An introduction to the development of a product brand: an evidence-based template for use with first year undergraduate Industrial Designers.

George Edward Torrens*, Kevin Badni**, Karl Hurn*, Ian James Storer*

*Loughborough Design School, Loughborough University
** College of Architecture Art and Design, American University of Sharjah, UAE

Introduction

Successful industrial design activity has been shown to persistently improve corporate financial performance across a number of manufacturing industries. (Hertenstein et al 2005). Product aesthetics have been shown to positively influence consumers' responses and alter perceptions of brand quality. (Page 2002) This development of product aesthetics through the manipulation of color, form and texture within a commercial design activity is a core competency for an industrial designer and a significant factor in the potential success of commercial products However, from nearly 50 years of combined academic experience, it is the authors' opinion that this key component of professional knowledge and skill is difficult to isolate within a design process. This may be due to the complexity of interactions that deliver both physical and social functionality. This area, which may be considered 'soft design engineering', is often overlooked within a purely physical functional approach to a new product design development. Social functionality is in this paper considered to be the value or values placed upon an object or service by an individual, group or society. The social function of a product is a core deliverable of an Industrial Designer, but still important to an Engineering Designer. To ensure a successful return on a new product, the physical and social functionality must be satisfied.

Social functionality may often be most easily seen through the delivery of brand. Brand may be considered to be a relationship between individuals within a market and a product, group of products and or product service. An important quality of a strong brand is the presence of a clear, well-defined brand identity. The identity is the set of desired associations with the brand that strategists working with the brand wish to establish and maintain. (Aaker 2000). Creating and maintaining a stable brand statement is an important aspect when developing a successful product in all industries. However, sustaining that statement is challenging due to the frequent misunderstanding of the associations behind the brand by industrial designers, marketing and engineering. Engineers need to explain manufacturing constraints to the designers; designers need a rational framework in which to describe form in a manner that is comfortable for engineering, while marketing needs to understand the emotional impact of forms that compose the brand.

The job of the Industrial Designer is to use color, form, texture, temperature and movement to deliver a sensory experience that evokes a desired response. It is critical for a designer to understand the mechanism of human perception, along with the associated response that may result from the physical stimuli generated from a design intervention. The understanding of the mechanisms enables an industrial designer to employ an evidence-based approach to a user-centered process. The paradigm of evidence-based decision-making and putting the user at the center of a design process is core to the principles being taught by the authors and demonstrated through supporting professional practice in industry. This approach has also been developed and

applied by the authors; and, subsequently documented through a number of case studies in different product fields (Torrens and Black, 2011, Torrens 2012, Torrens et al, 2012)

The aim of this paper is to provide education practitioners with a template to facilitate the introduction of brand construction to first year undergraduate industrial design students through the visual and physical embodiment of a product. The ongoing pedagogic development has been refined over the last fifteen years alongside research into the professional practice of Industrial Design (ID). The objectives of this paper are to: provide signposting to the underpinning theories of the template; describe the template; show an example of student work that demonstrate the outcomes of template application; and, highlight where students have used the template within a brand related design competition to produce a successful design outcome.

Brand and product semantics

Brand may be considered the relationship between the product or service and the target consumer. The objective in this case is to deconstruct or reverse engineer a Brand. Dittmar (1992) provides a good discussion of the social value of things that are the drivers behind brand. As mentioned earlier, social value placed on the brand is important to try and measure the effectiveness of brand enhancement. Bloom (2010) provides a more generic social psychology viewpoint of the same drivers. A wider understanding of the social context of value and associated principles may be considered useful for academic staff to ensure they can answer student questions outside the focus of the given exercise.

Delivery of meaning, product semantics, is an important theoretical component of brand. Crilly (2008) has demonstrated some links between designed interventions within product artefacts and their deliberate manipulation of meaning through visual semantics. However, when considering the introduction of young designers to these concepts we should start with more fundamental explanations upon which to build to the complexity of a professional level of product semantics. Leborg (2004) provides an accessible introduction to definitions of visual grammar, such as describing what is a point, line or curve. Building on this understanding of visual grammar, ‘The Semantic turn’ provides a comprehensive discussion of more sophisticated elements of visual meaning linked with user experience that may be incrementally introduced to students of industrial design (Krippendorf 2006). In order to deliver product semantics of form, color and texture, we need to understand the mechanisms of perception.

Manipulation of perception by Industrial Design

Although there is still much debate about the cognitive processes of human beings, there are some elements of consensus regarding perception. In this paper perception will be considered a biological process. The text ‘Perception’ (Sekuler and Blake 2002) is a comprehensive and detailed reference that describes all aspects of perception. We perceive our world through a series of sensory organs that convert the physical stimulus from our world into electrochemical impulses or signals. The conversion from physical stimulus, such as light waves, vibration or energy (heat) is called transduction. The signals delivered from one’s eyes, ears, nose, tongue, skin and underlying tissues produce patterns within the different sections of the brain to which they are delivered. These patterns are processed as symbols within the brain.

There is so much signal information being delivered that the brain filters the information which it processes. The brain chooses only useful aspects of the physical world on which to focus. The way in which the brain chooses what to sample is driven by the needs defined by primates from whom we are evolved. Gestalt is a term covering a series of principles associated with fixed gaze, which is how we add detail to an object of interest on which we focus.

The theories behind some of the practical manipulation of an individual's emotional, behavioral and reflective response (user experience) through color, form, texture, movement, heat or vibration are documented. A possible reason for this is that much of the data now collected is for commercial use and not published. Hekkert and Shiverstien have discussed a 'Unified method of aesthetics' (UMA), (Sheiverstien and Hekkert 2013, Hekkert 2013) within the context of design and emotion; however, the text 'Universal principles of design' (Lidwell, Holden and Butler 2003) is an accessible reference that provides a compendium of both mechanisms of perception and how designers can manipulate them. The Lidwell et al reference, linked with a subsequent publication 'Universal methods of design' (Martin and Hanington 2012) provides a similar compendium of applied research based methods through which some of the principles may be evaluated. Key activities within the template based on this body of knowledge were to:

1) Identify keyword adjectives that define the current brand
2) Deconstruct aspects of the real world that match the current brand and additional keyword;
3) Define visual graphemes (building blocks) based on a keyword and original brand 'form DNA'; and,
4) Construct a new artefact that communicated the novel meaning of a given brand.

Pedagogic template

The module described here provides first year students with an introduction to brand and a process through which an existing brand may be analyzed and an associated product may be designed with an enhanced form of the existing brand. This process was meant to offer a simplified version of brand development that might be requested of a design consultancy. An analogy used during the explanation of this process to students was that it would be equivalent of making a perfect doughnut and then adding an unexpected, additional, flavor to it. The new blend of flavors is equivalent of what a consultancy would bring to the user experience of an existing brand, enhancing and renewing novelty in the relationship. Undertaking the task of blending new experiences into a brand, finding those which detract as well as enhance, is an important aspect of an Industrial Designer's learning experience. Dissecting the qualitative nature of brand development into a series of design decision-making elements provided an opportunity for more considered evaluation of the evidence used to make those decisions. The 'chunking' of information also enabled a clearer presentation of the pathway to brand development.

The module, within which the template was introduced and applied, accounted for 100 hours and delivered over 20 of the 30 weeks of a semester; around eight percent of the total within the first year of the 'Industrial Design and Technology' program. A much larger module, 'Design Practice', provided the main component of conventional industrial design process and practice,

based around an evidence-based, user centered design approach. The module provided specialist knowledge and skills for those intending to follow more marketing-driven professional practice. (Storer and Campbell, 2012)

The module was divided between a series of 11 one-hour lectures in the first Semester, which introduced brand, mechanisms of perception, and the ethical issues for designers associated with the development of brand and manipulation of consumer behavior. The knowledge examined via a multiple choice test was then applied through a project brief. The project followed a simplified professional process through an intensive day of activities, followed by five hours of project work per week for eight weeks to develop and communicate the final design. The brief was to develop and enhance a given automotive brand through an associated one litre oil bottle. The suggested theories applied through this section of the design process were:

1. Deriving keywords from the car brand description and Company 'mission statement', predominantly adjectives (describing words);
2. Brainstorming keywords, adjectives, associated with the brand;
3. Reviewing current forms and details from the cars produced within the current brand;
4. Choosing a keyword from those generated that would enhance the brand;
5. Taking pictures of forms, predominantly, that visually describe the chosen keyword;
6. Choosing ten images from those taken and using part of the student cohort (15 students) to rank them in order of which images most described the given keyword;
7. Deconstructing the outer form, graphic part lines, points of interest and surface finishes into a series of lines, simple shapes and textures of both current brand and the highest ranked images by the student cohort;
8. Reconstructing the identified lines, shapes and textures (graphemes) within the constraints of a one litre volume;
9. Validating the final design outcome using a peer review rating method against a given set of assessment criteria; and,
10. Presenting and edited version of the outcome and process within two presentation boards.

The main focus of exploration of form was related to the outline, which was considered to be a primary visual element reviewed by an individual. This is associated with a number of the principles highlighted in Table 1, particularly, figure-ground relationship, law of Pragnanz, top down lighting bias and threat detection. Color was not a primary consideration in this exercise.

Activities 1, 2, 3 & 4 involved the brainstorming of keyword adjectives the student felt described the cars produced under a given automotive manufacturer and product brand. The exercise included words taken from additional online documents associated with the brand and brand owner's 'mission statement'. Students were placed in groups and were encouraged to discuss their analysis, undertake group brainstorming and constructively critique ideas. The images had been visually grouped using a mind-map format, with annotation over the product images collected online.

Activities 5, 6 & 7 used a given ranking template to show the photographs taken for each reviewing student to complete. The given template, which was on an A3 size sheet, was

compiled using photographs taken by the student designer, labelled A, B, C, D, and so on, for 10 images. The given feedback sheet had enough rows for 15 student reviewers and two academic staff to rank the images, where rank 10 was most evocative and rank 1 least evocative. An average was used to order the images by each student, using a majorities rule if there was a tie between any two images.

Once ranked, the student designer reviewed the order to evaluate why one image and form had been chosen over another. Each student designer annotated their images and attempted to derive lines and forms, visual graphemes, which most evocatively matched their keyword adjective.

In activity 8 the student designers attempted to combine the graphemes from the ranked images with those derived from the forms of the branded products. The students used annotation to act as an 'aide memoir' and externalize their understanding of the relationship between different forms.

In activities 9 and 10, students peer-reviewed draft versions of the two A3 presentation boards. The boards were used to present the process and evidence of insights gained; and, descriptive illustrations of refined product designs into an evocative representation of the given brand and blended keyword adjective.

Students had discussed with staff the assessment criteria during the briefing at the start and at regular intervals during the course of the project. Students had been shown examples of good practice and process, quality of visual communication and effectiveness of brand delivery and enhancement from previous years student work. Students were also shown industry standard equivalents of the elements expected. The students were asked to peer-review the presentation boards of student designers in other groups with this common understanding of expected standards. Each given aspect of the assessed criteria was rated by reviewing students in each column. The rating was from 1-6, where 1 was very poor and 6 was excellent. As with the previous ranking document, there were 15 rows for student reviewers and two rows for staff.

Once the reviews were complete, each designer averaged the results in each column and plotted them onto a web diagram. This enabled each student to visually see strengths and weaknesses in their presentation, as identified by their peers and staff. Students were able to refine their work from activity 9 before submitting their finished presentation, as part of activity 10.

Outcomes

The following images in Table 2 show different stages of the prescribed process. It can be seen that iterative cycles of individual and group discussion were undertaken during the activity.

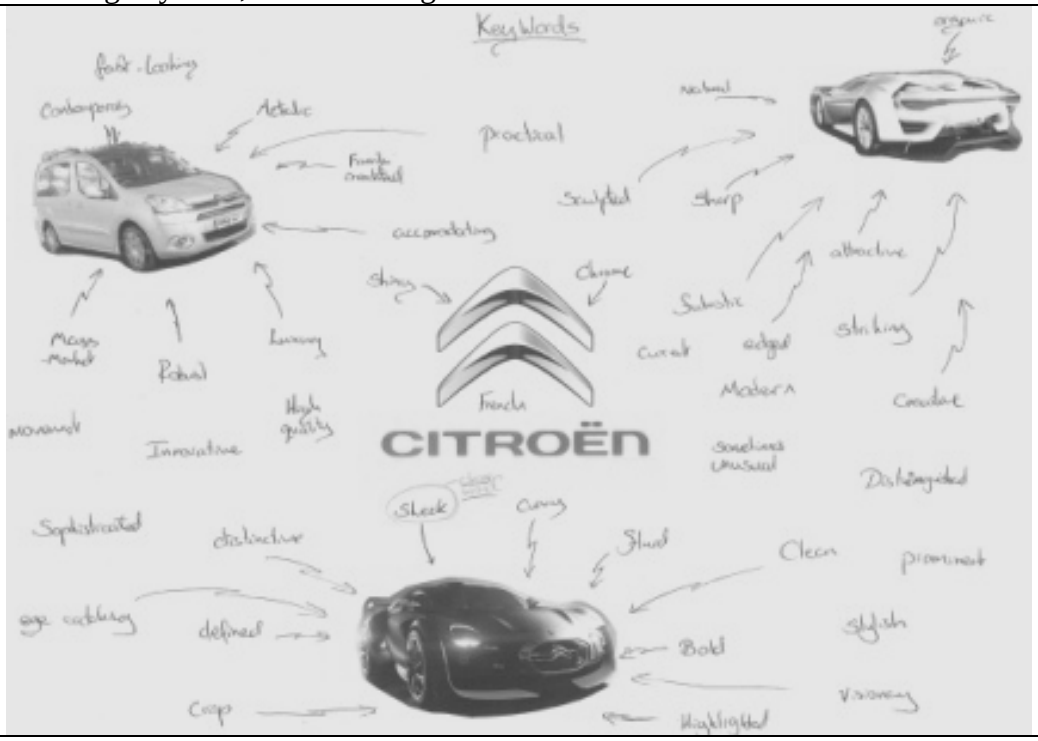
Table 1. Summary of principles from Lidwell et al (2006); grey sections are directly applied within the case study described in Table 2.

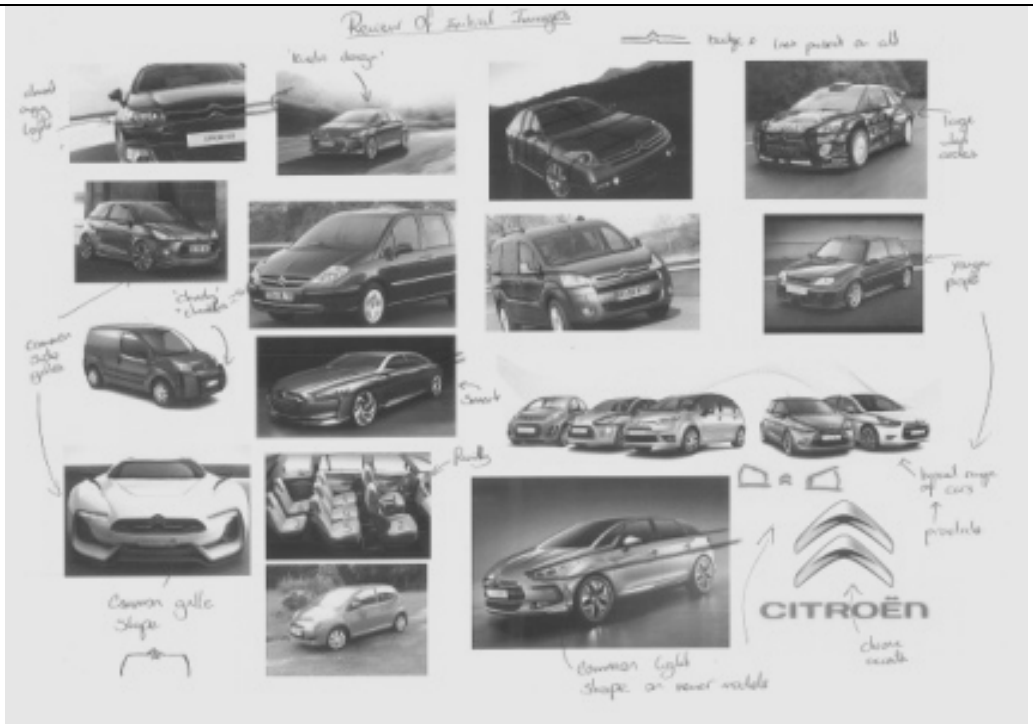
Principle	**Description**	**Application in ID**

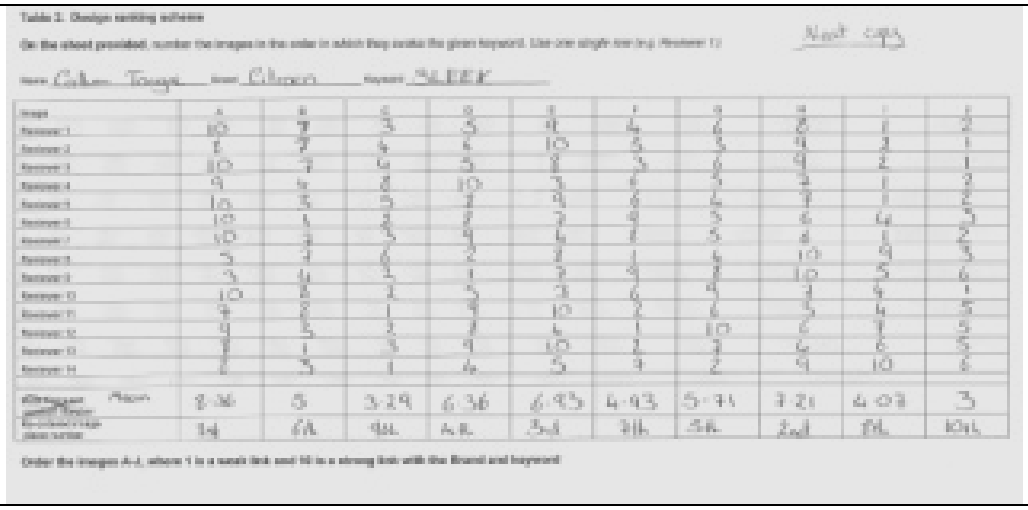
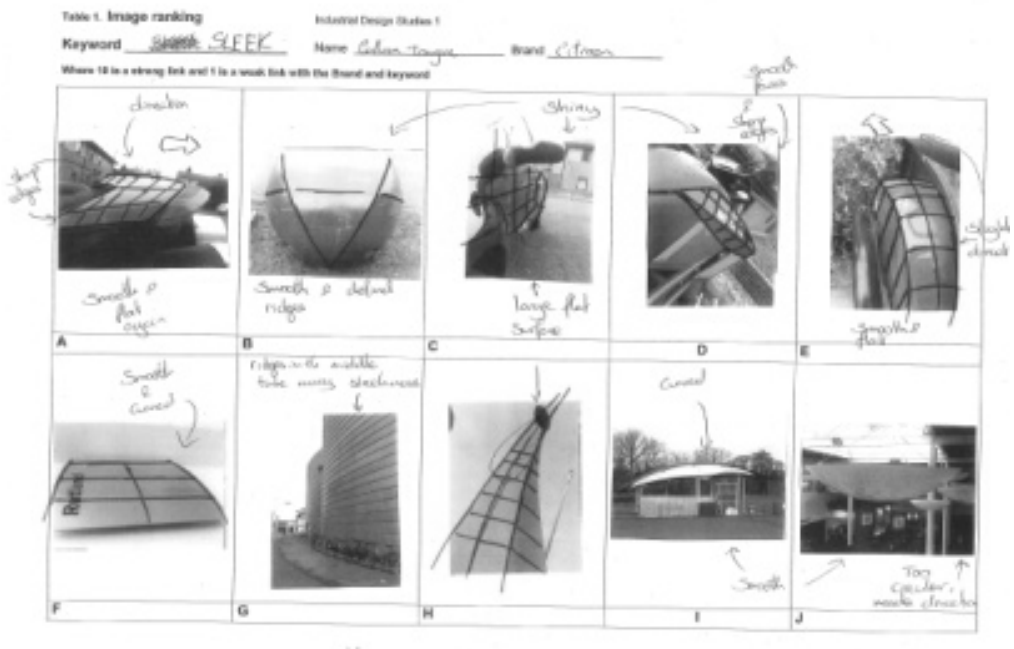
Affordance	Physical characteristics of an object influence its function	Relating semantics of components to function or controls
Alignment	Alignment of edges along common rows or columns or their bodies along a common center	Leading focus of attention along a series of elements or lists
Closure	Perception of individual elements as a single pattern	Making a common whole from parts, making objects appear complete
Color	Attract attention, group elements, suggest meaning and enhance aesthetics	Influencing emotion (unproven), highlighting objects and semantics of objects and controls
Common fate	Elements appearing to move in the same direction are perceived to be more related	Defining meaning through texture, differentiating components
Consistency	Similar parts expressed in a similar way	Emphasizing Brand and social groups
Constancy	A tendency to perceive objects as unchanging despite changes in sensory input	Combination of color, visual, haptic and sound changing over time to deliver meaning
Figure-ground relationship (gestalt principle)	Defining an object of focus or the rest of the field of perception	Defining primary form, semantic meaning, highlighting components
Good continuation	Elements arranged in a straight line or smooth curve are perceived as a group	Camouflage, combining individual objects into a whole
Law of pragnanz (gestalt principle)	A tendency to interpret ambiguous images as simple and complete	Camouflage, heuristic to reduce complexity
Gutenberg diagram	The general pattern followed by eyes when looking at evenly distributed homogeneous information	Order of review of elements, emphasize review of controls and information
Iconography	Use of pictorial images to improve recognition and recall	Controls, signals, semantics
Interference effects	Mental processes made slower or less accurate	Adding confusion to controls or products, puzzles, security, heuristic to reduce complexity
Layering	Managing complexity through organizing related groupings and reinforce relationships	Information, controls, heuristic to reduce complexity
Mapping	Relationships between controls and effects	Heuristic to enhance usability, alongside iconography, affordance and color
Orientation	Certain line orientations more easily and	Control interfaces, heuristic to

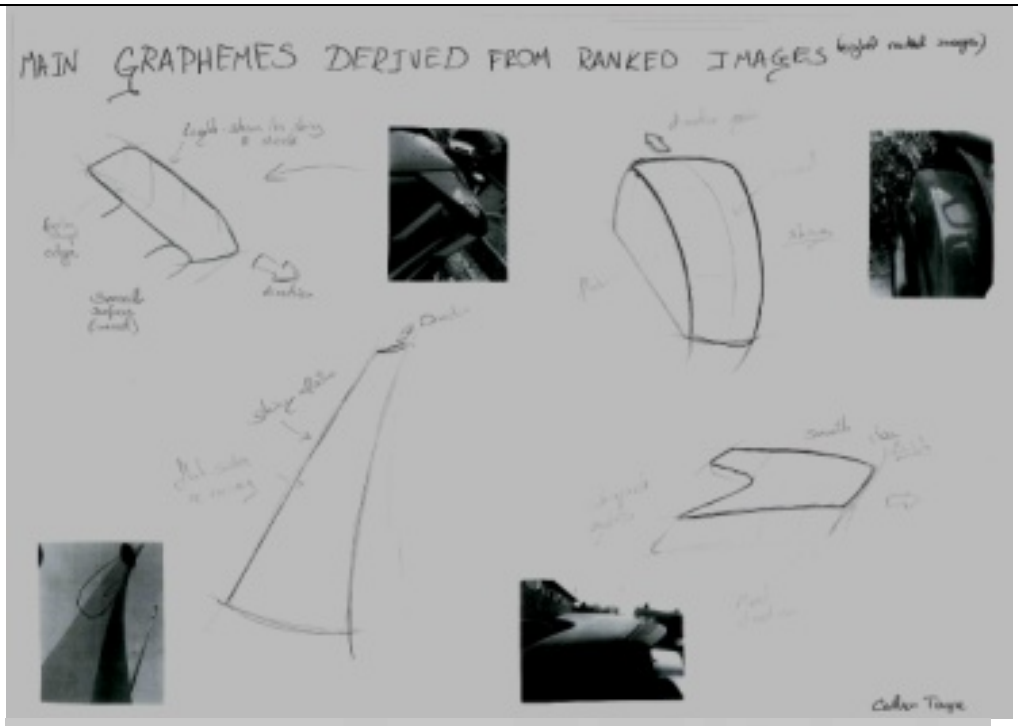
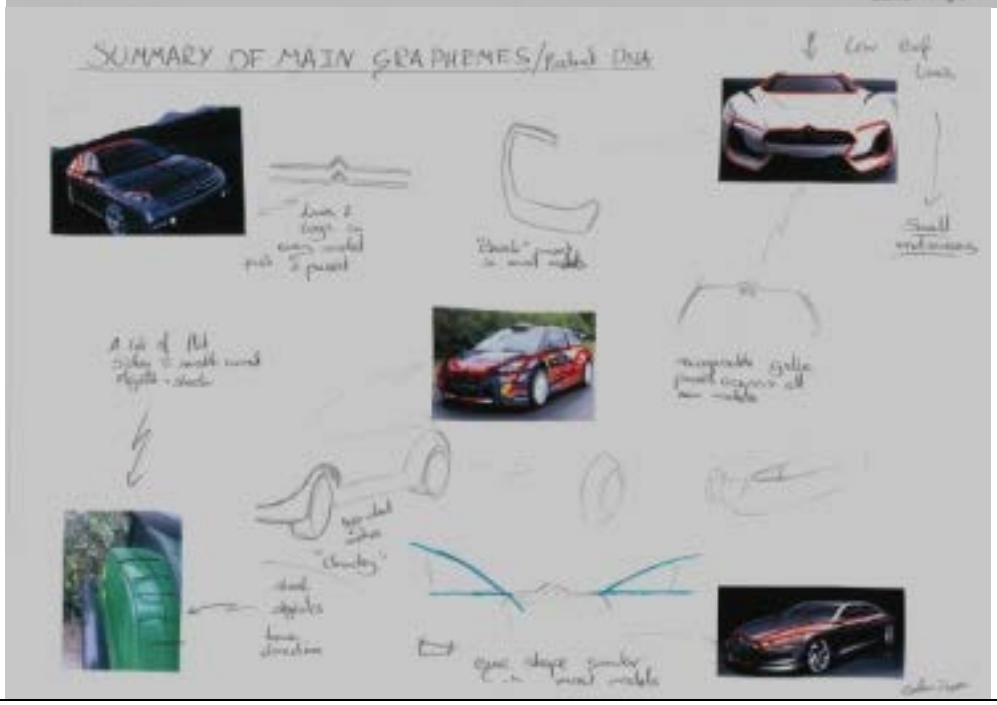
sensitivity	quickly processed	reduce complexity
Proximity (gestalt principle)	Elements close together perceived to be more related	Control interface, heuristic to enhance usability
Signal to noise ratio	Ratio of relevant to non-relevant information in a display	Heuristic to enhance control usability
Threat detection	Ability to detect threatening stimuli more effectively than non-threatening stimuli	Semantics of objects, heuristic to enhance user experience
Three dimensional projection	A tendency to see objects and patterns as three-dimensional when certain visual cues are present	Virtual environments viewed through a two-dimensional screen
Top-down lighting bias	A tendency to interpret shaded or dark areas of an object as shadows	Orientation of an object, enhance natural familiarity of an object
Uniform connectedness (gestalt principle)	Elements connected by uniform visual properties, such as color, perceived as more related	Control interfaces, heuristic to enhance usability

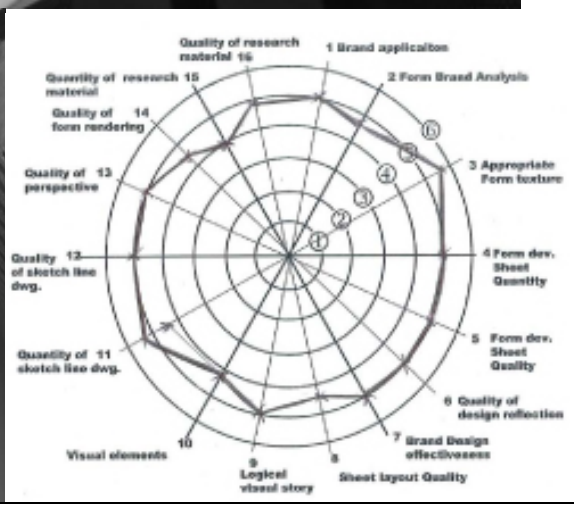
Table 2. Student project example, Designer: Callum Tongue

Activity	Student outcome
1, 2, 3 & 4	Deriving keyword, brainstorming
	
1, 2, 3 & 4	

	
5, 6 & 7	Images of keyword, ranked and analysis
	
5, 6 & 7	

	
5, 6 & 7	
	
8	Reconstructing using graphemes

	 
9	Validating design outcome through peer review rating

	  
10	Editing and presenting process alongside design solution

The two images under activity 1, 2, 3 & 4 show the brainstorming of keyword adjectives taken from the cars produced under the Citroen brand, as well as a those taken from additional online documents associated with the brand, and brand owner's 'mission statement'.

The three images under activity 5, 6 & 7 show the format of the template to show the photographs taken, the ranking form for each individual reviewing student to complete and the

images with annotations by the student designer who took them. When considering the student cohort, staff noted during the exercise that in some cases the averages produced very clear polarization of ranking; however, in some the averages were close together making clear rankings more difficult.

The design pages in activity 8 show how the designer attempted to combine the graphemes from the ranked images with those derived from the forms of the branded products, in this case Citroen cars.

In activity 9 and 10, the images and documents shown are from the final weeks of the project, where students had peer-reviewed the draft versions of the two A3 presentation boards. The boards presented the process and evidence of insights gained and descriptive illustrations of refined their designs into an evocative representation of the car brand and blended keyword adjective, which was ‘Sleek’ in the given example.

A tacit observation by staff of the applied process was that student designers did not undertake enough iterative cycles of exploration and refinement in each of the activity stages. This may be due to a lack of effective time management of multiple deadlines associated with this and other modules; leaving less time of what may have been considered a less valuable module. Mark or grade watching is discouraged, but staff had found some students take time to become refocused on a more professional viewpoint of their studies.

Evidence of the same or similar process being applied may be seen in student success in design and brand competitions. Ms Chloe Tuck used the principles and process taught and practiced in the module to win a UK National packaging competition. See Figure 1. The winning entry has the same elements within it as the submission of the academic module. The designer has added words from the competition requirements. Ms Tuck has derived keywords from the new source; in this case, the Charles Dickens’ novel ‘A Christmas Carol’. She has deconstructed visual elements, graphemes, from a humbug sweet and wrapper, a type of traditional confectionary in the UK. Ms Tuck had brought together these graphemes into a packaging design that emphasized the keyword ‘humbug’ and visual association with the traditional confectionary. The designer has also highlighted visually the links between the different elements. In doing so, she had demonstrated a visual audit trial to the viewer of her design process and decision-making. The presentation provides evidence of an evidence-based approach to a design process.

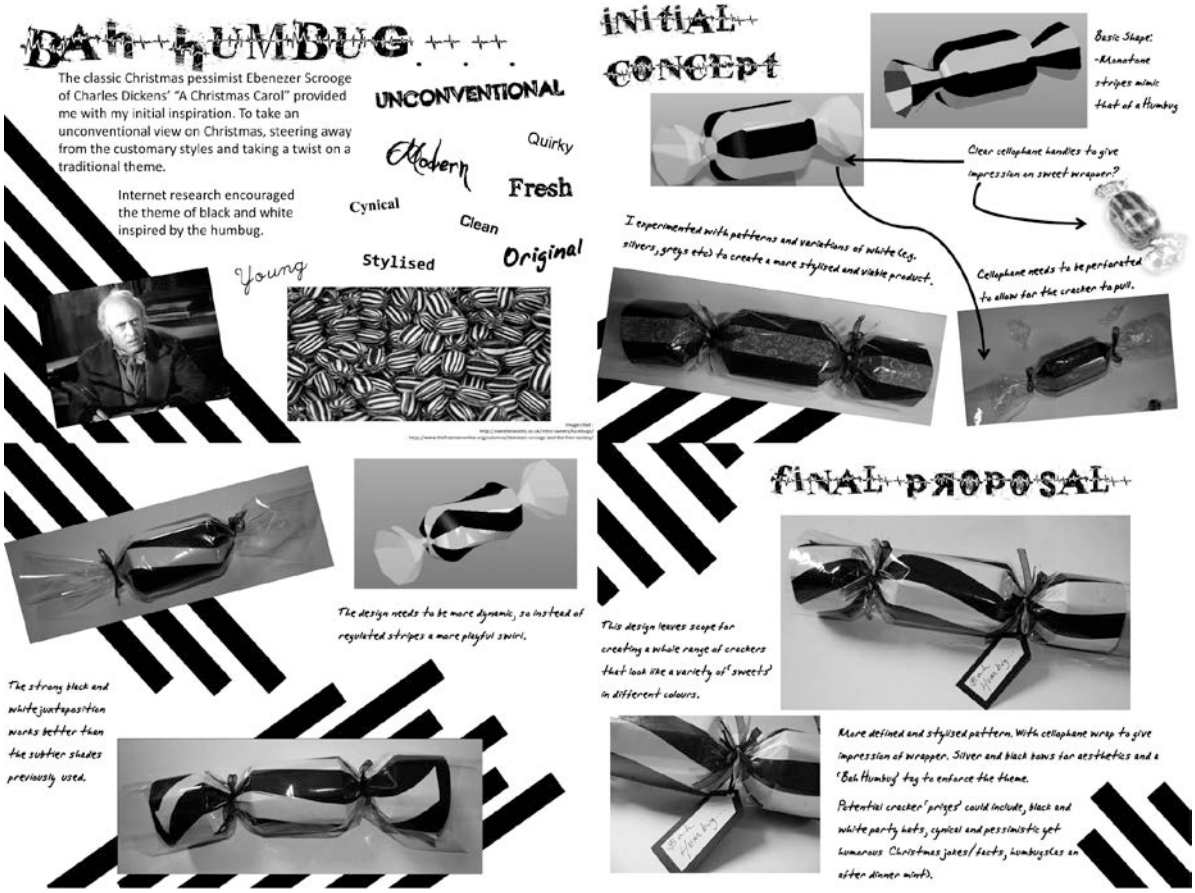


Figure 1. Winning entry for the Tigerprint 'Gifted' Christmas cracker competition 2012, Designer: Chloe Tuck (Loughborough University 2015)

A more detailed example of the application of the template was seen in the next example. In 2014 sixteen students entered the 2014 student 'Starpack' awards for packaging design. (Starpack 2015). One of those who entered was commended. What may be more enlightening is some of the feedback from judges to the students who entered the competition. The Starpack competition organizers and judges have kindly allowed their comments to be published (See Table 3.). The judges had a five point scoring system with an overall mark out of twenty. Half of those who entered obtained an overall score of nine, with one commended student receiving 11. An important element to pick out from the judges' comments was about the quality of the development boards. This element was specifically noted in four of the entries. From the comments made, most judges were critical of the practical application of technology and model-making.

Figures 2-4 show the commended competition boards from Ms Helen Couper. The three presentation boards provided research and development; the final design, linked to key brand elements; and, a scenario of use.

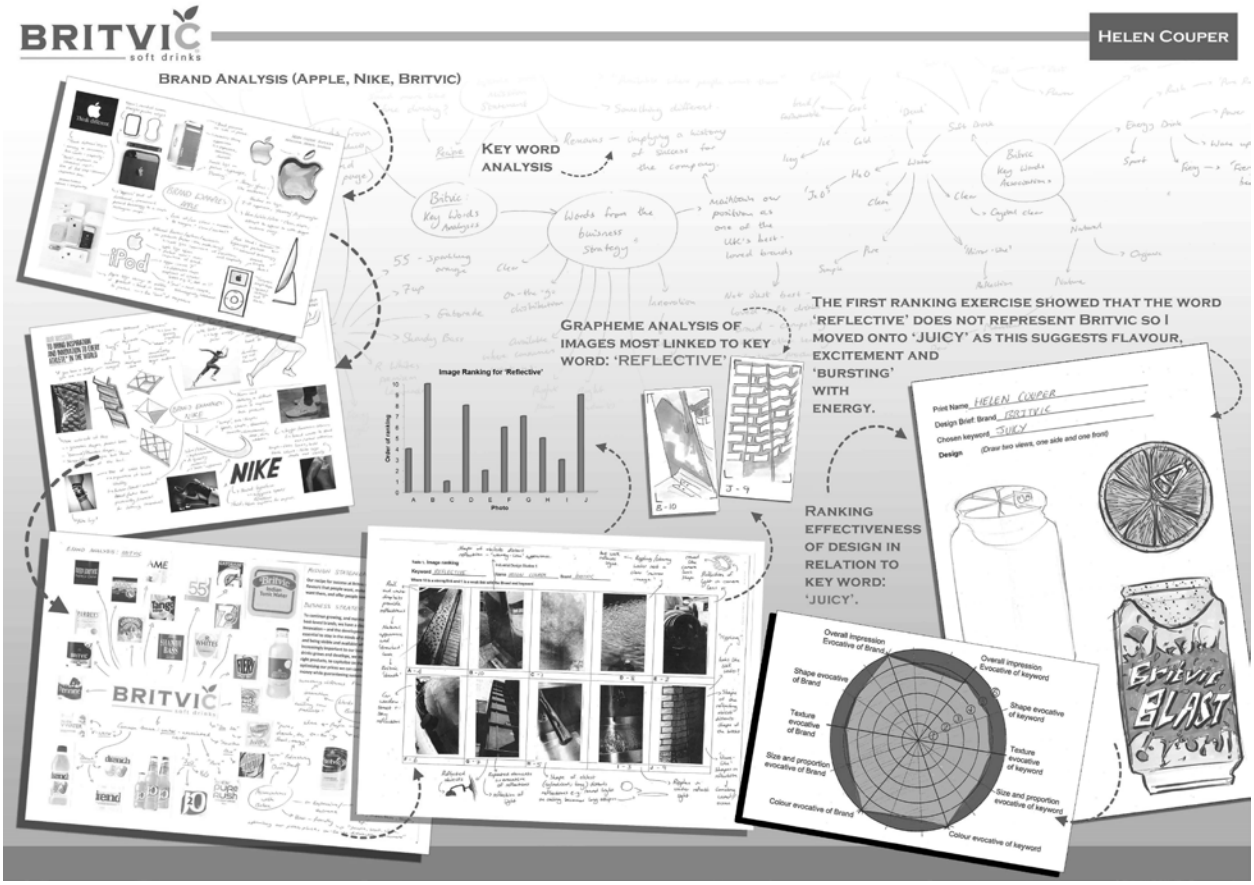


Figure 2. Research board shows brand analysis, deconstruction and validation of concept design. (Designer: Helen Couper)

The key stages shown in the earlier car brand exercise are clearly visible in this presentation. Brand analysis, keyword generation are seen in the top sections of the board. Validation of keywords used to define the visual graphemes through ranking and peer review, are shown in the lower section.

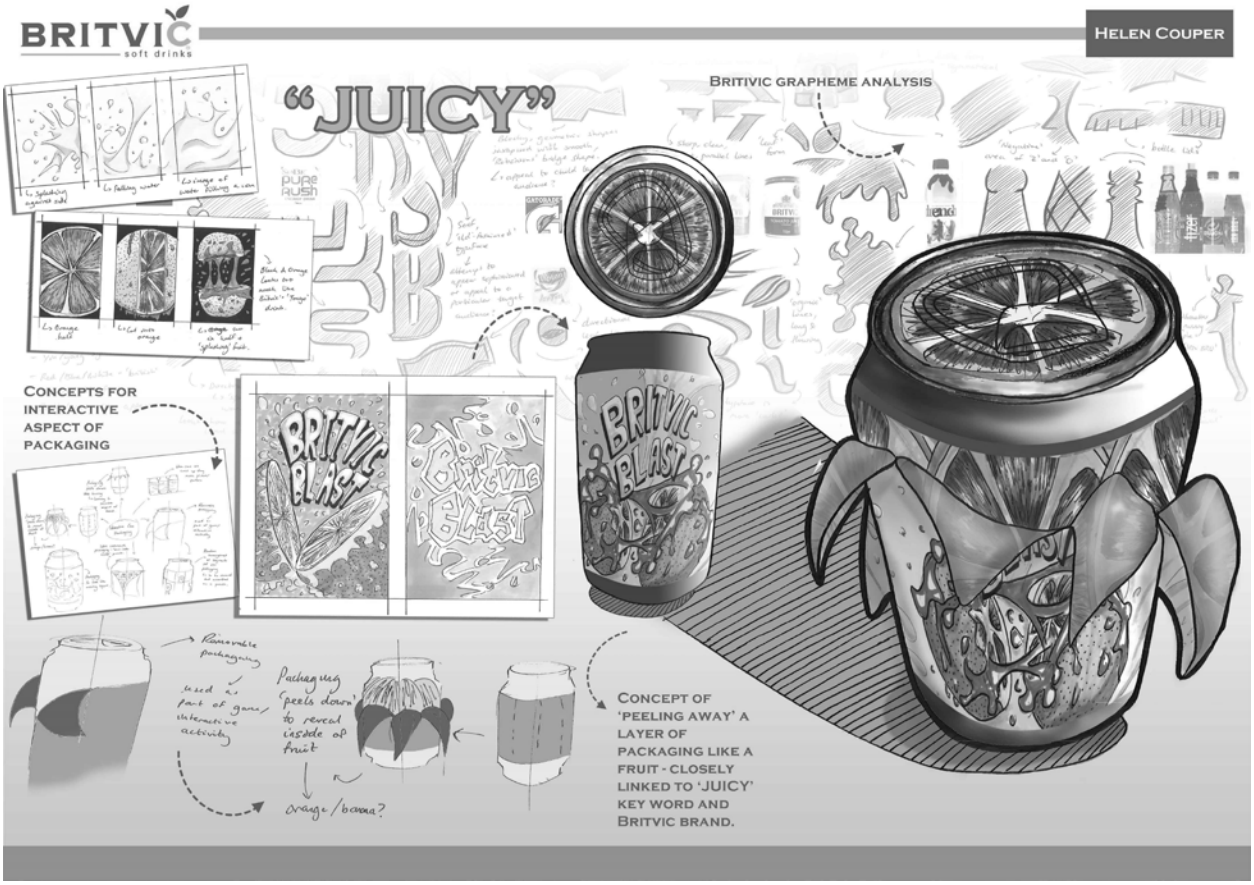


Figure 3. Final design board shows the link between brand and concept design. (Designer: Helen Couper)

The hand-drawn illustrations, brought together using Photoshop software, provide an explicit link between brand analysis, key images and the final design. Minimal annotation is needed to support the evidence for design decision-making and systematic approach to the concept development. However, the layered approach (foreground to background) provided a good example of a designer leading the viewer through levels of importance of the visual elements.

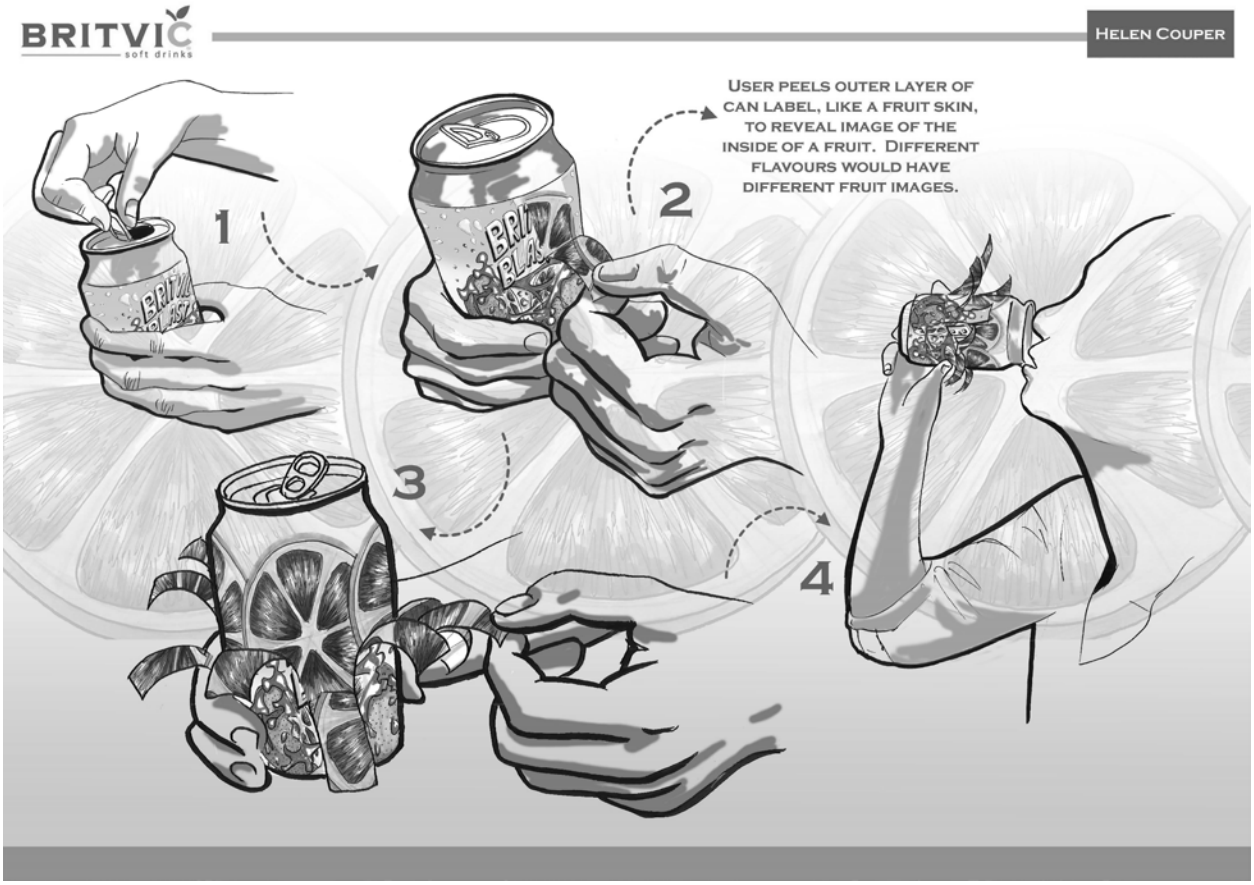


Figure 4 Shows the scenario of use presentation board. (Designer: Helen Couper)

A scenario of use delivers an explicit realization of individual and social interaction, ergonomic usability and brand delivery.

Table 3.

Scoring system is 10-11 commended award, 12 -14 bronze award, 15-17 silver award and 18-20 gold award.	Answers the brief	The concept	Model	Development Boards	Points to consider (see the brief)	Score		Result
C: Packaging as a marketing tool	3	1.5	2.5	3	1	11	Well researched and development boards give lots of detail. Would like to have seen how you would have marketed this.	COMMENDED
G: Norwegian fishcakes jump off the shelves	2	1	2	3	1	9	Would stand out on shelf and is innovative. However, not practical. Can't read the brand - too stranded!! Can't stack them. Good development boards presentation - very clear.	
F: The perfect package - designing for brands	2	2.5	2	2	0.5	9	Ergonomic, playful, stands out but rationale perhaps not fully formed. Obviously the student has a passion for structure. No link back to why decisions were made e.g. why olive oil? There's a lot more that could have been explored there. There was also no Webb deVlam branding or any real relevance to our company. We liked the idea of an everyday product becoming a design piece.	
F: The perfect package - designing for brands	2	2	1	3	1	9	The boards demonstrated a more progressive and creative idea than the model resulted in. The idea has potential but was not executed well at all. We would have loved to have seen some of the sketches on the boards which were more brand brought to life.	
E: Heinz miniature "trio-pack" for convenience sauces	2	2	2	2	1	9	Rather novel idea for stackable sauces by squeezing on to trays. Contamination concerns? Product waste? No mention of supply chain, nice mood boards.	
E: Heinz miniature "trio-pack" for convenience sauces	2	2	1	2	2	9	Good idea to hinge/attach the pouches would not work in blow molded PP, PET with molded cups. Good reference to the natural 'plant bottle' material.	
E: Heinz miniature "trio-pack" for convenience sauces	2	2	2	2	1	9	As a trio pack it works OK! Stackable blow molding would be complex as would filling. Shelf appeal unsure against existing market. Nice mood boards and consideration of design brief innovations.	

Nineteen students for the academic year 2014-2015 had entered the competition, following on from those who entered in the academic year 2013-2014. In this second year of students entering from the program, eight students achieved awards: five were awarded ‘Bronze’ status and another three were commended. Two of those who achieved a ‘Bronze’ award were second year students entering without tutorial support, but who applied the same template and process. The designs of the ‘Bronze’ award winners for 2015 can be seen on the ‘Starpack’ competition website.

Conclusion

The template may go some way to providing insights into what is often considered the ‘applied art’ of brand design. The template can help designers, marketing and engineering to communicate brand design by supporting communication understood by each discipline. Examples of the template presented in this paper enable other educators and practicing designers or engineers to apply this way of working to their own needs. Through the template, marketing and engineering can understand brand based on a logical framework that breaks down the brand into sub-elements, making it more accessible and comprehensible to those not trained in aesthetics. The defined elements within the template may now be more effectively evaluated using a ‘mixed methods’ approach of qualitative and quantitative research methods.

Taking images from the real world provided students with an opportunity to practice identifying suitable visual elements to collect towards their goal. Their goal was to build a novel version of their given brand. The two check points in the prescribed design process enabled students to gain timely feedback on the real-world images they collected and their final design. The rating of their final design by 15 individual students from their cohort gave students some indication of how effectively they had communicated their design interventions. It also gave an indication of the effectiveness of communication of the reasons behind the final design solution. The metrics for the rating were the same as used by academic staff to assess their outcomes. It also enabled the reviewing students to experience critically reviewing design work in a constructive way.

The prescribed process appeared to be effective for students, who went on to build the level of complexity of their meaning with a product design. Tacit feedback to the authors from students who had undertaken the module in previous years indicated it provided individuals with a simple framework within which they could identify and view marketing strategies, social value and brand communication in a wider society. It enabled them to see the patterns and coding embedded in advertising and associated Branded products.

The design competition winners showed that the generic understanding of brand and product semantics enabled these students to compete at a higher level of sophistication against more experienced design students and even design professionals. In the case of first year students competing in the student ‘Starpack’ packaging competition they received only basic advice relating to packaging technology before submission. They had to build their models in their own time, as it was not timetabled within the program at that time. This may account for the critical comments made by the ‘Starpack’ Judges.

Future developments will be to research and develop validation methods aligned with the principles shown in Table 1 and compiled by Martin and Hanington (2012) that are accessible for student designers and integrate them within a pedagogic program. The authors would welcome further discussion of the template presented in this paper with colleagues from design and engineering disciplines to further these objectives.

Acknowledgements

The authors would like to thank Chloe Tuck, Helen Couper and Callum Tongue for permission to use their work as part of this study. The authors would also like to thank Ms Rachel Brooks, Starpack Manager, Starpack Packaging Design Competition UK, for allowing the judges' comments to be published.

Reference

Aaker D. (2000) *A Brand leadership.* The Free Press, New York, NY

Crilly,N. Good, D. Matravers, D. & Clarkson, PJ. (2008) Design as communication: exploring the validity and utility of relating intention to interpretation, *Design Studies,* Elsevier, Vol.29, No. 5, pp 425–457.

Dittmar , H. (1992) *The social Psychology of material possessions: to have is to be*. Hemel Hempstead: Harvester Wheatsheaf.

Hertenstein, J. Platt, M. & Veryzer R (2005) The Impact of Industrial Design Effectiveness on Corporate Financial Performance, *Journal of Product Innovation Management*. Vol. 22, Issue 1, pp 3–21.

Hekkert, P. & van Dijk, M. (2011) *Vision in design: A guidebook for innovators.* Amsterdam: BIS.

Krippendorf, K. (2006) *the semantic turn: a new foundation for design*. Abingdon: CRC Press.

Leborg, C. (2004) *Visual grammar,* New York: Princeton Architectural Press

Lidwell, W. Holden, K. & Butler, J. (2003) Universal principles of design: 100 ways to enhance usability, influence perception, increase appeal, make better design decisions, and teach thorough design. Gloucester, Massachusetts: Rockport.

Loughborough University (2015) Tiger print competition winner, press release, (online). Retrieved from: http://www.lboro.ac.uk/service/publicity/news-releases/2012/205_Humbug-crackers.html.

Martin, B. & Hanington,B. (2012) *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions*. Beverly, Massachusetts: Rockport.

Page, C. & Herr, P.M. (2002) An Investigation of the Processes by Which Product Design and Brand Strength Interact to Determine Initial Affect and Quality Judgments. *Journal of Consumer Psychology*, 12 p133-147

Sekuler, R & Blake, R. (2002) *Perception*. New York: McGraw-Hill.

Sheiverstien, H.N.J & Hekkert, P. (2008) *Product experience*. Oxford: Elsevier.

Starpack (2015) Starpack Packaging design awards, (online). Retrieved from: http://www.iom3.org/starpack/student-starpack-packaging-design-awards-2015.

Storer, I.J. & Campbell, R.I. (2012) Using the continuum of design modelling techniques to aid the development of cad modelling skills in first year industrial design students, Engineering design graphics journal, Vol. 76, No.3, pp. 32-36.

Torrens, G.E. (2011) Universal Design: empathy and affinity, in Karwowski, W., Soares, M.M., Stanton N.A. [Eds], Handbook of Human Factors and Ergonomics in Consumer Products: Methods and techniques. London: Taylor & Francis, pp. 233-248.

Torrens, G.E. & Black, K. (2011) Equipment design in Inclusive physical activity and disability sport, in A.C. Roibas, E. Stamatakis, K. Black [Eds] Design for sport. London: Gower Press, pp153-178.

Torrens, G.E., Tutton, W. &Campbell, R.I. (2012) Military Extremities protection, in Sparks, E. [Ed] Advances in military textiles and personal equipment. London: Woodhead, pp.139-163.