Understanding Empathy
in children

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Acknowledgements

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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.

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Chapter 1 - Introduction

1.1 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.

Evidence suggests that obesity is increasing worldwide at a worrying speed. These circumstances have led to growing government concerns over the potential burden of an increasingly obese public on the public health system. The New Zealand Ministry of Health has been studying this issue - finding that one in three adults was overweight, and one in five adults was obese. Obesity has been identified as a significant risk factor for many chronic diseases, particularly coronary diseases, Type-2 diabetes, hypertension and stroke (Ministry of Health New Zealand [MoH], 2007). While these diseases are treatable, perhaps addressing the issue at the outset could prevent these problems.

The current concerns about obesity and its cost to society are not unwarranted. Quantifying the concerns in monetary terms, the World Health Organization estimates that obesity across all age groups costs the New Zealand health system $303 million a year. Child-related obesity issues are equally an increasing concern. The statistics reveal children are increasingly affected by dietary and nutritional issues. The New Zealand Ministry of Health ran the 2002 Children's Nutrition Survey, showing that about one third of New Zealand children aged between 5-14 years were overweight (21.3 percent) or obese (9.8 percent) (Parnell, 2003, p.xxii). Health complications from childhood obesity typically increase with age if not addressed.

Adults are classified as overweight or obese according to their body mass index, or BMI Body mass index is calculated by dividing a person's weight in kilograms by their height in metres squared (kg/m^2). An adult with a BMI of higher than 25 is considered overweight, and an adult with a BMI of higher than 30 is considered obese. With children and teenagers under the age of 18 however, these values are scaled down to account for their age and the onset of puberty. Table 1.1 below illustrates this by using Cole's survey

results that show the median curves for body mass index. The same survey was used by the Ministry of Health in its 2002 survey to determine the overweight and obesity percentages in Figure 1.1 and 1.2.

Assisting this pattern of obesity is undoubtedly the general decline in activity levels in children over the last few years. Sports and Recreation New Zealand has identified a steady decline in the levels of physical activity in young people aged between 5 to 17 years of age (van Aalst et al, 2007, p. 39) (Table 1.2), and now list 34% of all young people surveyed on 2000 / 2001 as inactive, up from 31% in 1997 / 1998 (ibid, 2007, p. 43) – with inactivity defined as no sports/leisure-time physical activities in the two weeks before the interview by SPARC (ibid, 2007, p. 53). Such a shift could be due to any number of lifestyle changes: fear in allowing children to walk or cycle to school, an increase in attention and engagement with electronic entertainment, and readily available food that is cheap and generally unhealthy. All of these factors combine to form the trend that point to a more sedentary and increasingly overweight society, particularly in the under-18 demographic.

For years, these concerns have been communicated to children through traditional educational means, such as readings and lessons. This thesis suggests that a more effective method can be communicated by establishing an empathic bond with children through 3-D character design. The research here lead to a range of characters for a series of print or web public service advertisements targeted at children with the aim to educate them about healthy nutrition and increasing media literacy.

Figure 1.11. Overweight using international cut-off values (2003)
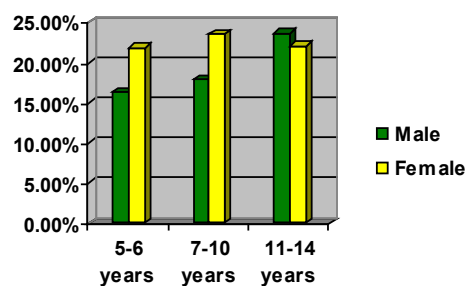
Figure 1.12. Obesity using international cut-off values (2003)
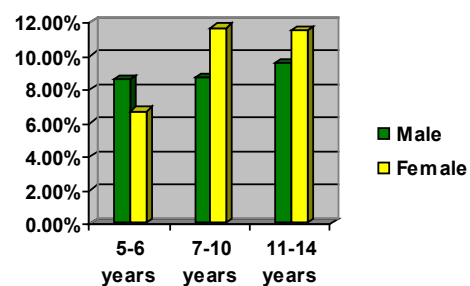
Table 1.11. International cut off points for body mass index for overweight and obesity by sex between 2 and 18 years, defined to pass through body mass index of 25 and 30 kg/m^2 at age 18 (2000).

Age (years)	Body mass index 25 kg/m^2		Body mass index 30 kg/m^2	Body mass index 25 kg/m^2
	Males	Females	Males	Females
5	17.42	17.15	19.30	19.17
6	17.55	17.34	19.78	19.65
7	17.92	17.75	20.63	20.51
8	18.44	18.35	21.60	21.57
9	19.10	19.07	22.77	22.81
10	19.84	19.86	24.00	24.11

Table 1.12. Activity levels for young people in New Zealand (2007)

	All young people (%)
Active young people	68
Inactive young people	32
Number of young people surveyed	4078

Two aspects were central to understanding how children form an empathic relationship with digital characters. The first aspect was to consider how children connect to one another on a social level. An integral portion of social interaction and social hierarchy is driven by children's perception of similarity, which includes similarity across facial features, gender, size, cognitive ability, and physical coordination. The second aspect of developing an emotional connection with a digital character includes children's visual vocabulary and comprehension of narrative structure.

Similarities in physical and behavioural aspects are integral within the identification and empathic connection between children, and a determining factor in developing and maintaining a social relationship. Recent research conducted by Lynne 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 (Hall et al, 2005, p.5).

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 preproduction and production.

In many ways, this project is as much about what we can learn from children as it is about what we can help them learn. This demonstrates the constructionist influence on this project. This educational relationship can become more of a two way conversation rather than the traditional one way communication by emotionally engaging children with educational tools. In the same way, designing for children can become more iterative and child-focused by involving children far earlier within the design process.

1.2 Rationale

Contemporary popular culture has generated a wealth of fictional characters in various time based media, such as 2-D animations to the latest and greatest 3-D computer generated imagery. Digital technology has provided a new medium for artists and animators to express and create designs. 3-D is supplanting 2-D animation in large-scale animation production. For example, Disney acquired Pixar in January 2006 for $7.4 billion (La Monica, 2006), effectively announcing to the world that computer generated 3-D feature animations are here to stay. Pixar's *The Incredibles* and *Ratatouille* represent a new wave of computer generated imagery that joins the wider entertainment animation universe. In little more than 10 years since *Toy Story* (the first feature length 3-D animation), 3-D animation achieved a commercial and artistic revolution, but it has also achieved something else: usurping 2-D animation's position at the top of the animated feature film hierarchy (Corliss, 2005).

3-D animation has entered the mainstream vernacular, and has become the default medium of animated features and shorter advertisements. By utilising 3-D character design, this research is tapping into an aesthetic language familiar to children who have grown up with the characters from *Toy Story*, *Monsters Inc*, and *Wall-E* (**Figure 1.3**). 3-D animation and character design is an art form that has surrounded them since their earliest memories.

Characters targeting children are often designed to communicate differently than characters designed for adults, and are increasingly used as marketing tools. These characters are increasingly self-promoting, resulting in a cycle of merchandising and increasing popularity. Advertising, in particular, has been adept at producing characters that are designed to sell products which communicate very effectively to a younger target audience. Significant improvements have been made in communication targeted at a

Figure 1.21. Ratatouille (2007)   *Figure 1.22.* Wall-E (2008)

Figure 1.23. Overview of the KidStory design method (2001).
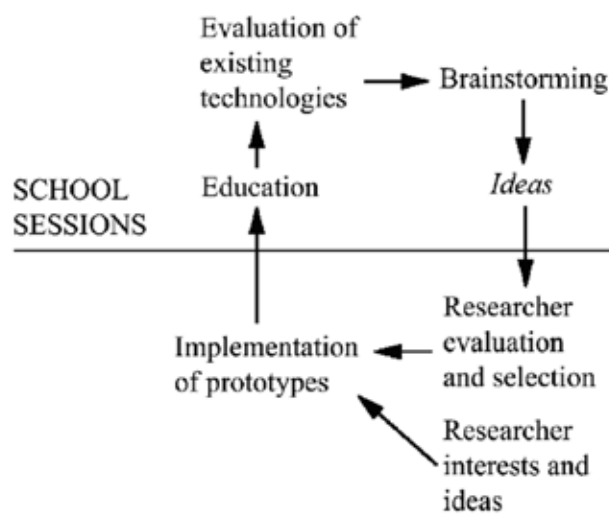
younger audience. The aspect that has the most potential for research is the phenomenon of how a child is able to empathise with a certain digital character, and how this research can use that empathy to encourage learning.

By developing a series of digital characters that are designed specifically to encourage empathy in children, specific details that support the development of an empathic bond were addressed through a specific medium. The potency of such a delivery can be proven by acquiring and analysing qualitative feedback via experiments from the target demographic. A semiotic analysis of affective character design allowed for better designs for children and gained an insight into children's psychology. Singer (2003) emphasises the role that research plays in successfully designing products and brands for children (p.301). The results of this research allowed for development of a set of guidelines for designing digital characters, targeting children, that communicate effectively.

Communicating an active lifestyle message through the inert media of television and computer games is potentially contradictory. Mediums such as television programmes and computer games have been linked to promote sedentary children rather than active ones (Lanningham-Foster et al, 2006, p.1832)(Veerman et al, 2009, p.3)(Epstein et al, 2008, p.244)(Graves et al, 2007, p.1282). Thus the medium that these character designs were presented in was in a still format, either as printed medium, or as a web-based intervention, which required a minimum of inert attention. The primary focus then became the character design and compositions' emotional connections to carry a healthy nutrition message.

Iterative design methods involve prototyping, testing and refining a product. This research used an iterative design process involving focus group experiments in order to explore the demographic perspective and preferences. By utilising their feedback and suggestions to critically refine the prototype, a satisfactory conclusion had been reached. Interaction between the prototypes and respondents was crucial to the design process, forming the basis for an early cooperative creative exploration. The focus group experiments with the respondents were an early introduction to the design process.

Iterative design has been a useful strategy for many years now. One of the more interesting precedents related to this research was TaxḖn's work employing an extended cooperative iterative design method. This method was put to use with children aged five to seven years for school environments that used a mixture of "evaluation, brainstorming and traditional education methods" in 2000. TaxḖn (2001) conducted *KidStory* – a project where respondents participated as collaborators in the design of a complex storytelling technology. The project successfully influenced the design of existing software and produced a number of interesting new designs (p.120).

TaxḖn's research model consists of:

- ideas are first generated and refined at brainstorming sessions;
- then a selection of ideas is implemented;
- and the resulting prototypes are brought back for refinement (Figure 1.5).

Sessions with educational activities and sessions where existing technology is evaluated support the brainstorming phase (TaxḖn et al, 2001, p.120). TaxḖn had a long development period involving the respondents – his research period was almost two years.

Children's relationship with contemporary media and their delivery mechanisms is a fascinating research field. Children have a comfortable relationship with new technology, being confident early adopters without fear of failure. Interacting with technology becomes an extension of play. Druin (1999) in her article *Children as Our Technology Design Partners* explained the development of her methodology for working with children (p.4-5). Her work with cooperative inquiry research and participatory inquiry has many parallels with action research. She outlined ten observation techniques used in cooperative inquiry and ten techniques of working with participatory design that set a useful introductory framework to working with children.

Designing a platform that encourages a conversation by appealing to the younger demographics' natural inquisitiveness can encourage the development of healthier lifestyle choices during this state of mental development flux. Persuasive and engaging rhetoric at this stage of a child's cognitive development could constitute a wider paradigm shift in a child's future behaviour. The same way advertising and branding targets children to develop life-long customers, healthy lifestyle choices can be encouraged through a carefully designed method of empathic communication.

Livingstone and Helsper (2006) suggest reducing focus on media literacy and concentrating on refuting the persuasion of marketing to overcome media coercion of children. Increased education in media literacy and countering the persuasion of marketing should go together. Engaging with children more effectively by encouraging them to empathise with the message and consequence is an important step. Instead of countering advertising with a contrary rhetoric, increasing awareness of advertising intent to point out facts that contest advertising claims is a more efficient means of contesting the ubiquity of food advertising (p.577).

Advertising is particularly adept at interlacing itself between education and entertainment often disguised as information. Advertising has a multi-layered engagement approach that is so successful that there is a strong association in children between the entertainment and information value to the advertised product (Helfand, 2001, p.30). Education could be well-enabled by such use of media communication to engage its target audience at an appropriate level, ideally from within the child's empathic social hierarchy to encourage conversation and interaction. Communicating from an authoritative perspective means the interaction is less of a conversation which lessens the effects of communication. This conversation becomes an important part of educating children of the intent of advertising, equipping them to be able to make the right nutritional and dietary choices.

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Chapter 2 - Methodological Approach

2.1.0 Literature Review

This project intended to create a series of three narratives with a cast of computer generated 3-dimensional characters designed to communicate a healthy nutrition message through an empathic connection with children. The research started with an overview of existing literature on the children and covered work by Piaget, Parten, Luquet, Hall and other prominent researchers. This review is split into two main themes: child psychology, play and their social construct; and children's drawings. Each theme bears a significant relevance to certain aspects of this research.

Aspects of child psychology and cognitive development are important to understanding narrative and visual complexity as perceived by children. They do this by causally mapping the varying cognitive developments in children. Play is fundamental in these developmental processes, while also a learning activity via imitation, and a means of social engagement. The literature explored here covers play as a primarily learning activity and is particularly concerned with social empathy and physical similarity as a catalyst for children's construction of social relationships. These processes surface from the cognitive development mechanism which drives most of this activity.

Second, children's drawings were a central element in this project. Getting insight into how to decode this format of inquiry allows for a better critical analysis and a more thorough visual and narrative evaluation. This understanding also allowed a more accurate gauge of children's mental development through the qualities of the drawings. The relationship between social construction through play and drawing sophistication, which are measures of the respondents' cognitive development, are all key elements to the research.

2.1.1 Child Psychology

Cognitive development is a fundamental process to consider in order to design for children. This is because it is during this stage of both physical and intellectual growth that children are most actively constructing a mental model of the world. Understanding this ensures that effective communication can be delivered on the level of the audience, in this case, children.

An important contributor to our contemporary understanding of child and developmental psychology is Piaget's research based on observations of his own children (Piaget, 1969). Piaget was a Swiss biologist, natural scientist, psychologist and philosopher. His background in biology and the natural sciences eventually led to psychology, where he introduced standardized evaluations for measuring intelligence (Smith, 1997). His conclusions, despite being based on a small sample, were in-depth and well-considered. Piaget's theories of genetic epistemology, particularly involving exploration of child developmental psychology has formed the basis for a variety of research across many fields, including this research.

Piaget's (1969) theory of cognitive development has four distinct stages:

Table 2.1.1.1. Piaget's Key Ideas (2005)

Sensori-motor period [ages 0 – 2]	Achieves autonomous thought. Recognises self as agent of action and begins to act intentionally: e.g. pulls a string to set mobile in motion or shakes a rattle to make a noise. Mentally achieves object permanence where the child realises that objects out of sight continue to exist in abstract space
Pre-operational period [ages 2-7]	Learns to use language and to represent objects by images and words. Thinking is still ego-centric: has difficulty relating to the viewpoint of others. Classifies objects by a single feature: e.g. groups together all the red blocks regardless of shape or all the square blocks regardless of colour
Concrete operational stage [ages 7-11]	Can think logically and abstractly about objects and events. Classifies objects according to several features and can order them in series along a single dimension such as size.
Formal operational stage [ages 11 and up]	Can think logically about abstract propositions and test hypotheses systematically Becomes concerned with the hypothetical, the future, and ideological problems.

A popular image that comes to mind of children watching media is that they cannot sit still. Jessica Helfand (2001) commented that an audience in general is constantly in a fluid state, and argued that its variations defy a demographic quantification. Helfand is right 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" (p.74). Designing effectively for this audience which is fundamentally in a mental state of flux is an interesting challenge.

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. Understanding the characteristics of each mental stage allows this research to test the hypothesis that cognitive development exists in a semi-fluid state where it is not mapped directly to age, but can be gauged subjectively through qualitative analysis of thought processes via visual and verbal feedback.

According to Piaget (1969), *concrete operations* are directly related to objects and not yet directly related to abstract or intangible terms. *Concrete operations* provide a transition between schemes of action and general logical structures. These structures involve a combinatorial group and a group structure coordinating the two possible forms of reversibility (p.100). Assigning meaning at the concrete stage is still fairly literal and explicit. The *concrete operational* stage also marks the move away from the purely ego-

centric child to one more open to the environment. This means the child now has the mental facilities capable of coping with the abstract thought of others. This period then passes into the *formal operational* child.

Formal operations represent the period of transition to formal thought in a child: combining systems where forming understanding, opinions based on direct observation and abstract verbalization happens. It is through this period of transition that developed cognitive abilities now have experience which is translated into memory, providing cognitive assets to draw upon for comprehending an environment. This is attributed to the onset of puberty, and is the final stage of cognitive development as a child.

Piaget has structured each stage quite formally and his model follows a rather rigid set of procedures and strict compartmentalisation. According to Luquet's mode, the transitions between formal stages of cognitive development are a lot more fluid than what Piaget insists. Children today are achieving a more sophisticated degree of cognitive abilities at an earlier age than is suggested by Piaget. There are many arguments for the acceleration in cognitive development in children: better nutrition; increased exposure to more stimulating media; advances in education; even video games are cited (Rushkoff, 2006, p.232) as environmental factors that aid in mental development. Understanding the rate of fluid, overlapping cognitive development stages is crucial to designing effectively for children. Children in this fluid mental state are capable of reacting and absorbing a multi-variant narratives and themes, and as such to entertain and educate multiple avenues is an achievable goal.

Play and Learning

Play, as covered by the following research, is primarily a learning tool. Play not only influences psychological development, but also serves well as a social activity and gauge of mental ability The literature reviewed is particularly concerned with three aspects of social play: Parten's (1932) model of increasingly social levels of play which describes the social construction of children through play; Hall's research into empathy between children and digital characters; and physical similarity as a driver for children constructing social relationships (Hall & Woods, 2005, p.5-6). These are important considerations for conducting empathic communication-driven research.

Play, as defined by Parten, is comprised of solitary play and social play. Parten's (1932) ethnographic observations have led to her model of the different types of play, defined here as:

Table 2.1.1.2. Parten's Modes of Play (1932):

Unoccupied play:	Not in play
Onlooker play:	Watching play
Solitary independent play:	Playing alone
Parallel activity play:	Playing alone, but *beside* other children
Associative play:	Playing *with* other children in a common activity
Cooperative play:	Playing with other children with an organised hierarchy

Parten's observations are commonly compressed to five kinds of play, ignoring unoccupied behaviour and combining associative and cooperative play. Although her research observed subjects aged two to five, her definitions of play still apply to the respondents in this research. The same types of play can be observed in older children in an unorganised open play area.

Older children are flexible enough to incorporate multiple threads of parallel play. Where they are involved in a sophisticated level of cooperative play, they can often also take interest in their surrounding peers who might not be involved directly in their hierarchy. Their peers exist in a parallel external group that is also involved in cooperative-level play.

This play pattern can be observed in the focus group experiments as the focus groups were broken down into sub-groups, with each group working in parallel but still conscious of their peers in other groups. These patterns of group dynamics within play helped position a cast of character based on the respondents' social dynamics. While the hierarchies might be composed through an underlying level of social structure, there often is an over-arching circumstance that allows the children to share an environment – such as a common school, a large field or playground, or even crossing the boundaries of imagination to a shared social experience.

Increased social interaction develops with increased complexity in game play (Piaget, 1962). The introduction of formal game play with rules combined with other players often results in meticulous attention to the rules and the concept of fair play. Piaget (1951) notes imitation is gradually integrated into intelligence by being brought in equilibrium with learnt behaviour, as does the evolution of drawings show a correlative reintegration of the learning activity in intelligence through progressive parallels with assimilated knowledge (p. 288). Parten's observations of escalating social interaction levels of play corresponds with Piaget's cognitive play model.

While the conducted experiments are primarily composed of parallel activity, there were some elements of Parten's (1932) observations of associative and cooperative behaviour in the group design sessions (p.249-252).

The respondents could balance focus on their own work, get distracted by their peers' other work, as well as place their creation in abstract hierarchy with the overall production of the group. The placing of each child's work within the hierarchy was particularly important, as it does begin to construct or reinforce a fluid social structure. They begin to class their peers not only according to social constraints such as physical similarities, but also overlap these considerations with the intellectual output.

Physical similarity is a driving factor in the construct of the social structure of children. Children prefer the company of other children that look similar in size and appearance. Hall's research into empathy between children and digital characters supports this with her conclusion that the perception of similarity has significant implications for forming friendships. She also remarks on studies identifying that when children perceive themselves as similar to another child, that they are more likely to choose them as friends. The opposite has also been shown to be true with children disliking those who are dissimilar to them in terms of social status and behavioural style (Hall and Woods, 2005, p.5-6). For these reasons, empathy and association are important elements to consider when designing characters as a medium of communication. Just as children choose to associate with other children based on physical similarity, this research extends the hypothesis that children can learn more effectively from characters designed to be physically similar, or at least have similar physical characteristics presented anthropomorphically.

Hall (2006) elaborates on the many issues and factors to ensure that an educational intervention populated by synthetic characters will provide a valuable, engaging and enjoyable experience for the child. A significant

factor impacting upon this experience relates to the design of the graphics, the animation of objects and characters, and the character interactions with the child (p.408).

Hall has set a valuable precedent using quantitative analysis to prove empathic communication is an extremely effective method to communicate to the chosen demographic. Hall noted where children are the intended audience, her research clearly shows the there is a need to incorporate their opinions, expectations and perspectives within the design process. This is important for all applications involving children, especially where the approach requires the child to interact with a synthetic character within a virtual environment. Even when the technical aspects of such an experience are ideal: inconsistency, lack of realism, or poor design of the virtual elements may cause failure in conviction. If a composition and its collection of objects and characters within it are not appropriate, then it is likely that the child will reject it (ibid., p.408). Empathic communication that encourages implicit learned social behaviour, such as extolled by Hall's research, is an excellent catalyst for developing a more elaborate visual-based research methodology. The process of designing with children allows an insight into the visual elements that children associate with. The iterative process, combined with active research, allows for a more in-depth extraction of the thought process when associating with synthetic designed characters.

Piaget (1973) reminds us that children's learning patterns show they learn most efficiently when engaged in active or personal research, as opposed to being passively engaged in a one-way teacher to student interaction. The essential functions of intelligence consist in understanding and in inventing; in other words, building up structures by structuring reality (p.148). An active conversation with small groups of respondents served as

a learning experience for both researchers and respondents in the activity sessions conducted, proving that the effectiveness of active learning is not limited to children.

Piaget's observations are relevant to the research objective of understanding child cognitive development which affects their capacity for empathy. Parten's observation on social play and Halls' observations on encouraging empathy in children with synthetic characters as an educational device helped the research begin to understand the social hierarchy of children and communicative value in understanding that hierarchy. Hall's work was an influence on how to work with children, particularly in identifying key factors in encouraging and maintaining emotional engagement with 3-D characters.

Piaget's and Hall's observations had informed on the development of the research methods, and were also relevant to the following theme where this research explored Luquet's modes of drawing and Cox's interpretation on children and their art, and which provide an initial critical framework for the research to interpret the collected respondent's drawings.

2.1.2 Children and Drawing

Children's drawings presented an excellent avenue of research during the activity sessions. When drawing, children were not restricted by the constraints of language, and were able to present a perspective that is not bound by what Luquet (1927) calls *visual realism*. This multi-modal means of expression presented a multi-tiered narrative from their perspective. Developing activities for projective research to extract meaning from drawings becomes a valuable exercise. Understanding this form of visual expres-

sion in children changed the criteria of the activity session. The different types of drawings also provided a good marker for estimating the stage of cognitive development. Drawing is a creative expression that is not limited to language, but is diverse in its forms and quality. Children's drawings are not only a means of expression but are also an accurate gauge of a child's cognitive development.

In Cox's *The Pictorial World of the Child* (2005), she gives a detailed account of children's "understanding and appreciation of art" and their improving capabilities in producing their own pictures (p.80). Cox discusses internal and external influences, including a "child's inventiveness and level of cognitive development", and the shaping influences of "adult drawings, cultural diversity and other children's pictures". She is also critical of the use of drawings as a measure of intelligence, preferring to describe drawing as a means of expression.

These internal modes may be better understood through the early childhood development psychologist Luquet. He had developed an argument that children have a pre-existing internal model to represent their environment (Luquet, 1927). In *Le Dessin Enfantin* (Children's Drawings) Luquet argued that children construct internal models expressed through four modes of drawing: *scribbling*, *fortuitous realism*, *intellectual realism* and *visual realism* (Matthews, 1999, p.84). This is a view that influenced, among others, Jean Piaget.

Luquet's two later modes can be defined as *intellectual realism*, where drawings capture the basic structure of the object but not from any fixed viewpoint; and *visual realism*, which captures the shapes of objects or scenes as if from a fixed point. Piaget then reinterpreted the mental model identi-

fied by Luquet into a more linear process. In Piaget's stage model, a child is meant to progress from meaningless *scribbling* through *visual realism* without moving back and forth (Matthews, 1999, p.84).

Luquet observes that the transitions between cognitive stages are not as distinct as Piaget believes. Earlier cognitive maturation that allows for a fluctuating, overlapping cognitive state is reflected in multi-modal drawings. These creative expressions are not necessarily correspondent to a set of aesthetic rules. Matthews (1999) elaborates: "In fact, Luquet never intended his identification of drawing modes to be translated as a 'stage' theory. Luquet argued that *intellectual realism* was not a deficient system compared with *visual realism*, but a different, yet equally legitimate mode which captured information important to the child" (p.84). Each mode of drawing has the potential for some overlap with another mode. Drawing as a sensori-motor coordinated exercise occasionally reveals an approach incorporating multiple modes of *realism* in the portrayal of an environment, with none of the four modes being exclusive of another.

When analysing the drawings collected from the active research sessions, it was important to be aware that children at this age have a memory that is primarily based on understanding and not visual perception. When they are drawing, for example, they are trying to portray their knowledge about an item, as opposed to portraying the appearance of the object. This form of drawing is known as *intellectual realism* according to Luquet's mental model and is common in younger children. Only in the mid-childhood years do children begin to pursue *visual realism*.

Cox (2005) compares the ideas of *intellectual realism* versus *visual realism*, and charts the shift from the traditional internal model to the portrayal of the perceived form relative to the age and mental development of the child. She challenges the idea of the conservatism schema as a mode of *intellectual realism*, but describes it as a deliberate choice. Like Luquet, she does not put *visual realism* over *intellectual realism*, but describes it as a natural progression into an extra dimension of expression. There is a correlation between a child's increased memory capacity and the pictorial complexity that they are capable of producing – marking the shift towards *visual realism* (p.71).

Cox (2005) details the relation of size and its emotional content. She ascribes positive emotional charge to drawings of larger figures, and the inverse with smaller figures (p.145). This criterion became an interesting point to test when developing the activity sessions for the respondents. Certainly contemporary design precedents are prevalent, with modern graphic novels typically using a larger scale as a signifier of superhuman or heroic status. A wide variety of television programmes aimed at children also use characters that are at the same scale as adults. *Barney* the Dinosaur, Big Bird from *Sesame Street*, the *Teletubbies* are all very large in comparison to children, with Big Bird and Barney being larger even than adults. Big Bird is large by deliberate design, with the performer's outstretched right hand acting as Big Bird's head and neck (Spinney & Milligan, 2003).

Drawing is an accurate reflection about children's perception of their world. The research was able to begin to see the children's perspective by using the critical analysis of content or topic of children's drawing as the primary focus. That analysis was supported using the aesthetic quality of the drawings as a secondary measure to decode their drawings. Incorporating

a focus on the social component of the content of these drawings gives the research a third point to triangulate an insight into children's unique world view.

2.2 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 (Singer 2003, p.302). 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 (Figure 2.22)
- Focus group experiments
- Critical analysis of respondent data
- Iterative design with respondent data

Bowen (2009) suggests that 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" (p.41)(Figure 2.21). 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 (Crotty, 1998, p42-43). This project used an interpretivist theoretical perspective as a guide when analysing the qualitative feedback gathered from the action research methods outlined in Chapter 2.3.

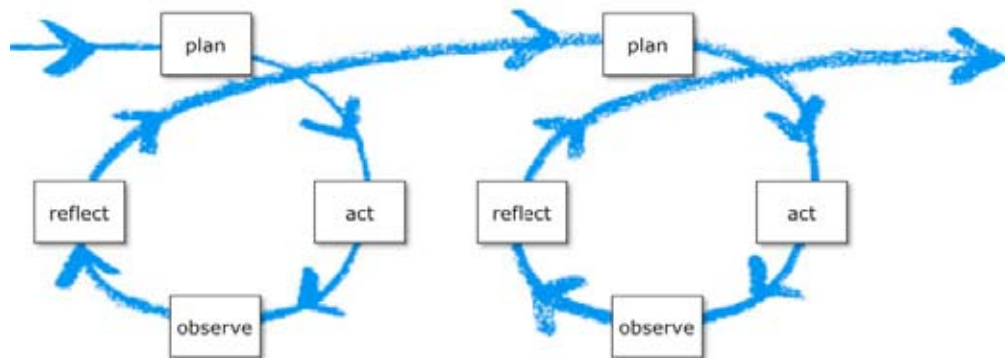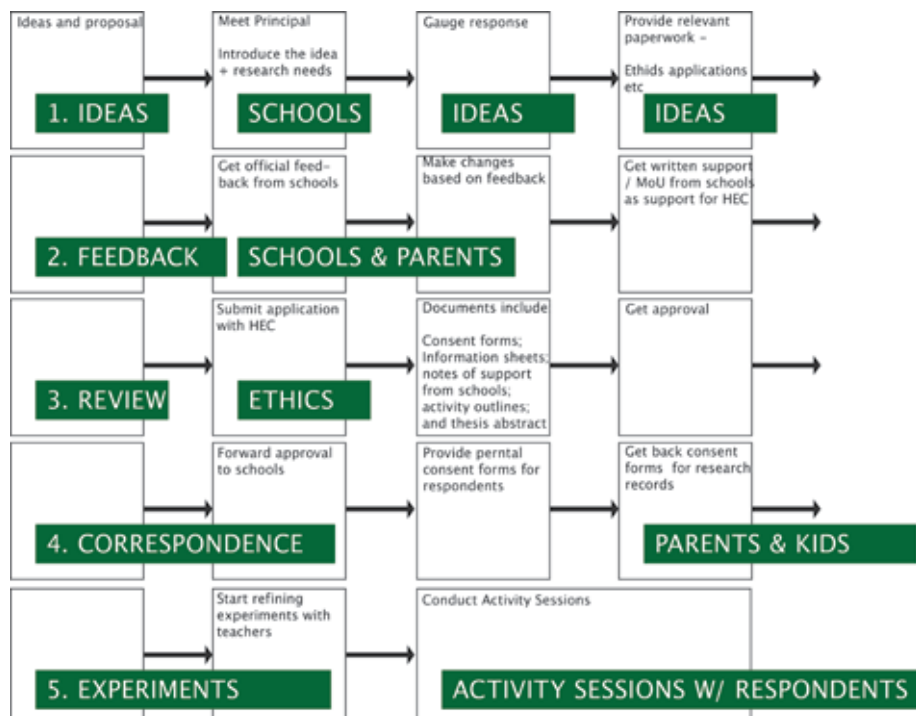*Figure 2.21.* Action Research as a series of cycles or as a spiral (2009)

Figure 2.22. Human Ethics process diagram

The respondent demographic of seven to nine year old children was chosen to correspond to the *concrete operational* stage as defined by Piaget's model of cognitive development. The project is particularly focused on the developing cognitive abilities of this demographic set. The research required experiments involving respondent interactions which focused on active projective techniques such as drawing and composing narratives to acquire qualitative data. The experiment sessions also featured an assistant observer to record an additional perspective to the primary researcher. These experiments typically involved a background class discussion introducing the experiment, followed by the individual activity and concluded with another class discussion. Consistent analytical processes were put in place to distil qualitative meanings from the collected visual work.

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.

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 (2003) observed that the medium affects the

society not by the content delivered, but by the medium's inherent characteristics (p.26-27), such as how television and computer games have been linked to promote more sedentary children due to the nature of its engagement.

For this type of projective research involving test groups of children, human ethics approval with the university was needed to ensure the research protocol was established and adhered to. The human ethics application procedure ensured that the experiments were necessary to the research and established guidelines that covered all aspects of interaction with the respondents who were external to the university (see Figure 2.22 for an overview of the entire process). The consent forms and information sheets required meant the experiments had to be articulated and clear prior to being conducted. The ethics process was the first step in research reliability and validity. The articulation of the process allowed for an early scrutiny of the methodology and allowed the research to focus on the salient issues.

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.

These 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.

2.3 Research Methods

The approach taken in this thesis was primarily action research based as the focus was interested in the opinion of the respondents. Active projective research methods within the action research methodology allow the respondents to be the cartographer of their experience. The respondents can share these maps in the form of drawings and verbal feedback. The primary methods that were employed were active research techniques combined with ethnographic observations within focus groups of varying sizes. Projective techniques can provide meaningful feedback from respondents, especially around more intangible issues (Banister and Booth, 2005, p.166). Ethnographic observations were used to determine the social habits and exchanges of the respondents within the environment of the school, the group dynamics of the class, and within smaller sub-groups.

The model for the experiments used here also doubled as an educational activity and creative exercise as the sessions were conducted during school hours. An additional observer was present to record ethnographic observations to supplement the primary observations made during the sessions.

The experiments were designed to understand the empathy that children have for other people or digital characters: a sign of mature cognitive development and effective empathic communication. This was made possible by allowing them to demonstrate *their* empathic abilities in relation to 3D character scenarios. McLuhan (2003) defines media as extensions of the body, thus analysis of media's effects on society needs to begin with analysis of the individual (p.19). Each session was designed for maximum interaction between the research and the respondents in order to understand the respondents and their relationship with current media.

The sessions managed the respondents effectively by breaking the classes down into different sizes for varying degrees of interactions with the different group dynamics. The classes were addressed as a whole, broken down to smaller sub-groups of five or six, as well as individual interactions. An additional observer was taking notes from another perspective as part of the research as the experiments were conducted with up to 27 respondents at a time. This allowed the research to have maximum interaction with the respondents verbally and integrated supplementary verbal feedback to go with the drawings. The group dynamics of the class as a whole were occasionally chaotic, but the smaller groups were easier to manage as a whole and yielded different data. As these focus group sessions were run in the familiar environment of their classroom under supervision of their teacher, the respondents were very comfortable and were both expressive and expansive in their feedback. The group dynamics and social support were also a major factor in encouraging honest, in-depth responses.

When the focus group sessions were broken down into smaller sub-groups, the researcher was able to engage respondents in loosely structured interviews. Certain questions were asked but the order of the questions were flexible, allowing the respondents to expand and elaborate on their creative work. Often there was urgency in the respondents to clarify their message in the drawings, and this generally included a narrative of why they did what they did. It was important that their message was communicated, and if the respondents felt that the visual renderings were not clear enough there always was a narration to supplement it to ensure clarity of communication.

The research gained insight via a multi-method methodology which initiated the analysis of the collected visual material. This process gained insight into the respondents' specific use of their aesthetic vocabulary. Understanding this vocabulary was the key to decoding the inherent narrative creativity and sophistication of the respondents. The content of their compositions revealed signs of abstract thoughts for others - a sign of intellectually mature cognitive development - indicators of both Cox's observations and Piaget's cognitive models.

Children use different tools to express themselves, and action-based research where the respondents are using projective techniques such as drawing or writing gives them the opportunity to crystallise their perspective into drawings. These drawn perspectives give an insight into their opinions and inclinations via their visual vocabulary. From this data set, I could then pick the salient points that tend to be the point of focus of children such as: popularity, both within their social hierarchy and popularity of cartoon characters, peer pressure in recognition of more popular cartoon characters, and their knowledge of marketing and advertising.

2.4 Precedent Investigations

This precedent investigation explored existing mediums of communication aimed at children, in particular television programmes, cereal packaging and advertising. Exploring the complexities of visual communication employed by these examples and gauging the varying levels of media literacy among respondents formed the basis for a critical repertoire analysis of current media. These precedent investigations provided some initial insight into the types of media that children are regularly exposed to and helped the research form a preliminary idea of the aesthetic vocabulary of children.

Some of the precedents explored in this investigation include the television program *Pocoyo* (Figure 2.41), a Spanish 3-D animated series aimed at children, and *Yo Gabba Gabba* (Figure 2.44), a North American program mixing live-action with stop-motion and traditional 2-D animation. Other precedents explored include: cereal packaging, such as products like Coco Pops, Frosties, and Froot Loops (Figure 2.46); "active" cereal advertising such as the Kellogg's Nutrigrain Ironman-themed advertising campaign (Figure 2.47); Nestle's Milo sports-themed campaign; and sports drinks advertising campaigns, such as Coca Cola Amatil's Powerade (Figure 2.48).

Pocoyo

Pocoyo is a Spanish-based animated series that premiered in 2005 and has since been translated in many languages across Europe. It features evocative imagery using simple pastel colours that are set in a white backdrop. This design allows the characters and props to stand out and emphasize narrative without the focus being on the background environment. The episodes are narrated, with each character speaking in single word exclamations, but the animation itself stands well on its own. It has a rather simple visual style

Figure 2.41. Pocoyo screen captures (2005)

42

Figure 2.43. Fruit (2006)   *Figure 2.42.* Pastry (2006)

From now on Pocoyo will not eat any more ice-creams and Pato [the bird] will only eat fruit. I'm sure it seems like we are taking quite a radical stand, because we all know that one ice-cream won't harm anybody plus the fact that we are limiting ourselves in terms of our scripts by doing so, but it is possible that by making this positive change, we may influence our children. If just one of them decides to imitate the eating habits of our characters, then it has been worth it ... any opinions? (Cantolla, 2006)

with soft shadows reminiscent of softly ambient-lit environments. The series is engaging regardless of the language of narration. It is reliant on a cast of characters and each character has a very distinct personality.

David Cantolla, Luis Gallego and Guillermo Garcia Carsi, who are the creators of *Pocoyo,* respect their social responsibilities, taking care not to use imagery of junk food in the programme. Instead the characters of *Pocoyo* will eat only healthy food. Cantolla, one of the creators of the programme, reflects:

From now on Pocoyo will not eat any more ice-creams and Pato [the bird] will only eat fruit. I'm sure it seems like we are taking quite a radical stand, because we all know that one ice-cream won't harm anybody plus the fact that we are limiting ourselves in terms of our scripts by doing so, but it is possible that by making this positive change, we may influence our children. If just one of them decides to imitate the eating habits of our characters, then it has been worth it … any opinions? (Cantolla, 2006)

Yo Gabba Gabba

Yo Gabba Gabba is a television programme aimed at children by Christian Jacobs and Scott Schultz that is an award-winning programme that combines live-action, with stop motion animation and traditional 2-D hand-drawn animation. *Yo Gabba Gabba* was nominated for a Daytime Emmy in 2007 and 2009 (Wildbrain Entertainment, 2009) and won the International category of the BAFTA Children's Award (Wildbrain Entertainment, 2008). *Yo Gabba Gabba* was also recognised as one of the top ten new television series in 2007 by *Time Magazine* (Poniewozik, 2007).

Figure 2.44. Yo Gabba Gabba screen captures (2007)

The images in Figure 2.44 were taken from the program's first season and come from the first episode, entitled "Eat". This particular segment from the episode features the song "Party in my Tummy". This segment was especially interesting – *Brobee* (the green protagonist) eats the meat and cheese characters, but not the carrot or beans characters. *Brobee* proceeds to announce, "There's a party in my tummy!", hence the title of the song. The main exhibition of empathy is the segment where *Brobee* recognises the sad vegetables and eventually invites them to the party in his stomach by eating them as well.

The very bright colours of the characters are in contrast to the more pastel shades of *Pocoyo*'s characters despite being aimed at the same age demographic. The final visual language is almost psychedelic, the bright colours and fantastic creatures that come to life present a vibrant, engaging narrative.

Yo Gabba Gabba is a natural heir to the *Teletubbies*, returning rave music and hip-hop to children's television. *Yo Gabba Gabba* does not only appeal to children, but has attracted the attention of audiences in their mid to late 20s, as well as the parents of the children watching (Friedman, 2008). It is leading a renaissance of "cool" television shows for children that have an appeal to adults as well.

Figure 2.45. Cereal Aisle (n.d.)

Figure 2.46. Kellogg's Cereal Products (n.d.)

Cereal packaging

Any cereal aisle at the local supermarket now assails the consumer with a wild variety of choices, each box or package of cereal louder than the last. Kellogg's Coco Pops and Froot Loops are a prime example of cereal packaging designed specifically to be strongly marketed at children. The archetype of this packaging typically involves an animal mascot: Tony the Tiger in the case of Frosties, set onto a brightly coloured box. The first three cereals in Figure 2.46 use bright primary colours as the background, the mascot set in the mid ground in a corner interacting with the cereal, and the cereal prominently in the foreground.

In 1997, breakfast cereal companies in the United States in general were estimated to have spent up to US$792 million in advertising (Story and French, 2004, p.2). This form of advertising as a medium has managed to transcend its fundamental purpose to now be considered something of an art form. Bogost (2007) describes this phenomenon as associative advertising - advertising that is almost no longer related to the product. Rather it is about the experience of using the product, or the lifestyle that the consumer is buying into when they purchase the product (pp.153-154). An example of this is how McDonald's advertising to children is more about the "fun" space of the McDonald's restaurant and toys that come with their Happy Meal, and less about the food in the Happy Meal itself. Going to McDonald's is rarely about the meal, but the experience of the toys and the designated play areas. Similarly, cereals have been packaging toys and collectibles to encourage cereal sales for a long time.

Advertising for sports hydration has always been a very dynamic medium filled with intensity. More recently, cereals targeted at children aged below 12 have adopted this same energetic message and have started to using more sports-filled imagery in order to imply that their cereal are going to fuel children's physical activities. Cereals such as Nestle's Milo and Kellogg's Nutrigrain have been promoting their products with this energetic, vibrant rhetoric. Nutrigrain in particular has a successful campaign involving an Ironman theme.

Advertising

Advertising's relationship to children is a widely discussed topic among popular media, educational institutions and between concerned parents. Children are exposed to increasing levels of exposure to advertising across all media. Children are vulnerable to such subtle, even subliminal, messages, and their parents are in a constant struggle to cope with these extraneous demands. Advertising, in coalition with toys, popular films and television programmes, prominent packaging in shopping aisles, as well as the peer pressure to conform exerts formidable pressure on parents to concede. In 2004, children between the ages of 4 -13 accounted for 60% of household buying decisions in the European Union (Raymond, 2004, p.16).

The ability to understand the increasing complexities of visual communication employed by advertising and having an appreciation for the varying levels of media literacy of children are central to forming a basis for a critical repertoire analysis of current advertising. Children have a strong association to advertising for various reasons, including the multi-layered nar-

Figure 2.47. Nutrigrain Commercial screen captures (2009)

Figure 2.48. Powerade All Blacks Commercial screen captures (2006)

ratives and engaging content. Gaining insight to that engaged relationship provides a theoretical framework for designing an alternative conversation that engages the audience and encourages another perspective.

Crucial to advertising literacy is the ability to distinguish advertisements from programs and the ability to recognize the persuasive intent underlying advertising (Livingstone & Helsper, 2006, p.562). The experience is increasingly similar between watching advertising and watching programming as the content of both is becoming increasingly enmeshed. Worryingly, advertising literacy in children does not equal imperviousness to the advertisement message at any age (Story and French, 2004, p.14) (Livingstone and Helsper, 2006, p.576).

Lawlor and Prothero support this observation, as their research found a sample of respondents aged between eight and nine years of age to have a remarkably sophisticated understanding of advertising intent. The same respondents also display an insight into advertising beyond the advertiser's intent. Regardless, the respondents still have an appreciation for advertising, even professing to have favourite advertisements. This means they are still predisposed to developing an empathic bond with synthetic characters that are clearly designed with an underlying motive (Lawlor & Prothero, 2006, p.421). Having the ability to decipher the semantic language of advertising and being able to separate the programming and advertising does not mean that advertising is not able to communicate to this demographic. The symbiotic nature of the medium and the message in contemporary media (McLuhan, 2003, p.25), particularly in advertising makes their separation nearly impossible by younger children. It seems advertising is able to successfully communicate despite the media savvy nature of its audience.

Increasingly, older children are not consciously filtering advertising content from programming. Story and French (2004) support Livingstone's conclusion by determining that respondents aged eight to ten have the cognitive ability and media savvy to process the advertising, but do not do so. They question the direct correlation between the level of literacy and level of advertising effects, citing a lack of consistent evidence to support the status quo of children with a lower level of media literacy are automatically more susceptible to the effects of advertising (p.3). It is not that children cannot make the mental switch between programming and advertising, they are simply choosing not to.

2.5 Respondents' Description

The chosen respondent demographic is 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. There was no discernible gender or racial bias in terms of class numbers.

This respondent demographic was chosen to correspond to the *concrete operational* stage because of the state of mental flux in their cognitive development. As previously noted, Piaget's theory of the cognitive development of children defines three stages of operational stages: the *pre-operational* period, the *concrete operational* stage, and the *formal operational* stage. This age group was very interesting, as the respondents have reached a sophisticated stage of mental development and possess varied communication skills. The respondents had no inhibitions in expressing opinions and providing feedback regarding the research. The respondent psychographic was dynamic and expressive, and their visual output demonstrated this via a varied vocabulary of visual expression. Effective communication should contain a multi-tiered model of narrative in order to engage the vast range of media literacy skills of the respondents.

As part of an iterative design process centred on user group feedback, there was significant repeated interaction. The knowledge of primary-level teachers and the opportunity to test out research concepts on focus groups of different sizes was invaluable. Particularly, the experience of the primary teachers with organizing children and managing their attention spans was important to run the activity sessions at the schools as smoothly as possible.

Along with their high enthusiasm, this age demographic has a highly developed group dynamic. This underlying social hierarchy is particularly important, as digital characters need to be able position themselves within the social construct in order to communicate efficiently. An excessively authoritarian or adult role, or at the other end of the scale, an excessively infantile role is not very productive at all.

The volatility of the respondents' mental cognitive state presents 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.

As noted before, their learning patterns also reflect this form of knowledge. They learn most efficiently when engaged in active or personal research, as opposed to being engaged in a one way teacher to student interaction. They are building the essential functions of intelligence by constructing internal mental models through structuring their environment (Piaget, 1973, p.148). This project explored this internal structured reality via a selection of methods covered in Chapter 2.4.

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 (Lawlor & Prothero, 2003, p. 422). 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.

Chapter 3 - Research Outcomes

3.1 Experiment Aims and Objectives

The question that this research explored was: can creating an empathic bond between 3-D characters and children communicate a healthy nutrition message effectively? The experiments were conducted with four primary objectives to understand children's unique perspective on their environment:

- to explore children's perspective with food;
- design a range of characters utilising an empathic relationship for effective communication;
- understand children's empathic relationship relative the designed 3-D characters;
- and test the characters for empathic effectiveness.

This was done by conducting a sequence experiments that explored the four objectives in detail.

The main aim for the research was to gain a better understanding of children's unique perspective of the world in order to answer to the research question. This was achieved by interpreting the cognitive sophistication of children via qualitative data collections, which was verbal, written and drawn feedback produced from Experiment 1. This experiment's objective with the respondents was designed to explore children's perspective on several issues, primarily on the respondents' knowledge of food in general, and their relationship with food as a whole and to gauge their mental development state.

The iterative design process was central to the next objective, designing a cast of characters that is capable of engaging emotionally with children to communicate a specific message via a process that allows for maximum input from the respondents. This was achieved by designing an appropriate experiment where the respondents were required to construct their own visions of

3-D characters to begin exploring the visualisations of their social hierarchy. The goal was to gather visual feedback and details to establish a basis to begin designing a cast of characters.

The third objective was to understand children's empathic relationship relative to 3-D characters. The third experiment was designed get an audience response to the 3D characters designed from Experiment 2. This experiment required the respondents to create a narrative based on these characters, which allowed the respondents to create their own scenarios and articulate their relationship with the designs.

This cast of characters that were developed through the iterative design process with the respondents were then tested for effective engagement and empathic connectivity. The fourth objective was to test the engagement factor and potential success of the final designs in the final experiment. The final experiment was run with the six final production characters that were separated into varied scenarios, and was tested on a control group that had no prior knowledge or exposure to the product.

The four objectives of the experiments were directed towards the main aim of understanding the perspective of children in order to create an empathic bond between 3-D characters and children.

3.2 Experiments Overview

Each experiment followed a carefully planned structure designed to make the actual focus group session as productive as possible. The hypothesis was designing for children with the feedback from children helps designers create the empathic bond between the children and the designed characters. By having an active role in the design process, the children significantly influence the potential empathic engagement value of the final designs, plus play a role in pre-determining the potential responses from a wider audience. Iterative designing with children involved two processes conducted in parallel – the focus group feedback, plus an active creative process that included this feedback and the designer.

The iterative design process included the following activities:

- Design experiments.
- Feedback from teachers.
- Test experiment on initial respondents.
- Creative / critical feedback from supervisors.
- Brooklyn Primary School (Session 1).
- Houghton Valley Primary School (Session 2).
- Observation notes / Verbal feedback / Visual results.
- Conclusion
- Design.
- Repeat.

The experiments were first conducted with two respondents to gauge potential outcome before being conducted at the schools. This was always the first activity for each experiment conducted with any respondents at all

and always turned out to be a learning experience. Managing the interactions, the test environments, ensuring the experiment kits were adequate, and managing the respondents themselves was an involved activity.

The pre-experiment review was to make sure the sessions at the schools would run as smoothly as possible, plus to make sure that the experiment kits provided would be adequate for the number of respondents. The far smaller focus group also meant that any hiccups could be resolved quickly, and provided the experience to prepare for further contingencies.

3.3 Experiment One

The first experiment with the respondents was designed to explore several things: notions of scale where Cox (2005) suggests positive emotional attribution to characters drawn at a larger scale, the social structure of children; the importance of physical similarity between self portraits and portrayed characters in relation to empathy and social structure; the respondents' preferred sports or activities; the respondents' knowledge of healthy food; the respondents' knowledge of food in general; and their relationship with food as a whole. These were initial explorations into their perspective and understanding what was important to them.

The benefit of the visual outcomes was a gauge of the visual sophistication the children can achieve, as well as a gauge of their intellectual development and aesthetic vocabulary. This is done by referencing Luquet's (1927) theory of when *intellectual realism* starts to transition to *visual realism*. When compared to the Piaget's (1969) theory of cognitive development (which was based on Luquet's observations), this then provided a good marker for estimating the stage of cognitive development.

The experiment consisted of two separate drawing sessions. The first sheet was food-related with the first two drawing questions being "Can you draw 5 types of healthy food?" and "Can you draw 5 of your favourite foods?". The second sheet was a little more complex, with a single question asking: "Can you draw you, your best friend, and your favourite T.V. or cartoon character playing your favourite sport?". The four elements of self-portrait, portrayal of other child, portrayal of synthetic character, and the outdoor activity blended to produce some very interesting results for the research.

The children were provided with an experiment kit – which consisted of colour pencils for each group and the two A4 drawing sheets ("Draw your favourite foods" and "Draw healthy food"). They also had pencils and other drawing utensils of their own. Each drawing activity was preceded by a brief class discussion of the topic as both a warm-up, and to gather early verbal feedback for the session. This also introduced the topic of the activity and encouraged the respondents to begin to think about the experiment ahead.

With the verbal feedback, it was immediately apparent that parents exert a great deal of influence in shaping many aspects of their child's future lifestyle choices. The respondents' knowledge of sport and outdoor activities was naturally related to what was played at school, plus also greatly influenced by their parents' interests. The Saint Louis University School of Public Health tested a program that taught parents in their homes how to provide preschool children easy access to more fruits and vegetables. The study examined the parallels between what the parents ate and how this affected what their children ate (Williams, 2008). The consensus was that children eat what their parents eat. The respondents' knowledge of food, particularly the respondents' knowledge and relationship to healthy food are formed by the parents' relationship and attitude to food at home. A majority of the healthy options depicted were foods prepared at home, such as pasta or soup.

Fruit was a very popular healthy and favourite food choice, with more than 90% of respondents identifying some form of fruit as healthy, and up to 50% claiming that some form of fruit was one of their favourite foods. Vegetables were less popular, with 8% identifying vegetables as one of their favourite foods. There were interesting favourite food choices as well, such as sushi (15%) and in one case, oysters (Figure 3.32). Some respondents voiced some adult, if not particular accurate, concerns regarding why fruit

was good for you. The preferred theory of a few respondents was that fruit had no sugar, and was therefore good for you. One respondent was adamant bananas were healthy because they contained protein. These were very mature opinions about the health factor of food.

Researcher: *"What do you think is a healthy food?"*
Respondent: *"Bananas. Because it's got a lot of protein and vitamins"*

Branding was obviously a rather important identifier of favourite foods, such as the Subway wrapped sandwich or the Nestle KitKat chocolate bar in one example of Figure 3.33. The same example also features generic chocolate for good measure.

There was a noticeable trend leaning towards fast food. 65% of respondents liked a form of fast food as their preferred food, and 57% preferred some form of candy or confectionary. Figure 3.33 have some beautiful examples of this enthusiasm, involving some hyperbole of favourite foods such as the jelly piled high or the oversized bacon strips complete with exclamation mark.

The visual results also showed that scale generally had little to no relevance, with all portrayed characters at roughly the same height regardless of whether it was a self-portrait or not. None of the examples below shows a distinct difference in size. However, there was a very apparent link between physical similarities as basis for social connections. More often than not both children were drawn similarly or wearing similar clothing. Many candid comments during the experiment were also recorded, many noting the similarities between them and their friends.

Figure 3.31. Selected visual results from Experiment 1
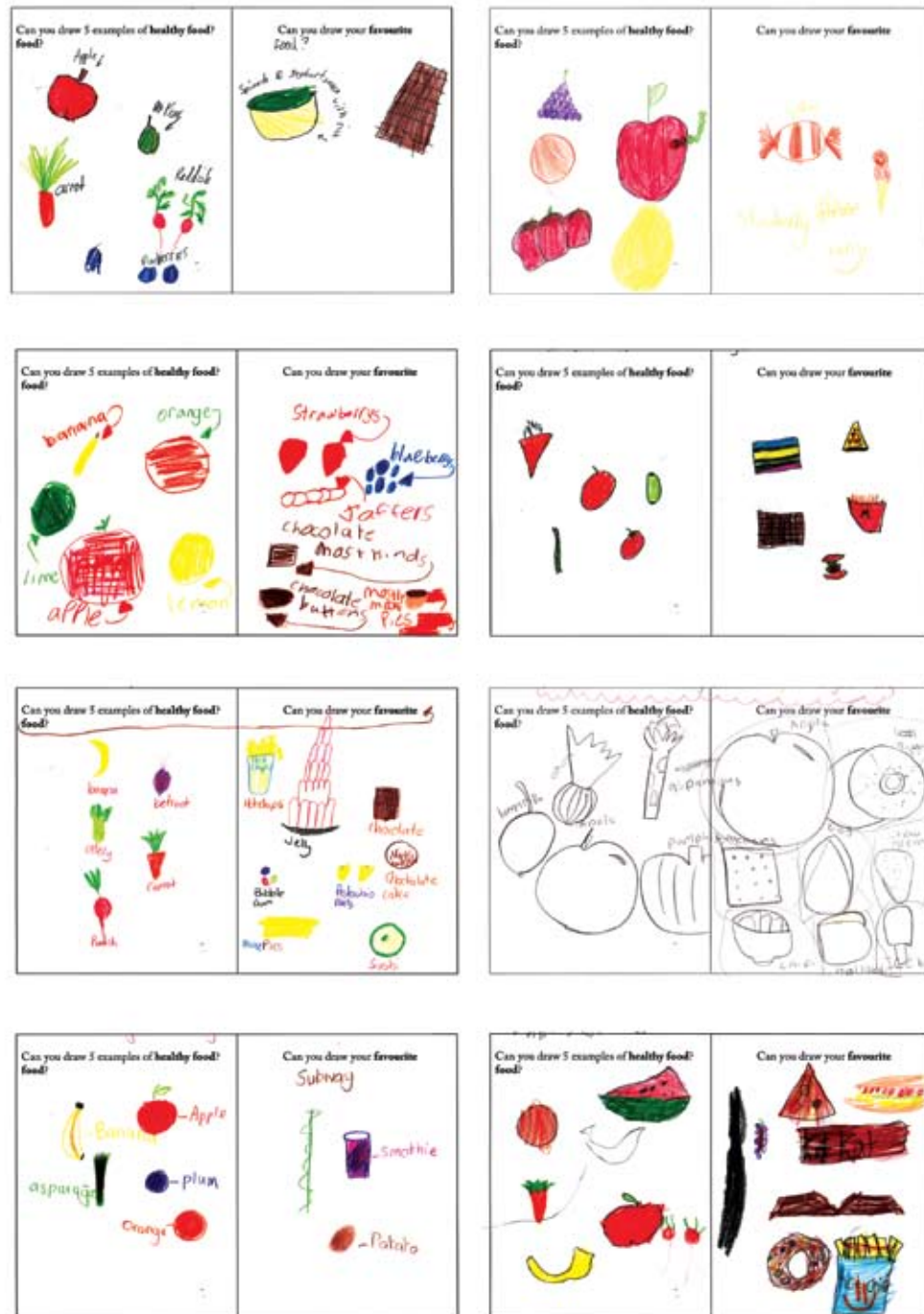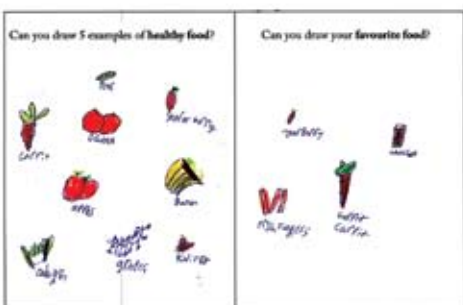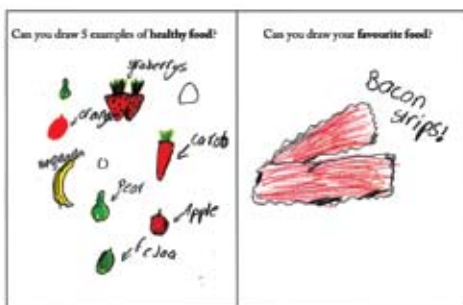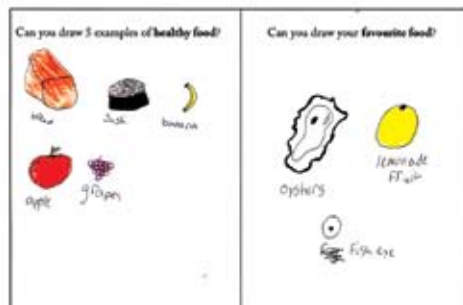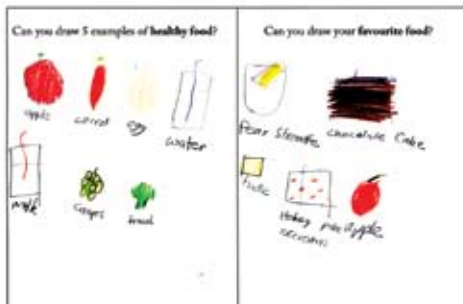
Figure 3.32. Selected examples of healthy foods

Figure 3.33 Selected examples of favourite foods
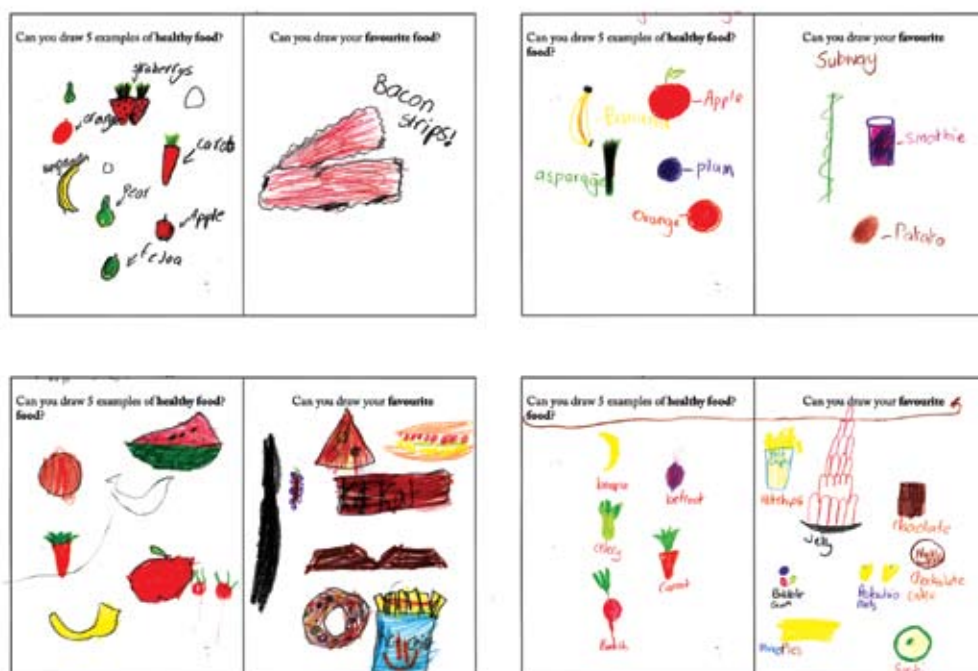
Verbal feedback received during activity sessions:

"Cheese, my favourite food, cheese for strong bones."
"Cheese is made of cows."
"Bananas. Because its got a lot of protein and vitamins"
"Strawberries. Its got vitamins like vitamin B."
"Oranges. Its got vitamin C."
"Cheese. Because it has calcium."
"Apples. Gives you strength."
"Apples. It's a fruit and has no sugar."
"Strawberries. Because they're a fruit and fruit is good for you."
"Orange. Got lots of vitamin C."
"Passionfruit. Not got heaps of sugar."
"Bananas. It's a fruit and has no sugar in them."

Collected experiment results from Experiment 1. ("Food", left; "Characters", right)

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Figure 3.34. Selected visual results from Experiment 1
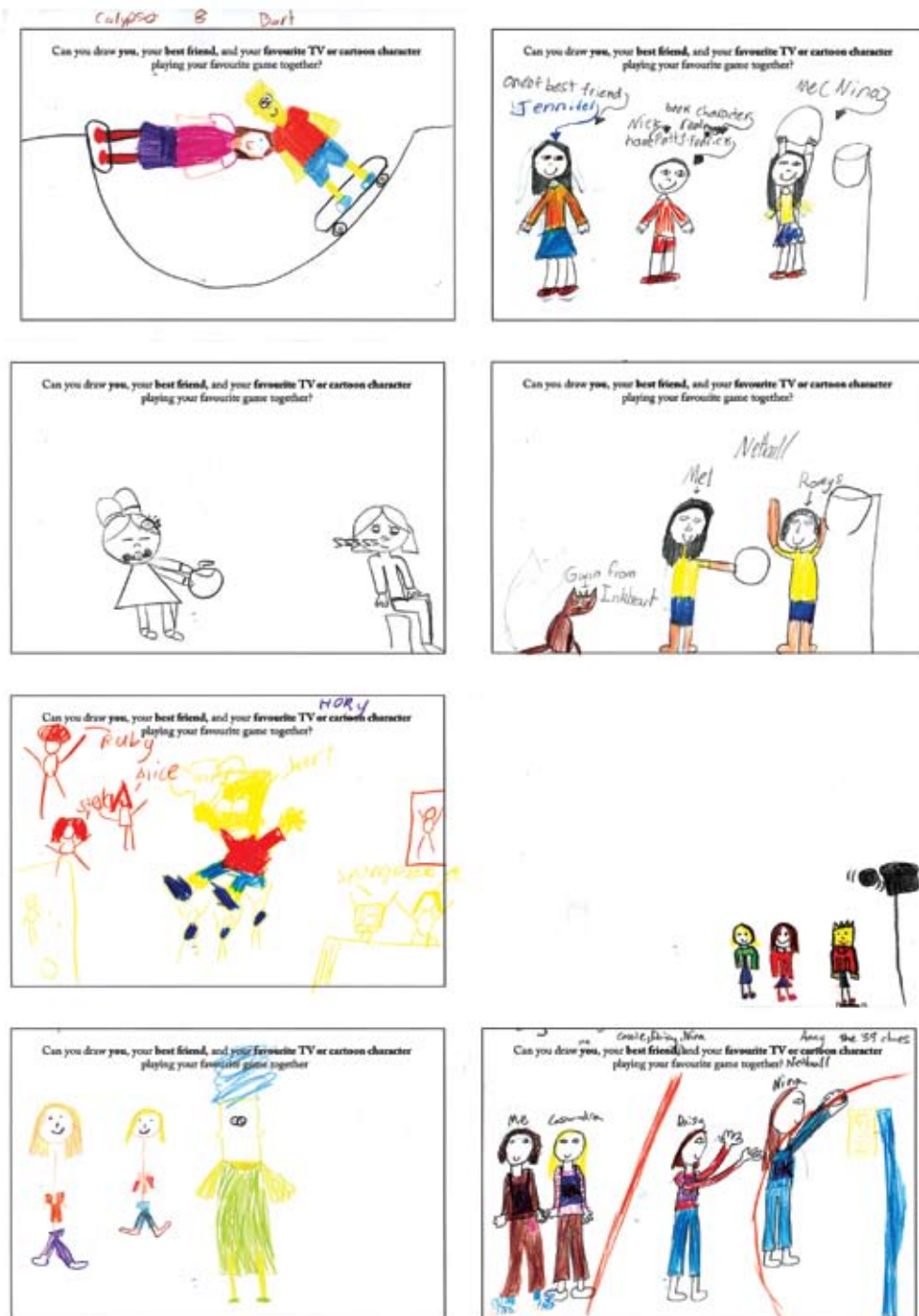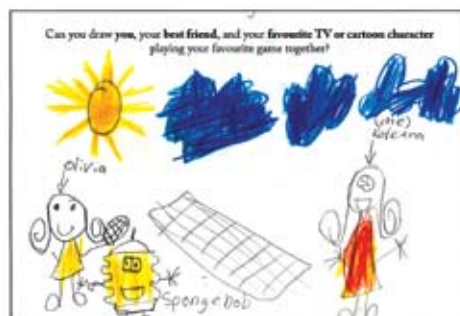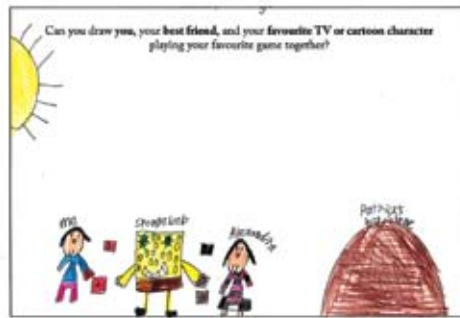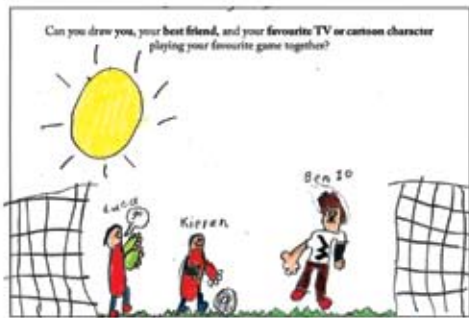
Figure 3.35. Selected compositions displaying scale
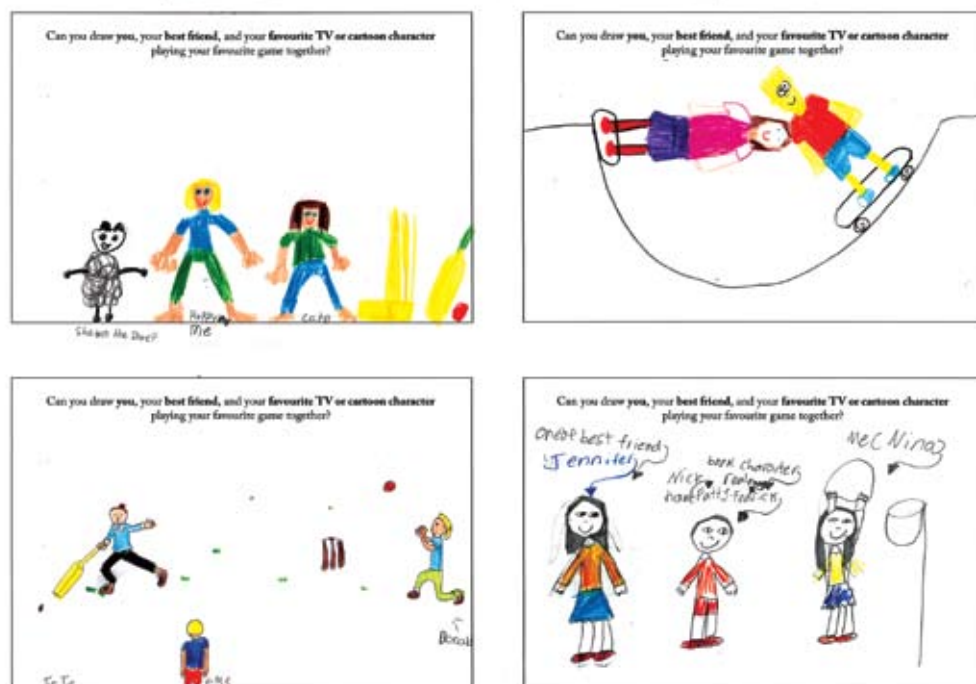
Verbal feedback gathered during the activity sessions:

"Stewie, the person I'm drawing is the same as Stacey is."
"My best friend is invisible."
"I'm drawing my best friend. People used to think we were sisters!"
"Do you think that looks good enough for him?"
"Sonic!" "Who's Sonic?"
"No, Tom from Tom and Jerry, Did you think it was my dog?"
"It looks like Kate is going to get knocked on the head by something."

Figure 3.36. "Curling"
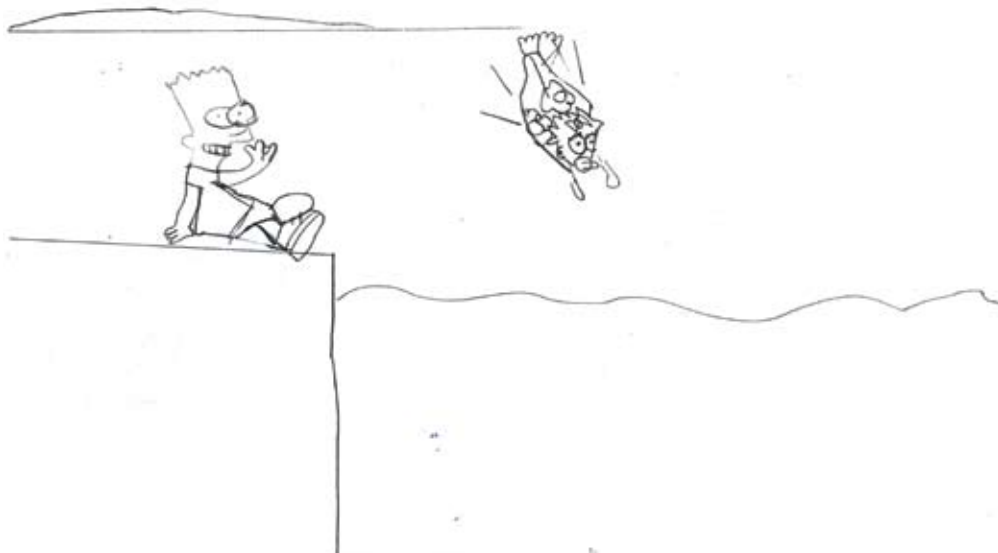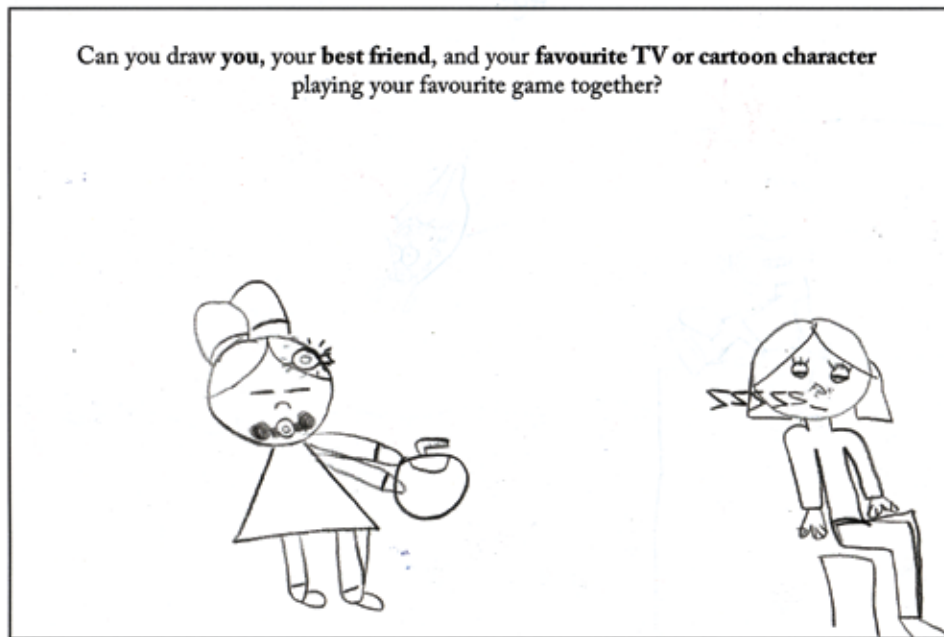
There was peer pressure to conform even at this age as shown in Figure 3.36. Creative individualism was not encouraged by the group. For example, there was a really interesting concept: an imaginary character curling (the obscure Scottish sport played on ice) complete with an accurate curling stone (Figure 3.36, left). This great example of creative individualism eventually reverted to the more popular *Simpsons* characters Bart and Maggie swimming (Figure 3.36, right).

The creative results achieved by the research as a result from the gathered visual material were initially less impressive. However the visual results collected did resolve in a far stronger second experiment that had more focus in terms of character design, but managed to incorporate different methods of visual expression such as collage plus introduced a more streamlined palette of shapes and colours available.

3.4 Experiment Two

In Experiment 2, the respondents were required to construct a multi-layered collage from the provided experiment kits. The aim of the experiment was to gather visual feedback to establish a basis for creating a cast of characters. The respondents were required to design their own versions of a protagonist and an antagonist combining the provided shapes and textures to create these characters. The collage process was a little complicated, requiring the respondents to first cut out a food outline, then paste this transparent outline onto a colour sheet, and finally cut out the combined outline and colour sheet. This yielded the first part of the created character. The above process was repeated with limb outlines and facial feature outlines to create collages of a "good" character and a "'bad" character.

The focus was primarily on character design based around food-shapes and various body parts, and incorporating associations between healthy and unhealthy food types and "good" and "bad" characters. This ended up being the most exciting experiment, both for the research and for the respondents. The collage activity was well received, with the respondents genuinely enjoying themselves. There were some minor hiccups initially with the preliminary session with the first two respondents, but these issues around the collage process were resolved quickly prior to the two experiments at the schools.

The experiment kit consisted of A4 food images, A4 transparencies (Figure 3.41 and 3.42) and an A4 template sheet to stick their designs on. The respondents were also given colour pencils, multi-coloured felt-tip pens, glue sticks, and scissors, and were encouraged to embellish their designs with as many details as they wanted. Like Experiment 1, to introduce the topic and activity there was a class discussion prior to the experiment as a warm-up. This served as an introduction to the topic of the activity and clarified any questions regarding the entire process.

The visual results obtain from both sessions were sophisticated for the age group and informative at the same time. The respondents intuitively followed the theme of the class discussions and prior experiments, the "good" and "bad" characters manifested in stereotypical description, i.e. "because he has a smiley face" or a certain character was "bad" because "he was fat and had short legs", and therefore couldn't walk.

Some more verbal feedback around a similar theme:

"My baddie first he is so fat, he can't even stand up."
"Mine's a fat guy - this is his stomach, his little legs."
"Because he's fat and can't walk."

Bias against fat or obese characters was relatively obvious, with fat characters regularly portrayed as the "bad" character. Similarly, Latner found bias against fat children are apparent in children as young as the age of three, who view drawings of chubby children as mean, as possessing negative characteristics, and as undesirable playmates (Latner and Stunkard, 2003).

Figure 3.41. Food images / Colour sheets for Experiment 2
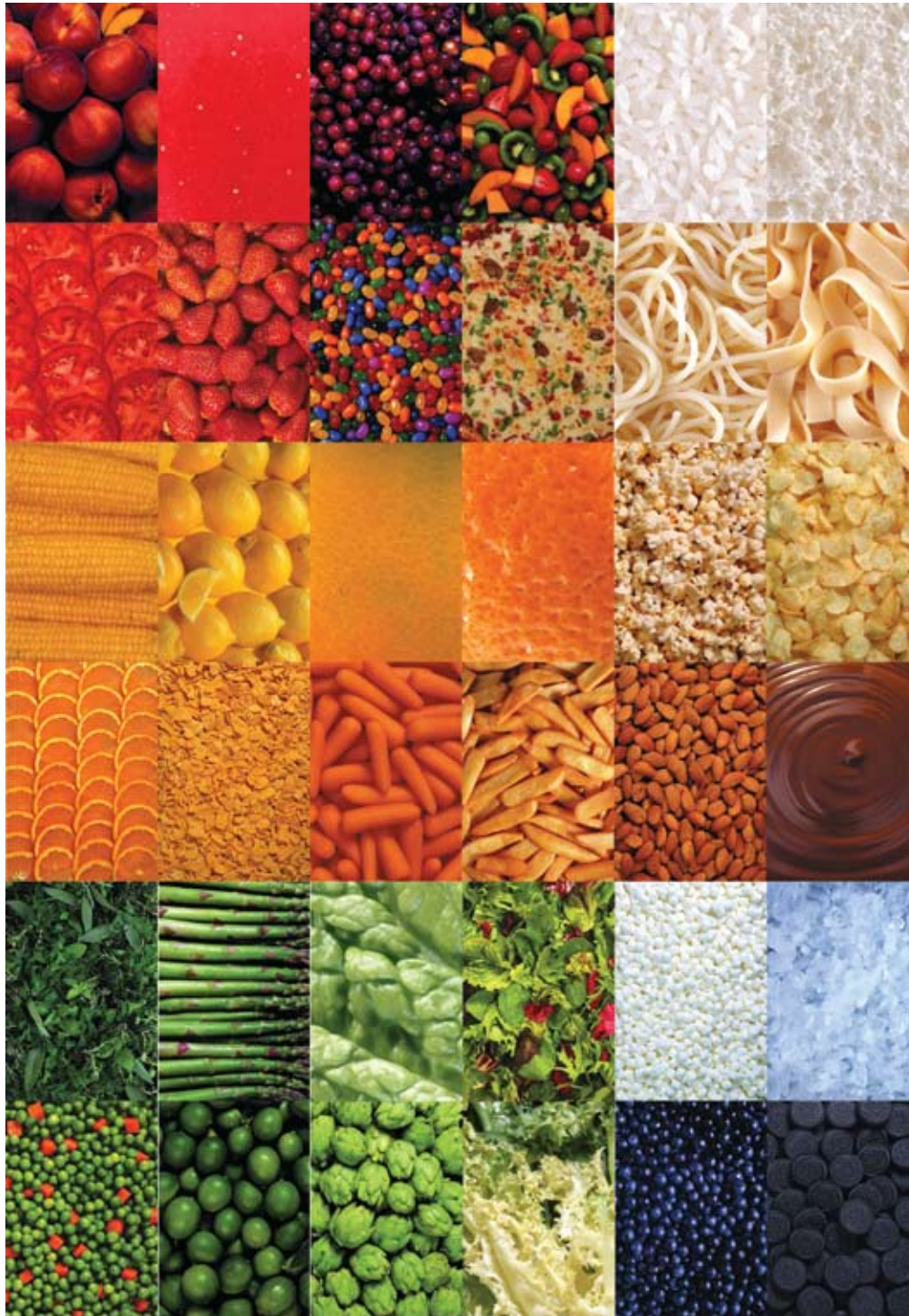
80
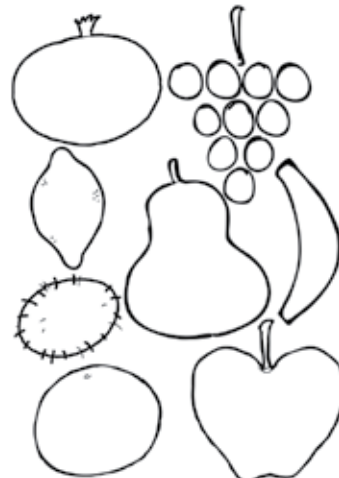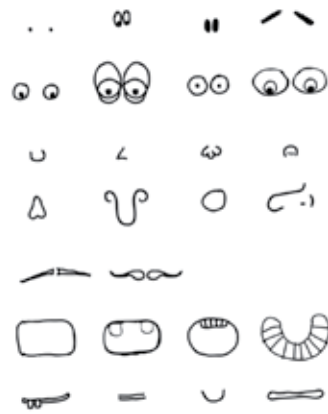
Figure 3.43. Examples of compositions involving fat characters

Verbal descriptions of their designs during the activity sessions:

"My baddie first he is so fat, he can't even stand up."
"Mine's a fat guy - this is his stomach, his little legs."
"My evil guy takes over the world."
You can use the circle you can use the egg."
"He's into spies, looks innocent but is a baddie."
"Because he's fat and can't walk."
"Ice cream and marshmallows and ice are a goodie"
"My baddie is going to have a chicken neck"
"Evil ice cream. Because it's a baddie, it's bad for you."
"My bad guy is going to be cross-eyed."
"This is my bad guy Mr. Know-it-all. And this is my good guy Mr. Cutie."

Figure 3.44. Selected Visual Results from Experiment 2

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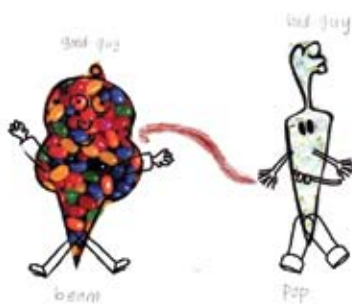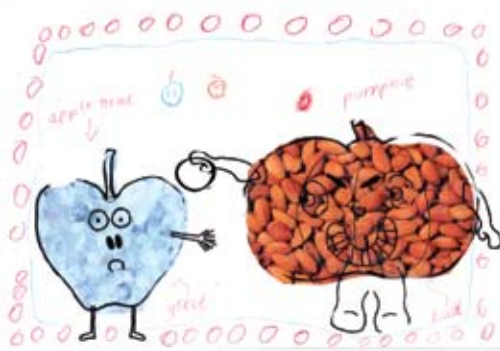
Collected experiment results from Experiment 2. ("Goodies", left; "Baddies", right)

bad

mr bad guy

bad guy

Pop

Evil pop

The herb Man...

bad

long kmg

baddy

unhealthy meanie

Jellybeaner (gangster)

fat guy

Bad guy
name: ledgleg
Age: one google

I will win

Penny age 8½

Baddie

mr eggy

Baddie

Figure 3.45. Vector templates
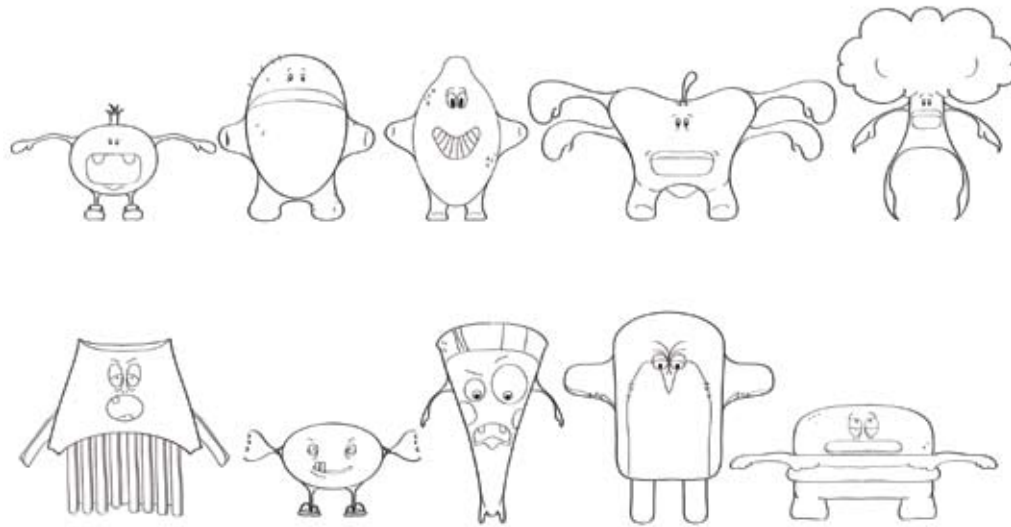
Figure 3.46. Initial 3D models

Creative results from Experiment 2

The collages provided an appropriate material to work from. A wide range initial pencil sketches were inspired by the collages. Those sketches were then refined to a short series of hand inked drawings that were then converted to line vector characters created in Adobe Illustrator. The better vector characters were extended to a smaller selection of 3-dimensional models created in 3D Studio Max, a 3D animation programme.

The vector drawings (Figure 3.54) were a continuation of the original aesthetic from the Experiment 2 collage material. The layering of the collage then inspired the illustrated ink and flat paint comic aesthetic in the 3D models. The designs from this experiment were taken back to the respondents for further feedback and testing in Experiment 3.

3.5 Experiment Three

The third experiment was designed get audience feedback to the 3D characters designed from Experiment 2. This experiment required the respondents to create a narrative based on these characters. One of the aims of the session is to refine a list of ten characters down to six preferred characters with respondent feedback. The final session also aimed to find out what was the level of narrative sophistication of the respondent demographic. A three frame template, corresponding to a simplified narrative model of Freytag's five point narrative pyramid was used (MacEwen, 1900)(Figure 3.51).

The introductory discussion for this experiment included feedback on the initial 3-D designs to see what was successful and what was not. Out of the ten models (pictured above), five were designed as "healthy" characters, and the other five "unhealthy" characters. There was some healthy discussion about the health factor of the characters between the respondents, plus whether this health factor made them "good" or "bad" characters.

The feedback was helpful, and in candid detail the prototype characters were dissected in terms of colour, shape, detail, whether they were healthy or not, whether they were "good" or "bad". Some feedback was contrary to the group for the sake of being contrary, and this was part of the group dynamics of working with an entire class. All opinions were noted for the sake of the experiment, but determining whether the characters were "good" or "bad" were eventually decided democratically through votes from the entire respondent group. There was great critical design feedback regarding the characters, and the less suitable or less successful designs were eventually reduced from the cast.
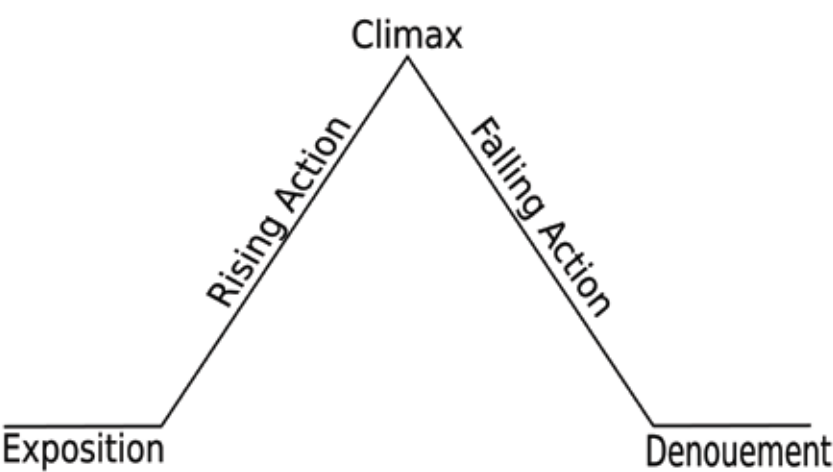
Figure 3.51. Freytag's pyramid (2006)

Climax

Rising Action

Falling Action

Exposition

Denouement

Figure 3.52. A3 template sheet for Experiment 3

Name:_____   Age:_____

Table 3.51. Quotes related to individual characters

Here are some selected verbal quotes from the class discussion:

"Good character but could be bad."
"Sometimes people disguise themselves as good."

"Bad character,"
"...but good because he has four arms!"

"He looks evil because he's red and has four arms."

"Good. Its good for you."
"Good guy because he's green, healthy and a super food."
"Good. Because people want to eat him."

"Kiwifruit is the fruit with the most vitamin C."
"Kiwifruit on the good side, kiwi, he's awesome."

"Good because it's healthy if there's lots of healthy stuff in it."
"He's got lettuce in it and a patty."

"Fried legs."
"Bad side because he's unhealthy."

"Bad, because he has one eye bigger than the other."
"He hasn't brushed his teeth."
*"I think he's bad because he looks scary."*

The second portion of the experiment, the respondent's narrative drawings revealed a sophisticated understanding of narrative and traditional story line. The respondents were very articulate about the story lines they had created: being able to narrate chronologically, display cause and intent, and in most cases, concluded with very satisfactory results. Each visual narrative was accompanied to some degree with a verbal supplement to make sure their point was understood.

The final visuals were exciting results for the research, and were a satisfying conclusion to the second run of research with the respondents. The semantic language involved in the narrative of these drawings was more important than the aesthetics. The respondents proved that they were capable both of producing and understanding alternative three-step narratives, as long as it retained two or more steps of a traditional narrative model. The respondents are able to unpack and decode a narrative, exposing their sophisticated understanding of media.

Some respondents (approximately 35%) wanted to extend the three frame model to involve more complicated narrative setups. While these were not always as successful due to the time constraints of the experiment, the results do demonstrate an ability to extend the simple narrative model and convey a more complicated story line.

Figure 3.53. Selected visual results from Experiment 3

Collected experiment results from Experiment 3.
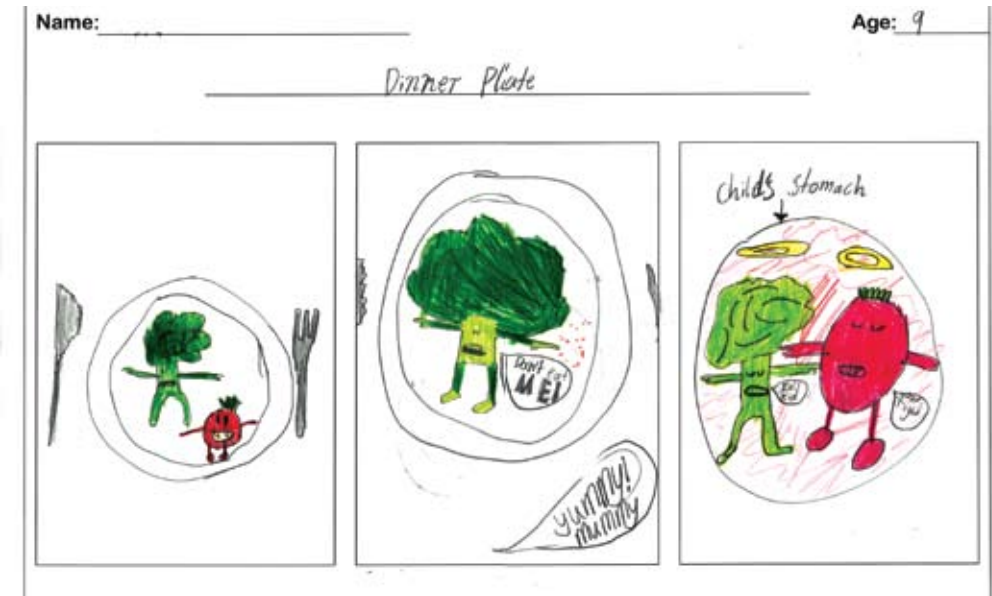
94
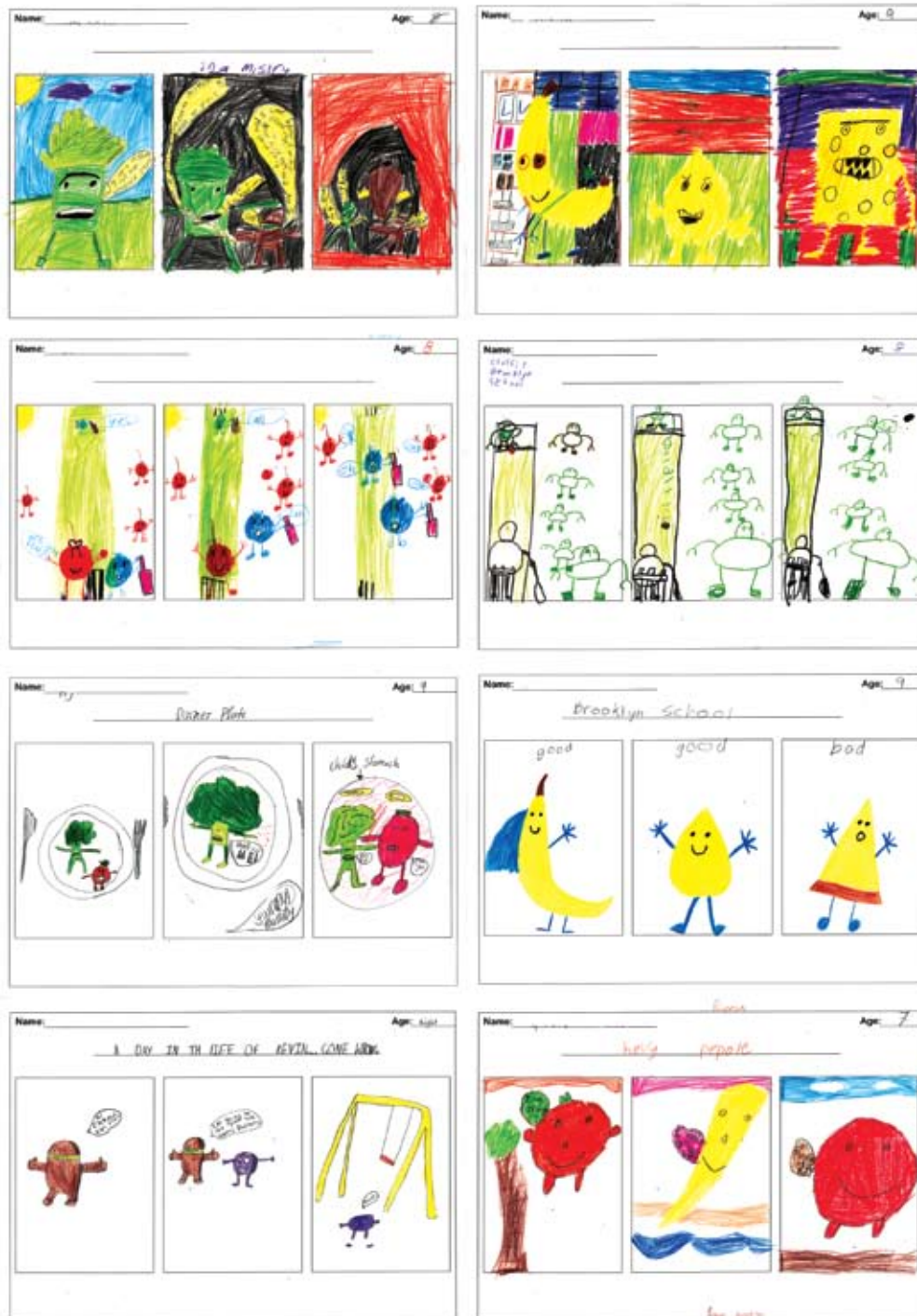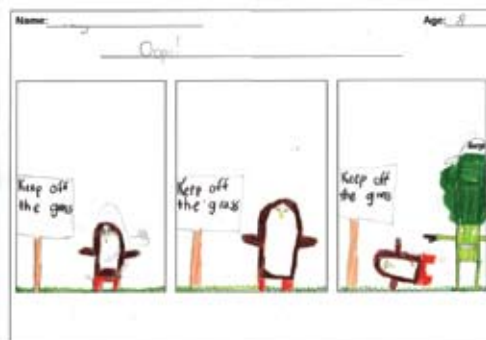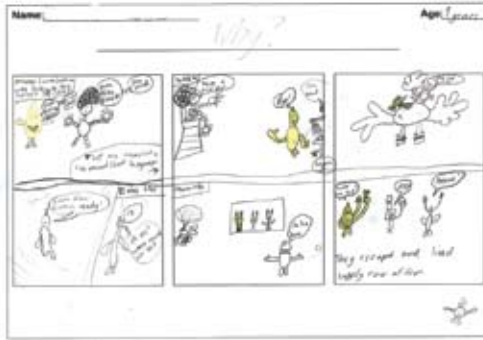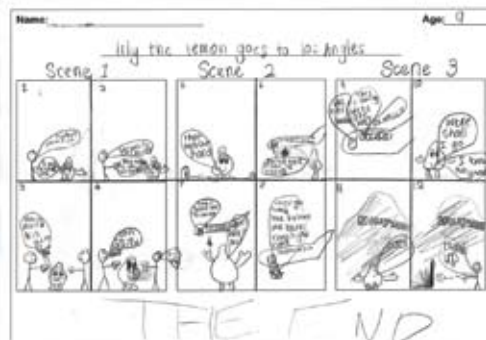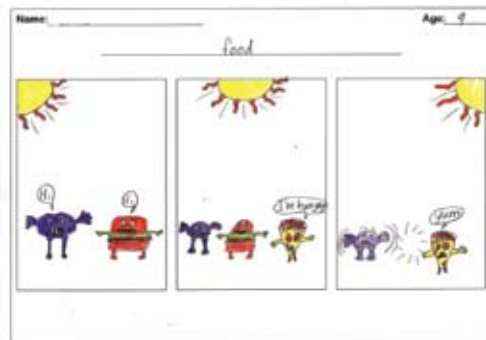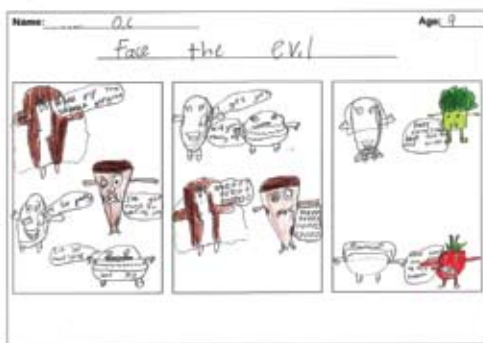
Figure 3.54. "Dinner Plate"
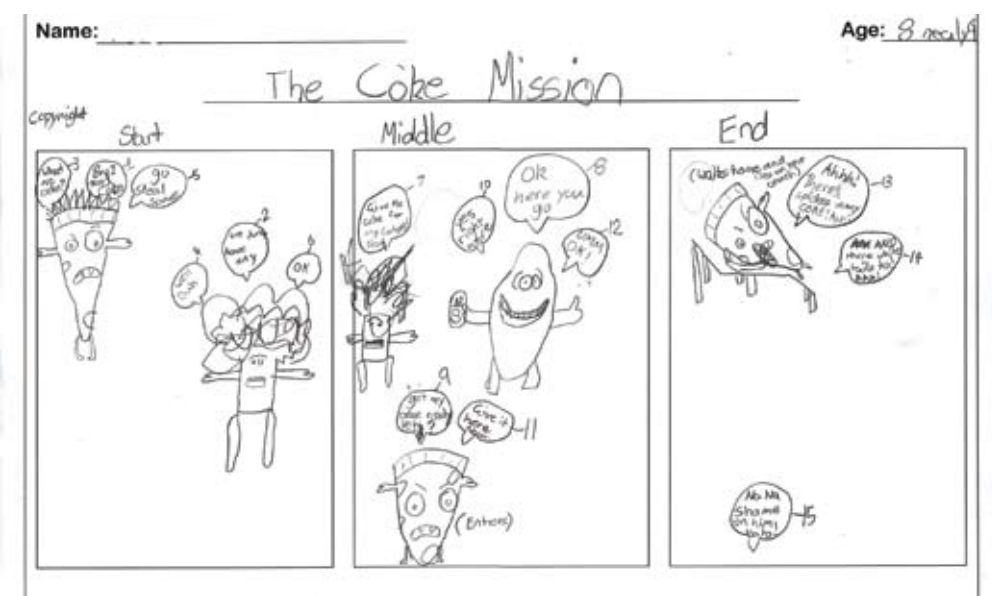

Figure 3.55. "The Coke Mission"

Table 3.52. "The Coke Mission"

Frame 1	Frame 2	Frame 3
1. Pizza: "Bro, I need Coke."	7. Broccoli: "Give me some Coke for my customer now!"	13. Pizza: "Ahhh! There's spiders in my COKE! Ahh!"
2. Broccoli: "We don't have any."	8. Lemon: "Ok, here you go."	14. Pizza: "AND they're white tails too! Ahh!"
3. Pizza: "What, no Coke?"	9. Pizza: "Got my Coke ready yet?"	%) "J c]W Zfca ˙c ˙ZfUa Y.
4. Broccoli: "Well, duh."	10. Lemon: "Yes, right here."	"Na na shame on him.
5. Pizza: "Go steal some."	11. Pizza: "Give it here now."	Ha ha!"
6. Broccoli: "OK."	12. Lemon: "Umm, ok."	

The more popular narrative themes revolved around sports such as cricket, or running a race. One creative example explored the idea of mortality and if there is life after death (or after getting eaten) as both the broccoli and tomato contemplate their fate in the child's stomach (Figure 3.54). There were some examples as well of rather complicated dialogue between characters. There was a particularly excellent example involving a copyright assertion, three characters, 15 lines of dialogue, criminal behaviour, a clear narrative sequence and a moral ending (Figure 3.55).

Interestingly, there is a lot of casual violence being portrayed by the respondents. It could be construed as just make-believe, or "play", with imaginary characters; of being able to experiment without fear of consequences. However, it could possibly be a reflection of the contemporary media that the respondents are exposed to. There were characters learning to fly (and failing), characters getting eaten, characters committing acts of burglary and even characters shooting each other.

After the feedback from Experiment 3 the ten models were reduced to the six preferred characters. Following Experiment 3's responses the 3D models were finished with different details from the feedback, mostly for further exaggeration of the fast food character's "bad" characteristics; asymmetrical features, improved and more detailed textures. The final models (the banana, the burger, the broccoli, the chips, the pizza and the tomato) were tested in the following experiment.

3.6 Experiment Four

The final experiment was designed to be run with the six final production characters to test their communication effectiveness. These were separated into single characters without any narrative and pairs of characters composed in a narrative sequence. There were six variants to the narratives, three in which the "healthy" characters act as the protagonist and was ultimately the victor of the competition. The other three had the "bad" characters as the protagonist instead in identical set ups. This experiment was conducted with 23 respondents that were involved in the first three experiments, and 25 respondents that had not been exposed to the research.

The identical scenarios were to test empathic connectivity of both sets of characters to determine if character design or narrative set up has more influence on empathic emotional bonding. This allowed an analysis on the variance of empathic connectivity between the "good" characters in comparison to the "bad" characters. The narrative scenarios were inspired by a sports theme, involving friendly and not so friendly competition.

Sports competition at this age is often in a more playful setting, not serious athletic competition. However, awareness of successful athletes in New Zealand is quite high, which makes sports and other similar physical activities a good narrative base. Also, celebrity athlete endorsements are a commonly used element in sports hydration and "active" cereal advertisements, such as the national rugby team, the All-Blacks, for Powerade; or Australia's Zane Holmes and Shannon Eckstein for Nutrigrain's Ironman-themed campaign.

This experiment was conducted with a preliminary discussion with the class, followed by an activity session with an activity kit that included six individual renders, and six composed narratives with six corresponding questionnaires. During that activity process, focus sub-group interviews were conducted. The experiment was then concluded with another class discussion.

Each activity kit asked four simple questions. Below are the questions for Questionnaire #1; each narrative had a corresponding questionnaire:

- Can you pick 3 of your favourite characters?
- Draw how you think the Broccoli felt when he got pushed?
- Draw how you think the Broccoli felt in the end?
- Do you think eating broccoli will help you run faster? Can you think of 3 reasons why or why not?

During the design production process, the research decided to shift the focus back towards design research and less on the actual design and animation production pipeline. The revised visuals for the experiments were a more efficient means of gathering data. The still renders, which fundamentally were the intended animations' block timing key frames, had the poses refined and then arranged in a narrative. This design input had the advantage of returning more focused data.

The shift towards the simpler experiment meant that there were no time-based or audio variables with the empathic connections of the character designs. These reduced variables isolated the empathy and emotional connections of the character designs.

The new experiment was re-designed to use these composed narratives as opposed to original concept of using several animations. The narratives granted the opportunity to present the "bad" characters as the protagonist to determine if narrative setup affects empathic connectivity. The message was to be tested via the provided narrative, which was constructed very similarly to the narrative structures that were created in Experiment 3. The traditional dichotomy of protagonist and antagonist in the compositions provided enough stimuli for the feedback this research needed. The respondents were obviously capable of comprehending more complicated plots based on the ease they dissected provided visuals

First, the respondents as a class were shown just the character designs without the narrative. These characters were later left on the board at the front of the classroom for reference during the experiment. This served as the warm-up discussion period and allowed the respondents to settle in to the new activity. The warm-up discussion also covered recognition of the characters and whether they could differentiate "good" or "bad" characters based on the design alone.

Later the respondents split into sub-groups with the six compositions and the drawing kits, which included the questionnaire where the respondents were provided with a narrative. They were then asked to deconstruct the narrative and explain it visually. During this activity session, the research also conducted impromptu interviews to gather verbal feedback to accompany the visual feedback that was being created.
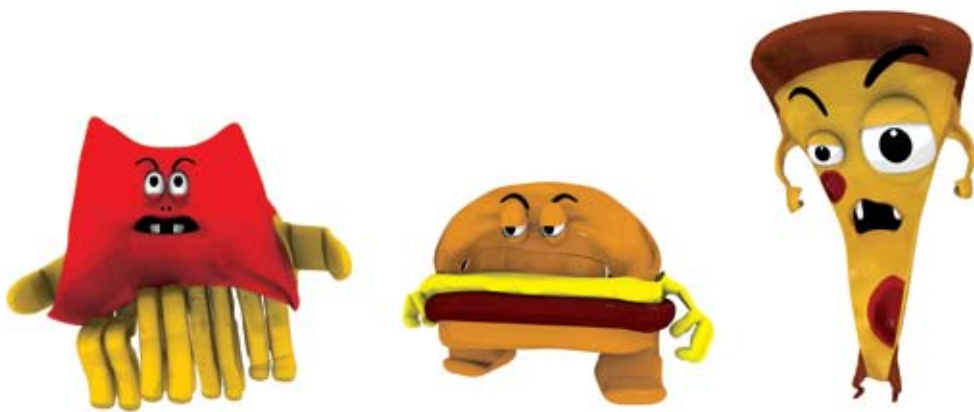
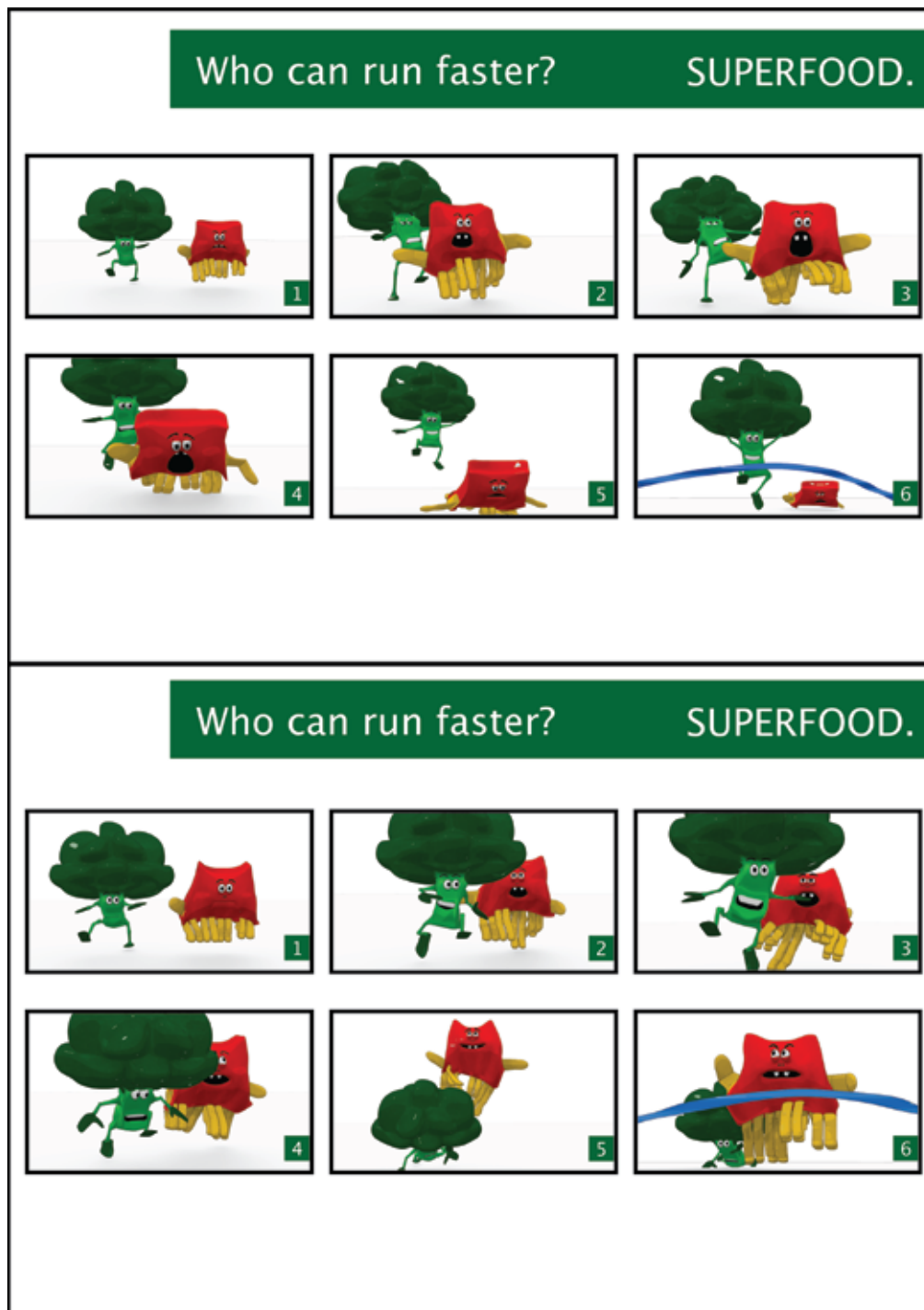*Figure 3.61.* 6 characters in isolation

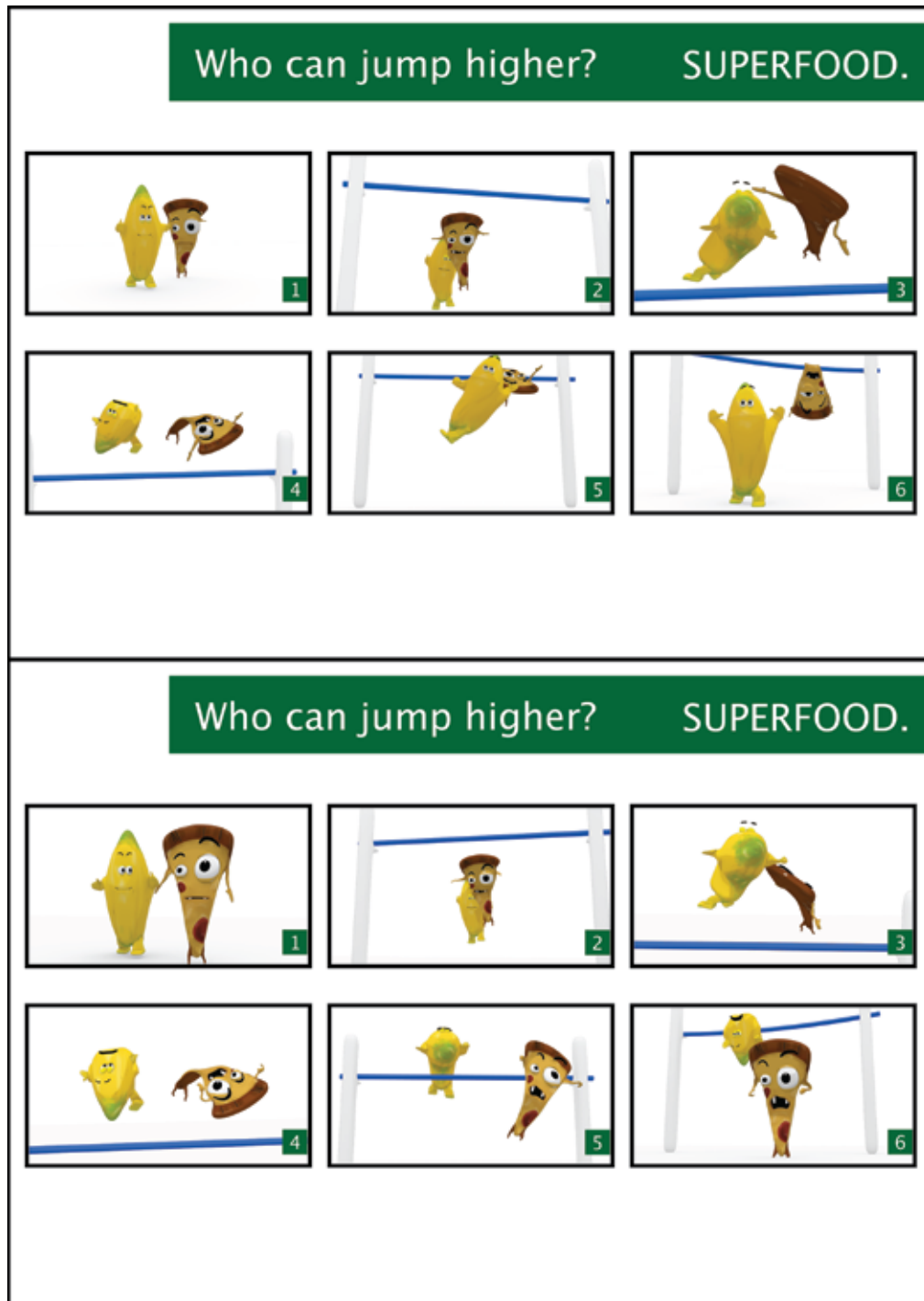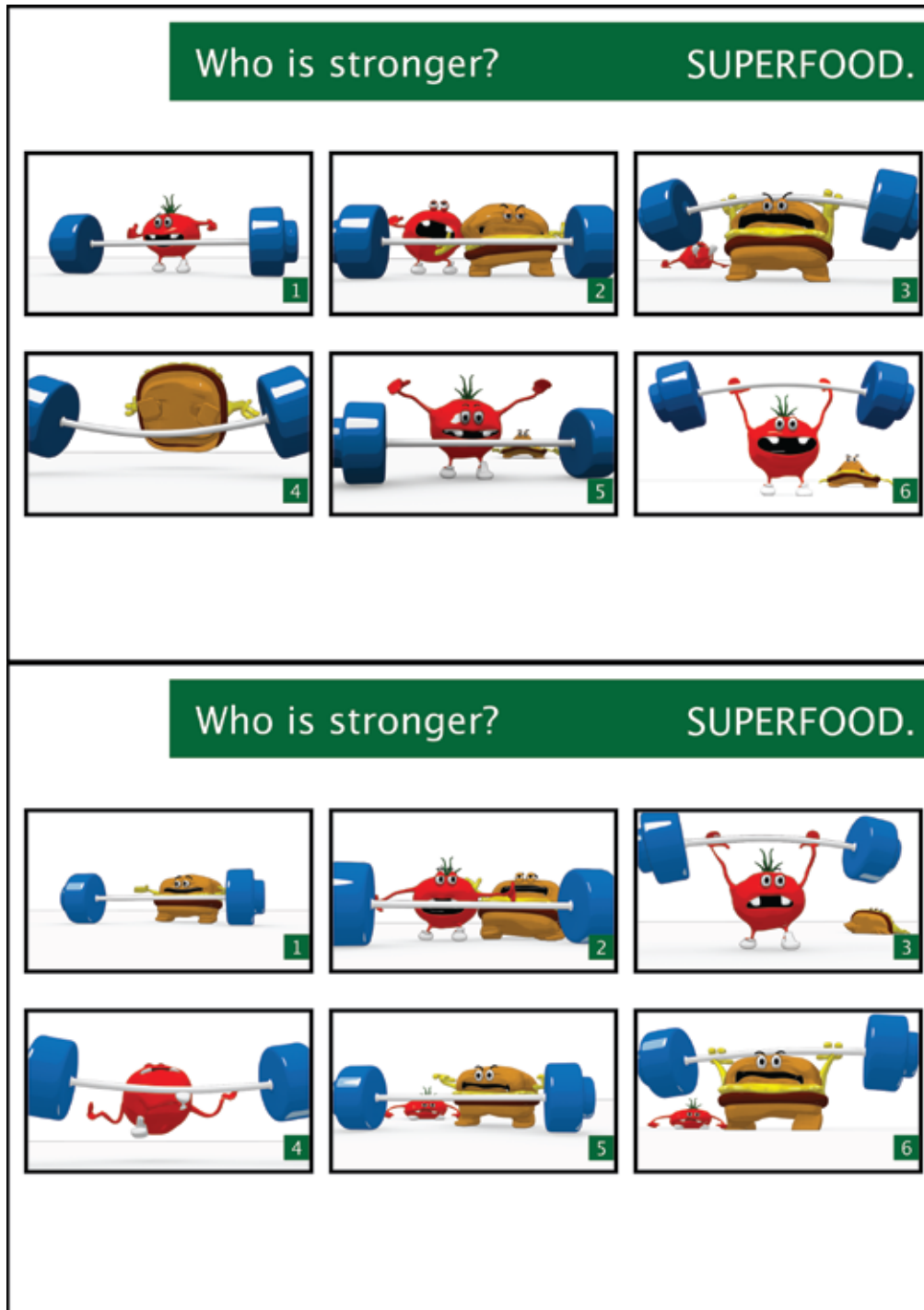*Figure 3.62.* Case 1

Figure 3.63. Case 2

Figure 3.64. Case 3
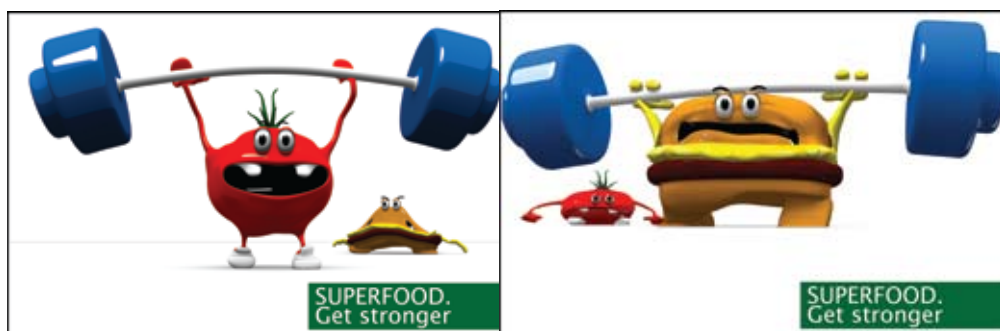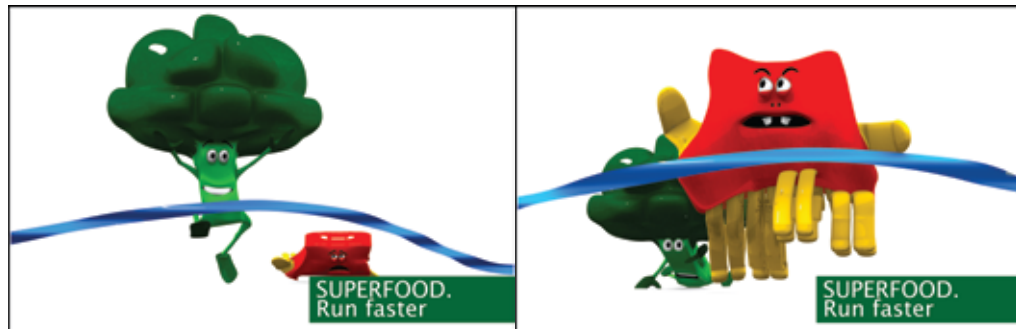
Figure 3.65. Final poster renders tested

SUPERFOOD.
Run faster

SUPERFOOD.
Run faster

SUPERFOOD.
Jump higher

SUPERFOOD.
Jump higher

SUPERFOOD.
Get stronger

SUPERFOOD.
Get stronger

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Figure 3.66. Questionnaire #1 for Experiment 4

Can you pick 3 of your favourite characters?

☐ ☐ ☐ ☐ ☐ ☐

Draw how you think the Broccoli felt when he got pushed?

Draw how you think the Broccoli felt in the end?

SUPERFOOD.
Run faster

Do you think eating broccoli will help you run faster?
Can you think of 3 reasons why or why not?

Please see Appendix vi (p. 218) for the other five questionnaires.

Finally, another discussion was conducted with the class again to conclude the experiment and recap their opinions on the character designs and the narrative compositions. This discussion reinforced their opinions, and allowed every respondent to give as much verbal feedback as they wanted within the experiment time frame.

The first question "Can you pick 3 of your favourite characters?" was to identify if the character design on its own based on the merit of being a "good" or "bad" character was enough to be the preferred choice of the respondent.

The first two drawing questions of "Draw how you think the [protagonist] felt when he got pushed" and "Draw how you felt for the [protagonist] in the end" were for designed to test empathy at two emotional stages of the narrative: the climax and the resolution respectively. The measures that were used to analyse these drawings and feedback were the respondents' ability to empathise with emotions in the characters and their ability to identify the reasoning for that particular sequence of events.

The writing section "Do you think the eating the [protagonist] will help you run faster / jump higher / get stronger?" was to determine the effectiveness of character design and empathic engagement in communicating the healthy nutrition message. This section was measured based on the respondents' response to the character design within the narrative set up, and the response to just the narrative set up. It also served to understand some of the key concerns that the respondents have with healthy and unhealthy food.

The final designs were tested on the same initial respondents that had prior knowledge and experience of the prototypes. These respondents had some initial creative input as their feedback formed part of the feedback loop of the iterative design process. The same designs were also tested on control respondents, a new group of respondents that had neither prior experience nor creative input in the final designs. The control focus group was to ensure that the results from the initial respondents could be measured for any bias caused by the first three experiments.

The final variables for analysis were the empathic connections that individual posed characters established and the empathic connections of the characters composed in opposing narrative schemas. Determining the value of the narrative compositions in relation to the character designs and determining if there was bias from earlier experience with the character designs were also important parameters to gauge.

The character choice question was interesting, with the healthy characters being preferred over the unhealthy choices by a final margin that was not very large. The first two drawing questions of "Draw how you think the [protagonist] felt when he got pushed" and "Draw how you felt for the [protagonist] in the end" returned verbal and visual feedback that was encouraging. The respondents provided good visual feedback at both climax and the resolution stages of the narrative. They easily recognised and empathised with the emotions in all the characters, even amplifying the emotions of the characters and adding dialogue to further flesh out the narrative. These drawn exaggerations and dialogue display a high level of engagement with the characters and the narrative.

Figure 3.67. Selected Visual Results from Experiment 4

SUPERFOOD.
Run faster

SUPERFOOD.
Jump higher

SUPERFOOD.
Get stronger

I LOVE BURGERS!

These points were interesting when contrasted with the next question in the activity pack. Despite the engagement and investment in the narrative in the early stage of the questionnaire, there is little indication that the narrative composition had any effect in the final character empathic connections or message communications.

The writing section "*Do you think the eating the [protagonist] will help you run faster / jump higher / get stronger?*" demonstrated narrative setting had little to no effect on the final connection to the audience with only five respondents of the fifty surveyed in the experiment preferring the "bad" character. The unhealthy characters were still recognised as unhealthy despite winning the contests within the narratives – suggesting the empathic connectivity of the characters managed to convey the healthy nutrition message regardless of narrative setting.

The multiple questionnaires instigated a few disagreements among respondents, mostly around which character "won" a particular contest, as the group dynamic meant that each respondent could see what the other respondents were working on. This was a small detail that did not affect the final feedback as the disagreements were friendly in nature and the respondents were content to carry on with these parallel story lines. This was a good example to reaffirm how children can be pedantic about narrative and presentation rules.

The overall results show that the character designs clearly managed to create an empathic connection with the respondents. The visual feedback indicates a strong audience engagement with the character designs. This

engagement was developed by designing a set of characters beyond superficial aesthetics; instead focusing on using the respondents' actual visual lexicon as opposed to what is stereotypically understood as aesthetics for children.

The respondents again voiced rather adult concerns, such as the oil content of deep-fried chips, the vitamin content of fruit, or even the type of energy food has, whether it was long lasting energy or a short burst of energy. Written replies such as "*…broccoli helps keep away cancer*" or "[bananas]… *provide natural sugars and vitamins that are useful*" reinforce this preoccupation with nutrition. The respondents who argued for the unhealthy characters also managed to justify fast food such as burgers and pizza could sometimes be healthy as long as the fillings or toppings were healthy, exhibiting an ability to understand issues in a more complicated manner beyond the good/bad dichotomy.

The final posters worked well to convey the healthy eating message by having characters that formed an emotional bond with the respondents. The final posters encouraged a strong correlation between nutrition and physical ability. They also served as a reinforcement of the importance of a multi-tiered narrative that involves a deeper implicit meaning beyond the immediate explicit humour.

Verbal feedback collected during the activity sessions:

"These are like South Park ads."
"I love burgers, but he needs sauce."
"My guy's like super and big."
"My banana has a lot of bruises on it, look at his face. So, he looks sad."
"He looks like he's happy."
"Look at it, he looks crazy."
"Mine are gonna have muscles."
"The strongest one would be the tomato because it's a vegetable."
"He is sad and he has rotten teeth."
"Look, look at my hamburger's muscles. He has the best guns."

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 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.

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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 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 – which is also a key factor in developing empathy for other people.

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.

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.

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. The reduced variables involved in the final experiment where still narrative compositions were tested yielded data that was very useful.

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 (Figure 3.54 was a great example) that fit in within the required parameters. These drawings often contained complicated narratives involv-

ing two or more characters and match quite closely to Freytag's (1863) narrative arc. 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 (Williams, 2008), and how the idea of nutrition has entered the forefront of our consideration when choosing food. However, this consideration for nutrition rarely makes it to the point of where it affects the action of selecting food; 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. It is not just predicated on similarity in looks, but also included behaviour and opinions. Figure 3.36 was a good example demonstrating peer pressure to conform; making an example of creative individualism conform to the more popular creations of their peers. 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 designs with the respondents was good based on the feedback gathered. The final experiment results was encouraging, with 88% (38 of 43) of the respondents returned drawings that demonstrated an empathic connection and identification between the respondents and the digital characters. 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. Only 14% (6 of 43) displayed any references to the compositional narrative.

Chapter 4 - Design Iterations

4.1 Final Design Iterations

The creative design process ran in parallel to the research experiments in a cyclical process incorporating feedback and producing progressive 3-D iterations. Each iteration had design decisions such colour palettes, character typologies, narrative complexity and medium choice that were influenced by understanding the respondents as well as possible, which included identifying their aesthetic vocabulary.

The visual interpretations of the research were designed as printed materials which served as educational interventions that encouraged better nutrition choices. These interventions were designed to improve the connection that children have with food and healthy nutrition. Key to such development is a greater appreciation of the external influences on children's food choices and the need to help children develop an understanding of the food / health relationship which has both meaning and ownership for them. Increasing children's involvement with the design of interventions could be a way forward in this respect (Bullen and Benton, 2004, p.59). The iterative communication process was at the core of this research.

The drawings and writing were a great resource for design process outlined in this thesis. The critical design feedback from the respondents was a significant driver for the design process. The feedback was a crucial intersection between the designer and audience in order to better understand the connection between the medium and the audience.

It was important that the content of medium be articulated in a coherent design that delivers the message and not allow the medium to obscure the message. The symbiotic nature of the medium and the message in contemporary media (McLuhan, 2003, p.25) makes their separation nearly impossible. The medium choice was a solution to the challenge of a strict economy

of attention while addressing the paradox of more contemporary medium choices. Separating the compositions into more modular forms helped the research redefine the relationships between all parts of the information transmission chain, particularly between the medium and the audience.

The compositions can be deconstructed into three parts: the content - the narrative compositions with the characters; the medium of communication – still renders of the characters in printed advertisement form; and the message – healthy eating and nutrition for children. The research was most concerned with the emotional engagement between the medium and the audience. This engagement was the crucial engagement in extending McLuhan's paradigm of "the medium is the message" by involving the audience in the creation of the medium.

Considering all the parts of the information transmission chain, the content, medium, message and the *audience*, it makes sense that the final and least malleable portion of that chain be the focus. The objective of this research was to understand the interaction of the audience with the medium is to ensure that the message is communicated with a minimum of static during the transmission of the content.

The final compositions featured the traditional narrative dichotomy of good and bad characters. Exploring more variables in extended narratives would have introduced unnecessary complexity to the medium of communication, the printed advertisements, which could obscure the message. Removing these extra complicating layers also meant the research could minimise the extraneous variables potentially encountered in the final experiments where the character designs were tested for empathic connectivity.

As part of the design process, the research attempted to define the aesthetic vocabulary inherent in children. This was done by judging the respondents' cognitive development, which was determined by whether they are more comfortable with visual or intellectual realism drawing modes (as per Luquet's schema), by cross referencing self-portraits and portraits of their friends (whom they have chosen due to their physical similarities) with their portrayal of more abstract good and bad characters, as well as a repertoire analysis of the contemporary media that they have been exposed to. The designs incorporated this aesthetic vocabulary to help with the communication of the medium, so the message did not get confused by forcing the audience to learn new visual terms.

Learning from Experiment 1

Experiment 1 was the first step in establishing the designer / audience symbiosis, and the first step in beginning to articulate the message. The research recognised this relationship to achieving maximum empathic connectivity with the target demographic, by gathering written and drawn feedback in active projective research techniques with focus groups.

This initial experiment helped the research to begin to understand the underlying social hierarchy of children, and the positions held by synthetic characters within this hierarchy. The children's response conveyed their media literacy, their verbal and written vocabulary, as well as their visual lexicon in both how they read visuals and how they produce visuals. The respondents' association with food of in general were explored in the first experiment, by asking the respondents what they thought was healthy food, what were the criteria for healthy food, and their actual behaviour around food, and what they liked to eat best.

Equipped with the feedback from Experiment 1, the research established the importance of physical similarity within the respondents' social construct (Hall et al, 2006), as well as their thoughts and *behaviours* around food. Cox's (2005) observations on how positive emotional charge is attributed to drawings of larger figures (p.145) became an important point when decoding the respondents' drawings. The feedback from Experiment 1 helped design the structure of the next experiment, as well as readjusted the initial goals based on the results. The second experiment was initially planned as further investigation into establishing the social positions of the digital characters, but the results encouraged a more active, creative approach. The respondents instead created characters in an expression of their aesthetic vocabulary and articulated their social architecture visually.

In parallel, the research was defining a colour palette based on a precedent investigation of the contemporary media that the children are commonly exposed to. The precedent investigation explored the visual communication methods employed popular television programmes targeted at six to twelve year old children from *SpongeBob* through to *The Simpsons*, cereal packaging such as Kellogg's Frosties and Coco Pops, online resources such as the MissionOn initiative instigated by the New Zealand Ministry of Health, and "active" cereal advertising such as Milo and Nutrigrain (such as Figures 2.35 and 2.36). The programming and cereals aimed at younger children had brighter hues, where as the programmes and cereals aimed at older children started to use darker, richer tones (Figure 4.11). The final colour palette concept was based on traffic lights, with bright natural hues of red, yellow and green (Figure 4.13). This system can also be used to encourage as much natural colour variety in their diet as possible, to maximise intake of a broader range of nutrients.

Character designs from Experiment 2

The character typologies were developed early on based on the social hierarchical structure of the respondents that corresponded to traditional simple narrative schemas. The designs of the two sets of final characters were based on what would maximise identification with the good characters and position the bad characters as undesirable within the world of children, much like Hall's (2006) research suggested. The characters' positioning within the social architecture was important. The second experiment was useful in developing these visual characteristics to emphasise these typologies and to firmly position them at within the hierarchy.

The vector ink drawings (Figure 4.12) were a continuation of the original aesthetic from the collage material collected during Experiment 2. The respondents created their versions of good and bad characters by collage with the provided materials. The collage layering process from Experiment 2 inspired the next inked and painted comic aesthetic. This experiment tried to better understand the target audience by combining research into their cognitive development and learning their visual aesthetics for effective empathic communication.

The aesthetic development at this stage was exploring audience identification. The visual style was deliberately simplified and reduced. By attenuating the realistic portrayal of objects the cartoon places itself into the conceptual realm, a blank slate encouraging audience identification by playing on the simplified conceptualised self image to extend to the inanimate object (McCloud, 1993, p.39-42). The vector drawings led to 3-D characters that feature a simplistic but more realistic painted colour scheme layered on stylised models.

Figure 4.11. Sample colour palettes from television programmes and cereal packaging
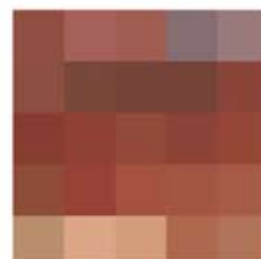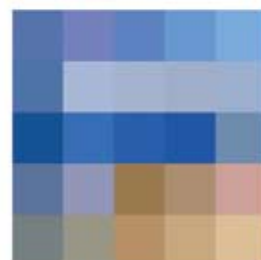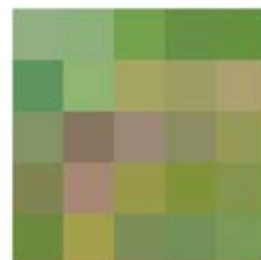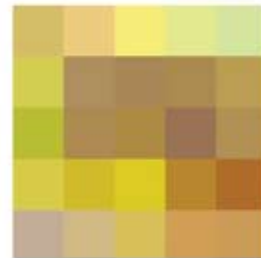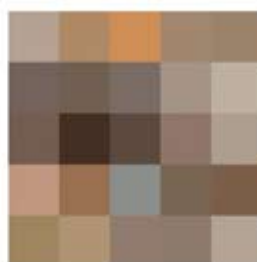
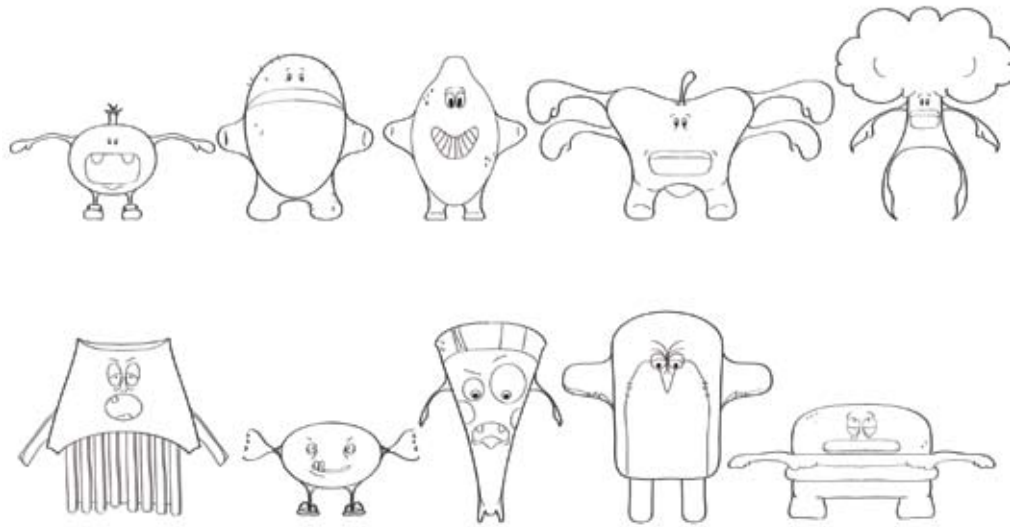*Figure 4.12.* Vector drawings from Experiment 2.

Figure 4.13. Final Colour Palettes

Iterative 3-D development for Experiment 3

The early 3-D models went through a series of form iterations before Experiment 3. Experiment 3 was an important iterative step for the character designs, as the 3-D models had only been tested on a small sample group prior the experiment for some early critical feedback. The critique from Experiment 3 would then drive the character designs toward the final production models.

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 feedback also helped refine the visual features of the final designs to strengthen each persona: e.g. the bad characters got pushed further with more asymmetrical features and more complex textures; the good characters had happier poses and smoother, cleaner textures.

Experiment 3 explored the structural complexities of the narratives constructed with the characters that the respondents produced. The conceptual sophistication of these narratives was very impressive, and served to reaffirm the cognitive diagnosis of the research that the cognitive modes of children are a lot more fluid that Piaget asserts. Piaget's (1969) cognitive models showed that the mental development of the respondents can be divided to some degree into his four stages. These narratives also served to resolve the potential narrative complexity of the final compositions.

The results from Experiment 3 empowered the research to finalise the characters based on a confidence in the character design and the quality of the responses. Experiment 3 also helped define the parameters for the final

narrative structure. The final structure was a six panel storyboard, which was an extension of the three panel storyboard used in Experiment 3. This allowed for better emotional engagement at the exposition and climactic stages of the narrative by allowing more investment in the characters.

Testing in Experiment 4

The characters were put through their final iterations for the narratives. Pairs were chosen based their visual interactions and visual characteristics for the narrative setting, e.g. the natural bend in the banana and floppy structure of a slice of pizza for the high jump because of the flexibility allowed by their shape or the stouter burger and similarly round tomato as characters that could potentially withstand more compression load with the weight lifting.

The 3D process in creating these characters include: initial design sketches, initial block modelling, model refinement, model skinning and texturing, character rigging (a virtual armature that allows the models to be posed and animated), block posing and timing, animating, and rendering. The process started after Experiment 2, as all prior sketches and concepts were either blended into the visual feedback gathered in Experiment 2 or discarded as they were not within the visual lexicon of the respondents. This production and refinement process was done between Experiments 2 and 4, with final minor refinements implemented after the results were gathered from Experiment 4.

The initial prototype cast of characters consisted of ten designs. Through a series of tests with two groups of respondents a final cast of six was selected to go through to production. Four characters did not resonate with the respondents as much as the other six because there was some confu-

sion among the respondents over the typology of these characters. Based on the feedback, these characters were not as strongly positioned within a social hierarchy. For example, the Apple character was neither accepted as a good nor bad character for various reasons. This character suffered from design flaws that meant it did not manage to achieve an emotional connection and find a spot within the social architecture of the respondents.

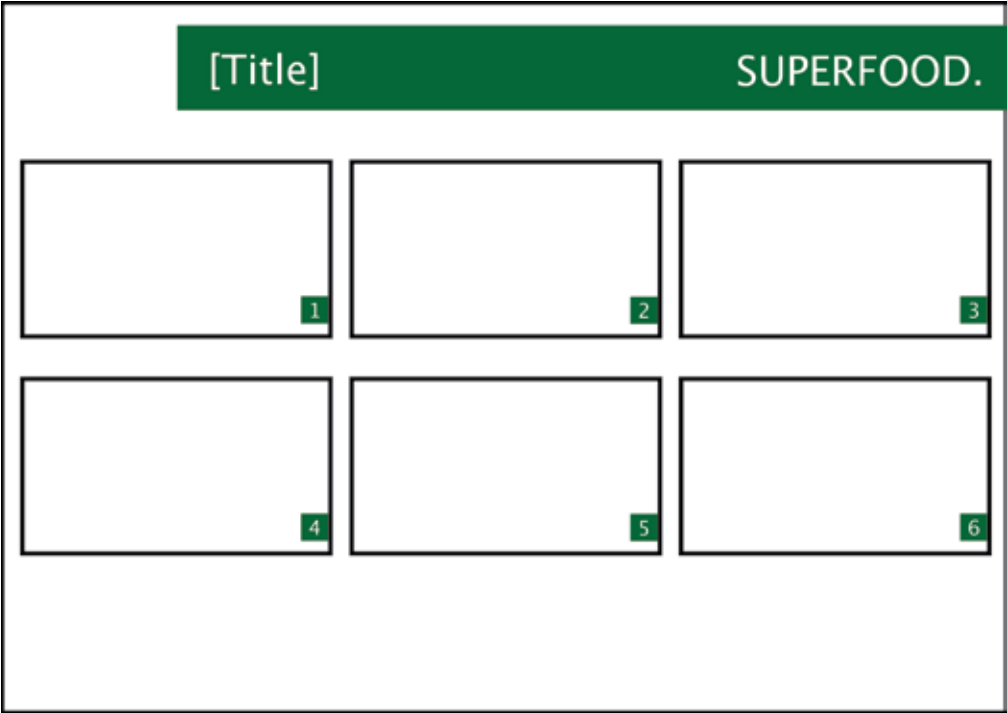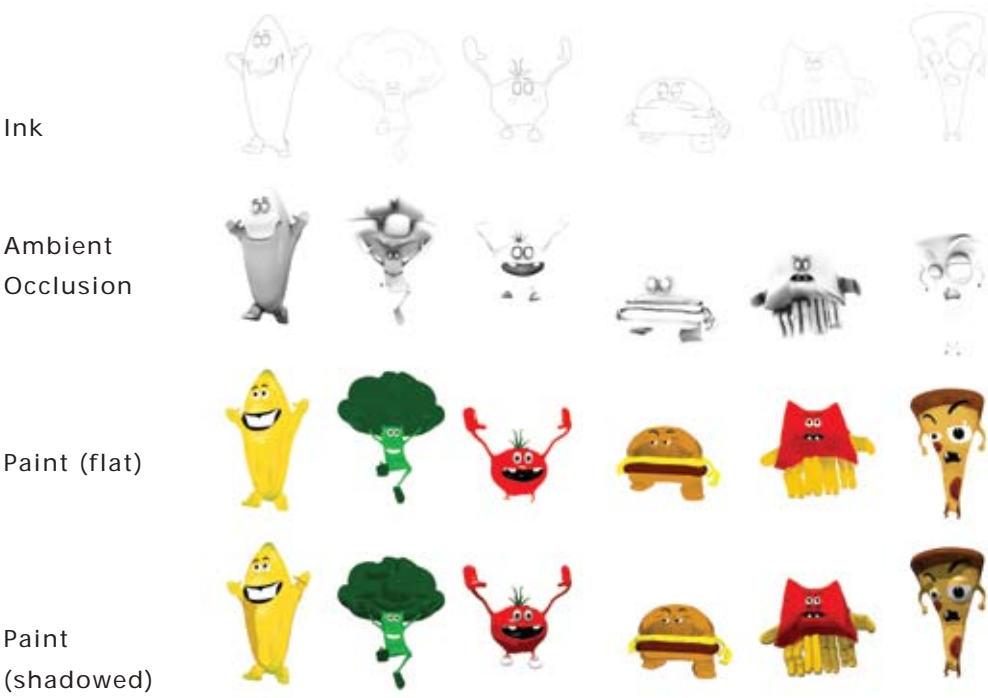*Figure 4.14.* Storyboard panel lay out

Figure 4.15. Prototype cast of characters   *Figure 4.16.* Four discarded characters

Figure 4.17. **Final Characters**
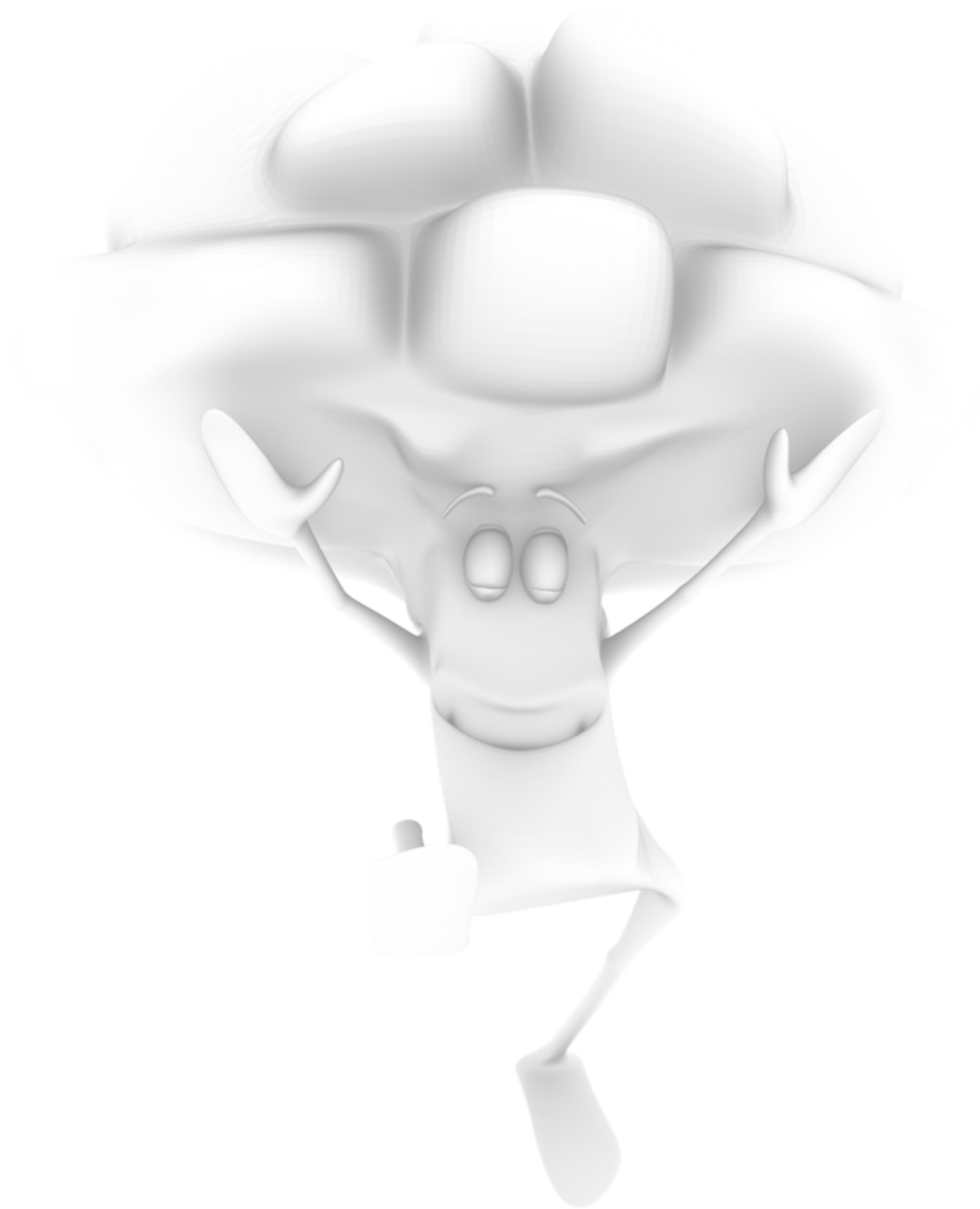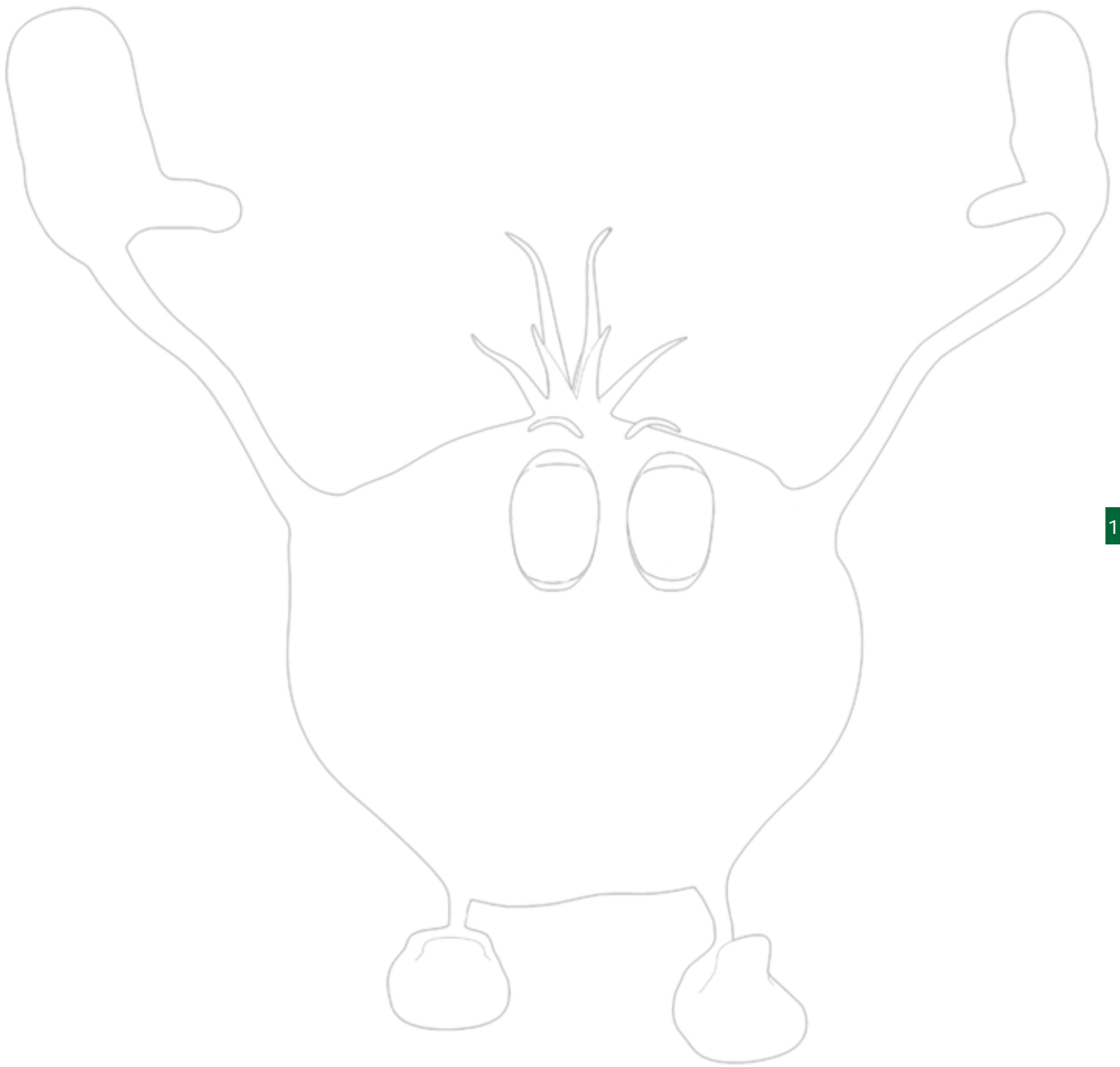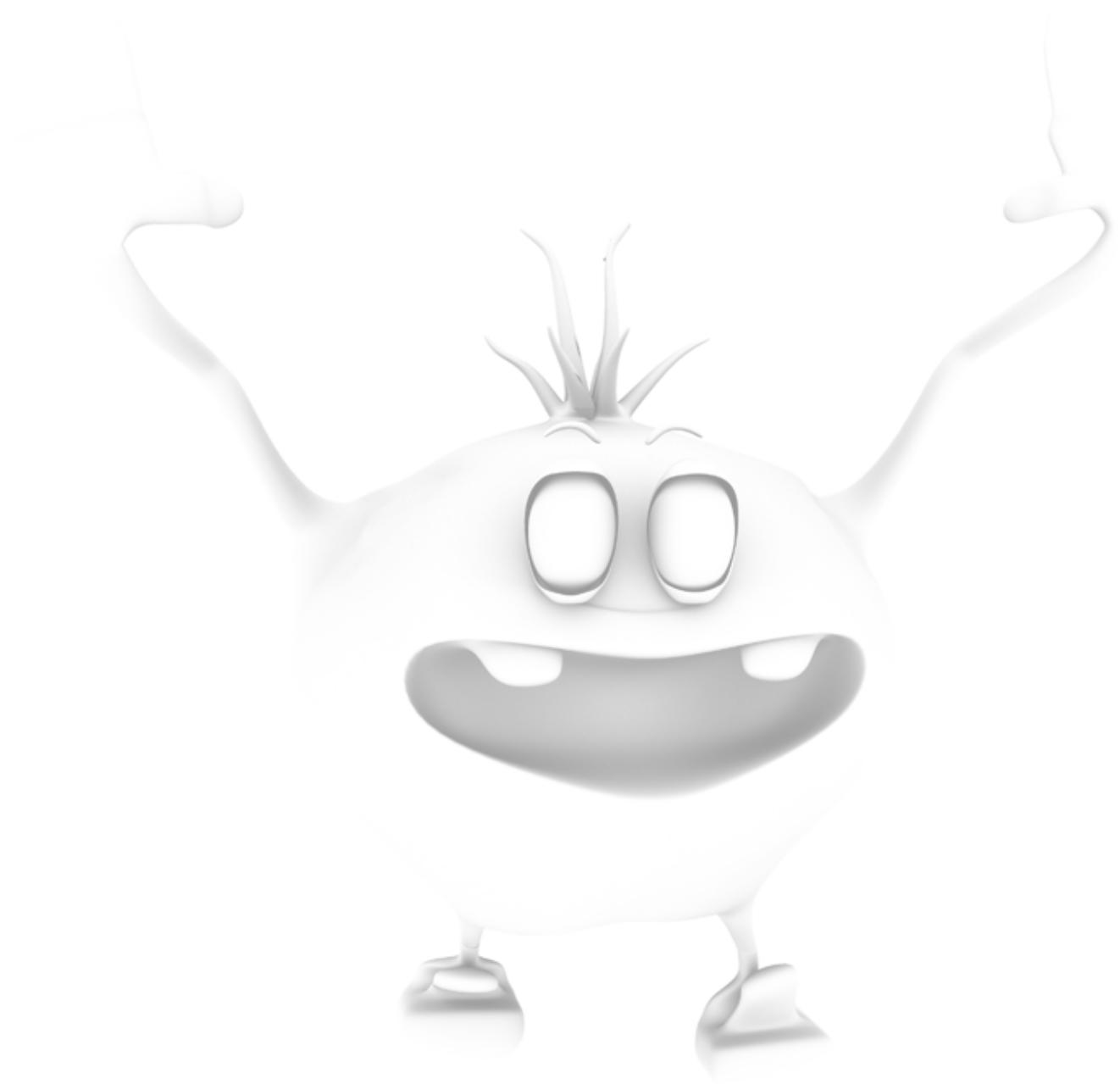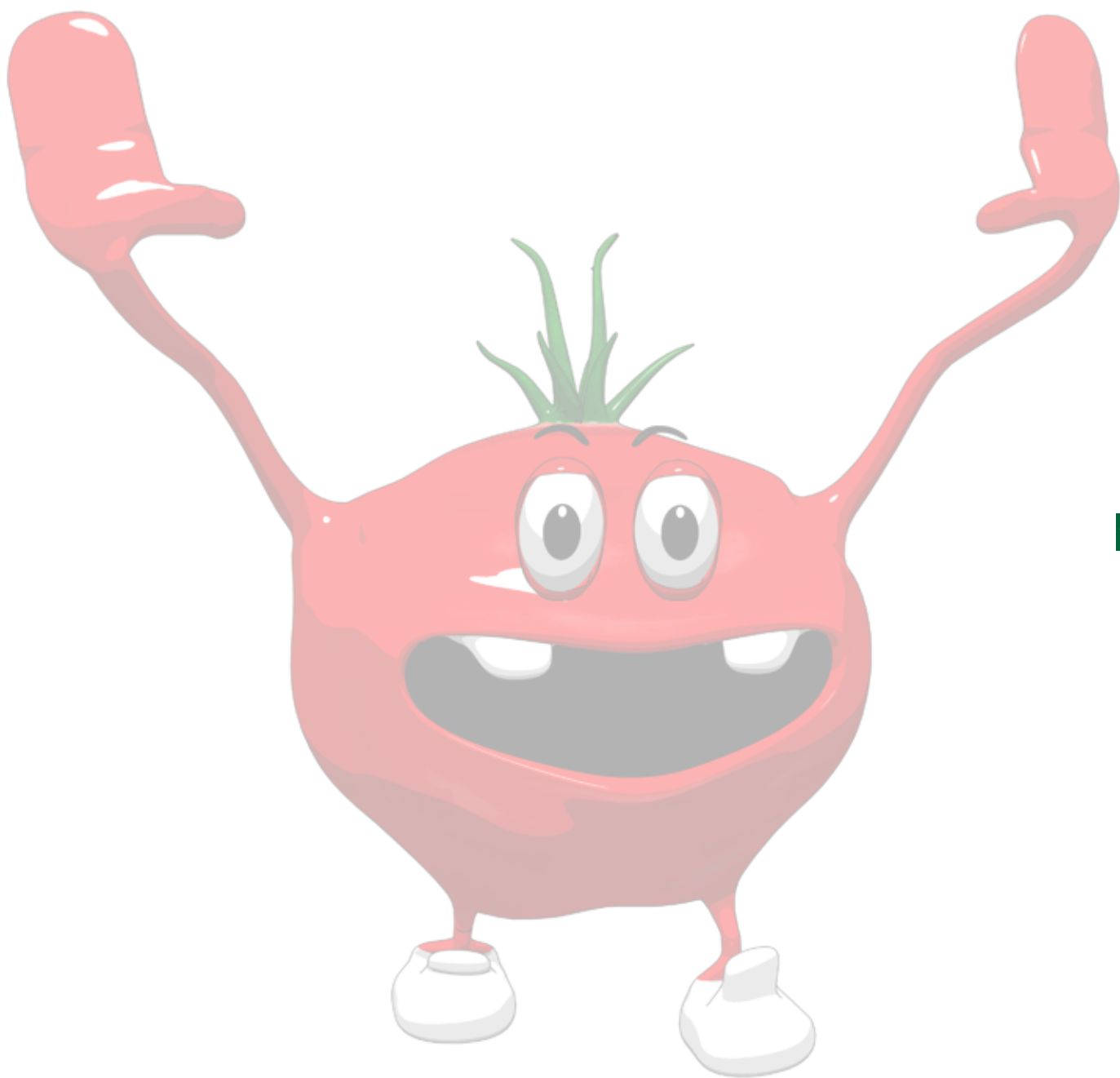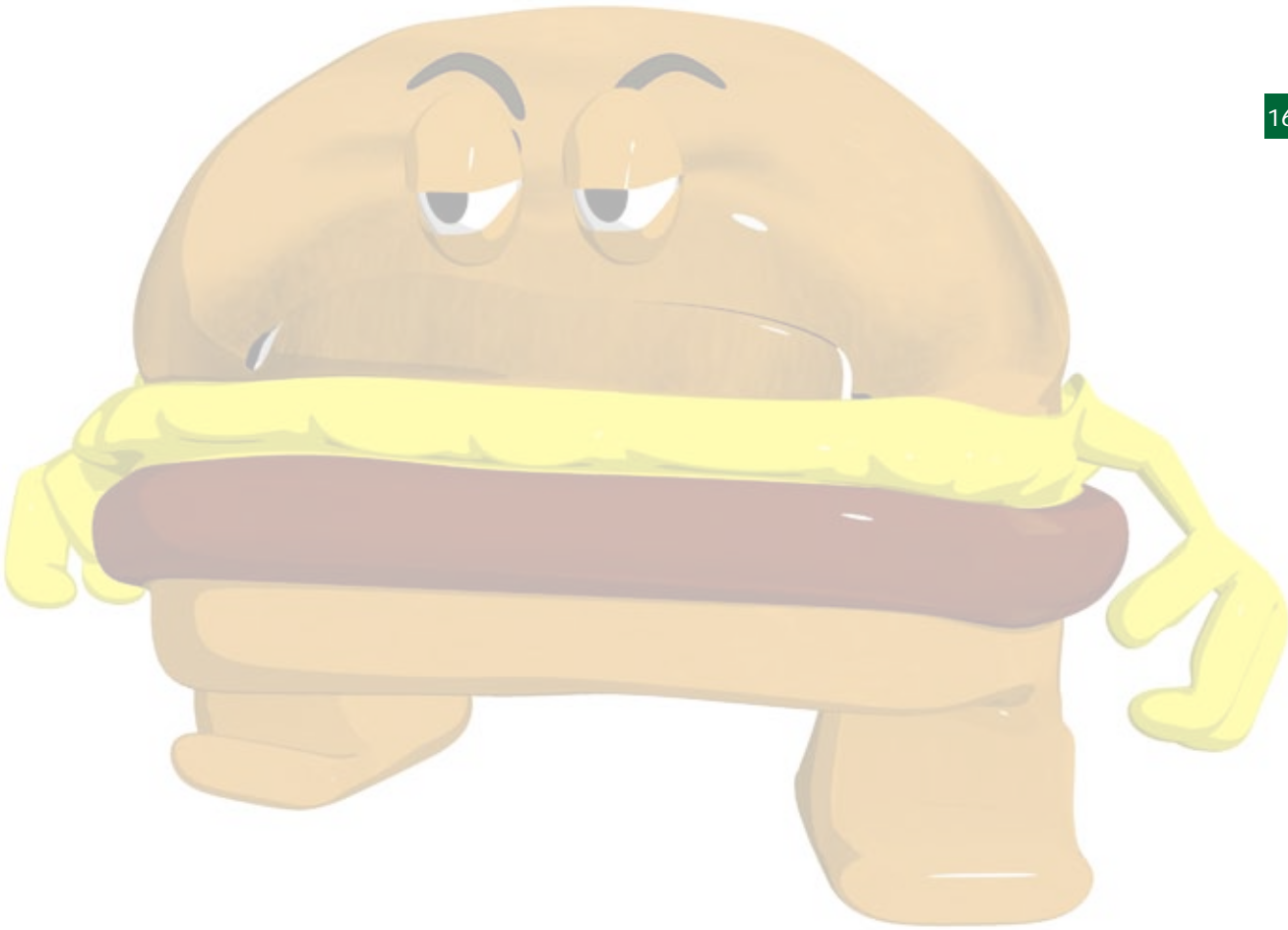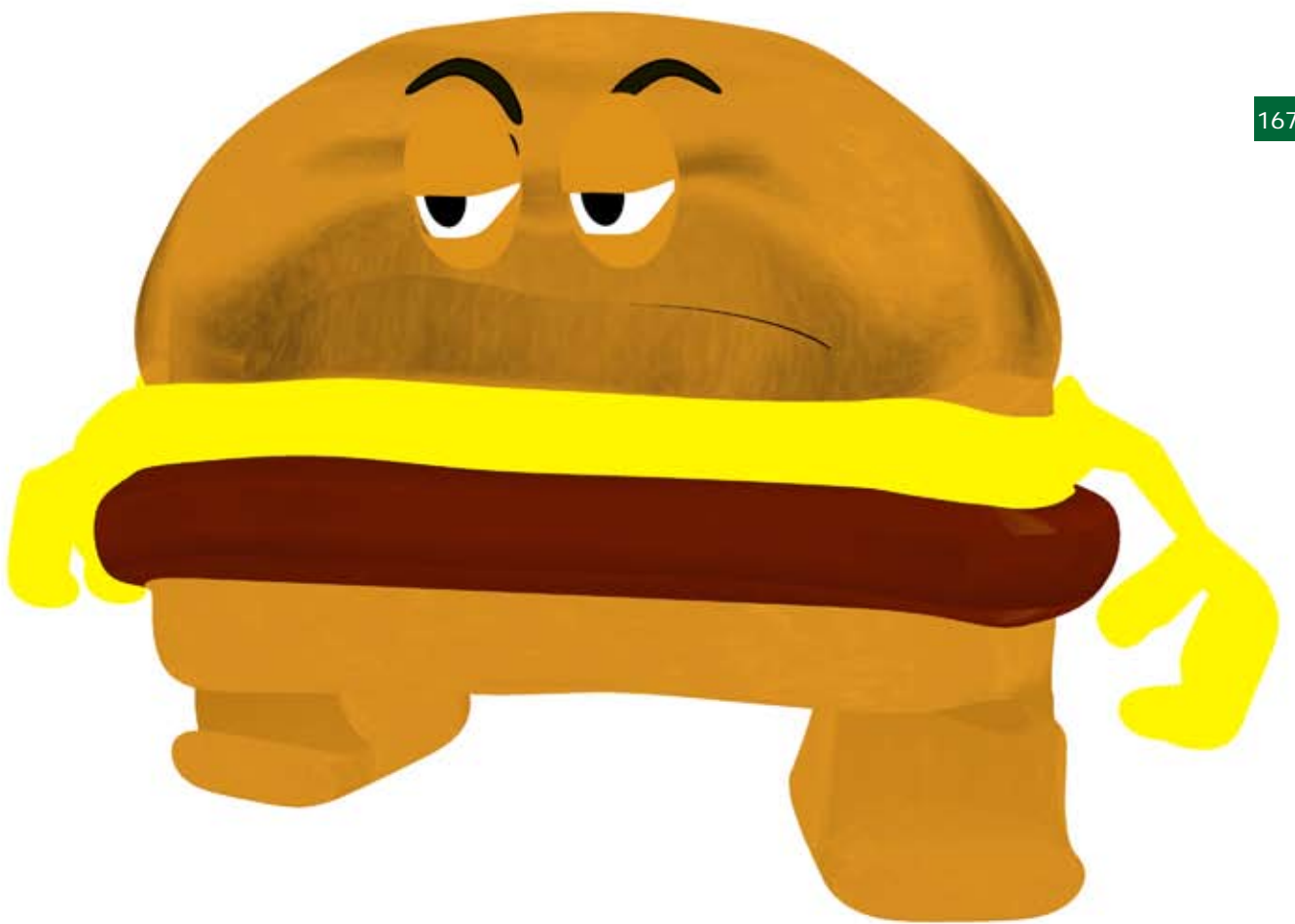
Ink

Ambient
Occlusion

Paint (flat)

Paint
(shadowed)

135

Banana

145

Broccoli

Tomato

Burger

Chips

174
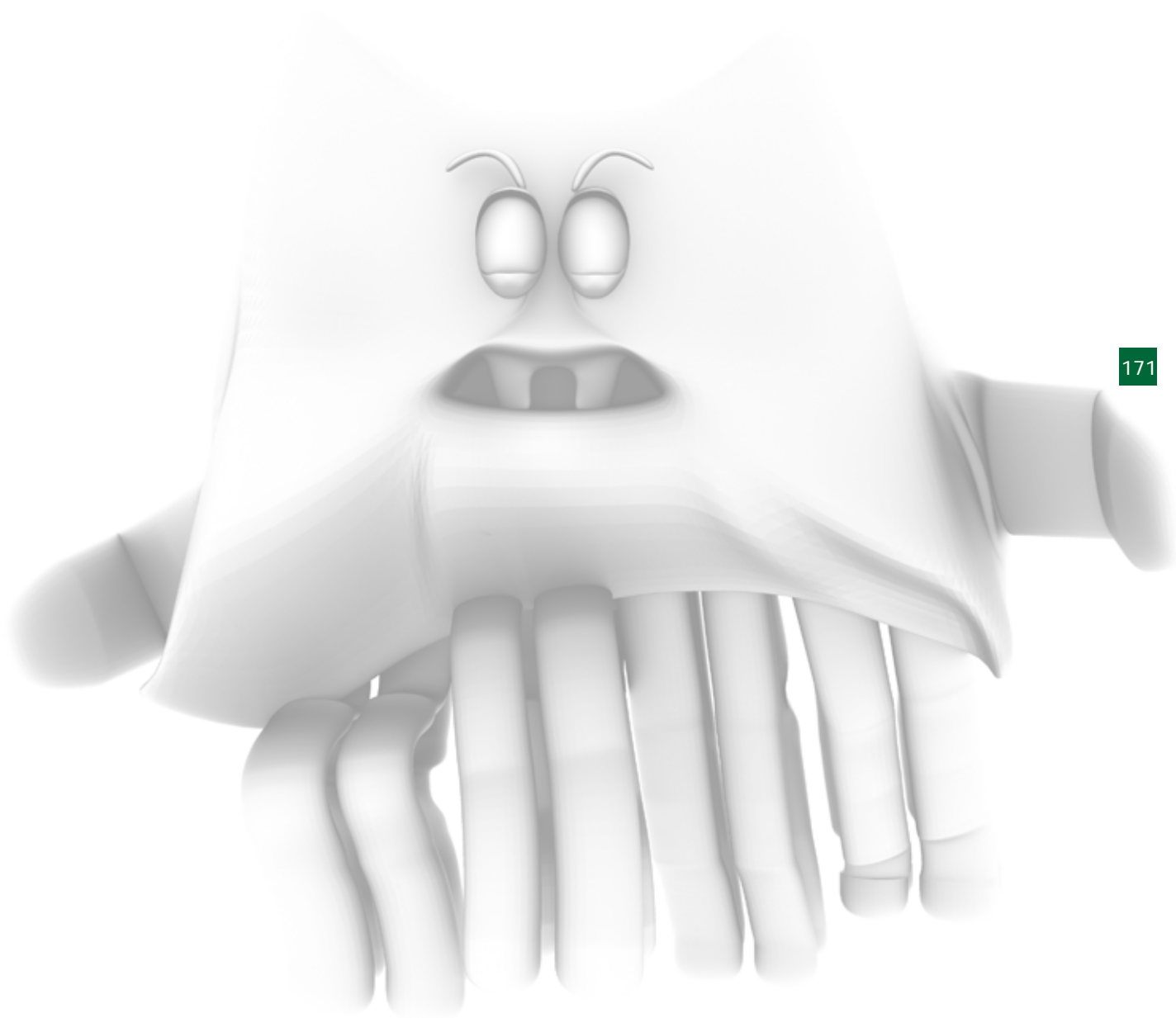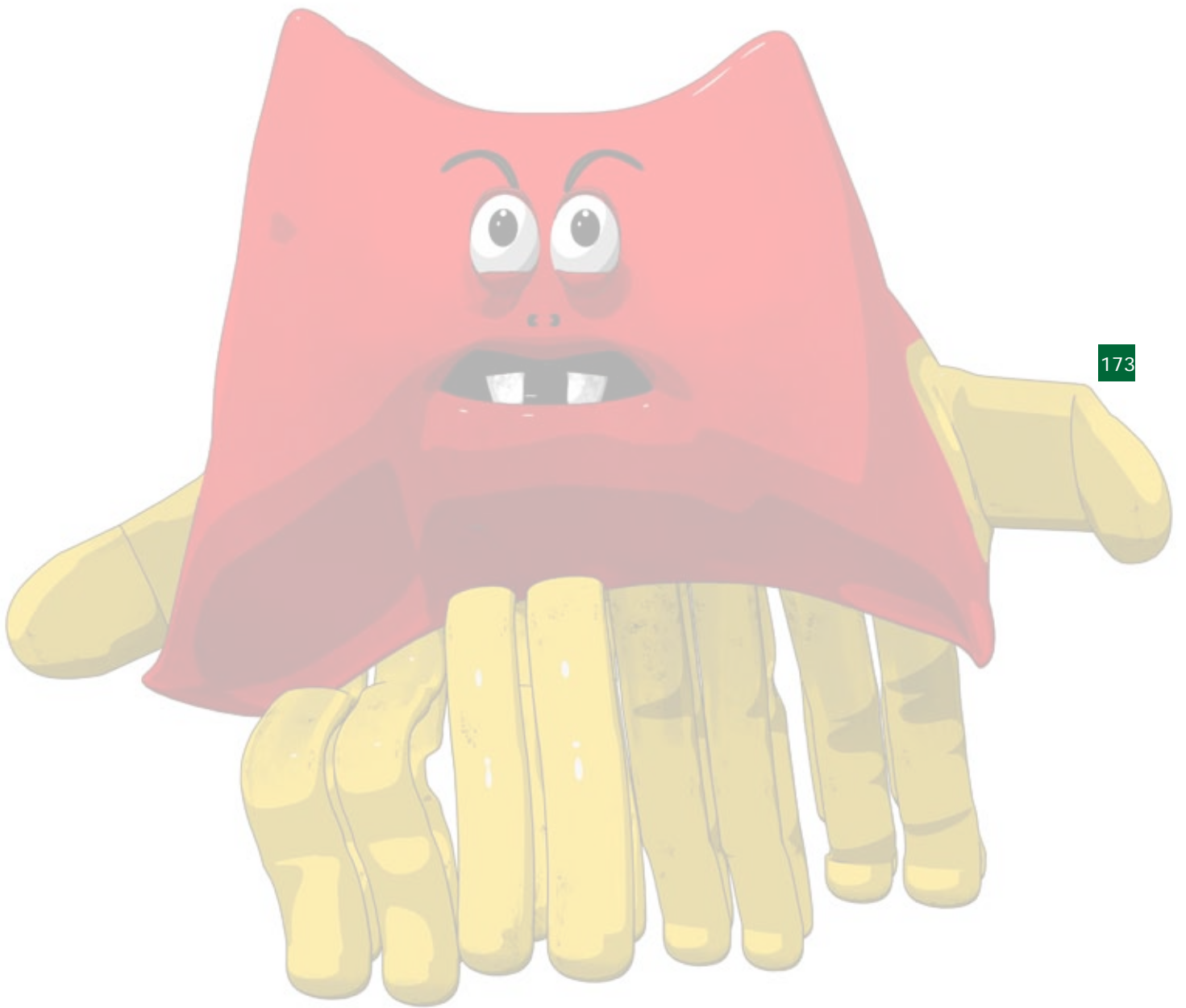
Pizza

Figure 4.18. Experiment 4 narratives
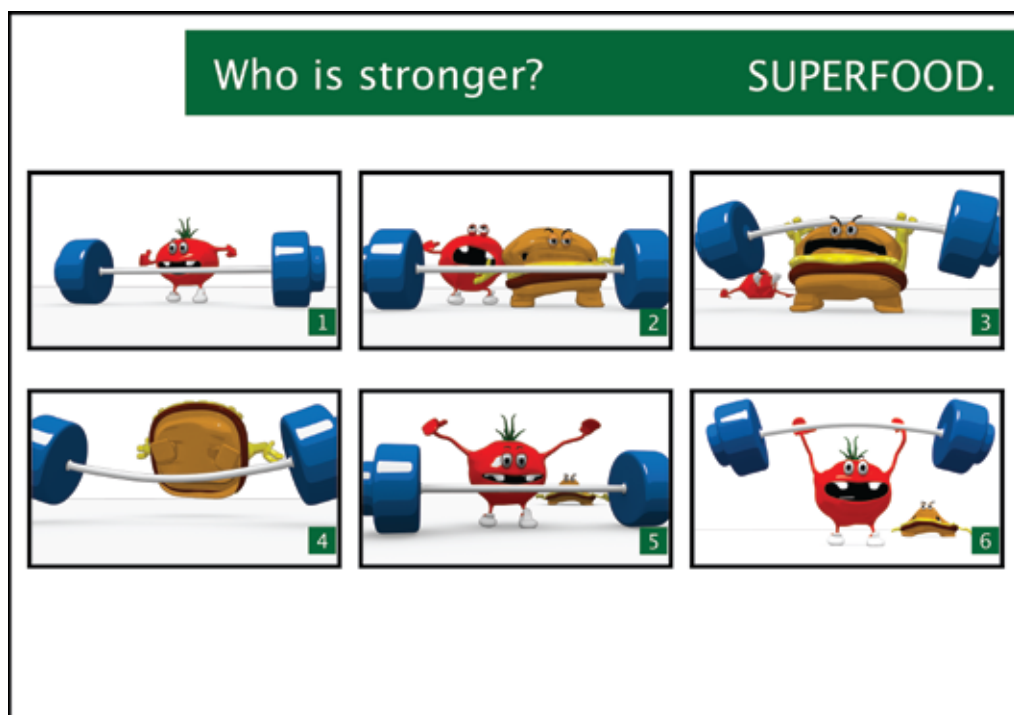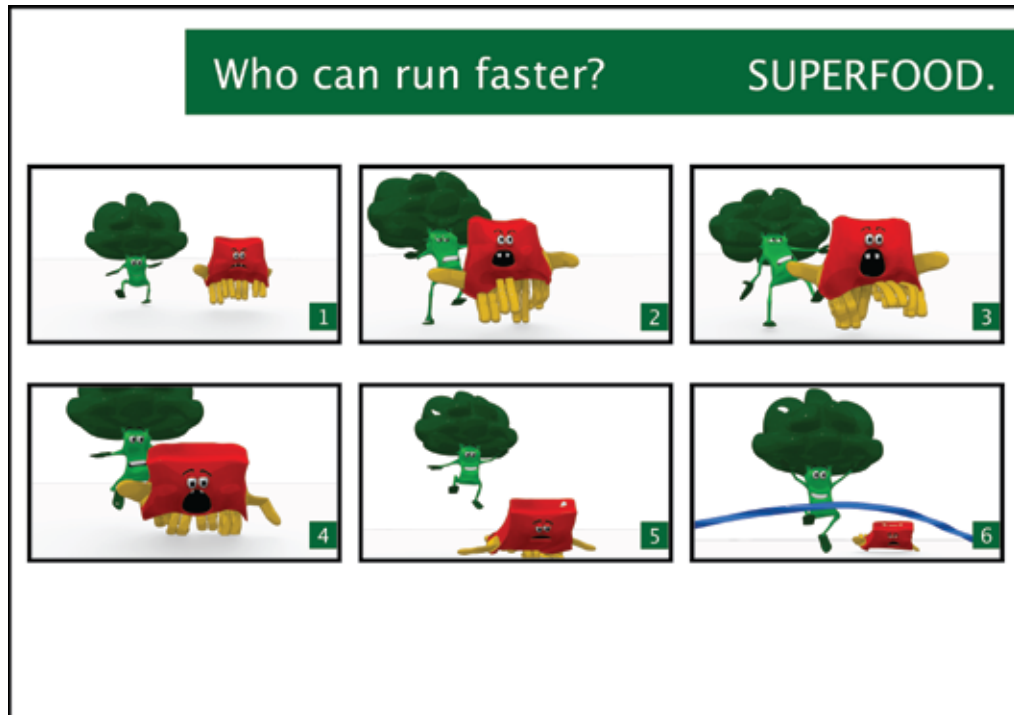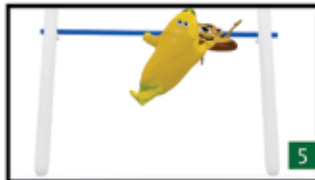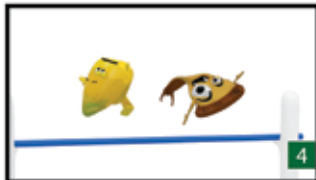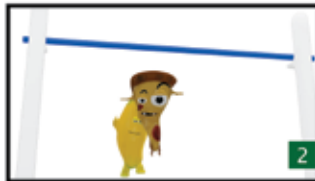
Figure 4.19 Final posters used in Experiment 4

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Athletic ability, and a willingness to participate in athletic or physical activities, are a contributing factor in establishing popularity in children. The Broccoli is clearly a faster runner despite the earlier pushing (Figure 4.18, top).

Each poster has a small back story (Figure 4.18), but works equally well on its own. Here the Tomato overcomes the Burger by virtue of being healthier (and thus stronger). The prop elements are either coloured white or blue to ensure maximum differentiation between prop and character.

The posters have characters that are paired up in a one frame dichotomous narrative designed to emphasise one character over the other. The narratives were simple but layered with both humour and a moral lesson (available in Figure 4.18). The protagonist is always in the front of the composition, while perspective forces the antagonist which is in the back to be a lot smaller. The protagonist is always in as active position or action, much like the archetypes examined in Figure 2.46.

Final production characters for Experiment 4

The final production character designs were designed with specific personas based on common social typologies. These were then set within an archetypal narrative composition comprising of a story line with a traditional dichotomy of good and bad characters. The semantic language involved in communicating the social typologies were managed to make a seamless blend with the desired aesthetic.

These narratives developed for the final interventions comprised of digital still renders as opposed to a series of animations were no less valuable as research tools. McCloud asserts that all forms of contemporary media provide us with a window to see our world that we inhabit (McCloud, 2009). Similarly, this research aimed to understand the way the respondents see the world through the window that the research has provided. The traditional narrative dichotomy yielded enough data for the research to have multiple avenues to triangulate the respondents' specific concerns around food.

The simple narrative included a multi-tiered blend of the healthy nutrition message as the main body, with a supplement of humour and an ethical lesson. This layered narrative was to engage a wider audience, particularly to capture the fluid demographic of children aged between seven to nine years old as they possess a dynamic cognitive state. This age group has a sophisticated stage mental development and possesses varied media literacy skills. The multi-tiered narrative model is probably most successfully used by the popular television series *The Simpsons* in managing to engage audiences from as young as five years old to those in their 40's with slapstick humour intertwined with references to contemporary topical events.

The final production character designs were taken for a final round of focus group testing and feedback. The final experiment was designed to gather a certain amount of data: namely, the empathic connections that individual posed characters established and the empathic value of the opposing narrative compositions.

The last session demonstrated that the empathy that was established by the healthy characters was encouraging as indicated by the collected visual feedback. This also determined that the tone and narrative of the compositions were successful in communicating and reinforcing a healthy nutrition message. This engagement was achieved with a medium containing of a set of characters that was primarily composed of the respondents' visual lexicon and had a firm position within the respondents' social hierarchy.

The research was predicated on the concept that effective communication with children can be established through emotionally engaging character design. The progressive design relationship was necessary to building an empathic connectivity with the audience through various methods of gathering feedback from respondents within a focus group environment. Empathic engagement is an important tool to communicating the salient aspects of diet and everyday nutrition as part of every child's education. Empathically engaging designed interventions will help equip children to deal with nutritional and dietary choices daily, ideally incorporating this intellectual knowledge into long-term behaviour change.

This research used 3-D character design as a tool to help children make more appropriate dietary choices based on developing a healthier relationship with food. The feedback gathered at various stages of the research strongly indicated that the 3D character design here does effectively communicate a healthy nutrition message by creating an empathic bond with target audience. Most drawings gathered as feedback from the respondents in the final experiment demonstrated an identification with the designed characters.

Printed advertisements were chosen as the medium of communication to encourage an active method of learning. Focus on the connecting to the audience of the information transmission chain was the basis for the success of the final designs. By understanding the interaction of the audience with the medium, and having a good understanding of the wider perspective of children, including understanding their social construct and gauging their cognitive abilities, meant the research was able to position the 3-D characters within the social architecture of the respondents – encouraging an empathic bond between the children and the designs.

Chapter 5 - Conclusion

5.1 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. Educational interventions should approach audiences from the same methods entertainment and advertising increasingly employ, in this case, the research believed 3-D character design can be used as a pedagogical intervention to facilitate children to make appropriate dietary choices.

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 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 (2006) and Parten's (1932) research into empathy's role in social play, gauging their cognitive abilities based on Piaget's (1969) and Luquet's (1927) observations, gauging their media literacy skills (Livingstone and Helsper, 2006) (Story and French, 2004) 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. This was done by allowing them to demonstrate *their* empathic abilities and communication abilities with the designed 3-D characters. 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.

The main aim of the research was achieved by meeting the first objective of gauging the cognitive sophistication of children via qualitative data collections. The next objective was to design a cast of characters that engages empathically with children to communicate efficiently via an iterative design process. The third objective was to understand children's empathic relationship with 3-D characters. Hall (2006) had a similar objective when creating *KidStory* and distilling certain factors such as character interactions with children in relation to encouraging empathy; similarly this experiment allowed the respondents to articulate their relationship with the designs by creating their own scenarios. The fourth objective of the research was then to test this cast of characters for empathic connectivity.

These objectives provided an insight that meant the research could begin extending McLuhan's adage of "the medium is the message" to include *who* the message is talking to. The symbiotic nature of the medium and the message in contemporary media (McLuhan, 2003, p.25) made the medium

choice crucial. The deconstruction of the composition into the content, the medium, the message, and the audience allowed the research to focus on the empathic connection between the medium and the audience. This in turn made the medium choice simple when considering the economy of attention and fulfilling the research criteria for isolating the character designs and compositions.

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 (Bowen, 2009, p.40). 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.

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 was achieved. The final medium of printed advertisements was chosen to isolate the effects of the character design and compositions.

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.

5.2 Discussion

There are many of avenues for further research into long term pedagogical interventions that can have an impact on children's relationship with food, particularly around changing their behaviour with food. Understanding the effects of television and obesity, and subsequently the relative effects of hours of advertising exposure to obesity; the relation of socio-economic factors to obesity; and the development of newer pedagogical methods that encourage a healthier lifestyle are valid niches to explore.

This research found cues to continue research into several assumed correlations. Story and French (2004) suggest interesting niches and gaps in the current body of knowledge mentioning studies that follow associations between hours of televisions watched and the prevalence of obesity in children, and suggesting the need to research the possible relationship between "exposure to food advertising, eating behaviours and obesity" (Livingstone and Helsper, 2006, p.576). Further research into the methodology of advertising to children is necessary to better understand their communication methods to improve media literacy in children from a younger age.

There are other concerns with advertising and its effects on children. Story and French found reason to question further research into a correlation between the amounts of advertising a child is exposed to relative to their weight, and expressed concern about the levels of media and advertising exposure children had in the U.S. They were particularly concerned about the increased presence of advertising in schools, and drew comparisons between advertising used by food companies and the advertising used in the tobacco industry (Story and French, 2004, p.14).

Advertising is the ubiquitous phenomenon for these respondents. Increasingly contemporary media for children, particularly programming and advertising are driven by design research and consumer focus group testing to develop their content. Information, education, entertainment and advertising increasingly employ a closely intertwined combination of design, technology and psychology to engage audiences in new ways (Helfand, 2001, p.30). Extended ethnographic research is needed featuring expert observation for improved insight to determine common diet patterns relative to cognitive development in children in order to improve on pedagogical intervention techniques.

Besides the effects of advertising on obesity, economic factors are also a prominent variable to research. The correlation between child's family economic status and obesity, plus the economic viability of government subsidies on healthy food would be an important quantitative survey to explore. While there is existing research into the dietary habits of children which suggest that children will choose to eat what their parents eat (Williams 2008), future research endeavours could include studying various external factors that could imply further causality, such as what can the parents afford, and how does that affect a child's future dietary choices?

A challenge for nutrition education lies in devising interventions that will work with children's individuality and overcome resistance to conceptual change. Key to such development is a greater appreciation of the pressures on children's food choices and the need to help children develop an understanding of the food / health relationship which has both meaning and ownership for them. Story and French refute the status quo linking the media literacy levels of children with the effects of advertising (Story and French, 2004, p.3). The respondents are possibly simply choosing not to dis-

tinguish between advertising and programming content because of a lack of incentive to do so. Increasing children's involvement with the design of interventions could be a way forward in this respect, together with the need for education authorities and individual schools to support the development of a 'healthy school' environment (Bullen and Benton, 2004, p.59).

The main challenge for nutrition education however is not in short-term diversions, but long-term changes in behavioural responses in media literacy. Improving how children of all ages respond to contemporary media is more important than improving what they know and understand of media. A constructionist pedagogical 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.

There is a need to establish stronger correlation between nutrition and daily dietary choices in children. An inter-disciplinary approach combining design with social science, education, psychology and economics could instigate a larger paradigm shift on a behavioural level. Increasing the amount of educational content intent on a healthy lifestyle to balance advertising's ubiquity could lead to a more balanced for children. Adult paradigms are not relevant for children – instead a new paradigm of child-centric altruistic media that can influence a behavioural shift is needed.

Appendix

The human ethics process was central to this research. Conducting any research with human respondents outside the university requires approval from the Victoria University Human Ethics Committee (HEC). The application process was particularly important because the research experiments involved minors aged between seven to nine years of age, who are Year 3 or 4 students. It is essential to understand the ethics procedures associated with this process when conducting research with children as there are legal and ethical requirements when interacting with minors. The ethics application process was a chain of events that had to occur in order for research to begin.

The research had to be presented in clear, concise terms for the HEC and all correspondence with the primary schools and their students' parents or guardians. First, the research and experiments were proposed to the principals of Brooklyn Primary School and Houghton Valley Primary in writing. These were the first two schools to agree to discuss the research of the six primary schools approached.

The research ideas were then presented and discussed in person with Acting Principal Felicity Bothamley from Brooklyn Primary and Principal Barry Schon from Houghton Valley to get their approval and cooperation. They were the first point of contact for the research to begin the process of gaining access to the respondents. They agreed to host the research at their schools. The entire process was designed to be mutually beneficial as the experiment sessions would double as class time. The healthy eating component of the research also fit in with the schools' initiatives around a similar theme.

The research proceeded to provide drafts of the consent form and relevant research information for the parents. The consent forms were particularly important, as to work with the respondents involved in the research

project, consent had to be acquired from both the respondent and the parent or guardian of the respondent. This was achieved via the cooperation of two primary schools: principals agreed initially on the consent form, and then via the consent form was distributed via the school to the individual parents.

The schools provided feedback regarding the wording of the consent forms for the parents and guardians and information sheets attached. The schools recommendations included changes to the precise wording, including recommendations for the refreshments that would be provided (e.g. no nut-related products or dairy in case of allergies). The new iterations of the human ethics application and consent forms and corresponding information sheets for the parents were written with feedback from the teaching staff that would be involved with the research.

The schools then provided written memorandums of understanding that were submitted as support for the research application with the HEC. These documents of support stated the schools' willingness and enthusiasm for hosting the research which reinforced the legitimacy of the research with the HEC.

The ethics application was submitted formally to the HEC once all the paperwork was collated. The entire process took just over five weeks, not including the three week wait for the committee to convene and decide on approval. Despite the initial hurdles, the HEC process ended up really focussing the structure of the research.

The approval was granted pending small amendments to the wording of the consent forms. After approval from the HEC was received, the approval was forwarded to the schools in order for the experiments to be scheduled.

The consent forms and research information sheets were distributed to the individual parents to notify them of the events. The consent forms were returned to the schools prior to the experiments and filed.

The researcher then began working with teachers to develop the experiments. These were further refined based on the feedback from Ms. Michele Morris and Ms. Katie Grinsted, the teachers whose classes were involved with the research. Their input meant that the best practise of working with children was followed by managing their attention and fully engaging the respondents during the experiments.

The research applied for five experiments: three initial experiments to develop and design the characters and two concluding experiments to test the engagement values of the final designs. The research was successful in acquiring HEC approval and the experiments were conducted. As the experiments were scheduled to be conducted with actual respondents at the schools that were hosting the research, that scheme set deadlines for all preceding elements that had to come together in order for the experiments to be run smoothly and to acquire useful data.

Throughout the research project, the Victoria University Human Ethics Guidelines for working with children was adhered to. This meant that all respondents understood that they had a choice in regards to participating with the research, that they understood they had the right to withdraw from the research at any time if they so wished, that they knew exactly what their role in the research was, and that their decision to participate did not affect their present or future relationship with Victoria University of Wellington

Privacy and anonymity were maintained according to HEC guidelines, where any information that was obtained in connection with this study and that could be identified with the respondents remained confidential. All responses were entirely anonymous outside this research and there is no link in any written or verbal report of this research project. Also according to the guidelines the acquired data and responses would only be available to the researcher involved in the project and would be destroyed after a two year period.

There were ample provisions for further questions from parents or guardians as contact details of the researchers involved with the research were supplied. This also meant that they could withdraw their child from the research if they felt uncomfortable with the proceedings.

Figure i. Ethics Application procedure overview
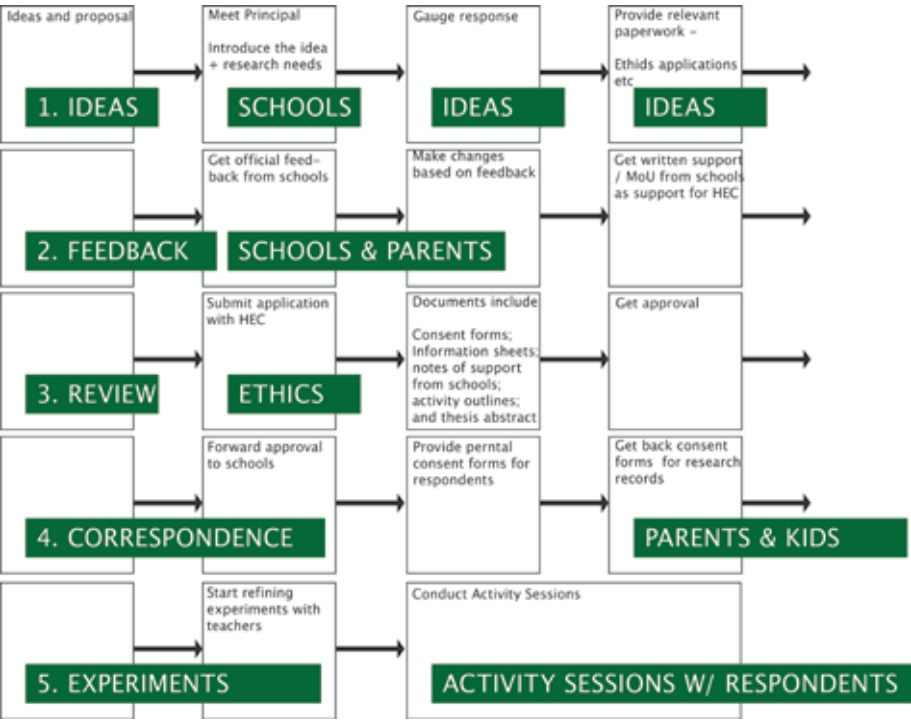
Figure ii. Consent Form for Brooklyn Primary

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wananga o te Upoko o te Ika a Maui

School of Design
Te Kura Hoahoa

PARENTAL CONSENT FORM
Drawing with Children:
Communicating Empathically to Children via Character Design

Your child is invited to participate in a study of children and character design. My name is Kah Chan and I am a post-graduate student at Victoria University's School of Design. This study is part of my research for my Masters thesis.

I am asking for permission to include your child in this study because I will be recording written and verbal responses in a group activity with the children from Brooklyn Primary School. If you allow your child to participate, I will be conducting group sessions at Brooklyn Primary School during Term 4. These sessions will be audio recorded.

Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. His or her responses will not be linked to his or her name or your name in any written or verbal report of this research project without your consent.

Your decision to allow your child to participate will not affect your or his or her present or future relationship with Victoria University of Wellington. If you have any questions about the study, please ask me. If you have any questions or concerns about your child's participation in this study, call me at 04-463 2603 or 021 103 5529. I can also be emailed at kahpow@gmail.com. My supervisors can be contacted at:

Douglas Easterly (supervisor)   Senior Lecturer, Victoria University School of Design,
04 463 6274   Vivian St, Wellington
Dr. Aukje Thomassen (co-supervisor) Senior Lecturer, Post-graduate Research
04 463 6136   Coordinator, Victoria University School of Design

You may request for a copy of this consent form.

You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow him or her to participate in the study. If you later decide that you wish to withdraw your permission for your child to participate in the study, simply tell me or the child's teacher. You may discontinue his or her participation at any time.

Please tick this box if you'd like to be sent a summary of the completed research thesis. ☐

_____
Printed Name of child

_____   _____
Signature of Parent(s) or Legal Guardian   Date

_____   13.10.2008
Signature of Investigator   Date

Figure iii. Consent Form for Houghton Valley Primary

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wananga o te Upoko o te Ika a Maui

School of Design
Te Kura Hoahoa

PARENTAL CONSENT FORM
Drawing with Children:
Communicating Empathically to Children via Character Design

Your child is invited to participate in a study of children and character design. My name is Kah Chan and I am a post-graduate student at Victoria University's School of Design. This study is part of my research for my Masters thesis.

I am asking for permission to include your child in this study because I will be recording written and verbal responses in a group activity with the children from Houghton Valley Primary School. If you allow your child to participate, I will be conducting group sessions at Houghton Valley Primary School during Term 4. These sessions will be audio recorded.

Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. His or her responses will not be linked to his or her name or your name in any written or verbal report of this research project without your consent.

Your decision to allow your child to participate will not affect your or his or her present or future relationship with Victoria University of Wellington. If you have any questions about the study, please ask me. If you have any questions or concerns about your child's participation in this study, call me at 04-463 2603 or 021 103 5529. I can also be emailed at kahpow@gmail.com. My supervisors can be contacted at:

Douglas Easterly (supervisor)   Senior Lecturer, Victoria University School of Design,
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04 463 6136   Coordinator, Victoria University School of Design

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Please tick this box if you'd like to be sent a summary of the completed research thesis. ☐

_____

Printed Name of child

_____   _____

Signature of Parent(s) or Legal Guardian   Date

_____   13.10.2008
                                                    _____
Signature of Investigator   Date

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Figure iv. Research Sheets distributed with Consent Forms

VICTORIA UNIVERSITY OF WELLINGTON
Te Whare Wananga o te Upoko o te Ika a Maui

School of Design

Te Kura Hoahoa

Session Schedules
Drawing with Children[1]:
Projective research [2] techniques applied to cartoon character design.

Researcher: Kah Chan

Introduction:
As part of the research for my Masters degree in Digital Media I would like run a small project to understand the ability of children (subjects) to develop their own cartoon characters and narratives.

The proposed subjects for this study are subjects aged seven to nine years old.

The subjects will come from one class at a local primary school – in this case Brooklyn Primary School, with parental/guardian consent.

Ethics approval has been sought and accepted from the VUW Human Ethics Committee.

Activity:
The subjects from the selected class will work together for five sessions of 30 minutes each, under the supervision of their teacher and observation of the researcher and research assistance. Each session will be a month apart.

A primary component of the idea gathering process for character design is a series of experiments commonly used in projective research with groups of children.

The subjects will be required to draw, write, and answer questions as a group.

The results from the first 3 sessions will be collected and analysed by the researcher to design and develop a series of new cartoon characters. Each session is affected slightly by the feedback from the session before it.

The final characters will be presented at the concluding session where effectiveness of the designs and the design method will be measured by the participating subjects.

---

[1] Full project title: Communicating Empathically to Children via Character Design

[2] Projective research is an alternative method (as opposed to direct questioning) to get consumers to express themselves. In this case this method is meant to facilitate / enable the articulation of thought otherwise difficult to express.
For more details: http://www.up.ac.za/academic/acadorgs/saafecs/vol28/donoghue.pdf

Session 1:

The question and answer session will be approached from 2 angles:

- The healthy eating part, concentrating on these points[3]:

  1. discuss favourite foods and breakfast cereals, e.g.:

     - "When I say 'CEREAL', what is the 1st word that comes to mind?"
     - "If I could have anything for breakfast, I'd have…"

  2. discuss what do you (the respondents) think is healthy food, e.g.:

     - "When I say 'HEALTHY', what is the 1st word that comes to mind?"
     - "If you were buying food at the supermarket, and you had to choose healthy stuff, what would you choose?"

  3. Do you know the food pyramid or how much should you eat?

     - Can you tell me what are everyday foods, sometimes foods, etc.

Part 1 / 4 (5-7 mins)

Drawing and writing:

4. which will be followed up by drawing/writing exercises that correspond and reinforce the discussion topics above:

   - Draw your favourite cereals. Write about it if you want.
   - Draw your favourite food, and tell me why you like it.
   - Can you think of examples of healthy (everyday food) food?
   - Can you draw the food pyramid? What goes in the food pyramid?

Part 2 / 4 (5-7 mins)

Session 2:

- and the character design part, concentrating on these points:

  1. discuss your favourite cereal mascot,

     - What are your favourite cereal characters?

---

[3] The wording will be a little different, as the younger respondents might be asked to choose food options for an imaginary character, i.e. , what do you think "James" or "Sophie" should eat at breakfast or during the morning tea break, and why?

- Is your favourite cereal character an animal? What kind of animal it?
- Why do you like it?
- What colour is it?
- What colour is the box?

2. discuss your favourite television/cartoon characters,

- What / who are your favourite television/cartoon characters?
- Tell me more about them, colour, why do you like them, etc?

Part 3 / 4 (5-7 mins)

Drawing and writing:

3. Draw / write about your favourite cereal/cartoon character,

- Is there anything you like in particular? Big ears, colour etc?

4. Draw yourself with your best friend,

- (This is more for the first design process, and develops comparisons between the best friend and favourite character)

5. And draw yourself, your friends, and your favourite character playing your favourite sport/activity.

- (This reveals what a child knows about healthy activities, as well as the relationship between the child and the synthetic character that the child chooses.)

Part 4 / 4 (5-7 mins)

Drawing tools (a combination of pencils, slightly thicker coloured pencils, and an assortment of crayons and paper) will be provided.

I have a particular interest in this angle, as there has been research that shows subjects form emotional bonds with characters/people who share their physical characteristics. This is also the first part of the joint character design process.

Session 3:
I'd then like to follow up with a series of drawings of character design that the subjects would then draw over, changing details to suit.
(4 weeks later)

- What do you like about "(Character's name)"?
- If you were "(Character's name)", and what would you change? Do you want to be taller? Shorter?

Drawing and writing:

- Can you draw yourself with "(Character's name)" playing your favourite sport / activity?
- Can you also draw the changes to "(Character's name)"?

Session 4:
I'd also like to come back with a series of 3D modelled characters, both digital (on screen) and physical paper prototypes for more feedback. I'll have a few extra paper prototypes I can leave behind.
(4 weeks later)

- How do you think "(Character's name)" moves (Fast, slow etc)?
- If you were "(Character's name)", and would you play a particular sport?
- If you were "(Character's name)", would noises would you make?
  Would you be loud and noisy?

Drawing and writing:

- Can you draw yourself with "(Character's name)" playing your favourite sport?
- What can you add about your favourite sport; i.e. why do you like it? How often do you play it?

Session 5:
Finally I'd like to show the near finished animations and get feedback regarding the characters behaviour, the subjects' reactions to the characters, and developing relationships between the subjects and the created cartoon characters.
(6-8 weeks later)

- What do you think "(Character's name)" was trying to say?
- If you were "(Character's name)", and would you have chosen the same food?
- What would you have done differently if you were "(Character's name)"?

These sessions will be complemented with audio recordings (with consent) and another strictly observational researcher. Sessions 2, 3 and 4 may have the questions change slightly depending on the preceding sessions.

I'll be glad to provide all the drawing and writing implements, as well as healthy refreshments for the children after.

Figure v. Drawing Sheets for Experiment 1

Can you draw 5 examples of **healthy food**?	Can you draw your **favourite food**?

Can you draw **you**, your **best friend**, and your **favourite TV or cartoon character** playing your favourite game together?

Figure vi. Colour sheets for Experiment 2 collage

Figure vii. Character parts for Experiment 2

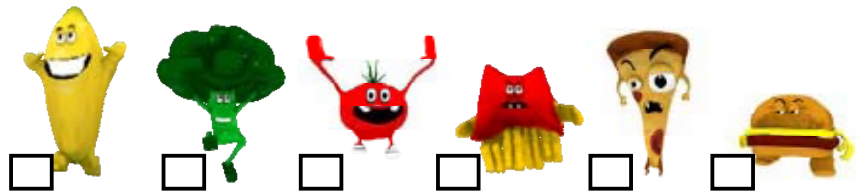# v. Experiment Three kit

Figure viii. Narrative Template for Experiment 3

Name:_____   Age:_____

_____

Figure ix. 6 variants of Questionnaires matching the 6 narratives for Experiment 4

Can you pick 3 of your favourite characters?

☐ ☐ ☐ ☐ ☐ ☐

Draw how you think the Broccoli felt when he got pushed?

Draw how you think the Broccoli felt in the end?

Do you think eating broccoli will help you run faster?
Can you think of 3 reasons why or why not?

Can you pick 3 of your favourite characters?

☐ ☐ ☐ ☐ ☐ ☐
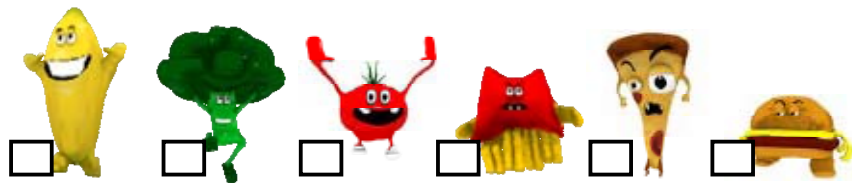
Draw how you think the Banana felt when he got pushed?

Draw how you think the Banana felt in the end?

SUPERFOOD.
Jump higher

Do you think eating bananas will help you jump higher?
Can you think of 3 reasons why or why not?

Can you pick 3 of your favourite characters?
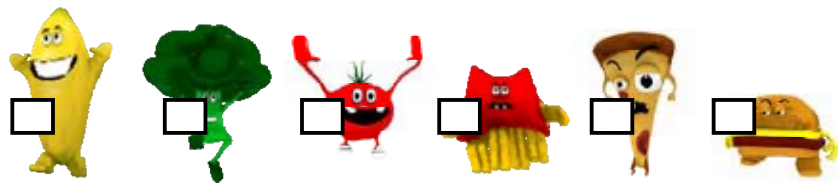
Draw how you think the Tomato felt when he got pushed?

Draw how you think the Tomato felt in the end?

SUPERFOOD.
Get stronger

Do you think eating tomatoes will help you become stronger?
Can you think of 3 reasons why or why not?

Can you pick 3 of your favourite characters?

☐ ☐ ☐ ☐ ☐ ☐
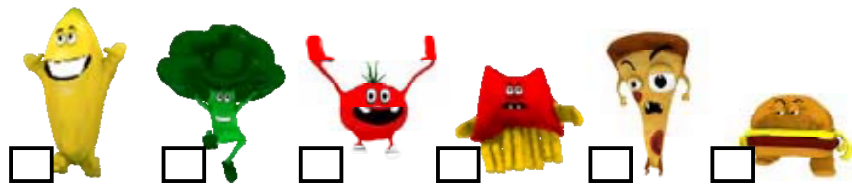
Draw how you think the Chips felt when he got pushed?

Draw how you think the Chips felt in the end?

SUPERFOOD.
Run faster

Do you think eating French fries will help you run faster?
Can you think of 3 reasons why or why not?

Can you pick 3 of your favourite characters?

☐ ☐ ☐ ☐ ☐ ☐
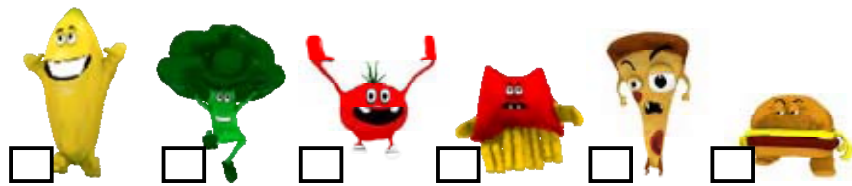
Draw how you think the Pizza felt when he got pushed?

Draw how you think the Pizza felt in the end?

SUPERFOOD.
Jump higher

Do you think eating pizza will help you jump higher?
Can you think of 3 reasons why or why not?

Can you pick 3 of your favourite characters?
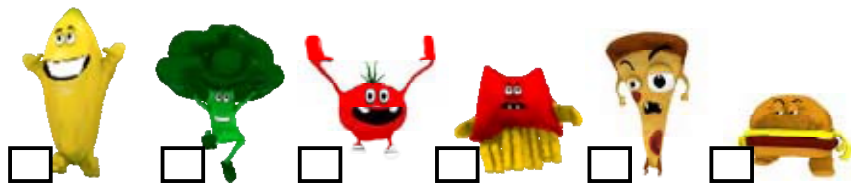
Draw how you think the Burger felt when he got pushed?

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Draw how you think the Burger felt in the end?

SUPERFOOD.
Get stronger

Do you think eating burgers will help you become stronger?
Can you think of 3 reasons why or why not?

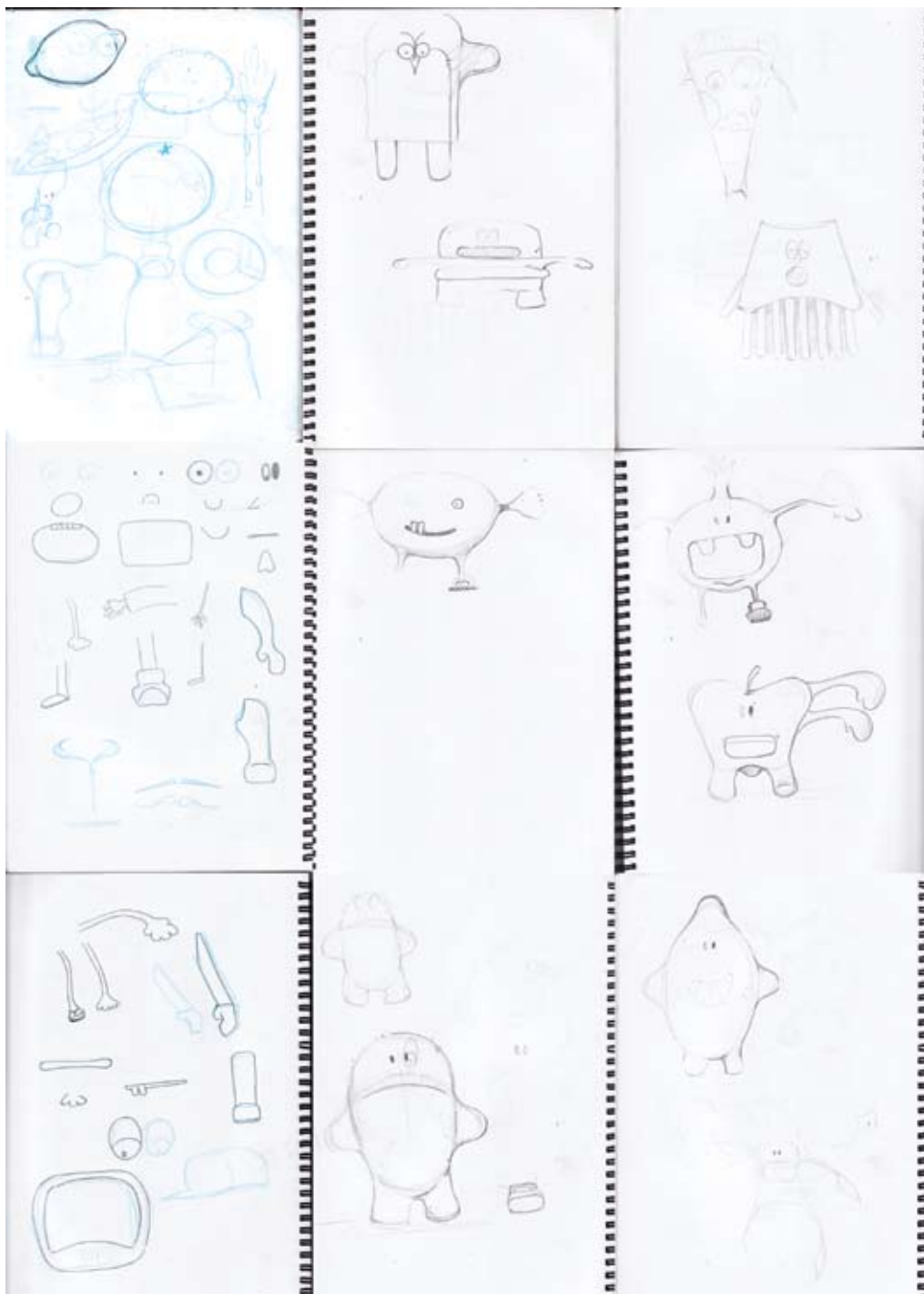*Figure x.* Character concepts by Martin Rowley for Wrigley's Extra (DDB Sydney)
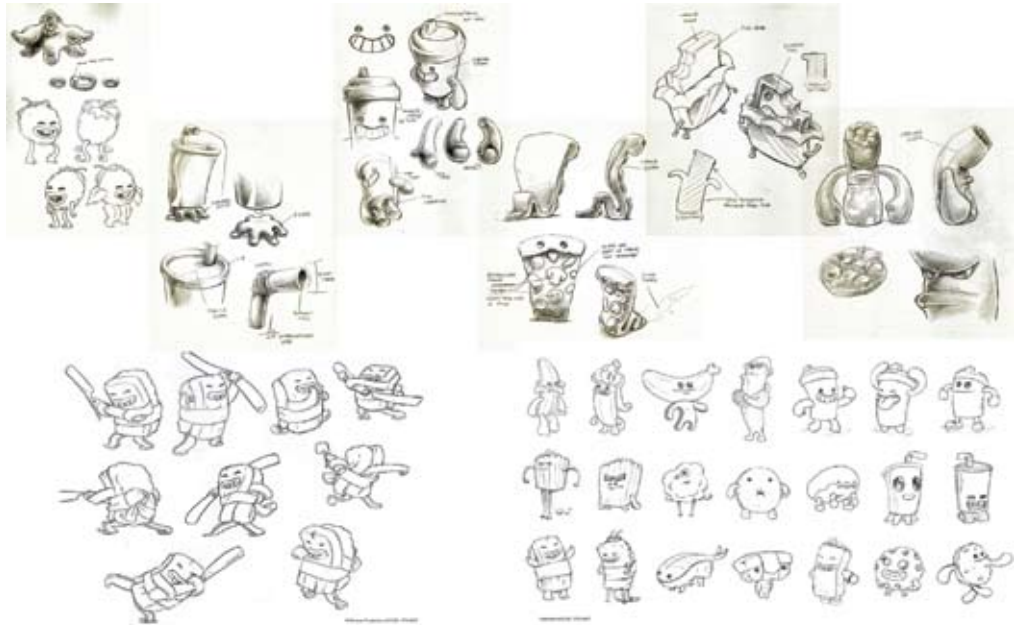
Figure xi. Selected early sketches

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"Come out and play"
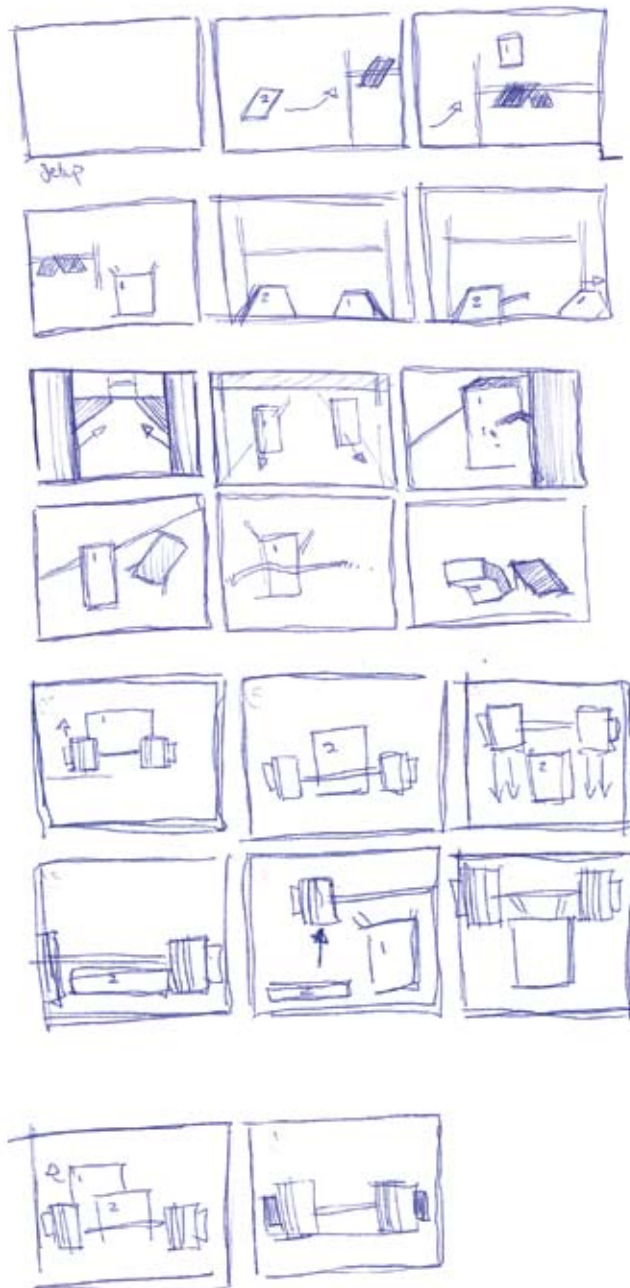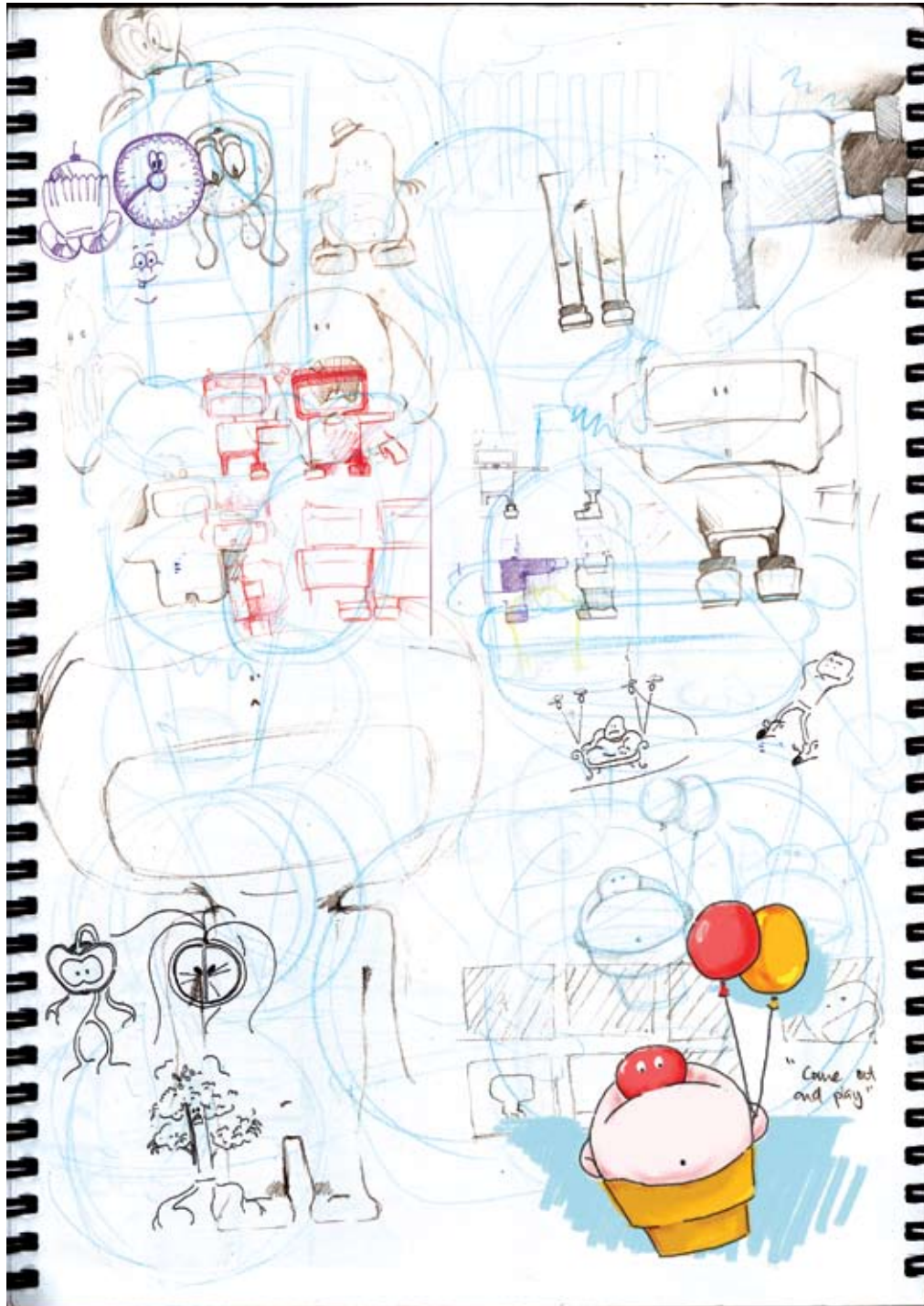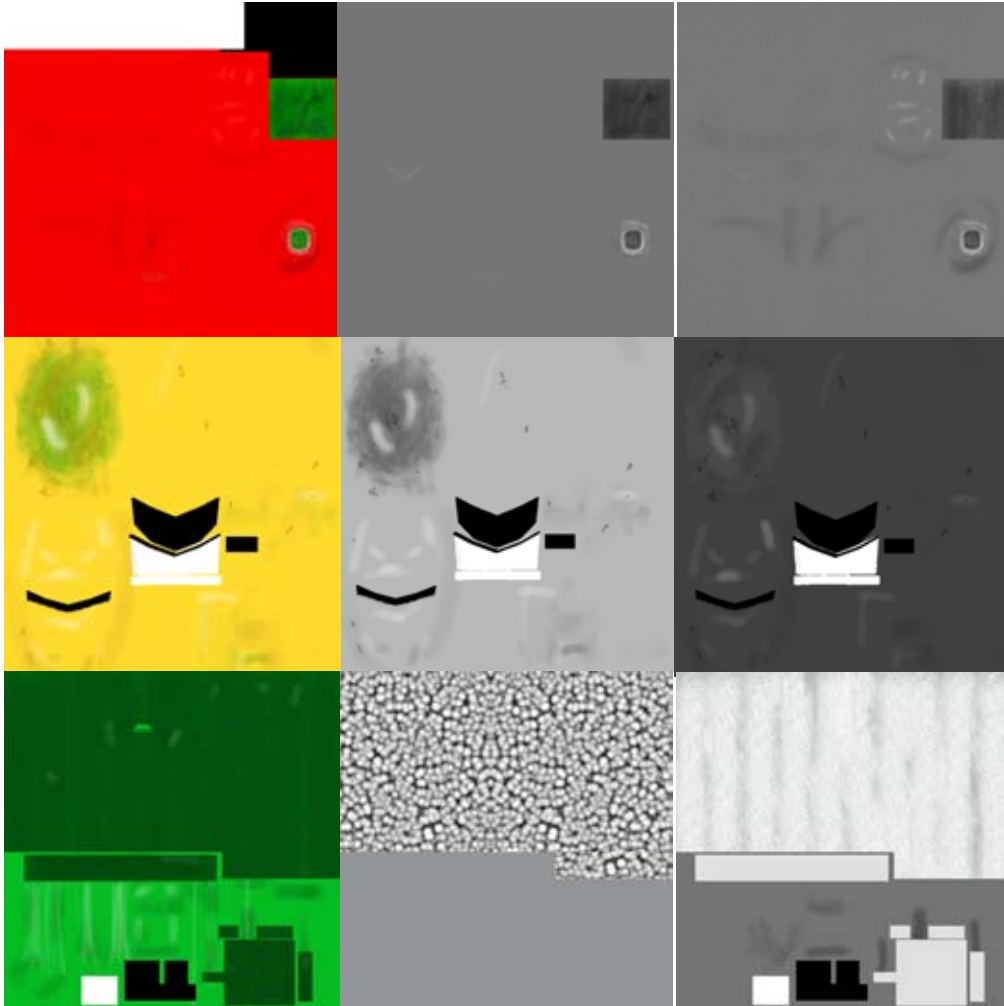
Figure xii. Early 3D models

Figure xii. Character Texture Maps (Colour, Bump and Specular)

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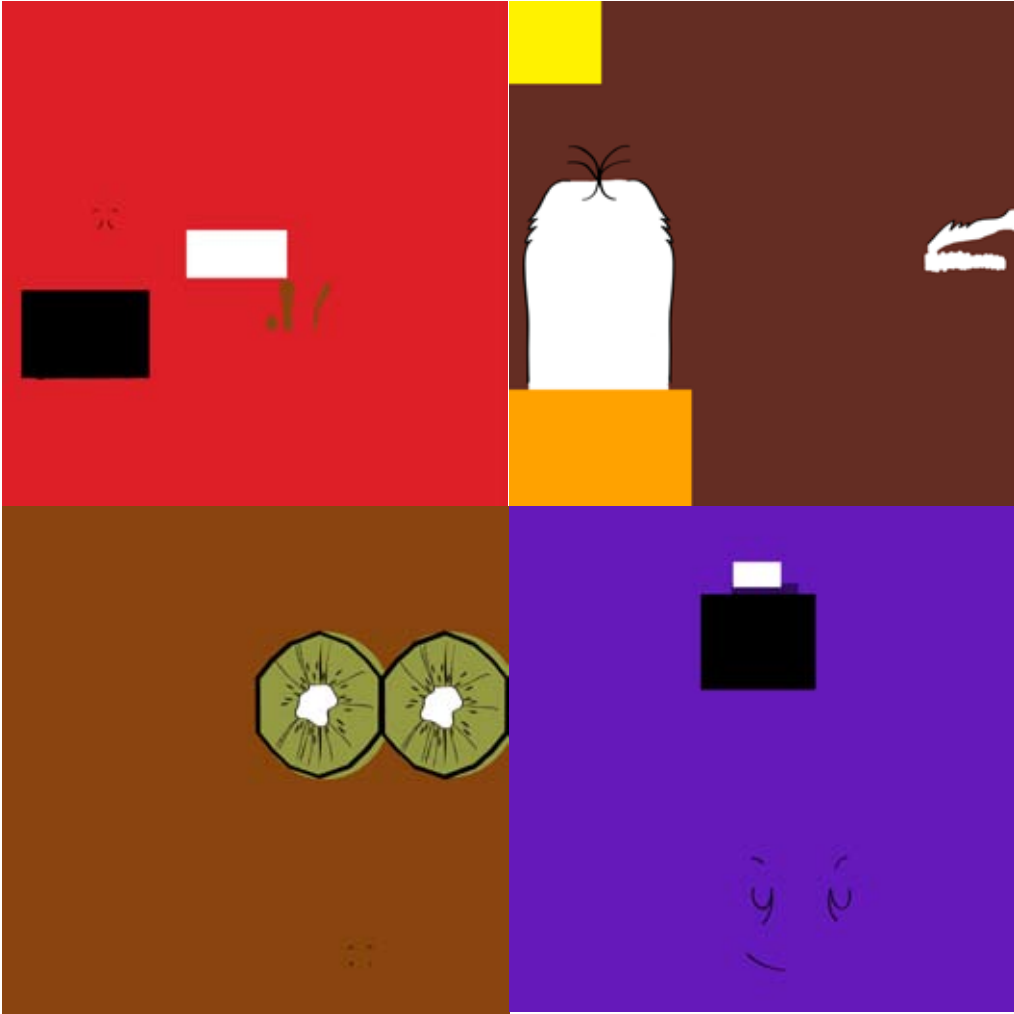
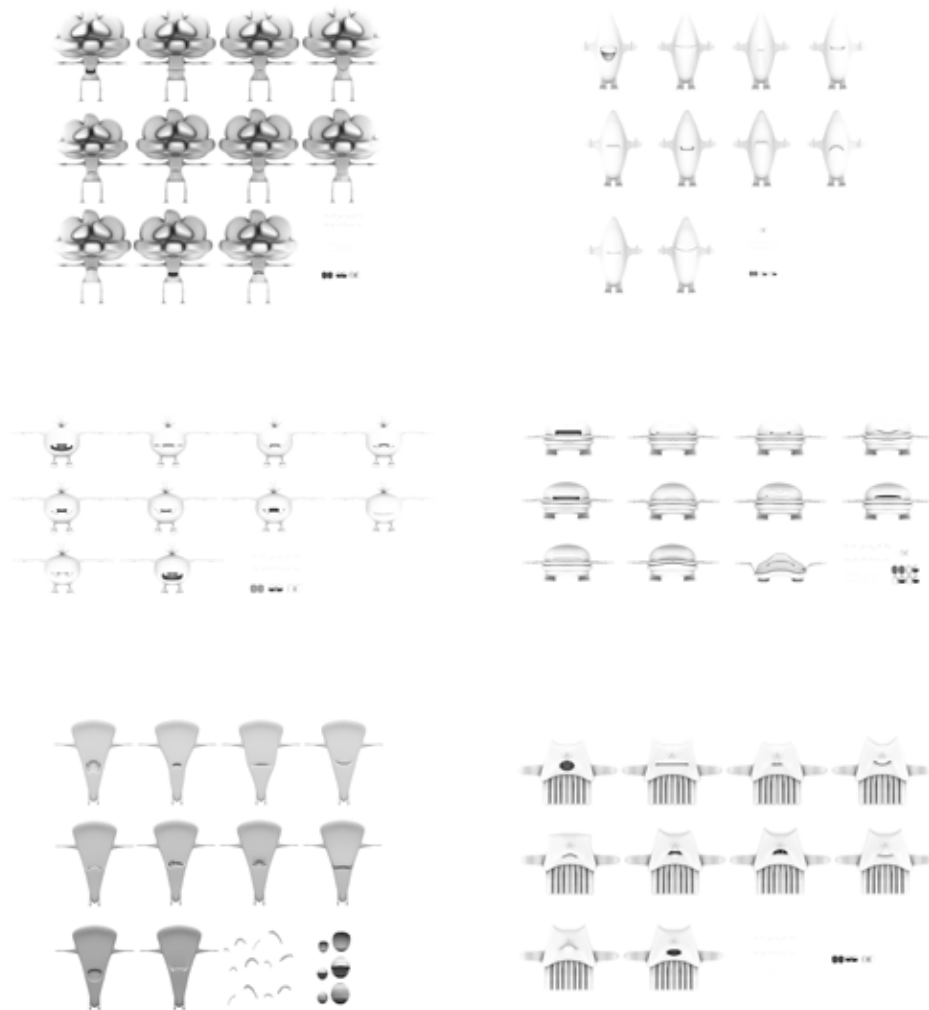*Figure xiii.* Blendshapes required for facial expressions

Figure xiv. 3-D model armatures for posing and animating
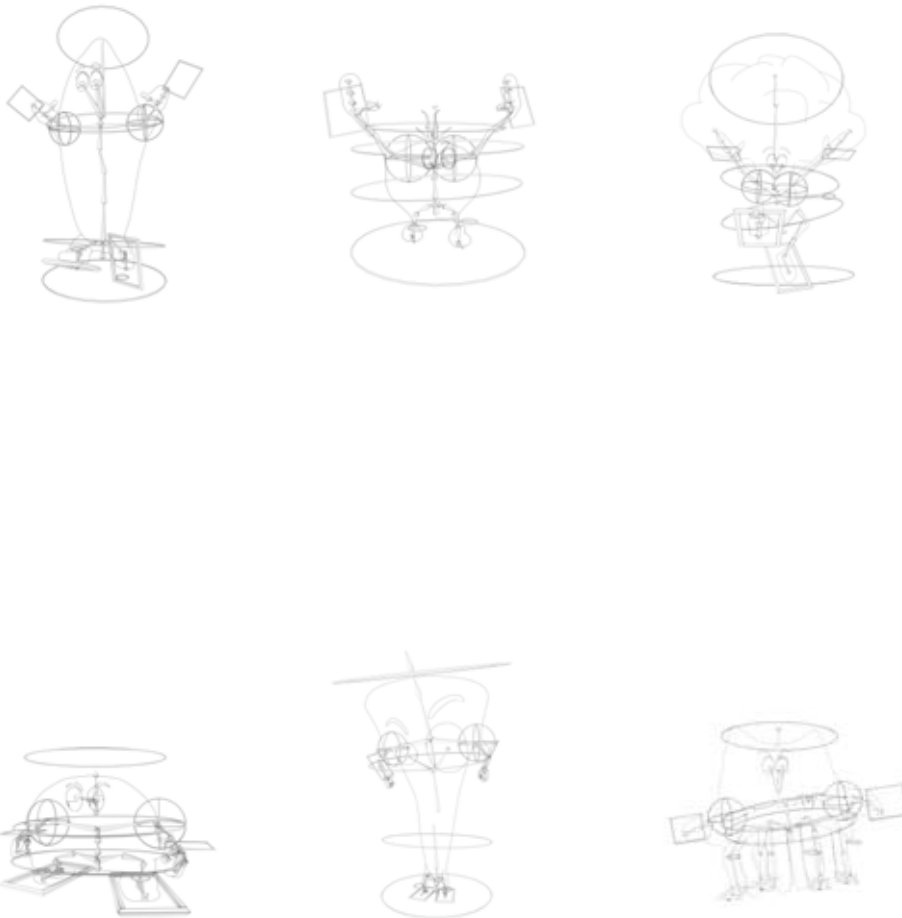
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