

# INTRODUCING TANGIBLE AESTHETICS: CONTRASTING THE INTRODUCTION OF AESTHETIC ANALYSIS TOOLS FOR PRODUCT DESIGNERS AND INTERDISCIPLINARY DESIGN RESEARCHERS

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## **ABSTRACT**

Design and aesthetics are two intrinsic words that naturally interrelate when a tangible object with formal qualities is developed by taking into account visible parameters. In this research, we describe how an aesthetic analysis of tangible objects could be a valuable and rich pedagogic medium for design research in a design innovation and interdisciplinary design research environment. By comparing the results gained from the application of this method delivered through a series of postgraduate student workshops we describe how “designing aesthetic miscommunication” facilitates learning across disciplines for supporting self-criticality and reflection. This results from the different associated meanings each discipline assigns through perception of objective and subjective aesthetic readings. Our method included combining physical artefacts with a diagrammatical aesthetic mapping framework designed to build mental models of aesthetic analysis, but also to introduce issues and conjectures. Even though various approaches have been applied to the product design discipline including affordances and semantic theory, this method explores a different kind of approach when applied to a more diverse audience. Under this lens visual design analysis facilitates discussion across disciplines and creates a common ground through the perceived visual truths that emerge in the workshops. Our findings have shown that students are capable of maintaining the original meaning shaped by their discipline while sharing observations with a wider audience about how such meanings shifts. The results illustrate how the students’ experience and their learning approach to design practice evolved through the introduction of tangible aesthetics.

*Keywords: Aesthetics, design engineering, design research, affordances, interdisciplinary*

## 1 MOTIVATION

Teaching aesthetics to product designers remains a controversial area and while there are some successful models and methods others encourage an innate approach rejecting ideas that may lead to a conformity of design language. The series of four workshops reported here came from a number of needs to: develop confident language skills for designers to discuss product aesthetics, support the development of mental models for understanding basic concepts of aesthetics, introduce a method of tangibly analysing objective and subjective aesthetic truths derived from affordances, use the understanding of a product’s aesthetic reading to decode underlying intentions and functions, and to use these to accelerate design and research skills. The workshops were used four times with two groups of postgraduate students over an 18-month period. The first were from the MA/MSc first year Innovation Design Engineering, a group of over 45 students from over 20 different countries and 15 different disciplines. The second was from the Masters of Research in Art & Design, a group of 17 students from a five-pathway programme (Design, Communication, Architecture, Fine Art and Humanities) from diverse backgrounds ranging from industrial design to fine art.

## 2 EDUCATING AESTHETICS

There is a large and diverse body of knowledge relating to industrial design and aesthetics however widely agreed frameworks and methods for design practice have yet to be established [1]. A large amount of this literature is focussed on analysing, categorising and attempting to quantify product aesthetics. Less focus is given to bridging theories of aesthetics to design practice and introducing teaching approaches that allow individuals to understand and form their own aesthetic sensibilities to emerge rather than delivering a fixed aesthetic method. Our interest here is to bridge theory and practice and develop an approach to design aesthetics which encourages a development of critical skills and language confidence to support developing creative methods. Of interest to our concerns is research by Desmet [2], Hekkert [3] and Norman [4] concerning designing for emotional responses illustrating the enhanced human-product potential of intelligent aesthetic design and the value this brings to users. The areas of objective-subjective analysis and affordances in design aesthetics relate to some of the work by Mayer and Landwehr [5] on extracting product typicality. Objective and subjective are two intrinsic qualities related to the aesthetic quality an object is capable of communicating through its surface perception.

Affordances were initially described by Gibson [6] in a major breakthrough for the field of environmental psychology often summarised as ‘Ask not what’s inside your head, but what your head’s inside of’. According to Gibson environmental affordances are the real and objective features that an environment offers to people, whereas value and meaning are the means through which people perceive and understand affordances. You and Chen [1] expand on the confusion in product design between affordance theory and semantic theory vis-à-vis the difference between the potential to afford versus the social and cultural value assigned to that affordance. They state that design practice has not yet matured to be able to define the difference between an affordance and symbolic meaning and that these often get confused. Norman goes further and suggests that designers should forget affordances and instead focus on signifiers [7]. Given the mediation between people and environment in understanding affordances, defining objective and subjective values can be difficult. Affordances then are something in between, they cut across the subjective-objective barrier and represent the point in common between the environment and one’s potential behaviour. Due to their value as a foundational base from which to identify how an object is legible, affordances have been of interest to designers for some time. The point identified above by Norman [7] stresses the emotional response people can have when interacting with objects, which is an aspect mediated by the object’s formal and aesthetic qualities through design. Legibility is key and how this is conveyed as the subject via the process of observation; the object’s signifier needs to be an intrinsic property of the object. According to Norman the designer’s concept needs to match the user’s model. Environment plays a pivotal role for design as demonstrated by Gaudion’s doctoral research [8] which showed that the understanding of affordances varies between neuro-typical and autistic adults leading to very different views of environmental stimuli and how design can respond to support special sets of environmental preferences.

The objective-subjective intrinsic relationship has an impact on the design process and how form is developed [9] as affordances are strictly dependent on the form that determines the object’s legibility and visibility [10]. In our workshops we focussed on how identifying affordances could lead to objective and subjective observations and how these could build semantic insights connecting to creative processes and design language development through reading artefacts. We used the misunderstandings, confusions and controversies that aesthetic analysis triggers to engage cross-disciplinary engineering design and design research students in debates and discussions. For us the design miscommunications [11] around aesthetics was the framework to construct a design dialogue.

## 3 INTRODUCING TANGIBLE AESTHETICS

The four workshops lasted varying lengths of time with the shortest being 3 hours and the longest one day. At the start of each workshop students were introduced through a one-hour lecture to basic ideas of aesthetics including how objective and subjective observations form truths, physiognomic perception, zoomorphism, affordances, product emotion and psychology, design metaphors and cultural transfer. At the end of the introduction session students were formed into groups of 4-5 people and given an A0 size printed map (Fig. 1 left) where an artefact pre-selected by the research team was given to each group. Groups were then instructed to discuss the object and begin to decode affordances to identify the objective truths that emerged. As affordances led to identifications, groups would use notes at the end of coloured wires to indicate the affordances and how strong they were in

terms of an objective truth. If an affordance was strong they would place the note close to the object and if weak further away (Fig. 1 right). Following this activity groups were then asked to identify their subjective truths. Once both objective and subjective observations (via affordances) had been identified groups were asked to synthesise these together to form a reading of the object, how much of the features were the result of conscious design decisions versus iterative evolutions over generations of product development and what the intended context was. The intention was to move from the identification of objective and subjective features to a reading of the object and through this process to encourage more confidence in the language of discussing aesthetics and to build a tangible mental model for critical aesthetic evaluation.

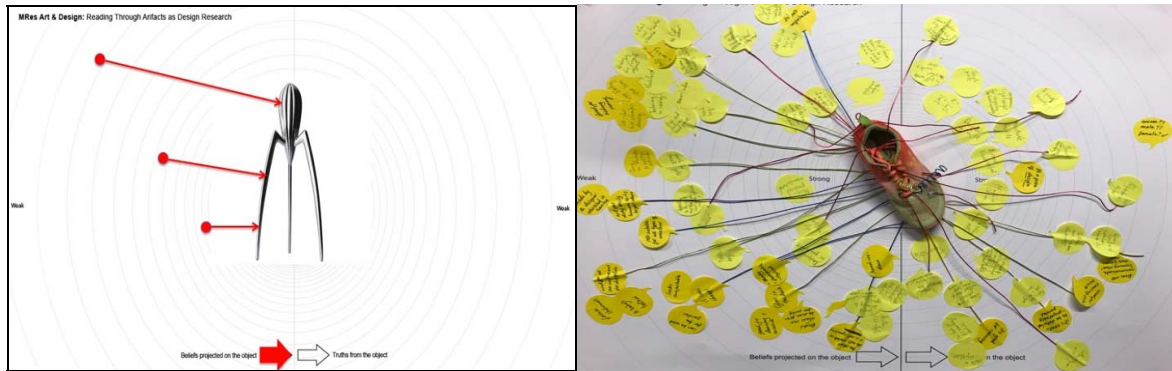


Figure 1. Printed map and example of how to connect affordances for objective observations

#### 4 OBSERVATIONS ON TANGIBLE AESTHETICS

One of the immediate observations that made itself known to the authors was the difficulty in deciding what an objective and subjective feature of an object was. For example the trainer illustrated in Fig 1 right has some notes in the objective section titled; 'it's a piece of design,' 'it's good for running,' and 'down to earth attitude', The subjective side has some comments including 'it glows in the dark,' 'rubber,' 'it's not comfortable,' and 'not suitable for all types of weather' which indicate some confusion between objectivity and subjective assessments. These observations were repeated across the groups in all four series of workshops and clearly indicate some difficulty in grasping the concept of truth received from objects or truths projected onto objects as supported by You and Chen [1]. However other explanations may be possible including the groups not agreeing what objective-subjective assessments are and getting confused where to place notes on the map. Although this can be raised as a potential issue, the strategy of asking students to divide critiques into objective-subjective provided a tangible platform for comparing observations and was successful in generating a series of observation notes relating to function and emotion that could be developed into an object reading later on.

When selecting objects, the research team experimented through the series of workshops with different types of objects beginning with ones that generally had obvious functions like a coffee pot, trainer, early apple computer etc. As the workshops progressed, the researchers started to experiment with more obscure objects in order to push students' affordance recognition skills and whether reading sets of affordances could result in identification of more challenging objects. We deliberately gave out objects without explaining what they were. One of the challenges encountered by the students was reading an object away from its context and this became clear with two of the later objects selected, a solar lamp manufactured by D-Light (Fig. 2 left) and a mid 20<sup>th</sup> century engineering education product used to teach mechanical principles that was found in a skip outside Imperial College (Fig. 2 right). The solar lamp confused several students some of whom thought it was a water purifier due to its large opaque base. The two deep slots just under the top of the solar cell (Fig 2. centre) also drew extended comment as these appeared to have a significant function due to their aesthetic affordance prominence, yet students could not decide what this was (the researchers have assumed this is a manufacturing decision to support the solar cell assembly). The educational product was introduced on two occasions in different workshops to both design engineers and MRes researchers and both groups failed to identify its function for teaching mechanical principles although one group decided that it was a hole punch by recognising the affordance of the reciprocal shaft travelling through the base hole as a

possible function although they admitted it did not do this job very well. Both of these examples illustrate that some sets of affordances that define a product's function need context in order for successful diagnosis to be made [6]. However, both of these groups enjoyed the unclear functions and the conversations raised some inventive interpretations.



Figure 2. Solar lamp by D-Light and mechanical education product

When we compared across the four sets of workshops we noticed that only two product types ran in common all of the way through. These were the cast iron stool (designed and made by one of the authors) and the copper coffee pot made in Portugal. An interesting observation was made as we analysed these objective-subjective affordances made in this series of objects during the workshops. We saw that the early workshops using wires to connect to the exact affordance on the object for objective-subjective analysis seemed to generate richer and more accurate sets of diagnostic notes that those that just used a marker pen to make lines later on (Fig 3). The motivation for this was to reduce effort and allow the lines to be more easily recorded as the wires were easily dislodged and lost.

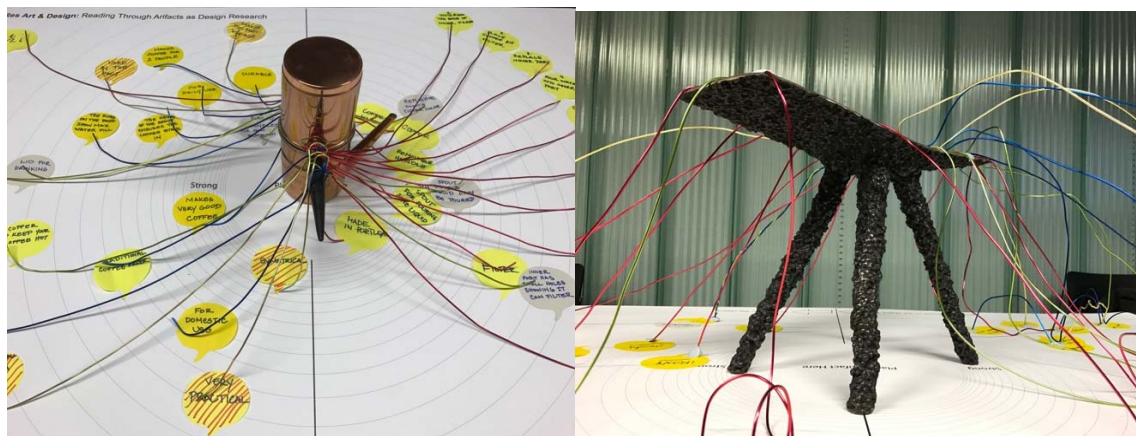


Figure 3. Map with artefacts and wires connecting affordances to objective and subjective assessments

Our assumption is that the wires (which were often tied on or secured with blu-tack) encouraged more precise affordance identification along with greater detail. The coloured wires also needed more effort and concentration to attach, and that this was enough to improve the level of critique (Fig.4). Another way of understanding this is that the wires break down the assessment into features and affordances whereas the pen lines do not go up the objects so tend to encourage an overall appreciation that reduces the detailed level of focus. We also noticed that objective-subjective differentiations are better using the coloured wires. Another difference is that the first two workshops had sub-phases where students would be asked to consider objective, affordances, cultural frameworks and subjective observations in order to generate a final 'reading' of the object. This process was confusing for the students so we reverted to a simpler objective-subjective analysis for the final workshop.





Figure 4. Comparing stool and coffee pot observations with methods

## 5 CONTRASTING AESTHETIC RESPONSES & CONCLUSIONS

When we reflect on our initial motivations for developing and researching this series of workshops to improve aesthetic language skills for designers and researchers, support developing of mental models for understanding aesthetics and introducing tangible objective and subjective truths derived from affordances we have evidence that students were able to engage with and learn from all of these motivations. The ability to appreciate basic concepts of aesthetic critique, identify affordances, generally differentiate between objective and subjective truths and form these into narrative 'readings' of the artefacts was successful. In terms of methods it was interesting to note that what may be seen as a relatively simple change of swapping coloured wires for drawn lines made such a big difference to the ability to focus on decoding affordances and this can be the subject of more research in the future. Object selection and the capability of linking niches of affordances to artefact function through context or in this case the issues inherent in extracting objects from contexts was apparent and again an interesting topic for further research. Underlying both of these was the observation that groups struggled to separate objective and subjective truths in their analysis and while this was not a significant issue for successfully narrating the aesthetic narrative of the objects this is potentially a cause for concern for creative processes. As technologies complexify and functions become more disembodied with cloud based and intangible technological interactions between human and intelligent machines, practicing designers require even greater aesthetic sensibilities to bridge this gap. This implies a closer relationship with the user's environmental experience supporting the process of learning as evidenced in our observations of the difficulties in reading objects removed from their context.

The comparison between how Innovation Design Engineering and a cross-disciplinary cohort of MRes students approached the aesthetics workshop was also of interest to us and we expected some difference in approach. We were surprised that it was difficult to distinguish the analytical depth between both groups however. Our fourth workshop which was delivered to the cross-disciplinary MRes group was a full day session with the afternoon being devoted to students within each group using the same method applied to objects from within their own discipline. Here we saw some very interesting observations with a fine-art student selecting a book for an aesthetic content without considering the book as an aesthetic artefact and an architecture student discovering the falsity of rendered aesthetic images for large city centre developments. Hence the opportunity this research provided to explore cross-disciplinary approaches that use aesthetic under different kinds of perspectives.

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