informational resource for packaging designers to better understand how consumers respond to their packaging designs. This resource, entitled the *unpack knowledge tool*, aims to literally ‘unpack’ the complexity that surrounds consumer response to packaging by making theory accessible to design practice. The tool has been designed in a way that allows it to evolve as the area of knowledge evolves. As more designers use the tool and provide feedback, the tool can be further refined, improved and tested for its impact in the packaging design process.
Bibliography


Dittmar, H. (1992). *The social psychology of material possessions: To have is to be*. New York, NY: St Martin’s Press.


Appendices
Appendix A

Discussion questions for study 1:
Packaging industry experts

Discussion theme: How research is applied within the design process

1. What is your background?

2. What is your current position within your organization?

3. What are your thoughts on how research can inform the design process?

4. What has been your experience with applying research to the design process?

5. Do you think designers should be involved in research?

6. Do you think researchers should be involved in design decisions?

7. Do you think research is often applied successfully to the design process?
Appendix B

Interview questions for study 2:
Scenario development

Discussion theme: *Responding to packaging designs*
Interview participants responded to several packages within the same product category. Products tested with participants included tampons and water bottles.

1. What product do you often buy?
2. What do you think of that product’s packaging?
3. What do you think about the competitor products?
4. What do you think of their packaging?
5. How do you use the product and/or packaging?
6. When finished with the product, what do you do with the packaging?
Appendix C

Ethics Clearance

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**SUHREC Project 2008/019 – Ethics Clearance (Revised Duration)**

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To: Prof Alan Whitfield/Ms Emily Wright, Design

SUHREC Project 2008/019 Developing a Knowledge tool for Packaging Designers

Prof A Whitfield Design Ms Emily Wright

Approved Duration: 01/08/2006 To 01/10/2008

---

I am pleased to advise that the Chair of SHESC3 (or delegated member) has approved the revisions and clarification as emailed by you on 19/09/2008 in response to previous communication (SHESC email of 08/09/2008 and 16/09/08).

Unless otherwise notified, human research activity in the project may commence in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices must conform to Swinburne and external regulatory standards, including the current National Statement on Ethical Conduct in Research Involving Humans and with respect to secure data use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical approval clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any remedial measures; (b) proposed changes in protocols; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project can be undertaken at any time.

Please contact me if you have any queries or concerns about on-going ethics clearance. The SUHREC project number should be cited in communication.

Best wishes for the project.

Yours sincerely

Anne Cain
Secretary, SHESC3

Ms Anne Cain
Research Administration Coordinator
Faculty of Business and Enterprise
Swinburne University of Technology

P.O. Box 218
Appendix D

Tool testing: task questions

The study of Aesthetics stems from the discipline of Psychology
- True
- False

What is the opposite of the concept Kansei?
- a. zen
- b. mattaki
- c. chisei
- d. none of the above

The four ways a consumer can interact with the packaging include sense, communicate, use and symbolic.
- True
- False

What are the two possible responses when a consumer has a behavioural response?
Please write in the space below:

How do the concepts of novelty and typicality relate to one another?
- a. The concepts are both found in the "sense" or "aesthetic" areas
- b. The concepts are opposites and therefore inter-related
- c. A successful package must balance the two concepts
- d. All of the above

What are the three areas that comprise a consumer's response?
Please write in the space below:

What areas of the knowledge inform the unpack knowledge tool (UKT)?
- a. Design research and design practice
- b. Business, Social Science and Engineering
- c. Market research and design industry research
- d. All of the above

How do the concepts of emotional design, product emotions and kansei relate to one another?
- a. The concepts examine different aspects of cognitive processing
- b. The concepts are related to the emotional or affective response
- c. All of the above
- d. None of the above

Personas are useful in predicting how a consumer may respond to a package. It is best to base this information on a real person and create the persona using that person's personal details.
- True
- False

Simplicity in design is related to the idea of
- a. form follows function
- b. maximum effect for minimum means
- c. less is more
- d. all of the above
Appendix E

Task score sheet

Appendix B  Researcher score sheet

<table>
<thead>
<tr>
<th>2. Simple: 3 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>The study of PERCEIVED INVOLVEMENT stems from the discipline of Psychology. (True or False)</td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>8. Complex: 6 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
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<tr>
<td>What is the opposite of the concept Kansei?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. zen</td>
<td>b. mattaki</td>
<td>c. chisei</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Simple: 3 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>The four ways a consumer can interact with the packaging include sense, communicate, use and symbols. (True or False)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<th>10. Complex: 6 clicks</th>
<th># of actual clicks</th>
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<tr>
<td>What are the two possible responses when a consumer has a behavioural response?</td>
<td>Please write below.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>4. Complex: 6 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the concepts of novelty and typicality relate to one another?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. The concepts are both found in the &quot;sense&quot; or &quot;aesthetic&quot; areas.</td>
<td>b. The concepts are opposite and therefore inter-related.</td>
<td>c. An excellent package must balance the two concepts.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>5. Simple: 3 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the three areas that comprise a consumer's response? Please write below.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Simple: 3 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>What areas of the knowledge inform the unpack knowledge tool (UKT)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Design research and design practice</td>
<td>b. Marketing, Social Science and Engineering</td>
<td>c. Market research and design industry research</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6. Complex: 6 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do the concepts of emotional design, product emotions and kansei relate to one another?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. The concepts examine different aspects of emotional response.</td>
<td>b. The concepts are related to the emotional or affective response.</td>
<td>c. All of the above</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Simple: 3 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personas are useful in predicting how a consumer may respond to a package. It is best to base this information on a real person and create the persona using that person's personal details. (True or False)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Complex: 6 clicks</th>
<th># of actual clicks</th>
<th>time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity in design is related to the idea of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. form follows function</td>
<td>b. maximum effect for minimum means</td>
<td>c. less is more</td>
</tr>
</tbody>
</table>
Appendix F

Post-test questions

1 Ease of Use

Think back to the task you just performed. Using this scale, how difficult or easy was it to use this tool?

1 = Very Difficult
2 = Difficult
3 = Somewhat Difficult
4 = Somewhat Easy
5 = Easy
6 = Very Easy

Why did you give that rating?

___________________________________________________________________________________________________
___________________________________________________________________________________________________
___________________________________________________________________________________________________

2 Satisfaction

Think back to the task you just performed. Using this scale, how would you rate your satisfaction with the tool?

1 = Very Dissatisfied
2 = Dissatisfied
3 = Somewhat Dissatisfied
4 = Somewhat Satisfied
5 = Satisfied
6 = Very Satisfied

Why did you give that rating?

___________________________________________________________________________________________________
___________________________________________________________________________________________________
___________________________________________________________________________________________________

3. What did you like best about this tool?

___________________________________________________________________________________________________
___________________________________________________________________________________________________
___________________________________________________________________________________________________

4. What did you like the least about this tool?

___________________________________________________________________________________________________
___________________________________________________________________________________________________
___________________________________________________________________________________________________

Thank you very much for your time and help assessing this tool.
Appendix G

Recruitment email

Dear communication design student,

We would greatly appreciate your participation in testing a new online informational resource about packaging design. This resource is called the “unpack knowledge tool” and seeks to literally “unpack” the complex information around how people respond to packaging. This information about consumers is vital to design development success and could be of benefit to your design education.

We are asking you to volunteer your time by using the “unpack knowledge tool” on a computer in our Swinburne computer lab at the Faculty of Design building. You will be asked to answer 10 questions about the information in the tool and then you will be asked to complete a short survey about your experience using the tool. This should take no more than 20 minutes of your time.

We do not request your name and there are no questions that would reveal your identity through participating. Your participation is entirely voluntary so if you wish to withdraw from this research feel free to exit at any time.

By participating in this research you will be helping me complete my thesis and contribute to the development of teaching tools around packaging design. Feel free to contact me with any questions.

Kind regards,

Emily Wright
Appendix H

Ethics Clearance

To: Dr Alan Whitfield/Mr Emily Weight, Design

Dear Alan and Emily,

SUHREC Project 2013/068 Testing user’s task performance when using the ‘unpack knowledge tool’
Dr Alan Whitfield, Design, Mr Emily Weight, Dr Stille Lindgaard, Dr Declan Burren
Approved Duration: 24/07/13 To 30/07/13 [Amended]

I refer to the ethical review of the above project protocol undertaken by a SUHREC Sub-committee (SHESC). Your response to the review, as e-mailed on 22/07/13 with attachments, was put to a SHESC delegate for comment and your response to their comments, as e-mailed on 24/07/13 with attachments, was also put to them for consideration.

I am pleased to advise that, as submitted to date, the project may proceed in line with standard on-going ethics clearance conditions here outlined.

- All human research activity undertaken under Swinburne auspices may conform to Swinburne and external regulatory standards, including the current National Statement on Ethical Conduct in Human Research and with respect to secure data, use, retention and disposal.

- The named Swinburne Chief Investigator/Supervisor remains responsible for any personnel appointed to or associated with the project being made aware of ethics clearance conditions, including research and consent procedures or instruments approved. Any change in chief investigator/supervisor requires timely notification and SUHREC endorsement.

- The above project has been approved as submitted for ethical review by or on behalf of SUHREC. Amendments to approved procedures or instruments ordinarily require prior ethical appraisal/clearance. SUHREC must be notified immediately or as soon as possible thereafter of (a) any serious or unexpected adverse effects on participants and any remedial measures; (b) proposed changes in protocol; and (c) unforeseen events which might affect continued ethical acceptability of the project.

- At a minimum, an annual report on the progress of the project is required as well as at the conclusion (or abandonment) of the project.

- A duly authorised external or internal audit of the project may be undertaken at any time.

Please contact the Research Ethics Office if you have any queries about on-going ethics clearance. The SUHREC project number should be quoted in communication. Chief Investigator/Supervisors should retain a copy of this e-mail as part of project record keeping.

Best wishes for the project.