Understanding Empathy in Children through 3D Character Design

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ABSTRACT

Health, particularly diet and everyday nutrition, as the ultimate causal factor in life is an important aspect of every child's education. Meanwhile, computer generated (CG) 3-dimensional (3-D) graphics is a medium often used by entertainment and advertising. Educational intervention to help children make appropriate dietary choices can be designed by employing similar methods used by entertainment and advertising, such as 3-D characters aimed at children. The question that this research asked is: can creating an empathic bond between 3-D characters and children communicate a healthy nutrition message effectively?

This thesis is based on qualitative research founded on the constructionist theory that focuses on exploring the perspective of children via focus groups. Educational designs based on familiar computer-generated graphics will help equip children to deal with nutritional and dietary choices, ultimately initiating behavioural change as their relationship with food matures earlier. Empathy on the children's and adult's sides of the healthy nutrition conversation is important to establish this relationship in children's nutritional decisions.

The main challenge for nutrition education is not in short-term diversions, but long-term changes in behavioural responses in media literacy. A constructionist approach of helping children work through advertising by improving their media vocabulary would be a more sustainable approach to enhancing their ability to decode advertising rhetoric and in turn forming their own informed opinion and responses. Industry referenced educational content intent on healthy lifestyles can balance the prevalent advertising messages leading to a more balanced overall media that children are exposed to.

Author Keywords

Children, empathy, 3D character design, emotional connection, education, communication

INTRODUCTION

The recent transformation of design, from simple decoration to today's more academic design research, indicates the potential for design as an enabler for change. This is particularly true of 3-dimensional (3-D) computer graphics. However, the pervasiveness of 3-D digital media is partially responsible for the modern condition of rampant consumerism coupled with an increasingly sedentary lifestyle across all ages.

Health is an important concern for everyday life as it is the ultimate causal factor in life. Particularly, diet and everyday nutrition is an important aspect of every child's health-related education. Faced with a multitude of choices in food, we as consumers do not necessarily make the right dietary choices all the time. Children in particular may not be entirely equipped to deal with these same nutritional and dietary choices. Design, in this case, computer generated 3-D character design, can be used as a pedagogical intervention which helps children to make appropriate dietary choices. Educational interventions can assist audiences using the same modes of media increasingly employed by entertainment and advertising.

The question that this thesis asks is: Can creating an empathic bond between 3-D characters and children communicate a healthy nutrition message effectively? To answer this question, my research sought to understand children's unique perspective on their environment through a series of objectives: design a range of characters to create an empathic relationship for effective communication, understand children's existing empathic relationship relative to 3-D characters, and test the characters for empathic effectiveness.

Two aspects were central to understanding how children form an empathic relationship with digital characters. One aspect that aided in understanding empathy in children was how children connect to one another on a social level. Similarities in physical and behavioural aspects are integral within the identification and empathic connection between

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children, and a determining factor in developing and maintaining a social relationship. Research conducted by Hall argues that children who distinguish a similarity between themselves and a correspondent is foundational for empathising with someone. This perception is also fundamental in reactions to fictional characters, where the perception of similarity and the resulting relationship to them typically ends with the children empathising with their situation and actions [1].

Another aspect of developing an emotional connection with a digital character includes exploring children's visual vocabulary and comprehension of narrative structure. Forming an empathic bond with a digital character requires an acceptance that comes naturally to children. The phenomenon of the user experience is much richer and affective if there is an empathic component to the process. My design process and research methods reflected this, as the respondents were deeply involved in the initial ideation process, and their feedback steered each iteration of my designs through all stages of pre-production and production.

Piaget's model of cognitive development has four distinct progressive stages: the sensori-motor stage, the pre-operational stage, the concrete operational stage, and the formal operational stage. [2] In this project the focus was narrowed to the *concrete operationa*l stage and the transition to the early *formal operational* stage as this reflects the seven to nine year old age demographic selected as a target group. The specific demographic was chosen as the *concrete operational* child has made significant cognitive leaps to possess the mental faculties to move away from the ego-centric self and process the abstract viewpoints of others, providing the child with the cognitive ability to empathise consistently with others. Helfand commented that an audience in general is constantly in a fluid state, and argued that its variations defy a demographic quantification. Helfand has a point when she concludes (although she was referring to the audience in a general way): "The simple truth is this: the audiences do not sit still" [3]. Designing effectively for this audience which is fundamentally in a mental state of flux is an interesting challenge.

METHODOLOGICAL OVERVIEW

This project was primarily an action research project based on the constructionist theory and was intent on conducting an interpretive inquiry into the meaning the collected feedback. The data was obtained from children via the integration of active projective techniques and ethnographic observations in a varied focus group environment. Research is central to the design process as research eventually defines the issue [4]. The core of this research concerns its respondents' experience of contemporary media. The approach that this project took consisted of:

- Identifying the respondent demographic
- Literature review
- Precedent investigations
- Human ethics processes
- Focus group experiments
- Critical analysis of respondent data
- Iterative design with respondent data

Action research is a methodology with cyclical processes that are similar to the design process itself, "consisting of problem/research, analysis, synthesis, execution, production and evaluation" [5]. The use of action research methodology in this project fell within the epistemology of constructivism, where individuals construct meaning of their world out of interaction and engagement with their world [6]. This project used an interpretivist theoretical perspective as a guide when analysing the qualitative feedback gathered from the action research methods.

Demographic

The chosen respondent demographic was children aged between seven to nine years old. The sample groups come from two local primary schools – Brooklyn Primary School and Houghton Valley Primary School; both in Wellington, New Zealand. This respondent demographic corresponded to Piaget's *concrete operational* stage. This age group was very interesting, as the respondents have reached a sophisticated stage of mental development and possesses varied communication skills. The respondents had no inhibitions in expressing opinions and providing feedback regarding the research.

The volatility of the respondents' mental cognitive state presented an interesting visual communication design challenge. When working with this age group, it was important to be aware that memory that children have at this age is primarily based on understanding and not visual perception. Children use different means of expression and communication to adults, and this often provides very rich layered visualisations. When they are drawing, for example, they are trying to convey their knowledge about an item, as opposed to portraying the appearance of the object. The semantics of these drawings is then more important than the aesthetics, and these drawings are therefore subject to a different set of rules of scrutiny when analysed and deciphered.

The respondents are the ideal age group, as they possess advanced media literacy skills, and are able to decipher the content with an experienced understanding of implicit semantics. By this age, the respondents would already been exposed to all kinds of media and are on the cusp being fully comprehending the distinctions between content. Lawlor in Children's Understanding of Television Advertising Intent summarizes that children of this age group have a developed comprehension of television programming and advertising. The ubiquity of advertising media that target children means the lines are blurred between advertising content with entertainment content.

Many children regard certain advertisements as entertainment [7]. At the same time, their extended engagement with variety of media means that children can be pedantic about narrative and presentation rules. They can prove very knowledgeable about narrative structure, plus possess the ability to recount past presentations that were not satisfactory.

A literature review was conducted to construct the necessary analytical criteria to interpret meaning from the data collected. The review explored two themes central to this project: cognitive development in children and critical analysis of children's drawings to begin to understand the precedent theoretical frameworks of Piaget, Parten, Luquet, Hall and other prominent researchers. Both themes were significant in the development of this research's academic structure.

Initial Repertoire Analysis

Following the literature review, this thesis conducted a visual precedent analysis or visual repertoire analysis of the media that the respondents are regularly exposed to. The repertoire analysis covered successful children's television programmes, cereal packaging and advertising, and sports hydration advertising. Exploring the semantic language of the visuals in the repertoire analysis helped determine the aesthetic vocabulary that the respondents are exposed to. The medium of delivery for these visuals was also considered in this repertoire analysis. McLuhan observed that the medium affects the society not by the content delivered, but by the medium's inherent characteristics [8], such as how television and computer games have been linked to promote more sedentary children due to the nature of its engagement.

Criteria for interpreting data

The sample size had to be adequate in order to achieve a good representation of the demographic. As the research was primarily interested in qualitative data, the respondent sample size did not need to be very large, ultimately amounting to approximately 75 respondents. Also, the respondents were a good representative of the demographic group analysed with 50 respondents being integral to the initial experiments and another 25 to integrate another perspective from the initial respondents.

Criteria for judging empathy was established as a method of measure for analysis of the qualitative data. The idiosyncrasies of qualitative data acquisition meant that traditional quantitative measures were not suitable. The criteria were established to translate the data in order to inform the design process. The efficacy of the research was determined based on the empathy criteria listed below:

- the ability of the respondents to engage with the characters;
- the ability of the respondents to recognize and empathise with emotion in the portrayed character;
- and the ability of the respondents to communicate their knowledge.

This criteria allowed the iterative design process with the respondents to focus on maximum progress across the four experiments. The multi-method research methodology that combined projective research, ethnography and interviews yielded informative results that informed and guided the design process. The final product was presented in a session that featured two experiment groups: one class that was involved in its creation and another class that has not seen the designs before as a control group. These distinct groups were to test character empathic engagement at two different levels of prior exposure to the research.

EXPERIMENTS

This project was based on qualitative analysis of respondents' feedback gathered via focus groups. This feedback was the mainstay an iterative design process with the respondents from the target demographic. This model of design research and development was chosen as an appropriation of pervasive marketing to children. The four focus group experiments were provided feedback that formed the basis for development and prototyping of the character designs through to final design validation. Establishing a relationship with the respondents, creating a prototype cast of characters, refining the prototypes and testing the efficiency of the final characters were parts of an iterative design process that revealed many relevant insights to the respondents' behaviours, particularly around their relationships with food and nutrition, advertising, and television programming.

All evaluations of the data acquired for the design process were qualitative and constructionist in nature, but a consistent analytical framework was applied systematically across all four experiment results. The research collected over 400 drawings in total from 70 children over four experiment sessions. The drawings and writing were a great resource for understanding the perspective of children. The critical design feedback provided really meaningful insight into their world – the social hierarchies that govern their behaviour, their preferences that are predicated on physical similarities, as well as their cognitive and creative ability. The research conducted four experiments with four primary objectives: to understand children's cognitive development, design a range of characters to utilising an empathic relationship for effective communication, understand children's empathic relationship relative to 3-D characters, and test the characters for empathic effectiveness.

Experiment 1

The first experiment was designed to collect the respondents' opinions about the health factor of certain foods to help the research begin to understand their relationship with food in general. The respondents have very adult concerns around the nutritional value of food, occasionally revealing some gaps in their knowledge (such as bananas containing protein or that fruit have no sugar).

These concerns do not necessarily influence behaviour, with up to 65% of the first 50 respondents preferring some form of fast food as their favourite choice. Branding and advertising also had a significant role in this food recognition, with multiple examples of food being portrayed mainly by packaging such as in Figure 3.33. There was also evidence of peer pressure to conform, not just in terms of active behaviour, but also in terms of intellectual and creative expression. This started to reveal some level of social hierarchy within the respondents. The hierarchy is determined by a number of factors, most prominently physical similarity – whish is also a key factor in developing empathy for other people.

Experiment 2

Together with the knowledge from Experiment 1, the visual feedback collected in the second experiment provided a basis for creating a cast of characters with excellent visual material collected to work from. The respondents were required to design their own protagonist and antagonist by collage: combining shapes and textures to create these characters. The collages also revealed an additional insight into the respondents' social hierarchy, with bias against fat characters relatively obvious, as fat characters were regularly created as the "bad" character.

Experiment 3

The third experiment required the respondents to create a narrative based on character designs that were inspired by the second experiment's collages. The respondents have a very sophisticated understanding of narrative and traditional story line and were confident in articulating the story lines they've created. They were able to narrate chronologically, display cause and intent, and conclude with interesting results. The feedback for the prototype characters gathered from this experiment led to repeated iterations that reduced the total cast down from ten to six characters.

Experiment 4

The final experiment was designed to test the final six production character designs. The verbal and visual feedback from this experiment clearly shows that the final production characters managed to create rapport, both with the respondents that were involved prior to the final experiment and with the new set of control respondents. The prior experience of the first group of respondents caused no discernible bias when measured against the control group. The characters communicated just as well with the control group as the main respondents. The healthy nutrition message contained in the questionnaire and final poster prints was tested on the respondents and the responses confirmed that they understood the message communicated. The final compositions were designed using archetypal visual language that forms part of the demographics' inherent vocabulary for more efficient communication. This meant that the research was not introducing new terms to their lexicon, thus not confusing the message with the medium.

Figure 1: Selected collages from Experiment 2

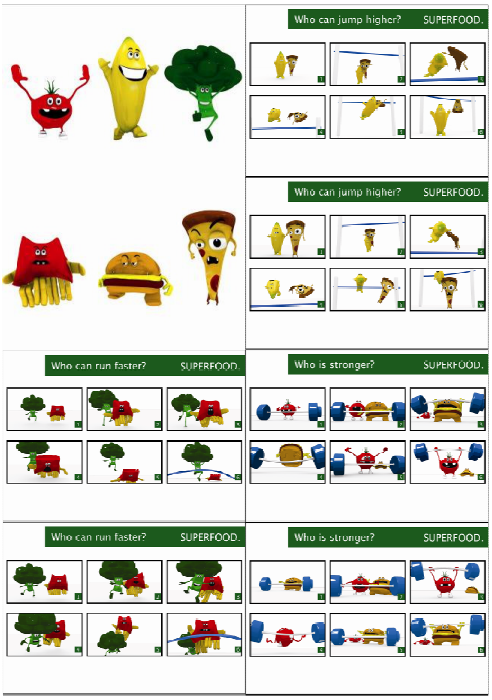

Figure 2: Final experiment character designs and narrative scenarios

Experiment Outcomes

The collected data was scrutinised to determine cognitive levels, social hierarchy, relationships with food in general, empathic connectivity, and how these factors affected the respondents' larger world view, particularly around issues of nutrition. The feedback also helped the research identify the aesthetic vocabulary of children, which in turn helped develop the aesthetics of the final characters. The respondents' behaviour and preferences also influenced which final prototypes selected for production

The cognitive level estimates from the drawings proved that the children were highly intelligent. They provided highly sophisticated multi-layered drawings that fit in within the required parameters. These drawings often contained complicated narratives involving two or more characters and match quite closely to Freytag's narrative arc [9]. The drawings also show a combination of visual and intellectual realism, indicating that the respondents have relatively fluid cognitive states. This presented a more direct parallel with Luquet's observations compared to Piaget's model. The respondents demonstrate that the target demographic is flexible enough to accommodate reality and fantasy simultaneously. They can juggle multiple narratives while creating their own parallel narrative. They have an inherent comprehension of archetypal narratives which possibly is the foundation for their accommodation of fantasy, reality and the in-between.

Children develop relationships with food and nutrition from a very young age. This research has a few interesting highlights, one of which were the very adult concerns that children have about food, primarily around the nutritional content of food and common allergies like peanut or lactose intolerance. This was specifically interesting when these concerns are contrasted with their depictions of their favourite food – comparing thought and opinion with actual behaviour. Much like adults, these intellectual concerns seemed to have little effect on actual dietary choices.This contradiction can possibly be attributed to the parallels between what the parents ate affected what their children ate [10], and how the idea of nutrition is central to the food choice process. However, it rarely makes it past the consideration part, as although the thought process has altered, the behaviour patterns have not. The obesity rates in New Zealand are still rising and are a significant cause for concern.

Further understanding of how children develop their relationships with food could provide better methods to encourage their intellectual capacity to influence behaviour, rather than interim solutions that do not address the core issues. Designing effective interventions and shifts in educational processes early can augment behaviour in regards to food and nutrition. Design can push this shift into a cultural phenomenon until it instigates social behaviour changes.

The research also observed the social hierarchy that is built within a community of children. This social hierarchy is not just predicated on similarity in looks, but also included behaviour and opinions. This often happens without any direct or overt pressure, but it is pressure nonetheless just to fit in better within the larger social construct. Designing a set of characters to fit within this social construct using the respondents' empathic connection to these characters helped establish the relationship and improve the communicative value of the designs.

This research proposed that central to this communication is empathic connectivity. A good way of achieving this connectivity, particularly with this target demographic is recognising the need for designer / audience symbiosis. The iterative design process in this research was predicated around empathic connectivity within the final designs and the audience by incorporating as much feedback as possible. The body language and facial expressions of the characters, including the narrative composition settings were all tailored to engage the audience emotionally and intellectually based on an analysis of the active research feedback gathered.

The designs were dependant on a deeper understanding of the perspective that children have on nutrition. Crucial to this comprehension was an accurate gauge of the respondents' cognitive levels, understanding the construction of their social hierarchy, and understanding their relationship with food to maximise potential empathic connectivity with the designs.

The communicative efficiency of the final design with the respondents was good based on the feedback gathered. The final experiment demonstrated that the character empathy was established by the healthy characters was encouraging. Development of the character typologies early on based on the social hierarchical structure of the respondents helped to establish the empathic connectivity of the characters. This also determined the tone and narrative of the compositions, although the results show that the composition variable was less important in the communication process compared to character engagement.

CONCLUSION

The project aimed to understand empathy in children and the empathy that they have for digital characters that can be used in an educational context. The question that this research asked was, can creating an empathic bond between 3-D characters and children communicate a healthy nutrition message effectively? The research undertaken here has found that creating an empathic and emotional engagement helped communicate to children. This conclusion was based on the response to the 3-D characters tested with the respondents. This was one of the aims for the research, which was to gain a better understanding of children's unique perspective of the world in order to design a conversation that allowed children to communicate their priorities. This helped the research develop its own

sense of empathy that was necessary to encourage empathy in the respondents.

The design process undertaken in this project was a child-centric research-driven process that concentrated on understanding the children that the design was aimed at. A conversation was established with children to help the research distil points that will help children get meaning and ownership of the final designs. Design as a discipline is interested in social practices associated with designed interactions, whether with tangible or intangible products, and the design of the interactions can change social behaviour [5]. The feedback from the respondents influenced design decisions such as colour palette choices, character typologies, character development, narrative complexity, overall aesthetic and style and semantic language.

The efficacy of the final designs was based on a strong focus on the audience. A research objective was to understand the relationship of the audience with the medium via the integration of a multi-method research methodology to obtain a good understanding of the wider perspective of children. This understanding of their social construct was influenced by Hall's [1] and Parten's [11] research into empathy's role in social play, gauging their cognitive abilities based on Piaget's [2] and Luquet's observations, gauging their media literacy skills [12,13] and identifying their visual vocabulary.

The research was able to triangulate these variables by analysing the cartography of the respondents' world as mapped by the gathered data. These maps provided insight into the respondents' their unique perspective of the world. The interpretations of these maps provided the basis for the design of experiments used to further our understanding of empathy in children and the empathy that they have for abstract concepts.

Here, 3-D character design was a tool to help children make more appropriate dietary choices based on developing a healthy relationship with food. The research was able to position 3-D characters within the social architecture of the respondents based on the research's understanding of the wider perspective of children, including understanding their social construct and gauging their cognitive abilities.

The research found that empathic engagement was an important tool to communicating the salient aspects of diet and everyday nutrition as part of every child's education. Empathically engaging pedagogical designs will help equip children to deal with nutritional and dietary choices daily, ultimately initiating behavioural change as their relationship with food matures earlier. Empathy on the both sides of the healthy nutrition conversation is important to establish a long-term behavioural change in children's nutritional decisions. An active conversation with children can prove to be mutually educational for both children and adult educators alike.

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