

HOW EMOTIONS INFLUENCE ANTHROPOMORPHISM

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HOW EMOTIONS INFLUENCE ANTHROPOMORPHISM

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*The road ahead is long and has no ending; yet high and low I will search with my will unbending.*

Qu Yuan, The Lament

This is the third time I write a dedication. The road of learning is long and has no ending as Qu Yuan said. A doctoral dissertation is a milestone for my study in the field of business. The road in the doctoral program was high and low, and I have received help and support from lots of people at the Spears School of Business.

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Abstract: The purpose of this dissertation is to explore the relations between emotion, consumers anthropomorphism, and related consequences. Current literature examines this relationship by the perspective that anthropomorphic brand designs can elicit certain emotions and increase brand evaluations subsequently (Aggarwal and McGill 2007; Aggarwal and McGill 2012; Kim et al. 2016; Yuan and Dennis 2019). Minimal amount of research investigates this relationship from the direction that emotion can induce anthropomorphism. To fill this void, I examine the effect of emotional valence and arousal separately in this dissertation. It is valuable to scrutinize the effect of these two dimensions respectively (Di Muro and Murray 2012) since they are independent from each other. In fact, the results across six studies revealed that valence and arousal did not influence consumers' anthropomorphism in the same way. While the initial proposal was based on the suggestion that emotional arousal would influence anthropomorphism, my conclusion based on the studies reported herein is that both emotional arousal and emotional valence play a significant role. Positively valenced emotions tend to have significant effects in all three studies. Emotional arousal seems more complicated. I never observed a significant affect from the manipulation of emotional arousal to the dependent variables, however, measured felt arousal appears to be positively and significantly related to anthropomorphism. While I cannot claim that emotions drive anthropomorphism to the exclusion of cognitive operations, it is clear that emotions can play an important role in anthropomorphism. Additionally, study 3a and 3b suggest that compared with the brand with low preexisting anthropomorphism, likability to the brand with high preexisting anthropomorphism stays in a relatively high level regardless of consumers' emotion. Hence, I suggest that high preexisting anthropomorphism can be a buffer for a brand.

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## CHAPTER I

### INTRODUCTION

We find human faces in the moon, armies in the cloud.

David Hume, *The Natural History of Religion*

*The trees. "I think that I shall never see slash a poem lovely as a tree."*

*"A tree whose hungry mouth is pressed slash against the earth's sweet flowing breast."*

*Why "mouth"?*

*Why "breast"?*

*The working of the creative mind.*

*An unfathomable mystery.*

*Never to be fathomed.*

Donald Barthelme, "The leap"

#### 1.1. Emotion and Consumer Anthropomorphism in Marketing

Marketing managers often create emotions in an advertisement. For instance, some dog food advertisements are designed to create a pleasant emotion by showing how happy the dog is when eating the food. Some may create sadness by showing a sad dog which needs love and care in order to persuade consumers to buy the food. Apparently, emotion is an important element in advertizing, and managers often aim to influence

consumers' perception and evaluations of a product by eliciting a particular emotion in advertisements.

Further, anthropomorphism refers to the tendency to imbue humanlike features to nonhuman object (Epley, Waytz and Cacioppo 2007). People commonly see human characteristics in nature or in artifacts. Some see a face in clouds or consider a voice assistant as a loyal servant because it can communicate and finish tasks like a human. Marketing managers often encourage this propensity in consumers to anthropomorphize products and brands. In some cases, managers imbue humanlike images and distinct personalities to brands, aiming to increase consumers' perceived credibility (Biel 1993) or develop consumer-brand relationship (Fournier 1998). Hence, consumers' anthropomorphism is a way to foster relationship with brands. Further, current literature focus on the influence of anthropomorphic designs on consumers' evaluations, while minimal amount of research has explored the relation between anthropomorphism and emotion. Therefore, this dissertation aims to fill this research void in the literature.

## 1.2. Purpose of the Study

The purpose of this dissertation is to explore the relations between emotion, consumers anthropomorphism, and related consequences. Current literature examines this relationship by the perspective that anthropomorphic brand designs can elicit certain emotions and increase brand evaluations subsequently (Aggarwal and McGill 2007; Aggarwal and McGill 2012; Kim et al. 2016; Yuan and Dennis 2019). Minimal amount of

research investigates this relationship from the direction that emotion can induce anthropomorphism.

My goal is to add to anthropomorphism and emotion literature by exploring the relationships between the two, and providing insight into conditions under which anthropomorphism play a strong role on emotion to consumer evaluations. Additionally, emotion is conceptualized with two dimensions: arousal and valence, and thus I examine the effect of emotional arousal and valence respectively. Furthermore, minimal research investigates the influence of preexisting anthropomorphism toward a brand on brand likability. It is interesting to address this issue as well. Hence, I aim to explore the research questions below.

1. Does emotional arousal /valence induce consumers' anthropomorphism to a focal product?
2. Does emotional arousal/valence increase willingness to pay via anthropomorphism to a focal product?
3. Does preexisting anthropomorphism to a brand influence the relation between emotion and brand likability?

### 1.3. Proposed Model

To address these questions, I draw upon the comfort thesis of anthropomorphism and emotion regulation theory to propose a conceptual model that explains consumer anthropomorphism as a response resulting from emotional arousal/valence stimulus and the subsequent outcomes led by anthropomorphism. People feel comfortable when they are

surrounding by others (Loukatos 1976), and they tend to anthropomorphize the nonhuman objects to create a comfortable environment. Emotional regulation theory posits that people manage their emotion, such as regulate bad moods, raise energy or reduce tension through social activities (Thayer et al. 1994). I suggest that anthropomorphism can serve as a way to development connection with nonhuman objects, such as a brand. Prior research suggest that people tend to build relationship with a brand as an alternative for interpersonal relationships, especially when people are lack of social connections with others (Huang et al. 2018). Therefore, I suggest that emotion can trigger consumers' propensity to anthropomorphize a focal product/brand. Additionally, emotion is conceptualized with two dimensions: arousal and valence, and thus I examine the effect of the dimensions on anthropomorphism independently (Figure 1-1).

Prior study suggests that anthropomorphic product in a visual form, which triggers consumers' anthropomorphism to the product, increases willingness to pay in the online auction context (Yuan and Dennis 2019), and that consumers with mildly positive emotions bid more than those with neutral emotions. Building upon these propositions, I propose that emotional valence and arousal increase consumers' willingness to pay to a focal product through anthropomorphism toward that product respectively (Figure 1-1).

In addition, consumers may initially tend to have high anthropomorphism toward some products, such as a robot or a smart phone, and have low anthropomorphism toward some such as a microwave or a bottle of water. Therefore, consumers with positive (vs. negative) emotion tend to have higher likability towards the brand with higher preexisting anthropomorphism than those with lower preexisting anthropomorphism. In a similar vein, consumers with high (vs. low) emotion tend to have higher likability towards the brand with

higher preexisting anthropomorphism than those with lower preexisting anthropomorphism (Figure 1-2).

Figure 1-1 Proposed Model in Study 1a, 1b, 2a & 2b

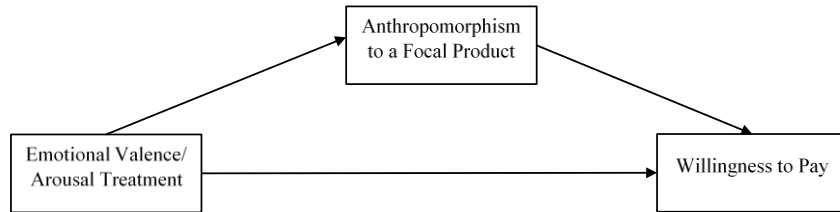
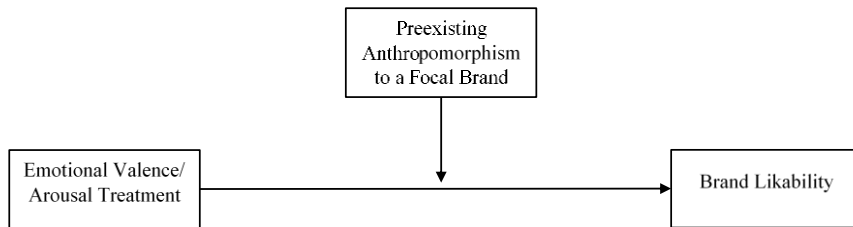


Figure 1-2 Proposed Model in Study 3a & 3b



#### 1.4. Theoretical Significance

In this dissertation I aim to contribute to the marketing literature by exploring the influence of emotional arousal and emotional valence on consumers' evaluations and willingness to pay through anthropomorphism. First of all, instead of examining the impact of product with anthropomorphic designs on consumers' emotion and evaluations as outcome, this research provides a new perspective to explore the relationship between emotion and consumer anthropomorphism. That is, emotion can trigger consumers' anthropomorphism toward a product.

Second, the study broadens the willingness to pay literature by investigating how emotions influence willingness to pay via consumer anthropomorphism. Prior research focuses on the impact of specific stimuli such as wine with different quality (Danner et al. 2016) or anthropomorphic products (Yuan and Dennis 2019), while some focus on particular contexts such as online auctions (Yuan and Dennis 2014). It is surprise that rare research explores this relationship by examining the role of consumer anthropomorphism. Therefore, this dissertation aims to address this issue and focus on the role of consumers anthropomorphism to a focal product.

Again, marketing literature about anthropomorphism focuses on the effect of anthropomorphic designs on evaluations and few researches investigate the influence of preexisting anthropomorphism to a brand on this issue. This dissertation provides a new perspective to see consumer anthropomorphism to a brand. Anthropomorphic designs can induce consumer anthropomorphism toward a product/brand, and overtime the anthropomorphism can become a preexisting perception that some products/brands tend to have higher anthropomorphism than others. Hence, it is interesting to investigate the influence of preexisting anthropomorphism on brand evaluations.

### 1.5. Managerial Significance

In terms of managerial implications, the current dissertation provides recommendations that can help managers in successfully implementing branding strategy related to anthropomorphism. Given that it is common to use anthropomorphic designs to induce consumers' anthropomorphism to a product/brand, finding a new way to achieve this



goal benefits marketing practitioners. This research finds that positive emotion and high arousal can induce consumers anthropomorphism. This finding implies that managers can add emotional stimulus in advertisement or in store display to increase consumers' tendency to anthropomorphize the products/brands associated with the stimuli.

Additionally, this research suggests that preexisting anthropomorphism can serve as a buffer for a brand. In particular, consumers' tendency to like a brand for which they have high preexisting anthropomorphism remains stable regardless of whether they experience positive or negative emotion. Hence, the anthropomorphism developed overtime by consumers is valuable for a brand. In the long run, it is worthy for firms to invest in product designs and marketing initiatives aimed to increase consumers anthropomorphism.

#### 1.6. Organization of the Dissertation

The current dissertation consists of six chapters. In this first chapter, I introduce the research background and issue, study purpose, proposed model, and theoretical and managerial contributions. Chapter II reviews the literature, including anthropomorphism theses in psychology and in marketing. Chapter III provides a detailed explanation for the development of the proposed model and hypotheses. Chapter IV illustrates the research methodology for empirical testing. In Chapter V, I summarize and explain the results from the data analysis and conclude the hypotheses testing. Last but not least, Chapter VI discusses the research findings, contributions, limitations, and directions for future research.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1. Introduction

Prior research suggests that consumers' anthropomorphism is a cognitive process of interpreting the behavior of nonhuman objects in the external world (Epley, Waytz, and Cacioppo 2007; Waytz, Cacioppo, and Epley 2010), and that consumers tend to have positive evaluations on an anthropomorphic brand/product (e.g., Aggarwal and McGill 2007; 2012; Puzakova, Kwak and Rocereto 2013; Kwak, Puzakova and Rocereto 2017; Maeng and Aggarwal 2018). Additionally, emotion influence consumers' evaluations (e.g., Bagozzi, Gopinath and Nyer 1999; Gorn, Goldberg and Basu 1993; Griskevicius, Shiota and Nowlis 2010), advertising persuasion (e.g., Gorn, Pham and Sin 2001; Pham 1996), and decision making (e.g., Cohen, Pham and Andrade 2008; Pham 1998). However, very few researches examine the relationship between emotion and consumers' anthropomorphism. Specifically, it is not clear that whether emotion can trigger consumers' tendency to anthropomorphize a product/brand and influence the subsequent consequences such as product/brand evaluations.

This dissertation aims to address these research questions, starting from the literature review of anthropomorphism, a concept which can be traced back to ancient

Greek. There are eight sections in this chapter. The first section is the overview of this chapter. In the second section, I discuss the definition of anthropomorphism based upon current literature in psychology and marketing. The third section provides a thorough review of the two fundamental theses about anthropomorphism in psychology, including familiarity thesis and comfort thesis, and Guthrie's criticism on both theses. In the fourth section I review Guthrie's thesis of animism and anthropomorphism, and in the fifth section I discuss Epley et al.'s (2007; 2010) SEEK model of anthropomorphism, which is established based on familiarity thesis and comfort thesis. In section sixth, I summarize and compare all four major theses reviewed in prior sections. The seventh section provides an in-depth review about marketing literature on anthropomorphism. Finally, the eighth section concludes the chapter by briefly summarizing the literature on anthropomorphism and discuss the research gaps in marketing literature.

## 2.2. Definition of Anthropomorphism

Although research of anthropomorphism in marketing emerged within the latest two decades, the concept of anthropomorphism can be traced back centuries. The ancient Greeks visualized their deities such as Zeus and Apollo in human forms, exhibiting admirable and contemptible human traits. The ancient philosopher Xenophanes observed that people fashion or shape their God after themselves (Freeman 1983). The word anthropomorphism derives from the Greek words "anthropos" (human), and "morphe" (shape or form). That is, anthropomorphism refers to the behavior of attributing human shape or form to nonhuman entities or events. The first meaning of the term "anthropomorphism" was attributing human traits to God, and expanded to attribute human traits to any nonhuman object.

In the psychology literature, anthropomorphism refers to “the tendency to imbue the real or imagined behavior of nonhuman agents with humanlike characteristics, motivations, intentions, or emotion” (Epley, Waytz and Cacioppo 2007, p.864) . This definition specifies the contents of anthropomorphism: people tend to attribute not only humanlike physiological characteristics, but also uniquely humanlike capacities such as motivations, intentions, and emotion to nonhuman objects.

Guthrie (1993) suggests three forms of anthropomorphism: the partial, the literal, and the accidental. Partial anthropomorphism happens when people see nonhuman objects or events as having important human traits but do not regard it as a fully human. For instance, consumers may see a brand as having a personality and interpret it using the schema for people without regarding it as a whole to be human. Literal anthropomorphizing occurs when people regard an object as a person. For example, people may mistake a trash bag in the dark as a person sitting on the floor, regarding it as a fully person. Accidental anthropomorphism occurs when people see human traits in inanimate objects and consider the outcome to be coincidental. People see a person in a cloud. The concept of anthropomorphism includes two elements: 1) the tendency of perceiving humanlike characteristics in nonhuman objects, and 2) the degree to which nonhuman objects are perceived as real humans.

In the marketing literature, theorists usually define anthropomorphism based on Epley et al.’s definition (2007). Aggarwal and McGill (2012) define anthropomorphism as “the attribution of uniquely human characteristics and features to nonhuman creatures and beings, natural and supernatural phenomena, material states or objects, and even abstract concepts” (p.308). Kim and McGill (2011) define anthropomorphism as “the tendency to attribute humanlike characteristics, intentions, and behavior to nonhuman objects” (p.95). These

definitions (see Table 2-1) capture the essence of anthropomorphism suggested by Epley et al. (2008) that “characteristics”, “intentions”, “emotion” and “behavior” are the traits which differentiates human from nonhuman objects.

Table 2-1  
Definition of Anthropomorphism

Author	Definition
Spada (1997)	Anthropomorphism “was originally described as the inclination to ascribe human appearances and feelings to and animate or inanimate being, particularly gods (p.37).”
Guthrie (1997)	Anthropomorphism is defined as “the attribution of human characteristics to nonhuman things or events (p.51).”
Epley et al. (2007)	“Anthropomorphism describes the tendency to imbue the real or imagined behavior of nonhuman agents with humanlike characteristics, motivations, intentions, or emotion (p. 864).”
Waytz et al. (2010b)	From Epley et al (2007), “Anthropomorphism represents a process of inductive inference whereby people imbue the real or imagined behavior of other agents with humanlike characteristics, motivations, intentions, or underlying mental states (p. 411).”
Kim and McGill (2011)	From Epley et al (2007), “Anthropomorphism refers to the tendency to attribute humanlike characteristics, intentions, and behavior to nonhuman objects (p. 95).”
Aggarwal and McGill (2012)	From Epley et al. (2007), “Anthropomorphism is the attribution of uniquely human characteristics and features to nonhuman creatures and beings, natural and supernatural phenomena, material states or objects, and even abstract concepts (p.308).”
Connell (2013)	From Epley et al. (2007; 2008), "Anthropomorphism is the process of assigning real or imagined human characteristics, intentions, motivations, or emotion to nonhuman objects, often motivated by explaining and understanding the behavior of those nonhuman agents (p.461)."

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Table 2-1 Continued

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Touré-Tillery and McGill (2015)	From Guthrie (1993), “imbuing human entities with human characteristics, motivations, attitudes, and behaviors of called ‘anthropomorphism’ (p.94).”
Hur et al. (2015)	From Epley et al. (2007), Anthropomorphism is defined as “the tendency that people imbue nonhuman agents with humanlike characteristics, motivation, intentions, or emotion (p. 340).”
Puzakova et al. (2013)	From Aggarwal and McGill (2007) and Epley et al. (2007), “Anthropomorphism involves attributing mind, intentions, effortful thinking, emotional states, and behavioral features to nonhuman objects (p.82).”
MacInnis and Folkes (2017)	From Epley et al. (2007), "Perceiving a nonhuman objects as having humanlike features, a humanlike mind or humanlike traits have been labeled ‘anthropomorphism’ (p.358).”
Kim and McGill (2018)	“Anthropomorphism is the attribution of humanlike forms, behavioral characteristics, or mental states to nonhuman objects, such as products, animals, supernatural phenomena, or even abstract concepts (p.431).”

---

### 2.3. Familiarity Thesis, Comfort Thesis of Animism

This section provides an in-depth review of prevailing theories about animism and anthropomorphism in the psychology literature (Table 2-2), including familiarity thesis, comfort thesis, and Guthrie’s criticism of both theses.

Animism and anthropomorphism are closely related but different concepts. Animism refers to the behavior of attributing life to the nonliving (Guthrie 1993; Piaget 1933), while anthropomorphism includes attributing humanlike capabilities to non-livings objects and living animals (Guthrie 1993). Even though animism and anthropomorphism are not the same, people often do both at the same time. For instance, if we say a computer runs like a

turtle, we animate but do not anthropomorphize, and if we speak to our pet turtle, we anthropomorphize but do not animate. We both animate and anthropomorphize if we speak to the slow-running computer.

There are several ways to use the term animism. The first way stems from (Tylor 1873) explanation of animism. Tylor says the attempt to explain dream and death lead people to belief in spirit beings. That is, people attribute spirits to themselves, and then to animals, plants, and inanimate objects for the purpose of interpretation (Guthrie 1993). Since Tylor, many anthropologists use the term animism and refer it as a form of religion that attributes spirits to an object, human or not, which is the second way of using the term.

Developmental psychologists use the term in a third way: “the tendency among children to consider things as living and conscious” (Piaget 1933, p. 537). That is, seeing the nonliving as living. Piaget (1933) contends that children confuse self with other, and this inability will decrease but not disappear in adults. Ambiguities in the external world and the complexities in identifying animals and plants, makes discriminating what is alive from what is not conceptually difficult. The fourth and prevailing way is to define animism as Piaget but explain it as wishful thinking: “People want to see what they want to see and they want to see things as alive” (Guthrie 1993, p.41).

### 2.3.1. Familiarity Thesis

According to Guthrie (1993), there are two major views of familiarity thesis: “confusion” and “analogy”, which are on a continuum. Both views hold that anthropomorphism “consists in extending models of what we know to what we do not know”

(p. 65). However, the confusion view posits that this extension is involuntary, unconscious, and nonselective; while analogy view suggests that, it is voluntary, conscious, and selective.

The confusion view holds that people are unable to distinguish entities and processes that are internal, subjective, and mental from ones that are external, objective, and physical. These behaviors are often observed in children and people living in primitive societies. Such people mix their minds with objects or events in external world, and hence unselectively attribute their thoughts and feelings to the world: not only life but also human capacities, activities, social relations (Guthrie 1993). People view themselves as “in all respects, the center of the natural system, and consequently endowed with an infinite control over phenomena. This results from... the natural tendency which disposes men in general to form exaggerated ideas of their own importance and power” (Comet, 1974, p. 118). Hence, anthropomorphism derives from a failure to discriminate one’s own mind from the external world which is independent and objective.

Further, Lange and Nietzsche suggest that it is evitable to use human perspectives to see the independent world because humans’ perception of the world is based on their sensory organization. As Nietzsche (1968) says, “We are like spiders in our own webs, and, whatever we may catch in them, it will only be something that our web is capable of catching” (p.117). People do not process information objectively, but select, arrange, simplify and schematize it based on their interests such as getting food or building social relations (Nietzsche 1968). Therefore, people’s perception of the nonhuman world, established on their knowledge of themselves and their social relations, “are shaped and simplified by several layers of unconscious and inaccessible schemas, filters, and predispositions” (Guthrie 1993, p.68).



On the other hand, the analogy view holds that people tend to use the knowledge of themselves to see the world, rather than to tell the self from other (Guthrie 1993). People want to understand the world around but not everyone can see it scientifically. Thus, people use themselves, with whom they are familiar, as models to explain the nonhuman world. Anthropomorphism is analogy, driven by cognitive purposes; it is “a rational extension of principles from known phenomena to phenomena less known” (p.71). Hence, from the analogy view, anthropomorphism is rational, conscious, and discriminate.

### 2.3.2. Guthrie’s Criticism of the Familiarity Thesis

Guthrie (1993; 1997) criticizes the analogy view that humans’ knowledge of themselves is as limited as that of nonhuman world. Influenced by needs and interests, humans’ knowledge of themselves and the external world is constrained, shaped, and simplified (Nietzsche 1968). Guthrie (1993) argues that humans’ self-knowledge is, in fact, “deeply uncertain” (p.79), and is “more edifice than foundations” (p.79). Therefore, Guthrie (1993) argues that the analogy view provides frail grounds for explaining why people make analogies with nonhuman, and claims that there must be “some reason for making these analogies other than close or reliable knowledge” (p.79).

Further, Guthrie (1993; 1997) criticizes the confusion view. First, the primitive confusion is problematic. In fact, some researchers point out that even a young child can distinguish self from other." There is no confusion between self and other in the beginning or at any point in infancy (Stern 1985, p.10). Guthrie (1993) argues that the primitive confusion of self and others cannot fit many cases of anthropomorphism. For instance, a person

mistakes a garbage bag in the dark for a menacing man. That person anthropomorphizes the bag is not because he cannot distinguish self from other; instead, the anthropomorphism may be caused by his fear of other human. Gombrich says, "the greater the biological relevance an object has to us, the more will we be attuned to its recognition—and the more tolerant will therefore be our standards of formal correspondence" (cited in Arnheim 1974, p. 51). That is, humans are highly related and important to each other, thus the person has the propensity to attribute humanlike characteristics (e.g., seeing it as a menacing man) to the garage bag.

Second, Lange and Nietzsche, the chief advocates of the confusion view, suggest that people's perception of the world is constrained in their sensory organization. People perceive information in terms of needs and interests. However, Guthrie (1993) claims that Nietzsche conflates two concepts: anthropocentric and anthropomorphism. According to Guthrie (1993), anthropocentric means "attributing to things and events only those characteristics relevant to human needs and interests" (p.81), while anthropomorphism means attributing human characteristics to nonhuman objects. Guthrie (1993) suggests, "Humans could perceive only what is humanlike" (p.81). That is, people are able to perceive the world without the influence of their needs and interests. People are capable of discriminating means from ends. If understanding an object is to build an adequate model of it, it "requires correspondence only between object and model" (Guthrie 1993, p.81-82).

### 2.3.3. Comfort Thesis

The comfort thesis, which is compatible with the familiarity thesis, holds that people feel more comfortable when the world is viewed as more humanlike than not.

Anthropomorphism is driven by emotional motives, such as comfort or fear.

Anthropomorphism “sustained man with illusions [and] provided him with courage, comfort, consolation, and confidence” (White 1949, p. 401). Because humans have the nature of avoiding isolation and the need for social relations, they tend to anthropomorphize nonhuman objects in order to populate their surroundings (Loukatos 1976). Moreover, Hume (1975) claims that primary elements influencing humans’ fate become the objects for their hope and fear. Freud (1964) argues that fear and suffering (e.g., fear of death, or uncertainty about fate) are common states to humans, while having social relationships with nonhuman objects means influence and control over them. “If everywhere in nature there are beings around us of a kind that we know in our own society, then we can breathe freely, can feel at home in the uncanny” (Freud 1964, p.22-23). Hence, having social relations provides not only communion, but also a sense of influencing, which makes people feel comfortable in face of uncertainty caused by nonhuman objects or events.

#### 2.3.4. Guthrie’s Criticism of the Comfort Thesis

Guthrie criticizes the comfort thesis from two perspectives: emotion and need for social relations (Table 2-2). First, Guthrie (1993) argues that anthropomorphism is not only about comforting. He points out that emotions are interpretive. People perceive the external world in terms of their purposes, while emotion reflects people’s evaluations of the world. These emotions, in return, influence people’s perceptions and interpretations. “Emotion appears to be powerful influences on how we think and interpret events. They are the results of cognitions but in turn affect cognition” (Lazarus 1984, p.126). Guthrie (1993) contends

that emotion are as much the results of anthropomorphism as its causes, thus emotion provides a weak footing to explain anthropomorphism.

Second, Guthrie (1993) argues that needs for social relations are insufficient to explain anthropomorphism. For example, a person sees a shadow as a potential assailant. In this case, the person does not expect a social relationship with the “assailant”. However, the potential assailant is significant to the person because the assailant can be a threat. Therefore, Guthrie (1993) suggests, the reasons for humans’ anthropomorphism should be more than the desires for social relationship. Anthropomorphism can make the world “either friendlier or unfriendlier” (Guthrie 1993, p.77). Regardless of fear or comfort, a humanlike model offers greater significance than does any other. Because humans innately search for information and meanings, interpretations with more meanings are better than those with less (Guthrie 1993). Therefore, according to Guthrie (1993; 1997), looking for meanings is a reason for humans’ propensity to anthropomorphize.

Table 2-2

The Summary of Prevailing Theories of Anthropomorphism

The Familiarity Thesis		The Comfort Thesis	
The Confusion Version		The Analogy Version	It is compatible with the familiarity thesis
Anthropomorphism is involuntary, unconscious, and indiscriminate		Anthropomorphism is voluntary, conscious, and discriminate	“Discovering humanity around us necessarily makes us feel better than not discovering humanity” (Guthrie 1993, p.72).
Primitive confusion view	Lange & Nietzsche’s view	Humans use themselves and other people as models to perceive the nonhuman world, expending what is familiar to what is not.	Having social relationships with an object, human or not, provides not only communion but also influence and control over the object. Therefore, anthropomorphism offers human with comfort.
Humans (e.g., infants or people living in primitive societies) are unable to distinguish between self and other. That is the reason why people have the propensity to attribute human characteristics to nonhuman objects.	Most sophisticated and rational version of the confusion view of anthropomorphism.  Human perceive the world in terms of needs and interest. “We cannot extricate observation from interest and therefore, can only anthropomorphize” (Guthrie 1993, p.80).		
Guthrie’s Criticisms	Guthrie’s Criticisms	Guthrie’s Criticisms	Guthrie’s Criticisms
Some researchers argue that infants and young children are able to distinguish between self and other.	People are capable to avoid influence of needs and interest, and understand the world rationally.	Humans’ knowledge of themselves is as limited as that of the nonhuman world.	Anthropomorphism is more than comforting.  Looking for information and meanings are human nature, while humans are highly related and significant to each other. Thus, people have the propensity to see humans in nonhumans.

Source: Guthrie (1993;1997)

## 2.4. Guthrie's Thesis of Animism and Anthropomorphism

Based upon the criticisms of the familiarity thesis and the comfort thesis, Guthrie develops his thesis of animism and anthropomorphism, arguing that animism and anthropomorphism are driven by people's needs of finding significance in life. These theses are summarized in this section.

### 2.4.1. Guthrie's Thesis of Animism

Guthrie (1993;1997) criticizes that explaining animism from the perspective of wishful thinking is problematic: there is no correspondence between what people wish to see and what they think they see. He (1993) argues:

*“Distinguishing what is alive for what is not is intrinsically difficult and that animism stems in part from this difficulty. The difficulty has two sources: animals in their natural environments typically are hard to see, and criteria for life are uncertain. Therefore, we not infrequently are in doubts as to whether something is alive. When we are in doubt, the best strategy is to assume that it is” (p.41).*

Guthrie (1993; 1997) posits that animism results from a perceptual strategy. He (1993) argues, “Perception is interpretation; interpretations aim at significance; and significance generally corresponds to the degree of organization perceived” (p.41).

“Perception is interpretive”, meaning how people see a thing is a choice, which depends on their needs, interests or purposes under particular contexts. Further, Guthrie explains how people interpret the world. People tend to search for order and meaning, and to understand the world by models, which fit with their needs and interests. What people see results from

what models they use. People make choices among models, which generates the most information. Guthrie (1993) argues that the more information a model generates, the more significant it is to humans; the higher level of model people can use, the more meanings they can generate.

Guthrie (1993;1997) suggests that people attribute various hierarchies to the world. There are three basic systems: the inorganic world, the organic world and the “between”, which concerns about what is alive and what is not. The inorganic world refers to a hierarchy of scale among physical systems. For instance, universe contains galaxies, which contain planetary systems, and so on down through planets with moons. The organic world refers to organisms, which consist of nested systems associated with each other and with the external world (Guthrie 1993). Organisms are highly organized and complex. Guthrie (1993) argues that compared with inorganic world, organisms are “hot spots of order, humming with information” (p.45). The third hierarchy consists of the organic and inorganic worlds, and people try to distinguish the living from the nonliving.

Further, Guthrie (1993) explains the rationale of the perceptual strategy suggested:

*“If perception requires choosing among interpretations and therefore requires betting, and if the payoff is discovering significance, then the first bets to cover ... are bets as high on the scale of organization as possible. The discoveries of order they yield are those we most need. Some such bets are built into perceptual system... Built-in frog bets, for instance, are that a small moving image is food and that a large moving image is a predator” (p.45).*

Based on Guthrie's (1993) explanation above, people see the world as "what matters most" (Guthrie 1997, p.56). That is, people see the world with models determined by their most important interests. For example, people in the wild guess whether a large lump is a bear or a boulder. In this case, people are looking for models related to the third and crucial hierarchy Guthrie suggested. That is, people make decision about whether the object is alive or not. In the face of uncertainty, people tend to bet on the bear. If they are right, the reward is whatever they know to apply under this situation. If they are wrong, the cost is cheap. In contrast, if they bet on boulder and are wrong, the cost can be high. Compared with boulders, living bears provide more information and significance to humans. This guessing high strategy seems good to people because the rewards usually outweigh the costs.

Moreover, uncertainty is a common state to humans. In a complex and ambiguous world, people's knowledge is uncertain. An unresolved number of factors can cause a particular sensation (Guthrie 1993). However, usually people are unaware of uncertainty since most perception is quick and unconscious, and suppresses ambiguity. As Kahneman and Tversky (1982) suggest, "the suppression of uncertainty and equivocation in perception suggests that we may be biologically programmed to act on the perceptual best bet, as if this bet involved no risk of error" (p.147).

#### 2.4.2. Guthrie's Thesis of Anthropomorphism

Guthrie's (1993, 1997) explanation of anthropomorphism resembles that for animism. That is, anthropomorphism can be seen as a result from a perceptual strategy: a bet that the world is humanlike, and the bet has more upside than downside risk (Aggarwal and McGill



2007). Guthrie's explanation of anthropomorphism starts from discussion about related findings in cognitive psychology.

Using artificial intelligence to investigate natural perception, psychologists find that for both human and computer, the data interpreted are fragmented and degenerate (Guthrie 1993). However, humans/computer are able to scan and process data with schemata, which is central to perception. Arnheim (1969) says, "Perception consists in fitting the stimulus materials with templates" (p.27). Schemata are arbitrary and influenced by needs and interests; they show the aspects that are important to humans, and serve as guides to action (Guthrie 1993).

Further, Oatley (1978) suggests that in visual interpretation, complex organisms and computers assign levels of structure to data in two different ways: "bottom up" and "top down". In "bottom up" mode, scanning information begins with the elements of the lowest level (e.g., dots or points), and proceeds gradually toward more complex interpretations such as lines, fringes and so on. This approach requires collecting numerous interpretations and learning from the patterns from the interpretations. On the other hand, "top down" mode starts with the tendency to see what important is. This approach requires that "schemata be available for all important possibilities" (Guthrie 1993, p.101). Both approaches are interactive. Structuring knowledge properly generates related knowledge (Guthrie 1993; Rosch et al. 1976), and "the higher the level of successful interpretation, the more information we gain" (Guthrie 1993, p.101). Back to the boulder vs. bear example, if people guess it is a bear rather than a boulder, they do not need to test whether it is carnivore, or has fangs and paws. Oatley (1978) says, "It is advantageous to identify the most wide reaching, most meaningful hypotheses possible. After all, if you can see the cue of a nose, you not only

know that there is a person in the scene but where to look for the eyes, and the body” (p.209). Therefore, high-level of interpretation are more powerful and efficient than low-level ones, and has precedence.

Based on the findings above, Guthrie contends that perception is interpretation, and anthropomorphism results from a perceptual strategy: when exposed to a non-known object, it is better for humans to guess it is human rather than nonhuman. Guthrie (1993, 1997) argues that schemata of human provides a high level of interpretation because humans are highly organized. Moreover, humans are significant and meaningful to each other; humans have a need to know about the presence of other humans. Therefore, the schemata of recognizing other humans take precedence (Guthrie 1993).

In summary, Guthrie (1993;1997) suggests that anthropomorphism results from people’s attempt to see what is important to see, rather than what they want to see (suggested by the comfort thesis) or what is easy to see (suggested by the familiarity thesis). Guthrie (1993) explains why people have the propensity to attribute humanlike characteristics to nonhuman: people are motivated to detect high level of interpretations because it offers more information with higher efficiency (Guthrie 1993; Oatley 1978). High-level of interpretation take precedence over low-level ones. Humans are uniquely complex, highly organized and powerful organisms, and thus schemata of humans provide a high level of interpretations. On the other hand, other people are important and significant to people since they are born. Infants depend on parents or other people to survive, and this dependency continues throughout people’s life. These mutual needs are not only material, but also emotional and intellectual. People’s well-being is tightly bound with their fellow. Therefore, people have the tendency to attribute humanlike features to nonhuman.

## 2.5. Epley, Waytz and Cacioppo's Thesis of Anthropomorphism

Epley et al. (2007) define anthropomorphism as “the tendency to imbue the real or imagined behavior of nonhuman agents with humanlike characteristics, motivations, intentions, or emotion” (p.864). Epley et al. (2007) contend that anthropomorphism is “a process of inductive inference about nonhuman agent” (p.865). The anthropomorphic inference include the acquisition of knowledge, the activation of accessible knowledge, and the application of activated knowledge to a nonhuman object (Higgins 1996; Epley et al. 2007; see figure 1). The application process includes the correction or adjustment of accessible knowledge to integrate “alternative knowledge structures that are coactivated at the time of judgement” (p. 865).

Epley et al. (2007) develop the Sociality, Effectance and Elicited agent Knowledge (SEEK) model (Figure 2-1) to explain: 1) when and why knowledge about the self and humans is likely to be highly accessible and applied with little correction, and 2) when this knowledge is likely to be inaccessible or not to be applied. To answer these questions, Epley et al. (2007) suggest that individuals' tendencies to anthropomorphize objects are driven by three determinants: 1) elicited agent knowledge—“the accessibility and applicability of anthropocentric knowledge” (p.864; for definitions of accessibility, applicability, and anthropocentric knowledge, see Table 2-3), 2) effectance motivation — the desire to interpret, predict and interact with one's environment effectively, and 3) sociality motivation — the need and desire for social connections and affiliation.

Further, Epley et al. (2007) introduce a classification schema to explain each determinant from four categories of independent variables that affect anthropomorphism: dispositional, situational, development, and cultural variables (see Table 2-4). According to

Epley et al. (2007), dispositional variables refer to an individual's inherent traits and characters. Situational variables refer to temporary factors of one's environment, which may affect the accessibility of knowledge or change one's social or effenance motivations. Developmental variables represent factors that influence what people learn, and affect the strength of social or effectance motivation during the process of developing. Cultural variables refer to the factors related to the values, customs and social behavior of a society. The remainder of this part provides a summary of how the three determinants influence anthropomorphism within the four major categories of independent variables.

#### 2.5.1. Elicited Agent Knowledge

Elicited agent knowledge refers to knowledge representations in memory that are accessible to an individual when making a judgement. This knowledge is then subsequently applied to a given target (Epley et al. 2007; Higgins 1996). Epley et al. (2007) suggest that anthropomorphism is a process of inductive inference, which will be affected by the object's behavior, and by knowledge representations accessible to the perceiver at the moment of judgement. The process of inductive inference begins with highly accessible knowledge structure as a base. Epley et al. (2007) contend that human category knowledge or self-knowledge is more likely to serve as an automatic base for inductive inference about the characteristics or mental states of unknown objects (i.e. nonhuman objects).

There are three reasons for this contention. First, because of physical limitations, humans have direct access to phenomenological experience of being a human but have no access to the phenomenological experience of being a nonhuman object. That is, humans do

not have the sensory experience of nonhumans. Therefore, human category knowledge or self-knowledge is attained easier and richer in details than those about nonhuman objects are. Second, exposure to a nonhuman object's behavior may activate a phenomenological experience directly related to an individual's behavior, which serves as a guide to interpret the nonhuman object's behavior (Epley et al. 2007). Third, infants rely on other humans' intensive care to survive. The social interactions with other humans (e.g., parents) provides various representations of human characteristics, which create relatively vague representations of nonhuman objects (Epley et al. 2007). Therefore, human category knowledge or self-knowledge is more likely to be accessible when people make judgements.

Activation of knowledge means the action or process that "stimulate or activate some stored knowledge" (Higgins 1996, p.134; Table 2-3). The accessibility of knowledge refers to "the activation potential of available knowledge" (Higgins 1996, p.134; Table 2-3). According to Epley et al. (2007), anthropomorphism can be predicted by cognitive factors that influence: 1) the likelihood of activating knowledge about humans when interpreting nonhuman objects, 2) the likelihood of correcting this anthropomorphic knowledge, and 3) the likelihood of applying the anthropomorphic knowledge to nonhuman objects. Here, anthropocentric knowledge refers to knowledge stems from one's human category or self-knowledge, whereas non-anthropocentric knowledge refers to theoretical or practical understanding of a subject without the influence of personal feelings, interests, goals or desires. If the knowledge of nonhuman objects is obtained, the likelihood of applying human or self-knowledge will decrease. The activation of alternate knowledge will affect the application of accessible anthropocentric knowledge to a nonhuman object either through

correction of competing knowledge, or through integration of accessible knowledge (Epley et al. 2007; Gilbert 1991; Gilbert and Malone 1995; Trope and Gaunt 2000).

However, Epley et al. (2007) contend that in the process of anthropomorphism, the knowledge of humans or the self is more likely to be accessible and applied with little correction. Epley et al. (2007) explain this view from four categories of independent variables: dispositional, situational, developmental and cultural.

*Dispositional Influence: Need for Cognition*

The high accessibility of knowledge about the self or humans indicates that anthropomorphic inference serves as an “intuitive anchor” (Epley et al. 2007, p.869) . This implies that there are chronic differences in the degree to which people spend time and effort to search for information and knowledge. Such propensity is called need for cognition, which affects the degree to which people anthropomorphize. Compared with people in low need for cognition, those in high need for cognition are more likely to involve in effortful reasoning, and to correct or adjust original judgements if necessary. Therefore, the effortful reasoning will reduce the dependency on automatic anthropocentric information, and lead to increasing activation of alternate non-anthropocentric knowledge via the process of correction or integration. Epley et al. (2007) suggest that people in high need for cognition presume the existence of non-anthropomorphic representations, and thus should be less likely to anthropomorphize than those in low need for cognition.

Table 2-3

Summary of Definitions in Anthropomorphism Conceptualization

Construct	Definition
Activation	The action or process that “stimulate or activate some stored knowledge” (Higgins 1996, p.134).
Availability	Availability refers to “whether or not some particular knowledge is actually stored in memory” (Higgins 1996, p.134).
Accessibility	Accessibility is defined as “the activation potential of available knowledge” (Higgins 1996, p.134).
Applicability	Applicability refers to “the relation between the features of some stored knowledge and the attended features of a stimulus” (Higgins 1996, p.135).
Anthropocentric knowledge	Anthropocentric knowledge refers to knowledge stems from one’s human category knowledge or self-knowledge
Non-anthropocentric knowledge	Non-anthropocentric knowledge refers to theoretical or practical understanding of a subject without the influence of personal feelings, interests, goals or desires.

Source: Higgins (1996)

*Situational Influence: Perceived Similarity*

When targets are similar to the self, people’s dependency on self-knowledge is more likely to increase inductive inference about others (Epley et al. 2007). When the targets are dissimilar, people tend to depend on alternate information to interpret others (Epley et al. 2007). Thus, the perceived similarity will affect the degree to which people anthropomorphize nonhuman objects.

Further, Epley et al. (2007) suggest two dimensions of similarity: similarity in motion and similarity in morphology. Children see motion as a definite characteristic of living objects (Poulin-Dubois et al. 1996), while adults are more likely to attribute mental states to robots when the robots move at the speed near to normal human motion, compared with those move higher or slower than normal humans do. Morphology similarity refers to the degree to which a nonhuman object has the observable characteristics similar to humans. The more similar a nonhuman object looks like humans; the more likely people will use themselves as models and anthropomorphize the object (Epley et al. 2007; Morewedge et al. 2007). Hence, Epley et al. (2007) assert that awareness of similarity will activate human- or self-knowledge, or activate relevant stereotypes of humans, and thus affect anthropomorphism.

#### *Developmental Influences: Acquisition of Alternate Theories*

Human- or self-knowledge is acquired and developed through life, and is thus subject to various developmental impacts (Epley et al. 2007). Evaluating similarity of nonhuman objects and attributing characteristics of typical humans to nonhuman objects requires a person to develop representations of the self and of others. Anthropomorphism changes as a person develops, since representations of the self, other humans, and nonhuman objects change overtime. Humans are most anthropomorphic in early life when representations of the self are formed, and become less anthropomorphic as alternate representations of nonhuman objects are obtained (Epley et al. 2007). The acquisition of alternate representation does not necessarily eliminate anthropomorphism. Adults present less anthropocentric biases than children do because adults are more likely to correct or adapt anthropocentric inference of the



external world than children are, but not because adults are less likely to activate anthropocentric inference of the world (Epley et al. 2004).

### *Cultural Influence: Experience, Norms, and Ideologies*

Epley et al. (2007) contend that culture influences anthropomorphism in a similar way as developmental influence does. That is, culture affects the activation of anthropocentric representations in the process of inductive inference. Norms and ideologies about how people link to others and the nature, vary by different cultures. Norms and ideologies also affect personal experience of interacting with nonhuman objects and the attainment of non-anthropomorphic representations (Epley et al. 2007). For instance, people of unindustrialized cultures are more likely to attain non-anthropomorphic representations of animals and be less likely to anthropomorphize animals. In contrast, people of industrialized cultures have more access to mechanical devices than unindustrialized cultures do, and thus are more likely to attain independent representations of mechanical objects, and less likely to anthropomorphize those objects (Epley et al. 2007).

### 2.5.2. Effectance Motivation

The primary difference between cognitive and motivational determinants is that the strength of motivational determinants increases when a desire is deprived and decreases when the desire is satisfied; whereas cognitive determinants work following particular principles of cognitive activation, “increasing in strength at the point of activation and then decreasing over time” (Epley et al. 2007, p.871).

Effectance refers to individuals' desire to interact with one's environment effectively (Epley et al. 2007; White 1949). To humans, the external world is full of uncertainty and ambiguity. Individuals are motivated to explain, predict and reduce uncertainty in one's environment and the objects that exist in it. Humans have the desire to master their environment (Harter 1978) through controllability (Burger and Cooper 1979; Guthrie 1993) and predictability of the external world (Averill 1973; Lazarus 1984).

Anthropomorphism serves a utilitarian function for humans. Charles Darwin suggests that anthropomorphism is a useful tool for understanding nonhuman objects. Dennett (1987) contends that attributing humanlike intentions to nonhuman objects increase the ease with which people interpret the unknown objects, and thus people interact with nonhuman objects more effectively. Knowledge of the self or humans serves as rich representations to increase a sense of predictability and controllability (Epley et al. 2007), and thus anthropomorphism provides an intuitive and potential way to reduce uncertainty in the situations where alternative non-anthropomorphic representations are not available. Therefore, Anthropomorphism can be affected by humans' motivation to resolve uncertainty and feel effectual (Epley et al. 2007). The need for power (MacInnis and Folkes 2017), the need for control and the desire for competence (Epley et al. 2007) may activate effectance motivations, which facilitate the propensity to anthropomorphize nonhuman objects. That is, when effectance motivation is high, the tendency of anthropomorphism increases; when effectance motivation is low, the tendency of anthropomorphism decreases.

Further, Epley et al. (2007) contend that considering the influence of effectance motivation, anthropomorphism will be increased by two primary factors. First, observations of nonhuman objects' behaviors or behaviors attributed to nonhumans (e.g., natural disaster

attributed to religious object) should activate uncertainty. This uncertainty may appear because the object is unknown, because the object is unpredictable or go against one's expectation, or the causal relationship underlying the observed behaviors is unknown. Second, the incentives related with accurately understanding or predicting the behaviors of nonhuman objects influence anthropomorphism. When the incentives are high, anthropomorphism increases; when the incentives are low, anthropomorphism decreases. A nonhuman object perceived as threatening one's welfare will be anthropomorphized more promptly than an unthreatening one (Epley et al. 2007).

*Dispositional Influence: Need for Closure and Desire for Control*

The need for closure is defined as the degree to which an individual desires “an answer on a given topic...compared to confusion and ambiguity” (Kruglanski 1990, p.337). This desire may represent stable individual-differences such as “uncertainty orientation” (Kruglanski 1990; Sorrentino and Hewitt 1984; Sorrentino and Short 1986). People high in need for closure are more likely to maintain the current understanding about the self or the environment (Kruglanski 1990; Sorrentino and Short 1986), and be insensitive to new information or knowledge, since they are inclined to be certain-oriented and to maintain the current beliefs. Hence, people in high need for closure tend to operate anthropomorphic representations and be less likely to adjust those representations in the inductive process of reasoning a nonhuman object (Epley et al. 2007). By contrast, people in low need for closure are more likely to open to new information associated with a problem and be careful to process relevant information because they are inclined to be uncertain-oriented and to seek for valid information for a particular problem rather than hold a conclusion based on a “pre-

existing knowledge” (Kruglanski 1990, p.347). Therefore, Epley et al. (2007) suggest that people high in need for closure are disposed to anthropomorphism.

Desire for control refers to “extent to which people generally are motivated to see themselves in control of the events in their lives” (Burger, 1992, p. 6). People with strong desire for control are inclined to focus on “anthropomorphic concepts such as intentions and desires” (Epley et al. 2007, p.873) , and to employ anthropomorphism as a way to increase predictability and controllability of others’ behaviors. Hence, desire for control motivates the use of anthropomorphic representations when reasoning about nonhuman objects and increasing a sense of predictability (Epley et al. 2007).

#### *Situational Influences: Anticipated Future Interaction and Apparent Predictability*

Anticipation of future interaction, serving as a situational factor, increases people’s tendency to anthropomorphize nonhuman objects because this anticipation increases the rewards related to understanding a nonhuman object currently. This anticipation also increases the predictability and controllability of interaction with the object in the future (Epley et al. 2008; Epley et al. 2007). The anticipation motivates people to search for more information about others (Berger and Douglas 1981; Berscheid et al. 1976; Kellerman and Reynolds 1990), and increases people’s interests about others’ beliefs and attitude (Miller and Marks 1982), and motivations and thoughts (Douglas 1990). Thus, the activation of anthropomorphic representations will be more likely to occur when people expect interactions with a nonhuman object in the future.

According to Epley et al. (2007), there are various situational factors may induce uncertainty associated with a nonhuman object, and activate effectance motivation and

increase anthropomorphism; Expectancy violation is one of the most common one. When expectancy violations occur, people will reconsider current beliefs about a nonhuman object's behavior or mental states, and anthropomorphic representations will be activated about the object's intentions or motivations (Epley et al. 2007). Moreover, even though expectancy will not definitely increase anthropomorphic thoughts about a nonhuman object when people are already anthropomorphizing, it stimulates people's attentions on the object's goals or intentions, and thus facilitate anthropomorphism in general.

#### *Developmental Influence: Attaining Competency*

People tend to satisfy the desire to interact with one's environment effectively by increasing understanding of the environment currently and a sense of predictability and controllability in the future (Epley et al. 2007; 2008). Therefore, the strength of this desire will be affected by the degree to which a person attains a sense of understanding of the environment and rewards related to the possibility of predictability and by effective control over the environment (Epley et al. 2007; 2008). These approaches, Epley et al. (2007) suggest, are "are likely to vary systematically over one's lifespan" (p. 874).

In general, children are not capable to comprehend and interact with one's environment effectively. They have not attained a full sense of the environment. This incapability induces children to attribute humanlike characteristics, such as intentions, to nonhuman objects in order to reduce uncertainty. When children become more independent and attain more control over their life, the need to retain a sense of predictability and controllability increase with age (Epley et al. 2007). This increasing desire implies that effectance motivations will be more activated and influence adults more than children. Epley

et al. (2007) point out that “children may be motivated to attain comprehension and understanding more than adults, and adults may be more motivated to attain a sense of predictability and control overall than children” (p.874).

### *Cultural Influence: Uncertainty Avoidance*

Uncertainty avoidance refers to “the extent to which the members of a culture feel threatened by uncertain or unknown situations” (Hofstede 2001, p. 161) and is highly related with effectance motivation. Epley et al. (2007) suggest that people from cultures that are high in uncertainty avoidance, are more inclined to activate and employ anthropomorphic representations as an approach to increase predictability and controllability when exposed to uncertainty than those who from cultures that are low in this dimension.

### 2.5.3. Sociality Motivation

Sociality refers to the desire for social connections and social approvals from other entities (Epley et al. 2007). Sociality motivation increases the likelihood of activating social cues such as humanlike features (Epley et al. 2007; Gardner et al. 2005), and thus facilitates people’s tendency to anthropomorphize nonhuman objects during the inductive inference of these uncertain objects. Deprivation of social connection motivates people to seek for social cues in the environment (Pickett et al. 2004). Loneliness, social disconnection or attachment may activate sociality (Epley et al. 2007; MacInnis and Folkes 2017). Anthropomorphism may fulfill the needs of social connection by developing a connection between an individual and a nonhuman object with perceived humanlike qualities. In other word, when an individual feels a lack of connection to other humans, this individual has a propensity to

anthropomorphize nonhuman objects to fulfill their sociality motivation. In contrast, when an individual has a strong feeling of connecting with others, propensity of anthropomorphism will be attenuated by the satisfaction of the need of social connection (Epley et al. 2007). This argument is consistent with the proposition that in the absence of social connection, people tend to anthropomorphize a nonhuman entity and use it as a substitute for need of social connection (Dunn and Hoegg 2014; Huang et al. 2017; MacInnis and Folkes 2017).

#### *Dispositional Influence: Chronic Loneliness*

As mentioned above, people suffering from chronic loneliness are more likely to attribute humanlike characteristics and traits to nonhuman objects than those who are chronically connected. Hence, chronic loneliness increases the possibility of anthropomorphism because chronically lonely people tend to seek for social connection, and activates the anthropomorphic representations when these people are exposed to nonhumans (Epley et al. 2007).

#### *Situational Influence: Social Disconnection*

Suffering from social disconnection, people tend to relieve the “social pain” (Epley et al. 2007, p.876) by searching for social connections with other people. Epley et al. (2007) suggest that one way to build up social connections is to “anthropomorphize nonhuman agents, essentially likely, humans out of nonhumans” (p. 876). Situationally activated disconnection, such as loneliness or isolation, facilitates anthropomorphism in a way that may relieve the negative feeling of being socially disconnected. Therefore, people are more likely to anthropomorphize nonhuman objects when they are aware of social disconnection.

### *Developmental Influences: Attachment*

Attachment styles affect people's tendency to search for social cues. People with insecure-preoccupied attachment styles are more likely to be sensitive to social cues, whereas people with secure attachment styles are less likely to be (Mikulincer and Shaver 2003; Stanton et al. 2017). Thus, preoccupied people tend to anthropomorphize nonhuman objects, such as pets or Gods in order to create social connections.

Similarly, people with insecure-dismissing attachment styles, who avoid close relationship with other people (Bartholomew and Horowitz 1991), tend to compensate social isolation by searching for stable relationships with nonhuman objects (Huang et al. 2017; MacInnis and Folkes 2017). In brief, people with insecure attachment styles (e.g., preoccupied or dismissing attachment styles) tend to intensely search for more secure social relationships, and as Epley et al. (2007) suggest, anthropomorphizing nonhuman objects is one of the possible approaches to attain such relationships.

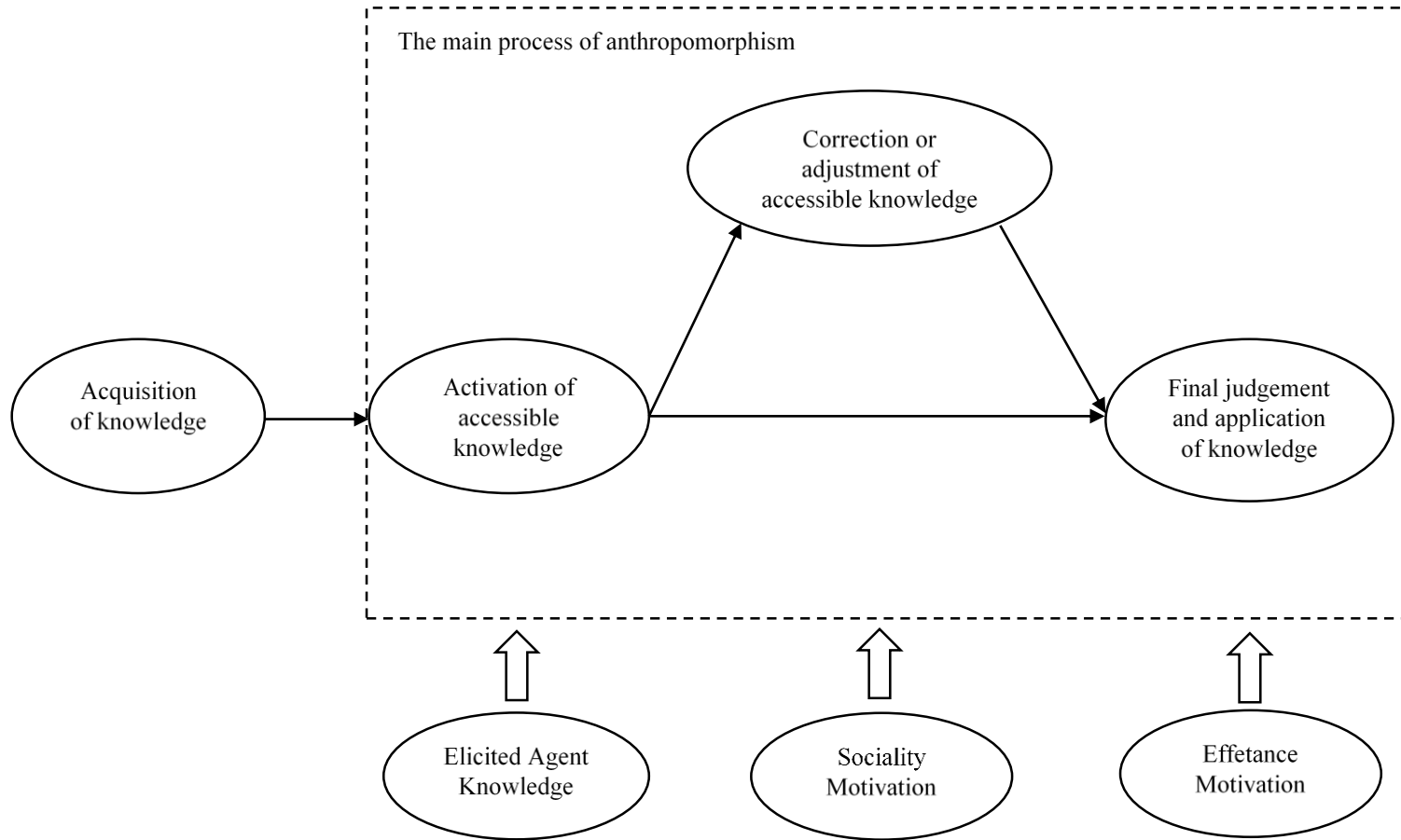
### 2.6. Marketing Literature on Anthropomorphism

Epley et al. (2007) suggest three-determinants for anthropomorphism: elicited agent knowledge, sociality motivation, and effectance motivation (SEEK model). In the first part of this section, I summarize what has been done in marketing literature about anthropomorphism from these three perspectives; in the rest of this section, I review literature on anthropomorphism from the perspectives of consumer-brand relationship and consumer-characteristic (for summary of marketing literature, see Table 2-6).



Figure 2-1.

The SEEK Model of Anthropomorphism



Source: Epley et al. (2007)

Table 2-4

Summary of Epley et al.'s Thesis, the Comfort Thesis, the Familiarity Thesis, & Guthrie's Thesis

Epley et al.'s (2007)	Cognitive Determinants	Motivational Determinants	
	Elicited Agent Knowledge	Effectance Motivation	Sociality Motivation
	<p>Anthropomorphism is a process of inductive inference</p> <p>People's human category knowledge or self-knowledge are automatically accessible and serves as a base for an inductive inference of nonhuman objects</p> <p>The reasoning process includes correction or integration of competing knowledge of humans and nonhumans</p>	<p>People have desire to interact with (White 1959) and to avoid uncertainty about one's environment effectively</p> <p>People have desire for a sense of predictability and controllability over uncertainty</p> <p>Anthropomorphism provide a possible way to interact with the nonhuman world effectively</p>	<p>Anthropomorphizing nonhuman objects can satisfy the need for social connections</p>
Familiarity Thesis	<p>People use themselves, with whom they are familiar, as model to interpret nonhuman objects, expending what is familiar to what is not.</p> <p>People's perceptions of the nonhuman world are confined to their sensations and influenced by their needs and interests (Lange and Nietzsche 1980).</p>		
Comfort Thesis		<p>Fear and suffering (e.g., fear of death or uncertainty about fate) are common states to human, having relationships with nonhuman objects means influence and control over them (Freud 1964).</p>	<p>Human have the nature of avoiding isolation and the need for social relations, they tend to anthropomorphize nonhuman objects to populate their surroundings (Loukatos 1976)</p>
Guthrie's Thesis (1993,1997)	<p>Anthropomorphism results from a perceptual strategy: anthropomorphism can be seen as a cognitive and perceptual strategy akin to a bet that is "more upside potential than downside risk" (Aggarwal and McGill 2007, p. 469).</p>		

### 2.6.1. The Elicited Agent Knowledge Perspective

Epley et al. (2007) contend that anthropomorphism is a process of inductive inference. The basic operations in this process are acquisition of knowledge, activation of knowledge, and application of the knowledge (Epley et al. 2008). People tend to apply self-knowledge or human category knowledge to understand one's environment because this knowledge is more accessible for humans. Hence, the accessibility and applicability of knowledge, especially self-knowledge or human category knowledge are identified as key determinants of anthropomorphism. In cognitive psychology, a schema is a framework of knowledge that represents information about a concept, an entity or a category, and describes its attributes and relationships among them (Aggarwal and McGill 2007; Fiske and Linville 1980). The congruity between features of a stimuli and person's human schema may influence the accessibility of human knowledge related to the stimuli, and thus affect a person's tendency of anthropomorphize it.

Marketing research indicates that the degree of congruity between product features and category schema will influence consumers' evaluation of a product (Fiske 2014; Meyers-Levy and Tybout 1989). Aggarwal and McGill (2007) suggest that human schema congruity drives the effect of product anthropomorphism on evaluations. Specifically, participants primed with human schema were more likely to see a product as a person and have more favorable evaluations toward a product when the target features were more congruent (vs. less congruent) with human schema. Human schema priming activates human schema and increases the accessibility of human category knowledge. Additionally, an anthropomorphized product is more easily to be processed (Connell 2013). The perceptual fluency (i.e., the ease of processing an anthropomorphized object) also creates positive

responses toward an anthropomorphized product (Connell 2013; Puzakova et al. 2013).

Hence, participants are more likely to anthropomorphize a product presented with humanlike features.

Further, affect associated with human schema (positive or negative) may transfer to an object (Aggarwal and McGill 2007; Fiske 2014; Puzakova et al. 2013). Previous research reveals that positive evaluations on a product only occurred when a product is associated with positive images (Aggarwal and McGill 2007, study 3). Consumers are more likely to have positive affect toward anthropomorphized animals (e.g., mascot cartoons) with high similarity to humans (i.e., an animal's baseline physical are similar to human) than those with low similarity to humans (Connell 2013).

There are two dimensions of social cognitions — warmth judgements and competence judgments (Fiske et al. 2002; 2007). Warmth dimension captures traits related to perceived intention, such as friendliness, helpfulness, and trustworthiness, while competence dimension captures perceived ability such as intelligence, efficacy and capability (Fiske et al. 2007). Zhou et al. (2018) argue that when people anthropomorphize money, they will attribute both warmth and competence to it, and that when money is perceived as a human, it as a warmer and more competent than money perceived as an object. Their research shows that money anthropomorphism increases donation intention when consumers perceive money as a warm person (i.e., warmth-perception serves as a mediator), whereas when money is perceived as a competent person, the effect does not occur.

In brief, the positive effect of human schema congruity on product evaluations is due to: 1) a perceived congruity between product features and activated human schema provides

ease to understand a product, and thus creates greater product liking, and 2) a transfer of positive affect from a human schema to a product will also create positive evaluations to the product (Aggarwal and McGill 2007; Puzakova et al. 2013; for details, see figure 2-2). The mediated effect of product perceptions, such as perception of a product as a person (Aggarwal and McGill 2007), and perceived brand personality (Puzakova et al. 2013) on product evaluations supports this view.

### 2.6.2. The Effectance Motivation Perspective

According to Epley et al.'s (2007) SEEK model, effectance motivation is a key determinant of anthropomorphism. Effectance motivation refers to the motivation to interpret, predict and interact with one's environment effectively (Epley et al. 2007). Epley et al. (2008) argue that one's human knowledge or self-knowledge serves as "a useful heuristic" (p.146) to understand nonhuman objects. This inference process is moderated by effectance motivations; such effectance motivation can be enhanced by factors such as a desire for control, unpredictability, or possibility of future interactions. These propositions are empirically tested. Specifically, a desire for control and unpredictability of nonhuman objects facilitate people's tendency to anthropomorphize an object (Epley et al. 2008; Waytz et al. 2010b). Moreover, Waytz et al. (2010b) suggest that not only anthropomorphism raised from effectance motivations, but also anthropomorphizing should, in turn, satisfy effectance motivation.

Power is defined as "the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance, regardless of the basis on which this possibility rests" (Weber 1947, p.152). Social power creates asymmetric controls in social

relationship (Kim and McGill 2011; May and Monga 2014). Prior research shows that people with high social power believe they are able to have influence over anthropomorphized, risk-bearing objects (e.g., slot machines, skin cancer); this control perception in turn, decreases risk perception toward the objects (Kim and McGill 2011). In contrast, people with low social power are more likely to have high risk perception toward the object since they believe they cannot control over the objects (Kim and McGill 2011).

Maeng and Aggarwal (2018) argue that from evolutionary perspective dominance is a fundamental motive for humans. They suggest that product faces can signal dominance in a similar way as human faces, and product looks deliver messages about its owners. Therefore, product can serve as a tool to attain dominance and power. Maeng and Aggarwal's (2018) research reveals that consumers are more likely to pay more for products with humanlike features which can signal high dominance for its owners; the liking of such products is driven by consumers' desire to enhance and signal their dominant status.

May and Monga (2014) suggest that 1) time can be anthropomorphized because "movement is the central of time and movement is a key characteristic of human" (p.926), and 2) wait time is a powerful force. Hence, they suggest that people will anthropomorphize wait time and perceive it as a powerful person standing in the way of options. They argue that people with high social power tend to focus on themselves, while people with low social power attend to powerful others. May and Monga's (2014) research shows that low social power decreases people's patience for waiting when time is anthropomorphized. Further, they suggest that time perception (i.e., time is aversive vs. beneficent) mediates the interactive effect between time anthropomorphism and perceived social power. Moreover, they examine time perception as moderator. Specifically, people who feel less potent

themselves will perceive aversive time with more potent. When time is anthropomorphized and perceived as an aversive force, people with low power are more likely to have less patience. By contrast, time anthropomorphism does not have significant influence on people with high power.

Distinctiveness motivation refers the desire to differentiate the self from others (Puzakova and Aggarwal 2018; Vignoles et al. 2006; White and Argo 2011). Previous research suggests that products can serve as self-extensions (Belk 1988) and as signals of individual's identity (Snyder and Fromkin 1980). People fulfill the desire for distinctiveness by signaling one's unique identity (Vignoles 2009). However, when brands are used an important way for signaling identity, factors that constraints the need for self-expression create negative influence on evaluations (Puzakova and Aggarwal 2018). Consumers with high distinctiveness motivations tend to concern with keeping a sense of agency for self-expressions (Bhattacharjee et al. 2014). Because anthropomorphized distinctive brands can be perceived as retaining its own identities and as less likely to be controlled, these brands decrease consumers' senses of agency in self-expressions and thus lead to less favorable evaluations toward the brand (Puzakova and Aggarwal 2018). Empirically, Puzakova and Aggarwal (2018) find that when consumers' distinctiveness goals are salient, they are more likely to have higher sense of agency in self-expressions and have less favorable evaluations toward anthropomorphized (vs. non-anthropomorphized) brands. When a brand is positioned as agent or controller, these identities create threats for people with high distinctiveness motives that they may lose agency for themselves in identity signaling. Therefore, consumers with high distinctiveness motives are more likely to have more favorable evaluations toward

anthropomorphized brands only when brands are positioned as a supporter (vs. brand-as-controller vs. brand-as-agent).

### 2.6.3. The Sociality Motivations Perspective

#### *Social Connections and Social Avoidance*

Sociality motivation is the basic need for social connections with others (Epley et al. 2008). Lacking of social connections with other humans, people may compensate the need by anthropomorphizing nonhuman objects (e.g., God, pets, or brands) in order to populate their surroundings. Epley et al.'s (2008) research indicate that people with chronic loneliness are more likely to attribute humanlike traits related to social connections (i.e., thoughtful, considerate, and sympathetic) to familiar pets. Although Epley et al. (2008) did not test any process explanations, they argue that the process is inferential and induces metacognitions.

Social crowdedness may lead people to avoid social interaction with others. This tendency may transfer to anthropomorphized brands. Puzakova and Kwak's (2017) research shows that in a crowded environment, consumers are more likely to have low purchase intentions for interaction-oriented anthropomorphized brand. By contrast, in an uncrowded environment, consumers are more likely to have high purchase intentions for an interaction-oriented anthropomorphized brand than an interaction-oriented non-anthropomorphized brand. Further, social avoidance mediated the effect of the interactive effect of brand anthropomorphism and brand interactive orientation on purchase intentions.

Social reconnection hypothesis holds that social exclusion experience drives people to search for new source of social relations (Maner et al. 2007). When the needs for social



connectedness is threatened, people tend to engage in compensatory behaviors in order to retain their sense of belongingness (Mandel et al. 2017). Mourey et al. (2017) suggest that anthropomorphic products provide consumers a way of compensating for social connectedness threat. Their study reveals that when exposed to anthropomorphic products (e.g., phone or vacuuming robot), socially excluded consumers are less likely to engage in prosocial behaviors (e.g., spending more time to talk with family) than those exposed to non-anthropomorphic products, indicating that anthropomorphic product mitigates the compensatory effect of social exclusion. In addition, this research reveals that social assurance mediates the interactive effect of social exclusion and anthropomorphic product on prosocial behavior, and rules out positive affect as an alternative mediator for this process.

### *Dehumanization*

From the perspective of sociality motivations, researchers discuss the concept of dehumanization. Waytz et al. (2010b) suggest that anthropomorphism and dehumanization is an inverse process. They are on the opposite side on a continuum. Based on the SEEK model (Epley et al. 2007), they propose that sociality motivations and effectance motivations are major determinants of dehumanization. Specifically, decreased similarity between humans and nonhuman objects will increase the propensity of dehumanization. Following this prediction, people are more likely to dehumanize social outgroups, such as discrimination to a different race. When people feel socially connected, they have less motivation to seek for social connections. Hence, these people are more likely to dehumanize other people. Later, Waytz and Epley (2012) attain empirical evidences to support these propositions.

Similarly, effectance motivation affect people's tendency to dehumanize other people. Waytz et al. (2010b) suggest that decreasing the need to interact with others will attenuate people's tendency to dehumanize other people. The authors suggest that having power over others will increase the feelings of independence and decrease the need for effective interaction with others. Therefore, effectance motivation decreases, and people are more likely to dehumanize others.

In brief, the determinant effects of social connection motivation and effectance motivation will not be strong all the time. These effects depend on the strength of the motivations. Most of the time regular people would be in a neutral state. When people go extremes — dehumanize or anthropomorphize, there are relatively strong influences caused by need for social connections or need for effective interaction with one's environment.

#### 2.6.4. The Consumer-Brand Relationship Perspective

Brand humanization is a popular marketing strategy. One way to humanize a brand is to position it as a servant, a partner. Consumers may regard brands as relation partners, and anthropomorphized brands can provide quasi-social experiences that serve as a substitute for interpersonal relationships (Aggarwal and McGill 2007; Fournier 1998; Kim and Kramer 2015). Dealing with social interactions, people have different goals, such as getting along well with someone or staying away from the person; their behavior is depended on the degree to which the behavior can lead them to reach interaction goals (Aggarwal and McGill 2012).

When a social category is activated, people will prepare for an interaction with a member from the activated category, and thus their behavior will be consistent with the stereotypes of the social category (Cesario et al. 2006). Aggarwal and McGill (2012) argue

that a partner brand that consumer like will facilitate assimilation of the behavior suggested by the brand. It is because consumers believe that collaboration is the most effective way to interact with a liked partner. In contrast, a partner brand that consumer dislikes will facilitate the consumer to violate the behavior suggested by the brand, because consumers believe that is an effective way to chase the brand away. On the other hand, a servant brand consumer liked will facilitate consumers' contractive behaviors related to the brand, because the most effective way to stay close with a servant is to let the brand to do the job. By contrast, a servant brand that consumers dislike will induce consumers' assimilative behaviors suggested by the brand, because showing self-sufficiency is the most effective way to keep the brand away.

In line with the arguments above, Kim and Kramer (2015) suggest that a servant brand may activate a master-servant relationship, in which being dominant is an effective way to interact with servants (e.g., a brand). Materialists, who have desire for pursuing self-interest, search for relationships that allow them to achieve this goal. Social power is critical to achieve and maintain such relationships. Materialists can find master-servant relationships easier in consumption settings rather than in the real life. Besides, research shows that materialists' consumption behaviors reveals their desire for social power and dominance (Burroughs and Rindfleisch 2002). Therefore, materialists like and are willing to pay more for servant brands (vs. partner brands) that allow materialists to fulfill their desire for dominance (Kim and Kramer 2015).

### 2.6.5. The Consumer Characteristics Perspective

Implicit theory of personality suggests that entity theorists believe personality traits are fixed, stable and consistent in behavior, whereas incremental theorists believe that personality is malleable and varies across situations (Poon and Koehler 2008; Skowronski 2002). Puzakova et al. (2013) posit that when a brand is anthropomorphized, consumers tend to perceive it as more responsible for its wrongdoings. Since entity theorists believe a brand's characteristics are fixed, they are more likely to have negative attitude toward an anthropomorphic brand than a non-anthropomorphic one when it is associated with wrongdoings. On the other hand, the authors suggest that incremental theorists tend to perceive a single wrongdoing is occasional, and expect changes in the future. Thus, incremental theorists are not likely to create more negative attitude toward an anthropomorphic brand than a non-anthropomorphic one when it is associated with wrongdoings.

Agency-communion orientation refers to the extent to which an individual focus on self- versus other-oriented interests and goals (Kwak et al. 2015). Agency-orientation reflects one's tendency to focus on self and emphasize the "forming of separations" from others (Helgeson 1994, p. 414). Communion orientation reflects one's focus on others and the "forming of connections" with others in social relationships (Helgeson 1994, p. 414). Communion-oriented people are more inclined to consider other people's positive intentions and actions than agency-oriented people (Kwak et al. 2017). Based on the individual differences in agency-communion orientation, Kwak et al. (2017) suggest that anthropomorphized brand (versus non-anthropomorphized brand) increases communion-oriented consumers' perceived fairness toward price decreases, because these consumers are

more likely to recognize positive intentions in others. In contrast, agency-oriented consumers are less likely to see positive intentions in other's positive actions. Therefore, Kwak et al. (2017) posit that neither anthropomorphized brand nor non-anthropomorphized brand have significant influence on agency-oriented consumers' perceived fairness toward price decreases.

### 2.7. Summary

In this section, I review the literature about anthropomorphism in psychology and marketing. There are three major theses explain why human anthropomorphize from the perspective of human knowledge (i.e., familiarity thesis), social relations and needs of control (i.e., comfort thesis) and perception strategy (i.e., Guthrie's thesis). Based upon these theses, Epley et al (2007) develop SEEK model to provide a comprehensive view of anthropomorphism. Building upon these explanations, researchers in marketing explore the relation between consumers' anthropomorphism and brand/product evaluations and explain various phenomena in marketing from these perspectives. Among all the literature reviewed in this chapter, anthropomorphism is considered a process of inductive inference (Epley et al. 2007).

Further, few researches in marketing literature investigates the influence of emotion on consumers' propensity to anthropomorphize a product/brand and the subsequent consequences on product/brand evaluations. This dissertation aims to address these research void in marketing and provides an insight into the relationship between emotion and anthropomorphism in the marketing context.

Table 2-5

## Summary of Marketing Literature on Anthropomorphism

Author	Type	Key Findings
Epley, Waytz and Cacioppo (2007)	Conceptual	Individuals are more likely to anthropomorphize when anthropocentric knowledge is accessible and applicable, when motivated to interact with one's environment effectively, when lacking of social connection.
Aggrawal and McGill (2007)	Empirical	The degree of consumers' anthropomorphism and product evaluation depend on the extent to which that a product is presented with features congruent with the proposed human schema. Consumers' anthropomorphism of the product mediates the path from the interaction between human schema and facial feature to product evaluation.
Epley, Waytz, Scott and Cacioppo (2008)	Empirical	Individuals with chronic loneliness or individuals with a stable need for control are more likely to anthropomorphize nonhuman objects.
Waytz et al. (2010)	Empirical	Effectance motivation facilitates individuals' tendency of anthropomorphism. Anthropomorphizing a nonhuman object makes it more predictable and understandable, indicating that anthropomorphism satisfies the motivation to understand an uncertain environment.
Waytz, Epley and Cacioppo (2010)	Conceptual	Dehumanization is an inversed process of anthropomorphism. Decreased similarity and need for effective social interaction increase dehumanization.
Kim and McGill (2011)	Empirical	Anthropomorphism influences risk perceptions and this effect is moderated by individuals' feelings of social power. Risk perception mediates the interactive effect of perceived power and anthropomorphism on willingness to pay.
Aggarwal and McGill (2012)	Empirical	Anthropomorphized brands facilitate individuals' goals for an effective social interaction, and lead to behavior assimilative to the brand image of liked partner brands/disliked servant brands. Results also indicate contrastive behaviors when individuals are exposed to liked servant brands/dislike partner brands.

Table 2-5 Continued

Waytz and Epley (2012)	Empirical	Satisfaction of social connection increases individuals' tendency to dehumanize outgroup people.
Connell (2013)	Empirical	Evaluation of low-level anthropomorphic animal images are less favorable than non-anthropomorphic ones. Evaluation of high-level anthropomorphic animal images are more favorable than non-anthropomorphic ones.
Puzakova, Kwak and Rocereto (2013)	Empirical	Individuals believed in personality stability (entity theorists) are more likely to devalue an anthropomorphic brand for negative publicity than a non-anthropomorphic brand. For individuals believed in personality malleability (incremental theorists), a single negative publicity does not lead to less favorable evaluations of an anthropomorphic brand than a non-anthropomorphic brand.
May and Monga (2014)	Empirical	Time anthropomorphism decreases patience for low-power individuals but not for high-power individuals because anthropomorphizing time make wait time more potent than low-power individuals who feel less potent about themselves.
Kwak, Puzakova and Rocereto (2015)	Empirical	Brand humanization increases perceived unfairness of price for agency-oriented individuals who maximize their own interests, while for communal-oriented individuals who concern about other people's interests, brand humanization enhances perceived fairness of prices increases and decreases.
Hur, Koo and Hofmann (2015)	Empirical	Temptation anthropomorphism decreases self-control by reducing individuals' experience of conflict but not by rising desire for the temptation. Anthropomorphic product serves as agent, which decreases individuals' tendency of internal attribution.
Kim and Kramer (2015)	Empirical	Materialists are more likely to have higher brand evaluation to an anthropomorphic servant brand than an anthropomorphic partner brand. Materialists have more favorable evaluation to an anthropomorphic servant brand than non-materialists.
Touré-Tillery and McGill (2015)	Empirical	Individuals in low interpersonal trust are more likely to be persuaded by anthropomorphized messengers than by human messengers since these individuals pay more attention to the nature of the messengers. When individuals in high interpersonal trust are attentive, they are more likely to be persuaded by human messengers than anthropomorphized ones.

Table 2-5 Continued

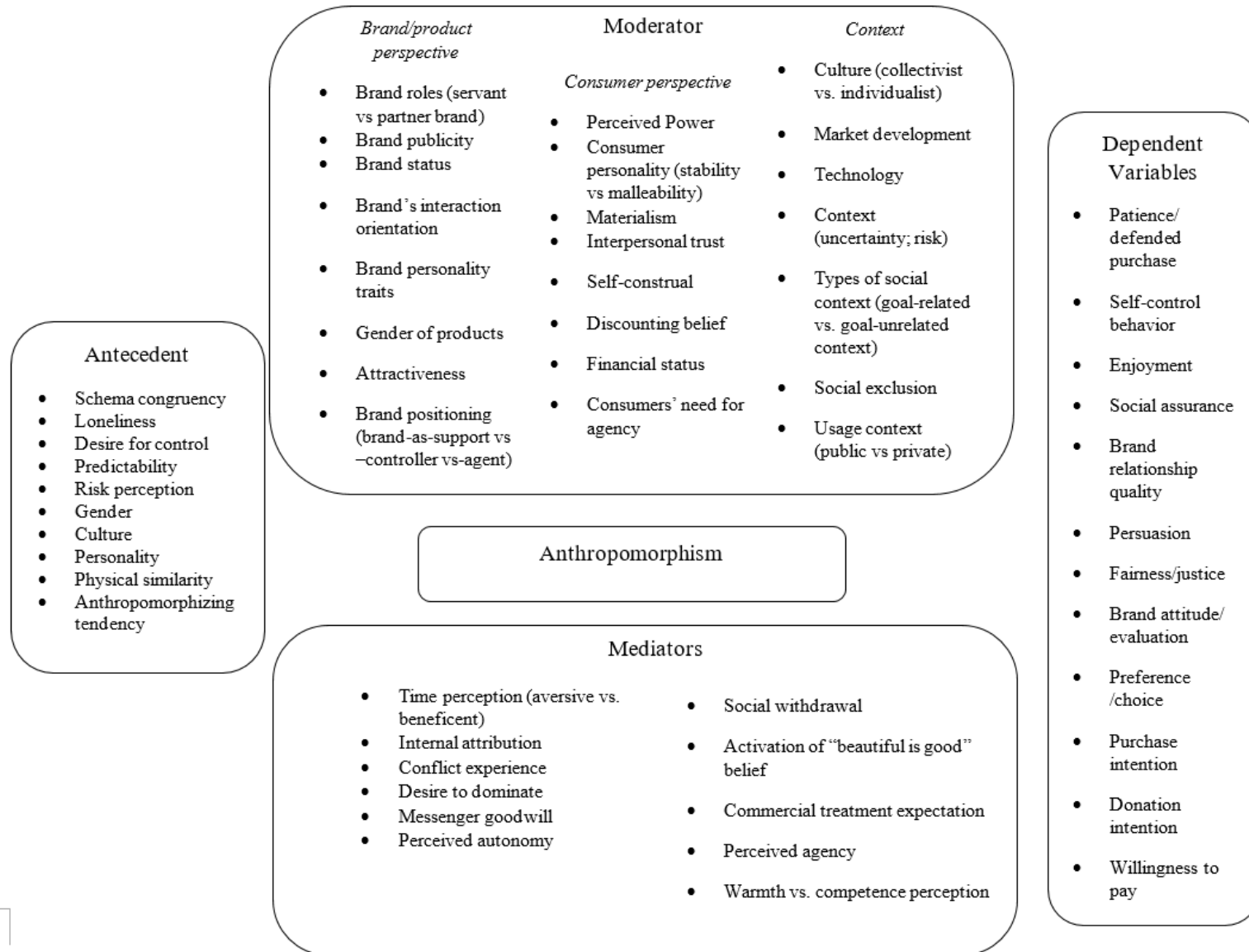
Kaur Ghuman, Huang, Madden and Roth (2015)	Empirical	Individuals with higher tendencies to anthropomorphize have higher tendencies to bind with brands and to build quality relationships with them.
Wan and Aggarwal (2015)	Conceptual	Knowledge accessibility, sociality motivation, and effectance motivation are antecedent variables of anthropomorphism, which serves as a mediator and affects the formation of consumer-brand relationships.
Kim, Chen and Zhang (2016)	Empirical	Anthropomorphic representatives of computer helpers reduce game enjoyment, and perceived autonomy mediates this impact.
Puzakova and Kwak (2017)	Empirical	Consumer's interpretation of an anthropomorphic brand's intentionality interact with social crowdedness facilitates social withdrawal (serve as mediator), and thus lead to lower preferences for the brand.
Kwak, Puzakova and Rocereto (2017)	Empirical	Consumers with independent self-construal (vs. interdependent self-construal) are more likely to respond negatively to instance of distributive injustice to an anthropomorphized brand than a non-anthropomorphized one. Consumers with interdependent self-construal (vs. independent self-construal) are more likely to react negatively to instance of procedural injustice to an anthropomorphized brand than a non-anthropomorphized one.
Wan, Chen and Jin (2017)	Empirical	Product anthropomorphism increases consumer preference for products with superior appearance because consumers apply the belief of "beautiful is good". This effect is mediated by consumers' conviction of "beautiful is good" in person perception.
Mourey, Olson and Yoon (2017)	Empirical	Exposure to or interaction with anthropomorphic products mitigates the effect of social exclusion.
Kim and McGill (2018)	Empirical	Consumers with higher financial status are more likely to have higher product evaluation to an anthropomorphic (vs. non-anthropomorphic) product. This effect is mediated by commercial treatment expectation and perceived agency.



Table 2-5 Continued

Merchant, LaTour, Ford and LaTour (2018)	Empirical	Consumers with high attachment avoidance and with high familiarity with a brand icon are more likely to higher donation intentions, particularly for consumers with a fearful attachment style. The feeling of rejection moderates this effect — the stronger the feeling of rejection, the stronger the impact of familiarity on donation intentions.
Puzakova and Aggarwal (2018)	Empirical	When consumers' distinctiveness goals are salient, they are more likely to have higher sense of agency in self-expressions and less favorable evaluations toward anthropomorphized (vs. non-anthropomorphized) brands. This effect is moderated by the roles of consumers' need for agency and brand positioning — consumers are more likely to have more favorable evaluations for anthropomorphized brand-as-support (vs brand-as-controller vs brand-as-agent).
Maeng and Aggarwal (2018)	Empirical	Consumers are more likely to pay more for products that signal high dominance; the liking is driven by consumers' desire to enhance and signal their dominant status.
Hoffman and Novak (2018)	Conceptual	Based on assemblage theory and object-oriented ontology, the authors build a conceptual framework describing a dynamic model about consumers' experience and interaction with smart objects. The authors suggest four consumer experience assemblages: enabling experiences, comprising agentic self-extension and communal self-expansion, and constraining experiences, comprising agentic self-restriction and communal self-reduction.
Zhou, Kim and Wang (2018)	Empirical	Money anthropomorphism increases both warmth and competence perceptions of money, but only increased warmth perception affects donation of money versus any other financial instruments (e.g., credit card).
Huang, Wong, and Wan (2019)	Empirical	Anthropomorphism increases consumers' use of absolute judgement strategy and then increases the preference for choices with favorable overall evaluation. This effect is mediated by consumers' perception of anthropomorphic product alternative as a wholistic entity vs. a bundle of individual attributes

Figure 2-2. Nomological Network of Anthropomorphism



## CHAPTER III

### HYPOTHESES DEVELOPMENT

#### 3.1. Introduction

In Chapter III, I draw connections among the four main theses of literature about anthropomorphism reviewed in Chapter II, and develop hypotheses about relationship between emotion, anthropomorphism toward brand/product and consumers' evaluations. This chapter consists of four sections. In the first section, I provide an overview of this chapter. In the second section, a discussion regarding research context and an overview of four main streams in emotion literature is provided. The third section discusses the research hypotheses. Within each subsection a detailed explanation of research hypotheses is provided. Lastly, the chapter concludes with the summary section.

#### 3.2. Research Context and Overview

As previously outlined in Chapter II, literature in psychology investigates the reasons why people anthropomorphize from the perspective of human knowledge, social relations, and need of control and predictability (Freud 1964; Guthrie 1997; Guthrie 1993; Nietzsche 1968). Further, researchers develop a model which illustrates the mechanism underlying the process of anthropomorphism. Literature in marketing

employs these theses and explores how consumers respond to products or brands with humanlike characteristics. Some research (e.g., Aggarwal and McGill 2012; Kim and Kramer 2015; Huang, Wong, and Wan 2019; Zhou, Kim and Wang 2018) investigates the persuasive influence of anthropomorphic appeals, and some examines consumers' anthropomorphism of a brand as mediator (Aggarwal and McGill 2007) in consumers' responses to product stimuli with different styles and sizes. Additionally, emotion have been a research interest in consumer behaviors. It is surprising that a minimal amount of research has investigated the influence of emotion on consumers' anthropomorphism to a brand/product. To have an insight into this relationship and discuss the meaning of investigating on this issue, I discuss the role of emotion in consumer behavior research and the reasons why emotion may influence consumers' anthropomorphism in this chapter.

### 3.2.1. The Role of Emotion in Consumer Behavior

Consumer researchers have long been interested in the role of emotion and consumer behavior. For example, Holbrook and Hirschman (1982) point out that information processing model has dominated consumer research. They call for researchers to expand models of consumer behavior by including "consumer fantasies, feelings and fun" (Holbrook and Hirschman 1982, p. 139). Similarly, Cohen and Areni (1991) contend that in consumer behavior research, affect has historically played a "subordinate role" (p.189) to the information processing model. Reassuringly, an article index search shows 648 papers published in the *Journal of Consumer Research* that includes emotion since 1991.

Given this, it is surprising that a large proportion of research in anthropomorphism is based on cognitive based models (e.g., Aggarwal and McGill 2012; Epley et al. 2007; 2008; Kim and McGill 2011). As reviewed in Chapter II, the familiarity thesis argues that people use human category knowledge or self-knowledge to interpret one's environment. People's perception of the world is restrained to their sensations, which are a part of the perceptual system. The comfort thesis suggests that humans use anthropomorphism as a cognitive strategy to manage future emotion. Guthrie (1993) suggests that anthropomorphism consists of perceptual strategy and complex interpretations, which are considered a part of the information processing system (Bettman et al. 1991b). Epley et al. (2007) suggest that anthropomorphism is a process of inductive inference. They build up the SEEK model, which rests on Higgin's (1996) spreading activation model. The spreading activation model is a model of human memory, which is associated with the information processing system.

In the marketing literature, most of the work done on anthropomorphism has stood on anthropomorphism as a cognitive process. Connell (2013) points out that an anthropomorphized product is easier to be processed; this property increases consumers' perceptual fluency, and thus creates positive responses towards the product. Besides, people with high power (vs. low power) are more likely to believe that they have control over anthropomorphized risk-bearing objects; this control perception in turn reduces such people's risk perception toward the objects (Kim and McGill 2011). Furthermore, Epley et al. (2008) argue that chronically lonely people tend to attribute humanlike characteristics associated with social connections to familiar pets. They contend that the process of anthropomorphizing pets is inferential. Puzakova and Kwak (2017) suggest that in a crowded environment (vs. un-crowded environment), consumers tend to avoid social connections, and

hence are more likely to have low purchase intentions for interaction-oriented anthropomorphized brands.

Some researchers investigate emotion in terms of consumers' evaluations toward anthropomorphized brands (i.e., brands with human characteristics). However, these studies are also based on information processing models. For example, people have schema about humans; when an anthropomorphized product is compared with human schema, a cognitive process occurs. The congruity between a human schema (e.g., a partner) and humanlike characteristics imbedded in the product makes the affect toward to the human schema transfer to the product. Aggarwal and McGill (2007) suggest that positive affect toward a human schema will transfer to an anthropomorphized brand presented with similar schema, and thus will facilitate favorable evaluations to the brand. On the other hand, anthropomorphized products (e.g., phone, vacuuming robot) can reduce consumers' feelings of social exclusion, and such effect is driven by a need for social assurance rather than positive affect toward the product (Mourey et al. 2017).

Based on the discussion above, most research investigates anthropomorphism from the perspective that it is a cognitive process. On the other hand, emotion are important part of consumers' life. Affective states impact consumer behaviors, such as product recall, evaluative, decision making and so forth (Cohen and Areni 1991). However, the question about how emotion influences anthropomorphism is still unclear. In order to fill this gap in the literature, I explore and scrutinize how anthropomorphism results from emotion. Below, I review the major streams in emotion literature, and then explain my contention based on the perspectives I suggest.

### 3.2.2. Major Streams in Emotion Literature

There are four major streams in emotion literature. The first one is the cognitive appraisal thesis. Appraisal theorists examine how people generate emotion, which refer to “mental states of readiness that arise from appraisals of events or one’s own thoughts” (Bagozzi et al. 1991, p.184). Smith et al. (1993) suggest that the cognitive appraisal is the “most proximal antecedent of emotion” (p.916). The basic argument is that people assess an event, and compare the event to what they expect for it. Emotion are raised by the discrepancy between an actual state and a desired state (Bagozzi et al. 1999). Specifically, cognitive appraisals of events that contradict one's expectations may cause people to perceive the events as “a misdeed or threat” (Harmeling et al. 2015), which creates negative emotion. Lazarus (1991) suggests that when people suffer from negative emotion, they are in an imbalanced state and tend to return to their normal states. In marketing, cognitive appraisal theses are associated with goal achievements, which is defined as “internal representations of desired states” (Austin and Vancouver 1996, p. 338). Positive emotion are related to the achievement of a goal while negative emotion are raised by the failure to attain desired goals (Bagozzi et al. 1999).

Extending cognitive appraisal theory, functional theory holds that particular appraisals trigger emotion, which lead people to deal with problems in an adaptive way (Frijda 1986). Griskevicius et al. (2010) suggest that emotion are “qualitatively distinct constructs” (p.239), That is, emotion are distinct from each other. A specific emotion should influence evaluative judgments through a specific cognitive and motivational process and system (Griskevicius et al. 2010). This perspective emphasizes that different emotion work

through different mechanisms, which facilitate solutions to adaptive problems (e.g., opportunities or threats).

The second stream suggests that people use affect as source of information for evaluations, and discrete emotion may lead to different evaluative judgments via different systems and processes. According to Schwarz and Clore's (1983, 1988) "affect-as-information" model, people use affect as a source of information. That is, people use subjective feelings associated with representations of a stimulus in their minds to assess the stimulus. This phenomenon still occurs even under the condition that stimuli are absent (Pham 1998). In line with this contention, Pham (1998) suggests that consumers use mood as a heuristic (i.e., how-do-I-feel-about-it heuristic) in evaluative judgements. More specifically, the influence of feelings on evaluation depends on two premises: 1) whether these feelings are associated with the representativeness of the target and 2) whether these feelings are relevant for the judgments (Pham 1998).

The third stream is emotion-management perspective established by Hochschild (1979). This thesis is based on an interactive account of emotion, which suggests that under the impact of social norms and situations, "thinking, perceiving and imaging ...are intrinsically involved" (p. 555). Building upon this account, Hochschild (1979) suggests that emotion are raised by a "schematic discrepancy" (p.555) between what people actually feel and what they want to feel. Moreover, people actively try to manage their emotion in line with feelings rules (i.e., what social norms instruct people on how they should feel under a specific situation). For instance, Peter attends a funeral for his best friend Jon. At the moment Peter sees Jon's picture in the church, all the happy memory with Jon is retrieved and Peter feels pleasant. However, Peter realizes that people are expected to feel sad in funeral (i.e., a



feeling rule). Therefore, Peter tries to manage the pleasant feeling and not to express it in front of others (i.e., emotion work as defined by Hochschild 1979).

Last but not least, some researchers argue that emotion can be partially or fully independent of cognition. Conventionally, emotion are considered as a subordinate system of cognitive process. Historically, it was widely believed that emotion only occur after cognitive processes. Zajonc (1980) points out that emotion can occur before perceptual and cognitive operations, and be the very first response to a stimulus. Emotion and cognitions have distinct and “partially independent” (p. 151) operation systems, which interact with each other and affect information processing separately.

Zajonc and Markus (1982) argue that both affect and cognition can influence preference: in some cases, cognition plays a dominant role, in some cases affect dominates, and in other cases affect and cognition interact with each other. Further, Zajonc and Markus (1982) point out that recognition of a stimulus is a factor that could influence affective evaluation to the stimulus, but not a necessary one. For instance, old stimuli (i.e., stimuli already exposed to people) are more likely to be preferred than new ones, regardless of recognition (e.g., Matlin 1971; Moreland and Zajonc 1977, 1979; Kunst-Wilson and Zajonc 1980; Littman and Manning 1954). In this case, preference for old stimuli may occur without cognitive processes. As Zajonc and Markus (1982) suggest, “a preference has been developed out of cognitive material...the preference will be become functionally autonomous and loses its original cognitive justification” (p.126).

In summary, these four streams reflect two discrete views about the role affect playing in information processing. Conventionally, affect is considered to be “post-

cognitive” (Zajonc 1980, p. 151) . Affect occurs after considerable cognitive elaboration, which include identification, examination, and comparisons of a stimulus’s qualities and values. Only after the elaboration is completed, can people make an affective judgment toward the stimulus (Zajonc 1980). In line with this view, cognitive appraisal theorists suggest that people compare an actual state with a desired state, and affect is elicited by the discrepancy between those two states (Bagozzi et al. 1999). Moreover, people use affect as a source of information, which provide a heuristic for people to make a judgment (Pham 1998; Schwarz and Clore 1988; 1983). Furthermore, affect is discrete from each other, different affect influences judgments through distinct processes and systems. That is, each affect has “its own way” to affect people.

On the other hand, some researchers consider affect as an independent factor influencing information processing. More specifically, affect and cognitions belong to separate systems, which provide different sources of influences on information processing (Zajonc 1980; Zajonc and Markus 1982). Zajonc (1980) argues, “It is entirely possible that the very first stage of the organism’s reaction to stimuli and the very first elements in retrieval are affective” (p. 154). Resting on emotion-management perspective, Hochschild (1979) suggests that people make an effort to feel what they think they should feel under certain situation. People are aware of feeling rules, and manage their feelings in accord with such rules. Therefore, it is possible that an affective response to a stimulus occurs before cognitive process. Once the feeling comes, a person is aware of such emotion and the feeling rules under this circumstance. Then, the person will try to feel what he/she wants to feel based on such feeling rules.

### 3.3. Research Hypotheses

Reviewing the literature of anthropomorphism, previous research scrutinizes anthropomorphism as a cognitive process. Little research investigates how affect influences anthropomorphism, and see anthropomorphism as an affective reaction to a stimulus. In line with Zajonc's (1980) view, I suggest a new perspective that anthropomorphism can be considered the result of affective reactions to a nonhuman object.

Moreover, perceptual system and cognitive system are two different systems which influence information processing (Bettman et al. 1991b). Perceptual system refers to sensory system that consists of sensory organs (e.g., eyes and ears) and associated memories. It translates and encodes sensations into "a symbolic code" (Bettman 1991, p.54) that can be decoded and processed by the cognitive system. As Zajonc (1980) posits, "affective reactions can occur without extensive perceptual and cognitive encoding" (p.151). Sensations received from a stimulus can arouse emotion and create the very first reaction to the stimulus. For instance, when people see a smiling face in Walmart logo, the first response to the logo may be a feeling of pleasure, because the smiling face (i.e., a positive emotional cue) elicits such a positive feeling. At this very moment, people generate affective judgments of the Walmart logo and attribute human characteristics to it. This action precedes the cognitive process in time. Based on the discussion above, I suggest that anthropomorphism can be considered an affective process which is a separate and independent system from cognitive processing.

### 3.3.1. The Effect of Emotional Arousal/Valence on Anthropomorphism

Emotion can be conceptualized with two dimensions (Di Muro and Murray 2012; Jefferies et al. 2008; Mehrabian and Russell 1974). Valence refers to the degree to which an affective state is positive or negative (Di Muro and Murray 2012), while arousal is “a feeling state varying along a single dimension ranging from sleep to frantic excitement” (Mehrabian and Russell 1974, p.18). Emotion varies in valence and arousal, and the influence of arousal on consumers’ evaluations can be independent of the valence of an individual’s emotion (Di Muro and Murray 2012; Fedorikhin and Patrick 2010; Gorn et al. 2001). Thus, it is important to examine the impact of emotional valence or arousal and keep the other dimension constant to avoid confound effect created by the two dimensions (Di Muro and Murray 2012).

Emotion regulation is an individual’s effort to manage and maintain a given emotional state (Cohen et al. 2008), involving behaviors that manage energy and tension to optimal levels (Thayer et al. 1994). Research in psychology reveals that people manage their emotion, such as regulate bad mood, raise energy and reduce tension, through social activities (Gallup 1989; Rippere 1977; Thayer et al. 1994). Further, comfort thesis posits that people feel more comfortable when the external world seems more humanlike than not. People tend to anthropomorphize nonhuman object to populate their surroundings and anthropomorphism can be driven by emotional motives, such as comfort or fear (Freud 1964; Loukatos 1976). Moreover, Epley et al. (2007; 2010) extend this view and define sociality motivations as one of the determinants of anthropomorphism. They argue that sociality motivations trigger the activation of social cues such as humanlike characteristics, and thus increase the likelihood of anthropomorphism toward a nonhuman object. Empirical research

in marketing also indicate that anthropomorphism is a way to build social relations and companionship with a brand (Aggarwal and McGill 2007).

In line with the arguments above, I suggest that people may use anthropomorphism as a way to manage their emotion, including enhance positive feelings and raise energy. Marketers use music, ambient scents or store display to influence consumers' emotion, and these tactics may increase the likelihood of anthropomorphism toward a product/brand. For instance, when shopping at a store playing uplifting music, consumers are likely to anthropomorphize the products at the store to enhance the positive feelings. Hence, under the influence of positive vs. negative valence stimulus, consumers are more likely to anthropomorphize a focal product.

Again, emotional arousal represents the level of activation and energy (Di Muro and Murray 2012; Jefferies et al. 2008; Mehrabian and Russell 1974). People increase energy through social activities (Thayer et al. 1994) and anthropomorphism can be a way to build social relations with a product/brand (Aggarwal and McGill 2007). Therefore, I suggest that consumers are more likely to anthropomorphize a focal product under the influence of high vs. low emotional arousal stimulus. Accordingly,

H<sub>1a</sub>: Under the influence of high (low) emotional arousal stimulus, consumers are more likely to anthropomorphize a focal product.

H<sub>1b</sub>: Under the influence of positive (negative) emotional valence stimulus, consumers are more likely to anthropomorphize a focal product.

Willingness to pay (WTP) is defined as the amount of premium price an individual is willing to pay for a product (Yuan and Dennis 2019). Prior research shows that perceived

enjoyment has positive impact on consumers' impulse buying (Parboteeah, Valacich, and Wells 2009), and that positive emotional valence can increase consumers' WTP (Yuan and Dennis 2014). Additionally, Bagchi and Cheema (2012) contend that arousal evoked by color can trigger aggression and consequently increase WTP. Importantly, anthropomorphic product (Hart, Jones, and Royne 2013) or displaying a product in an anthropomorphic way without changing the product itself can increase consumers' WTP (Yuan and Dennis 2019). Specifically, Yuan and Dennis (2019) contend that anthropomorphism can influence WTP through an emotional route. That is, anthropomorphic display of a product can evoke a particular emotion such as pleasure, and consequently the emotion influences consumers' WTP. This research implies that emotion is related to anthropomorphism.

Therefore, I suggest that anthropomorphism can bridge the relation between emotion and consumers' WTP. Valence and arousal elicited by emotional stimuli can influence WTP independently, and the changes in emotional arousal / valence can induce consumer's anthropomorphism to a focal product and consequently increase WTP. Accordingly,

H<sub>2a</sub>: Under the influence of high (low) emotional arousal stimulus, consumers have greater (low) level of willingness to pay.

H<sub>2b</sub>: Anthropomorphism mediates the effect of emotional arousal stimulus on willingness to pay.

H<sub>2c</sub>: Under the influence of positive (negative) emotional valence stimulus, consumers have greater (low) level of willingness to pay.

H<sub>2d</sub>: Anthropomorphism mediates the effect of emotional valence stimulus on willingness to pay.

Consumers may have preexisting anthropomorphism toward a brand. For instance, some consumers may have a high level of anthropomorphism toward high tech brands such as Amazon or Apple, while other consumers may have a low level of anthropomorphism toward these brands because these consumers simply see the brands as entities without lives. Previous research shows that anthropomorphism to a brand can increase brand evaluation (Aggarwal and McGill 2012). In line with this argument, it is possible that preexisting anthropomorphism to a brand may also influence on consumers' brand likability.

Again, emotion regulation theory holds that people increase energy or regulate bad moods through social activities. Based on comfort thesis, people tend to create a sense of social connection with the external world by anthropomorphism. For consumers, a brand with higher (lower) preexisting anthropomorphism may enhance the energy elicited from an advertisement associated with the brand. Therefore, an advertisement which elicits high (vs. low) arousal are more likely to increase consumers' likability to a brand with which they have high (vs. low) preexisting anthropomorphism.

Furthermore, when ad advertisement elicits positive (vs. negative) valence, consumers tend to have higher likability to a brand which can help them enhance the positive feelings. A brand with high (vs. low) preexisting anthropomorphism are more likely to help consumers enhance the positive (vs. negative) feeling. Accordingly,

H<sub>3a</sub>: When exposed to an advertisement with high (low) arousal cues, consumers with high (low) preexisting anthropomorphism to a brand are more likely to have a greater (lesser) level of likability towards the brand.

H<sub>3a</sub>: When exposed to an advertisement with positive (negative) valence cues, consumers with high (low) preexisting anthropomorphism to a brand are more likely to have a greater (lesser) level of likability towards the brand.

### 3.4. Summary

The interest of anthropomorphism is increasing in marketing research along with the rapid development and application of high technology in marketing practices. Lots of research in marketing focuses on how anthropomorphic brand/product influence on consumers' evaluations, emotion and behaviors. Emotion are examined as an outcome variable in these studies, few of which investigate whether emotions can induce consumers' anthropomorphism toward a product/brand. Focusing on the research context that emotion can be the first response to a stimulus, I suggest that manipulating the valence and the arousal of consumers' emotion can trigger the propensity of anthropomorphism to a product/brand. Further, I propose that consumers' anthropomorphism toward a product, which is triggered by emotional stimulus, mediates the relations between the stimulus and consumers' willingness to pay. Specifically, I suggest that anthropomorphism can increase willingness to pay. Last but not least, it is natural that consumers have different levels of anthropomorphism toward different product or brand. Some people tend to have higher level of preexisting anthropomorphism to high-tech products such as voice assistants or products that they are attached to. It is intriguing to examine the influence of consumers' preexisting anthropomorphism in the relations between emotional stimuli and brand likability. Specifically, I suggest that the higher the preexisting anthropomorphism toward the brand, the higher the brand likability.



## CHAPTER IV

### RESEARCH DESIGN AND METHODOLOGY

#### 4.1. Introduction

This chapter outlines the methodology used to examine the hypotheses proposed in the previous chapter. Specifically, there are two major sections that explain the research design and method of the six studies. In the first section, I discuss the measurement of main dependent variables and mediators, especially the measurement of felt arousal and felt valence. The second section describes the manipulation designs of emotional arousal and emotional valence in the studies. Importantly, I discuss the role of felt valence and felt arousal as the mediator rather than manipulation checks.

#### 4.2. Measurement

This section summarizes the measurement of felt arousal and felt valence, and dependent variable anthropomorphism (study 1a to 3a), willingness to pay (study 2a and 2b), and brand likability (study 3a and 3b).

#### 4.2.1. Measurement of Felt Arousal and Felt Valence

The measure of felt arousal should capture the degree to which participants become aroused after exposed to a stimulus. On the other hand, the measure of felt valence should capture the degree to which an affective state is positive or negative. Some researchers measure the level of pleasantness to capture emotional valence (Jefferies et al. 2008; Mehrabian and Russell 1974; Russell et al. 1989). Valence and arousal are considered two different dimensions of emotion (Di Muro and Murray 2012; Mehrabian and Russell 1974; Russell 1980; Russell and Barrett 1999; Russell et al. 1989; Thayer 1967; Thayer 1978).

Table 4-1 Summary of Construct Measurement

Construct	Study	Item	Scale
Anthropomorphism	Study 1a, 1b, 2a, 2b, 3a, and 3b	XX has a mind of its own.	1= “none at all”, 9= “to a great extent”
		XX has intentions.	
		XX has free will.	
		XX has consciousness.	
		XX has desires.	
		XX has beliefs.	
		XX has the ability to experience emotion.	
Felt arousal	Study 1a and 1b	“unhappy/happy” “annoyed/pleased”	11-point semantic differential scale
Felt valence	Study 1a and 1b	“unaroused/aroused” “relaxed/stimulated”	11-point semantic differential scale
Brand Likability	Study 3a and 3b	“dislike/like”, “negative/positive”, “bad/good”, “unfavorable/favorable”, “unpleasant/pleasant”	9-point semantic differential scale

Mehrabian and Russell (1974) argue that individuals' feeling of arousal and pleasantness can be captured by a semantic differential scale, which was anchored by items such as "happy/unhappy" and "aroused/unaroused". In study 1a and 1b, I adapted Mehrabian and Russell's (1974) scale and measured participants' felt valence and felt arousal with a 2-items semantic differential scale respectively (Table 4-1).

Figure 4-1 Affect Grid

Extremely pleasant	91	92	93	94	95	96	97	98	99
	81	82	83	84	85	86	87	88	89
	71	72	73	74	75	76	77	78	79
	61	62	63	64	65	66	67	68	69
	51	52	53	54	55	56	57	58	59
	41	42	43	44	45	46	47	48	49
	31	32	33	34	35	36	37	38	39
	21	22	23	24	25	26	27	28	29
Extremely unpleasant	11	12	13	14	15	16	17	18	19
Extremely low energy					Extremely high energy				

Further, Russell, Weiss and Mendelsohn (1989) develop what they call the affect grid to measure emotional arousal and valence. They argue that the semantic differential scale above is "too time-consuming or too distracting" (p. 493), and does not capture the fluctuation of affect response to stimuli. They assess emotional valence and arousal with a 9 x 9 grid with the vertical dimension "pleasure-displeasure" and the horizontal dimension "arousal-sleepiness", which divide the grid into four session: excitement (high arousal, high pleasure), relaxation (high sleepiness, high pleasure), stress (high arousal, high displeasure),

depression (high sleepiness, high displeasure). Based upon Russell et al.'s (1989) scale, Jefferies, Smilek, Eich, and Enns (2008) adjusted the affect grid by naming the vertical dimension "extremely pleasant/unpleasant" and horizontal dimension "extremely high energy/low energy", without the naming the sessions in their study. In study 2a, 2b, 3a, and 3b, I adjusted the Jefferies et al.'s (2005) affect grid to measure participants' felt valence and felt arousal after the exposure to stimuli (Figure 4-1).

#### 4.2.2. The Role of Felt Arousal and Felt Valence across All Studies

LaTour and Rotfeld (1997) distinguish between fear arousal and a fear appeal, which is a type of emotional stimulus in advertising. A fear appeal is a persuasive communication that aims to elicit fear to promote precaution or self-protection action (Block 2005; Rogers and Deckner 1975). An individual's response to a particular stimulus is idiosyncratic (Gross and John 2003; LaTour and Rotfeld 1997). When consumers are exposed to an emotional stimulus, feelings of arousal and pleasure/valence occur instantaneously and the strength of these feelings varies by individual. For instance, some may be highly sensitive to a news about the death rate of COVID-19 vaccines, while some may be inured to this stimulus. Importantly, in this case it is not the exposure to the news, but the extent of emotional arousal and valence that drives an individual's response. This contention is supported by empirical research in the literature. For example, Steenkamp, Baumgartner, and van de Wulp (1996) distinguish the arousal stimulus from the arousal evoked by the stimulus and suggest that there is an inverted U relation between arousal evoked by stimulus and consumers' evaluation of the stimulus. Empirical evidence reveals that emotional arousal is an idiosyncratic response to a stimulus which evokes arousal and mediates the effect of arousal

stimulus on subsequent evaluations (Carey, McDermott, and Sarma 2013; Gorn, Pham, and Sin 2001; Keller and Block 1996).

As discussed in 4.2.1, individuals' response to an emotional stimulus varies in both valence and arousal dimension, and the variation in both dimensions should be idiosyncratic. Therefore, emotional arousal and valence are appropriately viewed as mediators between an emotional stimulus and consumers' subsequent respond to the stimulus. Hence, in this dissertation participant's felt arousal and felt valence are considered mediators in the relationship between emotion treatments and anthropomorphism to a focal product/brand rather than manipulation checks in all studies.

#### 4.2.3. Measurement of Major Dependent Variables

*Anthropomorphism.* The measurement of anthropomorphism started from measuring how humans perceive pets/animals (Albert and Bulcroft 1988), natural entities such as tree or wind, or technology devices (Waytz et al. 2010b). In some marketing research, anthropomorphism is considered a mediator and it is measured by asking participants the extent to which a product "has a mind of its own" and/or "remind you of some humanlike qualities" (Hur et al. 2015; Puzakova and Kwak 2017). Moreover, Waytz et al. (2010) develop the Individual Differences in Anthropomorphism Questionnaire (IDAQ) to measure the extent to which an object is anthropomorphized by an individual. This scale is employed in marketing research to measure consumers' anthropomorphism toward products or brands (Kaur Ghuman et al. 2015; Kim and Kramer 2015). I employed IDAQ scale in this dissertation to measure participants' anthropomorphism toward a focal product (study 1a, 1b,

2a, and 2b) and a focal brand (study 3a and 3b). The IDAQ scale is composed of 7 items listed in Table 4-1.

*Willingness to Pay (WTP).* I measured the influence of emotional arousal/valence on consumers' willingness to pay via anthropomorphism toward a product in study 2a and 2b. There are various methods to measure WTP in the current literature, such as analysis of market data, direct/indirect surveys, laboratory/field experiments (Breidert, Hahsler and Reutterer 2006). In a laboratory setting, auctions are widely employed for WTP elicitation, including the Vickrey auction method and BDM procedures by Becker, DeGroot and Marshak (1964). In laboratory experiences participants are usually given and asked to spend the money on a specific selection of goods (Silk and Urban 1979). In study 2a, I adjusted the Silk and Urban (1979) procedures and asked participants to name a price they were willing to pay for the focal product after they were exposed to the emotional stimuli. The reported price was an absolute value, reflecting how much price participants were willing to pay. I suggest that looking a relative value (e.g., percentage or ratio) which indicates how much participants would be willing to pay before and after they were exposed to the emotional stimuli was informative. Therefore, in study 2b I followed the procedure suggested by Jiménez and Voss (2014) and used the percentage above or below the average price to estimate WTP.

*Brand Likability.* Brand likability considered an evaluation of a brand, reflects the extent to which an individual likes a brand (Spangenberg et al. 1996). In study 3a and 3b, brand likability was measure by a 5-item semantic differential scale (Holbrook and Batra 1987; Table 4-1).

### 4.3. Emotion Manipulation

This section demonstrates the manipulation designs and their effectiveness of six studies in this dissertation. Importantly, valence and arousal are considered two different dimensions of emotion (Di Muro and Murray 2012; Mehrabian and Russell 1974; Russell 1980; Thayer 1967; Thayer 1978), and the investigation of the effect of these dimensions on ANTH and other downstream variables respectively can provide an insight into the relation between emotion and consumers' ANTH to a focal product/brand. To achieve this goal, all the treatment designs were aimed to manipulate only emotional arousal or valence and keep the other dimension at a constant level. These manipulation designs ensure that emotional arousal and valence were not confounded and the effect of these variables were examined separately in different studies.

In summary, pretest 1 examines the effectiveness of the emotional arousal manipulation employed in study 1a and 2a, in which movie clips were designed to elicit high vs. low level of emotional arousal. Pretest 2 tests the effectiveness of movie clips manipulation used in study 1b and 2b, with the purpose of creating positive vs. negative emotional valence. Pretest 3, 4, and 5 examine the manipulation of emotional valence/arousal using dog food brand in study 3a and 3b, in which the treatments are designed to elicit the emotional valence/arousal respectively.

#### 4.3.1. Emotional Arousal Manipulation in Study 1a and 2a

Pretest 1 (n = 240; 64% female;  $M_{age}$  = 39; MTurk) was designed to test whether the manipulation treatments employed in study 1a and 1b elicit emotional arousal. Excitement is

considered a positive emotion with high arousal while contentment is considered a positive emotion with low arousal (Dunn and Hoegg 2014). The goal of the treatments was to manipulate participants' emotional arousal and keep the emotional valence level constant. At the start of the pretest, participants were randomly assigned to one of the 2 emotional arousal (high vs. low) conditions. In high arousal condition participants watched a 2-minute video clip of a *Jeff Foxworthy Live* comedy routine which should elicit a feeling of excitement. In the low condition, participants watched a 2-minute video clip of an art exhibition which should create a feeling of contentment. Then, participants reported their emotional arousal and valence in the self-report scale created by Mehrabian and Russell (1967). Specifically, participants' felt arousal was measured with a two-item scale anchored by "aroused" and "stimulated" ( $\alpha = .68$ ; a single factor EFA solution accounting for 80.23% of the total variance). Felt valence was measured with two items on a 11-point scale anchored by "happy" and "pleased" (1= "not at all", 11= "to a great extent";  $\alpha = .91$ ; a single factor solution accounting for 91.55% of the total variance).

A one-way MANOVA with manipulation treatment as independent variable, and felt arousal and felt valence as dependent variables revealed a significant main effect of the treatment on felt arousal ( $M_{low-arousal} = 4.82$  vs.  $M_{high-arousal} = 5.61$ ;  $F(1, 238) = 5.32, p = .02$ ,  $SE = .31$ ;  $\omega^2 = .02$ ). That is, participants in the high arousal condition reported a higher level of arousal than those in the low arousal condition. In addition, the main effect of the treatment on felt valence was not significant ( $M_{low-arousal} = 8.00$  vs.  $M_{high-arousal} = 7.53$ ;  $F(1, 238) = 2.30, p = .13$ ), indicating that the felt valence did not vary by the treatments. Moreover, the Pillai's Trace statistic indicated the assumption of the test was not violated (Pillai's value = .02,  $F(2, 237) = 2.71, p = .07$ ). Overall, the treatments created a difference in



participants' felt arousal while felt valence was constant. The goal of the manipulation was achieved successfully.

#### 4.3.2. Emotional Valence Manipulation in Study 1b and 2b

The purpose of pretest 2 ( $n = 240$ ; 66% female;  $M_{\text{age}} = 39$ ; MTurk) was to test the effectiveness of the emotional valence manipulation. Sadness is considered a negative emotion with low arousal while contentment is considered a positive emotion with low arousal (Dunn and Hoegg 2014). The goal of the manipulation was to put participants in a positive vs. negative emotional state while keeping the level of emotional arousal at a relatively low level.

At the start of the pretest, participants were randomly assigned to one of the two conditions. In the negative condition, participants watched a 2-minute video clip of the movie *Champ* in which a son cried for his father's death. In the positive condition, participants watched a 2-minute video clip of an art exhibition as in pretest 1. Then participants reported their felt valence and felt arousal. Participants' felt valence was measured by the two items in a 11-point scale as in pretest 1 (= "not at all", 11= "to a great extent";  $\alpha = .91$ ; a single factor EFA solution accounting for 91.58% of the total variance), and the felt arousal was measured by a one item "aroused".

A one-way ANOVA with treatment as independent variable and felt valence as dependent variable revealed that the treatments had a significant main effect on participants' felt valence ( $M_{\text{positive-valence}} = 7.53$  vs.  $M_{\text{negative-valence}} = 3.15$ ;  $F(1, 238) = 230.95$ ,  $p < .001$ ,  $SE = .29$ ,  $\omega^2 = .49$ ). Participants in the positive condition were more likely to feel positive than

those in the negative condition. The Levene's test indicated that the assumption of homogeneity was not violated (Levene statistics (1, 238) = .98,  $p = .32$ ). Furthermore, I ran a one-way ANOVA test with the treatment as the independent variable and felt arousal as the dependent variable. The Levene's test indicated a violation of the assumption of homogeneity (Levene statistics (1, 238) = 4.52,  $p = .03$ ). Using the Huber-White's Robust Standard Error approach (HC4) to correct the deficiency, the result indicated that the main effect of the treatment on participants' felt arousal was not significant ( $b = .41$ , robust SE = .33,  $t = 1.25$ ,  $p = .21$ ). That is, participants in both conditions felt the same level of arousal. Overall, the treatments created a significant difference in the level of emotional valence among participants and kept emotional arousal at a constant level. Thus, the manipulation of emotional valence was successful. I used this manipulation in study 1b and 2b.

#### 4.3.3. Emotional Arousal Manipulation in Study 3a

This section describes two pretests which tested the effectiveness of manipulation designs for study 3a. Specifically, pretest 3 tested the preexisting anthropomorphism to dog food brands which was employed in study 3a and 3b. Pretest 4 examined how well the dog food advertising commercial evoke participants' emotional arousal.

*Pretest 3.* In pretest 3 ( $n = 120$ ; 42% female;  $M_{\text{age}} = 36$ ; MTurk) I measured the level of consumers' anthropomorphism to a brand in general. Participants were asked to indicate the extent to which they think the following dog food brand "has a mind of its own": Pedigree<sup>®</sup>, Rachael Ray Nutrish<sup>®</sup>, ALPO<sup>®</sup>, Hill's Science Diet<sup>®</sup>, The Farmer's Dog<sup>®</sup>, and Knaz<sup>®</sup> (a fictitious brand). Participants reported that they had higher level of

anthropomorphization to Pedigree<sup>®</sup> than to Knaz<sup>®</sup> ( $M_{Pedigree} = 5.10$  vs.  $M_{Knaz} = 4.43$ ;  $t(1, 119) = 4.491, p < .001$ ). Thus, consumers are more likely to perceive Pedigree<sup>®</sup> (vs. Knaz<sup>®</sup>) with higher level of anthropomorphism.

Additionally, participants' preexisting anthropomorphism to Pedigree<sup>®</sup> is higher than those of other brands such as Rachael Ray Nutrish<sup>®</sup> and ALPO<sup>®</sup> ( $M_{Rachael\ Ray} = 4.81, M_{ALPO} = 4.67, ps < .03$ ) and preexisting anthropomorphism to Pedigree<sup>®</sup> was not different than those to other brands such as Hill's Science Diet<sup>®</sup> and The Farmer's Dog<sup>®</sup> ( $M_{Hill's} = 4.85, M_{Farmer's} = 4.88, ps > .09$ ). Moreover, preexisting anthropomorphism to Knaz<sup>®</sup> was lower than those to other brands ( $ps < .01$ ) except ALPO<sup>®</sup> ( $t(1, 119) = -1.67, p = .10$ ). In summary, participants had the highest preexisting anthropomorphism to Pedigree<sup>®</sup> and lowest anthropomorphism to Knaz<sup>®</sup>, and thus, I chose Pedigree<sup>®</sup> and Knaz<sup>®</sup> to create high vs. low preexisting anthropomorphism to focal brands.

*Pretest 4.* The purpose of pretest 4 ( $n = 101$ ; 55% female;  $M_{age} = 36$ ; MTurk) was to test whether the advertisement stimuli in study 3a elicits emotional arousal: participants in happy (positive valence, high arousal) condition should feel higher level of arousal with the same level of valence than those in the control condition (positive valence, low arousal). I used the affect grid (Jefferies, Smilek, Eich and Enns 2008; Russell, Weiss and Mendelsohn 1989) to measure participants' felt arousal and felt valence after exposure to the advertisements. At the beginning of the survey, participants were instructed how to rate their affect with a 9 x 9 grid, choose the number of the square which best represented their feelings (extremely low energy on the left to extremely high energy on the right) and valence (extremely pleasant at the top to extremely unpleasant at the bottom; see Figure 4-1). After reading the instruction, participants were randomly assigned to one of two emotional arousal

conditions: happy vs. control dog food advertisements. Results from another pretest ( $n = 288$ ,  $M_{age} = 21.73$ , 62% female, college students) indicated that participants had low familiarity ( $M_{Knaz} = 1.99$  vs.  $M_{mid-point} = 4$ ,  $t(1, 287) = -22.54$ ,  $p < .001$ ) toward the fictitious dog food brand Knaz<sup>®</sup> which was employed in pretest 4, pretest 5, study 3a and 3b.

In the happy ad condition participants watched a 20s Knaz<sup>®</sup> dog food advertisement with uplifting background music and 6s happy dog barking at the end of the advertisement. Following the same rationale, in the control ad condition participants watched a 20s Knaz<sup>®</sup> dog food advertisement with serene background music with no dog barking at the end of the advertisement. Then, participants reported their level of arousal and valence by choosing the number representing them in the affect grid (Russell et al. 1989; Jefferies et al. 2008).

A one-way MANOVA with emotional arousal advertisement as the predictor variable and felt arousal as the dependent variable revealed a significant main effect of emotional arousal manipulation on felt arousal. Specifically, participants in the happy ad condition reported a higher level of arousal than those in the control condition ( $M_{control} = 4.50$  vs.  $M_{happy} = 5.39$ ;  $F(1, 99) = 3.70$ ,  $p = .05$ ;  $\omega^2 = .03$ ). Additionally, the main effect of the advertisement treatments on felt valence were not significant. Specifically, the level of felt valence reported by participants in the happy ad condition were not significantly higher than those in the control condition ( $M_{control} = 6.62$  vs.  $M_{happy} = 6.45$ ;  $F(1, 99) = .16$ ,  $p = .69$ ). Overall, participants in happy ad condition reported a higher level of felt arousal than those in control condition, while the level of felt valence in both conditions was the same. The manipulation of emotional arousal was successful.

#### 4.3.4. Emotional Valence Manipulation in Study 3b

The purpose of pretest 5 ( $n = 120$ ; 42% female;  $M_{age} = 37$ ; MTurk) was to test whether the advertisement stimuli used in study 3b elicit emotional valence as designed: participants in sad (negative valence, low arousal) should feel higher level of negative valence with same level of arousal than those in control condition. I used the affect grid (Jefferies, Smilek, Eich and Enns 2008; Russell, Weiss and Mendelsohn 1989) to measure participants' arousal and valence after exposing to the advertisements as in pretest 4. At the beginning of the survey, participants were instructed how to rate their affect with a 9 x 9 grid. After reading the instruction, participants were randomly assigned to one of two emotional valence conditions: sadness vs. control Knaz<sup>®</sup> dog food advertisements.

In the sad (vs. control) ad condition participants watched a 20s Knaz<sup>®</sup> dog food advertisement with sad/serene background music with 6s sad/no dog barking at the end of the advertisement. Then, participants reported their level of arousal and valence by choosing the number representing them in the affect grid (Russell et al. 1989; Jefferies et al. 2008).

A one-way MANOVA with emotional valence ad treatment as the predictor variable, and felt valence and felt arousal as the dependent variable revealed a significant main effect of ad treatment on felt valence. Specifically, participants in the control ad condition reported a higher level of valence than those in the sad condition ( $M_{control} = 6.59$  vs.  $M_{sad} = 3.69$ ;  $F(1, 107) = 44.46$ ,  $p < .001$ ,  $\omega^2 = .29$ ). On the other hand, the main effect of the ad treatment on felt arousal was not significant ( $M_{control} = 4.41$  vs.  $M_{sad} = 3.74$ ;  $F(1, 107) = 2.49$ ,  $p = .12$ ). Overall, participants in control condition reported a higher level of valence than those in sad condition, while the level of arousal in both conditions was the same. Therefore, the manipulation of emotional valence by using dog food ads was successful.

#### 4.4. Data Analysis Plan

Overall, the data collected across six studies are analyzed through the following steps. First of all, the data are coded and organized via statistical software SPSS 26. Second, I examined the psychometric properties of all scales by running an exploratory factor analysis (EFA) to examine the latent variables' factor structure in each study. Reliability is assessed by calculating Cronbach's coefficient alpha to check internal consistency reliability.

#### 4.5. Summary

In this chapter, I provide an overview of the methodology employed in this dissertation. The manipulation treatments across six studies, measurements of major dependent variables and mediators, and a proposed data analysis plan are reported. Furthermore, I established the role of felt valence and felt arousal as mediators in the proposed relationship rather than manipulation checks in this dissertation. In the next chapter, I demonstrate the results from the collected data across six studies and examine the hypotheses proposed in Chapter III based on these results.

## CHAPTER V

### DATA ANALYSIS AND RESEARCH FINDINGS

#### 5.1. Introduction

This chapter is organized into six sections, including study 1a, 1b, 2a, 2b, 3a, and 3b. Study 1a and 1b examined the relationship between emotional arousal/valence on consumers' propensity to anthropomorphize a focal product. Study 2a and 2b investigated how emotional arousal/valence influence consumers' willingness to pay (WTP) a premium price for a product via the mediation effect of anthropomorphism. Study 3a and 3b explored the relation among emotional arousal/valence, preexisting anthropomorphism to a brand and brand likability. An overview of studies and the hypotheses testing results is summarized in Table 4-1.

#### 5.2. Study 1a

Study 1a is an experimental study that serves the purpose of establishing the effect of emotional arousal on consumers' anthropomorphism toward a focal product (*Hypothesis 1a*). An experiment with a two-level, single-factor (emotional arousal: high vs. low) between-subjects design was conducted.

### 5.2.1. Study 1a Respondent Screening and Sample Characteristics

Data were collected through a Qualtrics panel by conducting the experiment online. I recruited 77 participants from Amazon Mechanical Turk (MTurk) in exchange for financial incentives.

Excitement is considered a positive emotion with high arousal while contentment is considered a positive emotion with low arousal (Dunn and Hoegg 2014). Participants were randomly assigned to one of the 2 emotional arousal (high vs. low) conditions. At the start of the study, I employed video clips pretested in chapter IV to elicit a particular level of emotional arousal. In the high arousal condition, participants watched a 2-min video clip of a *Jeff Foxworthy Live* comedy routine which created a feeling of excitement. In the low condition, participants watched a 2-min video clip of an art exhibition which created a feeling of contentment. Then, participants watched a 26s clip of the official Roomba® 600 series advertising commercial. After watching the commercial, participants reported their anthropomorphism to the iRobot, felt arousal, and other measures (e.g., task involvement). The study concluded with an open-ended suspicion probe to identify hypothesis guessers.

To ensure the quality of the data, first of all I checked the answers of the open-end suspicion probe and no participants were identified as hypothesis guessers. Second, no responses were identified as statistical outliers, and thus, I had 77 responses for analysis.

To assess the characteristics of the respondents, participants were requested to provide demographic information, including gender, age, race, education level, and annual income. Based on 77 usable responses, the participants were 38 years old on average, with a minimum age of 18 and maximum age of 72. 47% of the participants were female; 64% of



them were white, 13% of them were African American, 3% of them were Hispanic, 14% of them were Asian. In addition, 51% of participants have bachelor's degree or above, and the medium of the annual income was between \$50,000 and \$59,999.

### 5.2.2. Study 1a Measurement Quality Assessment

I measured participants' anthropomorphism toward a focal product (ANTH) iRobot with four items adapted from Waytz et al.'s (2010) scale: "The iRobot has consciousness," "The iRobot has desires", "The iRobot has beliefs", and "The iRobot has the ability to experience emotion". I examined the reliability and the validity of ANTH scale by estimating Cronbach's coefficient alpha and by conducting an exploratory factor analysis (EFA) respectively. A scale can be viewed as reliable if its coefficient alpha is at least .70 (Nunnally 1978; Voss et al. 2000). The Cronbach's alpha of ANTH scale was .94, indicating that the internal reliability of the scale was established. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicated the proportion of variance in the items caused by the underlying factors (KMO = .75 > .50). The Bartlett's test of sphericity suggested that items are related and suitable for structure detection ( $\chi^2(6) = 310.16, p < .001$ ). The EFA results suggested a single factor solution accounting for 84.93% of the total variance.

I measured participants' felt arousal with two items on a 11-point scale anchored by "aroused" and "stimulated" (1= "not at all", 11 = "to a great extent"). Following the procedures above, the Cronbach's Alpha of this scale was .87, indicating that the internal reliability of the scale was established. The KMO (KMO = .50) and the Bartlett's test of

sphericity suggested that the factor analysis was valid ( $\chi^2(1) = 72.30, p < .001$ ). The EFA results showed a single factor solution accounting for 89.25% of the total variance.

### 5.2.3. Study 1a Hypothesis Testing

*Attention Check.* In the high arousal condition participants watched a comedy, and in the low arousal condition participants watched a video of an art exhibition. Therefore, I measured the participants' memory about the video clips by asking, "This question is about the first video clip that you watched. Please indicate what video did you watch at the beginning of the study?" The options are "a stand-up show with funny jokes", "a sad movie in which a man died", "a horror movie in which twins showed up in the hallway", "an art exhibition", and "None". In the high arousal condition, all participants reported seeing "a stand-up show with funny jokes". In the low arousal condition, 98% of participants reported seeing "an art exhibition" and one reported seeing "a lecture about photosynthesis" ( $\chi^2(2) = 78.00, p < .00$ ). Combined with the pretest reported in Chapter IV, this indicates that manipulation of emotional arousal was successful (Perdue and Summers 1986).

*Anthropomorphism toward a Product.* A one-way ANOVA with emotional arousal manipulation as the predictor variable and anthropomorphism to iRobot as the dependent variable revealed a nonsignificant main effect of arousal ( $M_{low-arousal} = 2.07$  vs.  $M_{high-arousal} = 2.04$ ;  $F(1, 76) = .03, p = .96, SE = .48$ ). That is, the propensity to anthropomorphize iRobot was not significantly different between conditions. The Levene's test of equality of error variance indicated that the assumption of homoscedasticity is not violated (Levene statistics  $(1,76) = .36, p = .55$ ). Additionally, the correlation between felt arousal and ANTH to iRobot

was significant ( $r = .32, p < .01$ ), indicating that felt arousal may have influence on ANTH. Therefore, a mediation analysis to examine the role of felt arousal in the relationship between the emotional arousal manipulation and anthropomorphism was conducted.

*Mediation Analysis.* I tested a mediation process model with the emotional arousal manipulation as the independent variable; felt arousal as the mediator; and anthropomorphism to iRobot as the dependent variable using a bootstrapping approach (Hayes 2018, model 4). The main effect of arousal manipulation was not significant on both felt arousal ( $b = .62; p = .36$ ) and anthropomorphism to iRobot ( $b = -.17; p = .71$ ), indicating that the direct path from emotional arousal manipulation to anthropomorphism to iRobot was not significant. In addition, felt arousal had a significant effect on anthropomorphism to iRobot ( $b = .23; p = .01$ ). The indirect effect through felt arousal was not significant ( $b = .15; 95\% CI = [-.15, .58]$ ). Overall, hypothesis 1a was not supported. Consistent with reasoning in Chapter IV, the emotional arousal manipulation did not directly influence participants' propensity to anthropomorphize a focal product, however, felt arousal was significantly associated with anthropomorphism to the focal product.

#### 5.2.4. Study 1a Discussion

The results of study 1a supported hypothesis 1a which suggests emotional arousal stimuli increases participants' propensity to anthropomorphize a focal product. In particular, felt arousal and ANTH was significantly correlated. The mediation analysis revealed a significant path from felt arousal to ANTH, indicating that felt arousal had positive effect on ANTH.

These results indicated that individuals' responses to an emotional stimulus is idiosyncratic. Study 1a examined the influence of emotional arousal stimulus on ANTH and held participants' felt valence as constant. It is interesting to examine the influence of emotional valence stimuli on consumers' ANTH toward a focal product. Thus, I investigated this question study 1b as follows.

### 5.3. Study 1b

Study 1b is an experimental study examining the effect of emotional valence on consumers' anthropomorphism toward a focal product (*Hypothesis 1b*). An experiment with a two-level, single-factor (emotional valence: positive vs. negative) between-subjects design was conducted.

#### 5.3.1. Study 1b Respondent Screening and Sample Characteristics

Data were collected through Qualtrics panel by conducting the experiment online. I recruited 96 participants from MTurk in exchange for financial incentives.

Contentment is considered as a positive emotion with low arousal while sadness is considered as a negative emotion with low arousal (Dunn and Hoegg 2014). I pretested these treatments in pretest 2 (chapter IV). Specifically, participants were randomly assigned to one of the 2 emotional valence (positive vs. negative) conditions. In the negative valence condition, participants watched a 2-min video clip of the movie *Champ* in which a son cried for his father's death. In the positive valence condition, participants watched a 2-min video clip of an art exhibition as in study 1a. Then, participants viewed a non-anthropomorphic

iRobot Roomba® commercial as in study 1. After watching the commercial, participants reported their anthropomorphism toward iRobot, felt valence, and other measures. The study concluded with an open-ended suspicion probe to identify hypothesis guessers.

To ensure the quality of the data, I first checked the answers of the open-end suspicion probe and no participants was identified as hypothesis guessers. Second, I checked statistical outliers and no responses were identified as outliers. Thus, I received a total of 96 responses.

To assess the characteristics of respondents, participants were requested to provide demographic information, including gender, age, race, education level, and annual income. Overall, the participants were 39 years old on average, with a minimum age of 21 and maximum age of 69. 46% of the participants were female; 65% of them were white, 10% of them were African American, 8% of them were Hispanic, 17% of them were Asian. In addition, 59% of participants have bachelor's degree or above, and the medium of the annual income was between \$50,000 and \$59,999.

### 5.3.2. Study 1b Measurement Quality Assessment

I measured participants' anthropomorphism toward a focal product (ANTH) by using the same scale as in study 1a. The Cronbach's alpha of ANTH scale was .96, indicating that the internal reliability of the scale was established. The KMO ( $KMO = .87 > .50$ ) and the Bartlett's test of sphericity suggested that the factor analysis was valid ( $\chi^2(21) = 965.69, p < .001$ ). The EFA results suggested a single factor solution accounting for 80.43% of the total variance.

I measured participants' felt valence by a 11-point semantic differential scale with five items anchored by "unhappy/happy" and "annoyed/ pleased" (Mehrabian and Russell 1974). Following the procedures above, the Cronbach Alpha of this scale was .83, indicating that the internal reliability of the scale was established. The KMO (KMO = .88 > .50) and the Bartlett's test of sphericity suggested ( $\chi^2 (1) = 69.94, p < .001$ ) that the factor analysis was valid. The EFA results showed a single factor solution accounting for 86.29% of the total variance.

### 5.3.3. Study 1b Hypothesis Testing

*Attention Check.* I measured the participants' memory about the video clips using the same question as in study 1a. In the positive valence condition, 92% of participants reported seeing "an art exhibition", and only one participant reported seeing "a sad movie in which a man died" and three reported seeing "a stand-up show with funny jokes". In the negative valence condition, all participants reported seeing "a sad movie in which a man died". A Chi-Square test ( $\chi^2 (2) = 92.08, p < .00$ ) suggested, combined with the pretest reported in Chapter IV, that manipulation of emotional valence was successful (Perdue and Summers 1986).

*Anthropomorphization to Product.* A one-way ANOVA with emotional valence and ANTH to iRobot as the dependent variable revealed a nonsignificant main effect of emotional valence ( $M_{positive-valence} = 3.82$  vs.  $M_{negative-valence} = 2.73$ ;  $F(1, 95) = 3.64, p = .08, SE = .57$ ) on ANTH. The Levene's test showed that the assumption of error variance was violated (Levene statistic (1,94) = 5.91,  $p = .02$ ). To correct this deficiency, I used Huber-White's Robust Standard Error approach to calculate the heteroskedasticity-consistent (HC4)

standard error ( $b = 1.08$ , robust SE = .57,  $t = 1.91$ ,  $p = .06$ ). Additionally, participants' felt valence was correlated with ANTH to iRobot ( $r = .37$ ,  $p < .01$ ), implying that felt valence may have influence on ANTH. To examine this possibility, a mediation analysis was conducted.

*Mediation Analysis.* I tested a mediation process model with emotional valence manipulation as the independent variables, felt valence as the mediator, and ANTH to iRobot as the dependent variable using a bootstrapping approach (Hayes 2018, model 4). The main effect of emotional valence manipulation on felt valence was significant ( $b = 4.28$ , SE(HC4) = .44;  $p < .001$ ,  $\omega^2 = .50$ ) and not significant on ANTH to iRobot ( $b = -.77$ , SE(HC4) = .99;  $p = .44$ ). Moreover, felt valence had a significant effect on ANTH to iRobot ( $b = .43$ , SE(HC4) = .18;  $p = .02$ ,  $\omega^2 = .10$ ). That is, the more positive the participants felt, the more likely they anthropomorphized iRobot. These results implied that felt valence mediated the path from emotional valence manipulation to ANTH to iRobot. Importantly, the conditional indirect effect through felt valence was significant ( $b = 1.85$ ; 95% CI = [.49, 3.03]). Hypothesis 1b was not supported. However, felt valence was significantly associated with anthropomorphism to iRobot. As in study 1a, a similar pattern emerged in that felt valence was a positive antecedent of ANTH to a product. However, unlike study 1a, in this study felt valence bridged the effect of the emotion manipulation on anthropomorphism. Again, these results suggest that even though the manipulation was designed to manipulate participants' felt valence, the responses to a particular stimulus was idiosyncratic and depends on their actual level of felt valence (Gross and John 2003; LaTour and Rotfeld 1997). The level of felt valence, rather than the valence manipulations, affected participants' ANTH toward an

object. Given the results in mediation analysis, the more positive the felt valence was, the higher the level of anthropomorphism.

#### 5.3.4. Study 1b Discussion

The results of study 1b can be considered as evidence to support the hypothesis 1b that emotional valence increases participants' propensity to anthropomorphize a focal product. Further, the results showed that participants' felt valence mediated this effect. Overall, 1) study 1a supported the hypothesis 1a that participants' anthropomorphism varied by the level of felt arousal, and 2) study 1b illustrated that participants' felt valence mediated the effect of valence stimuli on anthropomorphism toward a focal product. Study 2a and 2b are aimed to 1) investigate the relationship between emotional stimuli and anthropomorphism in depth, especially how this relationship influence consumers' willingness to pay and to 2) replicate the results of study 1a and 1b.

#### 5.4. Study 2a

Study 2a is designed to examine the effect of emotional arousal on consumers' willingness to pay (*Hypothesis 2a*) through ANTH (*Hypothesis 2b*). An experiment with a two-level, single-factor (emotional arousal: high vs. low) between-subjects design was conducted.



#### 5.4.1. Study 2a Respondent Screening and Sample Characteristics

Data were collected through a Qualtrics survey and 246 participants in a Midwest University were recruited from SONA online system in exchange for course credits. Participants were randomly assigned to one of the 2 emotional arousal (high vs. low) conditions. At the start of the study, participants were asked to estimate the average price of a vacuuming robot in this product category. Then, participants were randomly assigned to one of two conditions as in study 1a. As in pretest 1 (chapter IV), in the high arousal condition participants watched a 2-min video clip of a *Jeff Foxworthy Live* comedy routine which elicited a high level of arousal through creating excitement feelings; In the low condition, participants watched a 2-min video clip of an art exhibition which elicited a low level of arousal via creating a feeling of contentment. Then, participants watched participants watched a 26s clip of the official Roomba<sup>®</sup> 600 series advertising commercial. After watching the commercial, participants reported their WTP to iRobot, ANTH toward iRobot, felt arousal, and other measures. The study concluded with an open-ended suspicion probe to identify hypothesis guessers.

To assess the quality of the data, first I checked the answers of the open-end suspicion probe and no participants were identified as hypothesis guessers. Second, I screened out 9 respondents who spent more than one standard deviation of the average survey completion time ( $M_{\text{time}} = 453.33$ , *Std. Deviation* = 593.03; Zhang and Conrad 2014). Third, I checked outliers and no responses were identified as outliers. Thus, I received a total of 237 valid responses.

Participants were asked to provide demographic information for respondent characteristics in the debrief at end of the survey, including gender, age, and race. Based on

237 usable responses, the participants were 21 years old on average, with a minimum age of 18 and maximum age of 44. 63% of the participants were female; 76% of them were white, 4% of them were African American, 6% of them were Hispanic, 6% of them were American Indian, and 5% of them were Asian.

#### 5.4.2. Study 2a Measurement Quality Assessment

To measure WTP, participants were asked to report the price that they were willing to pay for an iRobot after they viewed the iRobot official commercial. In addition, I measured participants' ANTH toward iRobot with seven items as in study 1a and 1b. The Cronbach's alpha of ANTH scale was .92, indicating that the internal reliability of the scale was established. The KMO Measure of Sampling Adequacy ( $KMO = .89 > .50$ ) and the Bartlett's test of Sphericity suggested that items are related and suitable for structure detection ( $\chi^2 (15) = 1076.38, p < .001$ ). The EFA results suggested a single factor solution accounting for 72.64% of the total variance. To measure felt arousal and felt valence, participants were instructed how to rate their feelings by using affect grid (Jeffries et al. 2008; Russell et al. 1989; Figure 4-1).

#### 5.4.3. Study 2a Hypothesis Testing

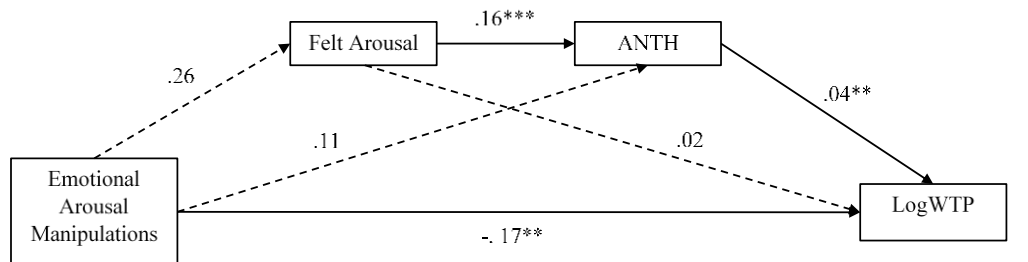
*Willingness to Pay.* The distribution of WTP after watching the video was skewed to the left (skewness = 14.186, std. error = .16) with a high peak (kurtosis = 210.418, std. error = .32). To achieve a normal distribution of the data, I transformed WTP into logarithm WTP (LogWTP) which was distributed approximately in a bell shape (skewness = -2.63, std. error

= .16; kurtosis = 19.65, std. error = .32). Even though LogWTP's skewness and kurtosis were not within the cut-off point of plus and minus 2 (George and Mallery, 2010), the distribution was highly improved after the logarithm transformation compared with the WTP. A one-way ANOVA with emotional arousal manipulation as the predictor variable and LogWTP as the dependent variable revealed a significant main effect of arousal ( $M_{low-arousal} = 2.26$  vs.  $M_{high-arousal} = 2.07$ ;  $F(1, 228) = 7.49$ ,  $p = .01$ ,  $SE = .05$ ). That is, participants in the low arousal condition were likely to pay more for the iRobot. The Levene's test of equality of error variance indicated that the assumption of homoscedasticity was violated (Levene statistics (1, 228) = 4.29,  $p = .04$ ). To correct this deficiency Huber-White's Robust Standard Error approach (HC4) was employed ( $b = .19$ , robust  $SE = .07$ ,  $t = 2.75$ ,  $p = .01$ ). Additionally, participants' felt arousal was correlated with ANTH to iRobot ( $r = .19$ ,  $p < .01$ ) and ANTH to iRobot was correlated with LogWTP ( $r = .18$ ,  $p < .01$ ), implying that there could be a serial mediation through felt arousal and ANTH to LogWTP. To examine this possibility, I ran a mediation analysis.

*Mediation Analysis.* I tested a mediation process model with the emotional valence manipulation as the independent variable, felt arousal and ANTH to iRobot as serial mediators, and LogWTP as the dependent variable using a bootstrapping approach (Hayes 2018, model 6). The main effect of emotional valence manipulation was significant on LogWTP ( $b = -.17$ ;  $p = .01$ ) but not significant on felt arousal ( $b = .26$ ,  $p = .37$ ) and ANTH ( $b = .11$ ,  $p = .65$ ). Importantly, felt arousal had a significant effect on ANTH to iRobot ( $b = .16$ ;  $p = .01$ ). That is, the higher arousal the participants felt, the more likely they anthropomorphized iRobot. Thus, hypothesis 2a was not supported. Similarly, as in study 1a, felt arousal was significantly associated with anthropomorphism to the focal product. In

addition, the effect of felt arousal on LogWTP was not significant ( $b = .02; p = .26$ ) while the effect of ANTH on LogWTP was significant ( $b = .02; p = .26$ ). These results implied that felt arousal and ANTH can be serial mediators in the relationship between emotional arousal manipulation and LogWTP. However, the conditional indirect effect through felt valence was not significant ( $b = .0018; 95\% \text{ CI} = [-.0021, .0078]$ ), given that the emotional arousal manipulation did not have significant effect on felt arousal. Interestingly, the path from felt arousal to LogWTP through ANTH was significant ( $b = .01; 95\% \text{ CI} = [.0007, .0157]$ ; see Figure 5-1). That is, the higher arousal participants felt, the more likely the participants anthropomorphize the iRobot, and subsequently the more likely they were willing to pay a premium price for the iRobot. Hence, hypothesis 2b was not supported. However, anthropomorphism to the focal product was significantly associated with WTP.

Figure 5-1 Mediation Analysis in Study 2a



Anthropomorphism = ANTH  
Willingness to pay = WTP

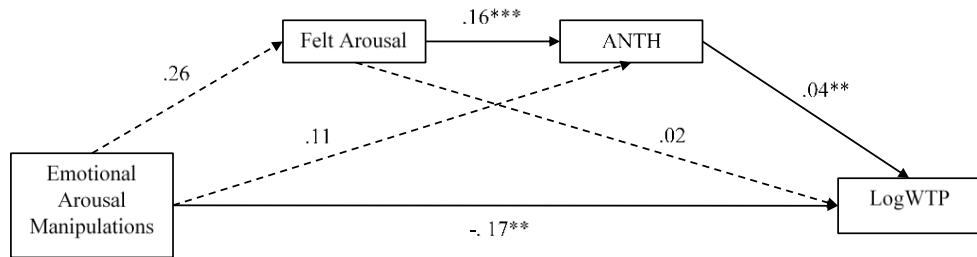
\*\*\*  $p < .001$   
\*\*  $p < .01$   
\*  $p < .05$

#### 5.4.4. Study 2a Discussion

Contrary to expectations, participants assigned to high arousal condition reported lower LogWTP than those assigned to low arousal condition. However, the mediation

analysis showed that participants' felt arousal had positive influence on LogWTP. That is, the responses to the manipulations were idiosyncratic. Felt arousal captured participants' arousal level rather than the manipulation itself. This study indicated that felt arousal had positive impact on ANTH to a product and importantly, ANTH to a product had positive impact on participants' WTP to the product. These results were consistent with those in study 1a. Even though the treatment did create a difference in participants' felt valence, the felt valence had positive influence participants' ANTH to the focal product.

Figure 5-1 Mediation Analysis in Study 2a



Anthropomorphism = ANTH  
Willingness to pay = WTP

\*\*\*  $p < .001$   
\*\*  $p < .01$   
\*  $p < .05$

### 5.5. Study 2b

Study 2b is designed to examine the effect of emotional valence on consumers' willingness to pay (*Hypothesis 2c*) through ANTH (*Hypothesis 2d*). An experiment with a two-level, single-factor (emotional valence: positive vs. negative) between-subjects design was conducted.

### 5.5.1. Study 2b Respondent Screening and Sample Characteristics

Data were collected through a Qualtrics survey and 203 participants were recruited from MTurk in exchange for financial incentives. Participants were randomly assigned to one of the 2 emotional valence (positive vs. negative) conditions as in study 1b. As in pretest 2 (chapter IV), in the negative valence condition participants watched a 2-min video clip of the movie *Champ* in which a son cried for his father's death. In the positive valence condition, participants watched a 2-min video clip of an art exhibition. Then, participants watched a 45s clip of iRobot Roomba® commercial. After watching the commercial, participants reported their WTP to iRobot, ANTH toward iRobot, felt arousal, and other measures. The study concluded with an open-ended suspicion probe to identify hypothesis guessers.

To assess the quality of the data, first of all I checked the answers of the open-end suspicion probe and no participants were identified as hypothesis guessers. Second, 24 participants were classified as careless respondents who finished the experiment beyond one standard deviation of the average time ( $M = 475.09s$ , Std. Deviation = 116.89s; Zhang and Conrad 2014) and one response was identified as an outlier. Thus, I received a total of 178 valid responses.

Participants were asked to provide demographic information for respondent characteristics in the debrief at end of the survey, including gender, age, race, education, and income. Based on 179 usable responses, the participants were 39 years old on average, with a minimum age of 18 and maximum age of 75. 50% of the participants were female; 71% of them were white, 11% of them were African American, 10% of them were Asian, 3% of them were Hispanic, 1% of them were American Indian or Alaska native, and 1% of them

were native Hawaiian or Pacific islander. Moreover, 65% of participants received bachelor's degree or above, and the medium of the annual income was between \$50,000 and \$59,999.

### 5.5.2. Study 2b Measurement Quality Assessment

Participants' WTP was calculated by asking participants to report what the perceived average price for a vacuuming robot. Then, the price the participants were willing to pay for iRobot Roomba after they watch the iRobot commercial was estimated. I calculated the percentage above or below the average price as the measure of WTP (Thomson, MacInnis, and Park, 2005). I measured participants' ANTH to iRobot by using the same scale as in study 1a, 1b and 2a. The Cronbach's alpha of ANTH scale was .94, which showed the internal reliability of the scale was built. The KMO ( $KMO = .91 > .50$ ) and the Bartlett's test of sphericity suggested that the factor analysis was valid ( $\chi^2(21) = 1477.26, p < .001$ ). The EFA results suggested a single factor solution accounting for 78.50% of the total variance. To measure felt arousal and felt valence, participants were asked to indicate their feelings by using the affect grid as in study 2a.

### 5.5.3. Study 2b Hypothesis Testing

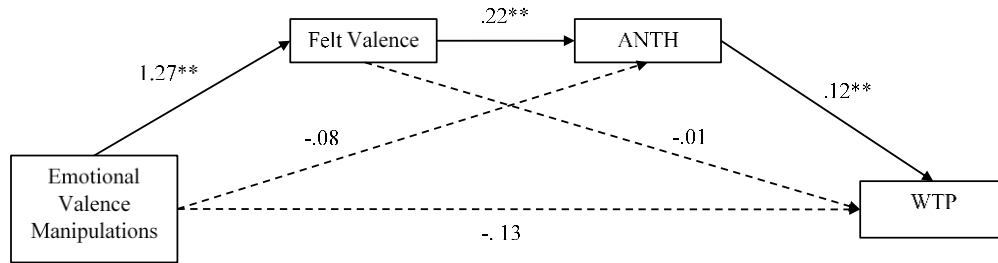
*Willingness to Pay.* Regarding the WTP responses, there were 29 missing values and thus I received 149 valid responses. A one-way ANOVA with emotional valence and WTP as the dependent variable revealed a nonsignificant main effect of emotional valence ( $M_{positive-valence} = .27$  vs.  $M_{negative-valence} = .34$ ;  $F(1, 147) = .08, p = .78, SE = .22$ ). Levene's test indicated that the assumption of error variance was not violated (Levene statistic (1, 147)

= .05,  $p = .83$ ). Moreover, participants' felt valence was correlated with ANTH to iRobot ( $r = .19, p < .05$ ) and ANTH to iRobot was correlated with WTP ( $r = .24, p < .01$ ), implying a serial mediation between emotional valence manipulations and WTP. To examine this possibility, I ran a mediation analysis.

*Mediation Analysis.* I tested a mediation process model with emotional valence manipulation as the independent variable, felt valence and ANTH to iRobot as the mediators, and WTP as the dependent variable using a bootstrapping approach (Hayes 2018, model 6). The main effect of the emotional valence manipulation was significant on felt valence ( $b = 1.27, p < .01$ ) and not significant on both ANTH to iRobot ( $b = -.08, p = .83$ ) and WTP ( $b = -.13, p = .51$ ; Figure 5-2). The main effect of felt valence was significant on ANTH to iRobot ( $b = .22, p = .01$ ), showing that the more positive participants felt, the more likely they were more likely to anthropomorphize iRobot. Thus, hypothesis 2c was not supported. However, as in study 1b, felt arousal was significantly associated with anthropomorphism to iRobot. Moreover, felt valence did not have significant effect on WTP ( $b = -.01, p = .77$ ), and the effect of ANTH to iRobot was significant on WTP ( $b = .12, p = .01$ ). Importantly, the indirect effect from emotional valence manipulation through felt valence and ANTH to WTP was significant ( $b = .03, 95\% \text{ CI} = [.0025, .0932]$ ). That is, the felt valence and ANTH were serial mediators in the relationship between emotional valence manipulation and WTP. To the extent participants experienced positive emotions, they were more likely to anthropomorphize a product and then were more willing to pay a premium price for the product. Therefore, hypothesis 2d was not supported. However, anthropomorphism toward iRobot was associated with WTP.



Figure 5-2 Mediation Analysis in Study 2b



Anthropomorphism = ANTH  
 Willingness to pay = WTP

\*\*\*  $p < .001$   
 \*\*  $p < .01$   
 \*  $p < .05$

#### 5.5.4. Study 2b Discussion

Consistent with the results of study 1b, participants’ felt valence had positive influence on their propensity to anthropomorphize a product. Results of study 2b revealed that participants’ anthropomorphism toward a product can increase their willingness to pay more for the product. Even though the emotional valence treatments in this study did not have a significant direct effect on WTP, it’s influence on WTP worked through the mediation effect of felt valence and anthropomorphism to the product.

Based on the four studies above, the level of emotional valence and emotional arousal can increase participants’ propensity to anthropomorphize a product. However, consumers may have preexisting anthropomorphism toward a brand. For instance, some consumers may have a high level of anthropomorphism toward high tech brands such as Amazon or Apple, while other consumers may have a low level of anthropomorphism toward these brands because these consumers simply see the brands as entities without lives.

## 5.6. Study 3a

The purpose of Study 3a was to examine the effect of emotional arousal influences consumers' brand likability to a brand and the effect of consumers' preexisting anthropomorphization in this relation (*Hypothesis 3a*). An experiment with a 2 x (emotional arousal: high vs. low) x 2 (preexisting anthropomorphism: high vs. low) between-subjects design was conducted.

### 5.6.1. Study 3a Respondent Screening and Sample Characteristics

I collected data via a Qualtrics survey and 480 participants were recruited from MTurk in exchange for financial incentives. Participants were randomly assigned to one of the 2 emotional arousal (high vs. low) x 2 preexisting anthropomorphism (high vs. low). The results of pretest 3 (Chapter IV) indicated that participants have higher preexisting anthropomorphism toward Pedigree<sup>®</sup> dog food than the fictitious brand Knaz<sup>®</sup> dog food. In high arousal high preexisting ANTH (vs. low arousal high preexisting) condition, participants watched a 20-second advertisement of Pedigree<sup>®</sup> dog food, which showed a picture of a happy dog (vs. a serene dog park) with uplifting (vs. calming) background music. In the high arousal low preexisting (vs. low arousal low preexisting) condition, participants watched an ad of Knaz<sup>®</sup> dog food which showed a happy dog (vs. a serene dog park) with uplifting (vs. calming) background music. Then, participants reported their likability to Pedigree<sup>®</sup>/ Knaz<sup>®</sup> dog food and other measures. The study concluded with an open-ended suspicion probe to identify hypothesis guessers.

To assess the quality of the data, I checked the answers of the open-end suspicion probe and no participants were identified as hypothesis guessers. Second, there were no statistical outliers. Thus, I received a total of 480 valid responses. Participants were asked to provide demographic information for respondent characteristics in the debrief at end of the survey, including gender, age, race, education, and income. Based on 480 usable responses, the participants were 40 years old on average, with a minimum age of 18 and maximum age of 77. 54% of the participants were female; 75% of them were white, 12% of them were African American, 7% of them were Asian, and 4% of them were Hispanic. American Indian / Alaska native and native Hawaiian / Pacific islander were both less than 1%. Moreover, 68.9% of participants received bachelor's degree or above, and the medium of the annual income was between \$50,000 and \$59,999.

### 5.6.2. Study 3a Measurement Quality Assessment

I measured participant's likability to the brand Pedigree®/Knaz® with five items on a 9-point semantic differential scale adjusted from Holbrook and Batra (1987), which was anchored by "dislike/like", "negative/positive", "bad/good", "unfavorable/favorable" and "unpleasant/pleasant". The Cronbach's alpha of brand likability scale was .98, which showed adequate internal consistency for the scale. The KMO (KMO = .95 > .50) and the Bartlett's test of sphericity ( $\chi^2 (21) = 4941.07, p < .001$ ) suggested that the factor analysis was valid. The EFA results suggested a single factor solution accounting for 88.05% of the total variance. To measure felt arousal and felt valence, participants were asked to indicate their feelings by using affect grid as in study 2a and 2b.

### 5.6.3. Study 3a Hypothesis Testing

*Brand Likability.* A two-way ANOVA with emotional arousal treatment and preexisting ANTH as independent variables and brand likability as dependent variable revealed a significant main effect of emotional arousal treatment on brand likability ( $M_{high-arousal} = 6.96$  vs.  $M_{low-arousal} = 6.42$ ;  $F(1, 475) = 12.10, p = .001, SE = .15; \omega^2 = .02$ ). That is, participants in high-arousal condition had higher likability to a brand than those in the low-arousal condition. The main effect of preexisting ANTH was not significant on brand likability ( $M_{high-anth} = 6.75$  vs.  $M_{low-anth} = 6.63$ ;  $F(1, 475) = .62, p = .43, SE = .15$ ). Moreover, the interaction between emotional arousal and preexisting ANTH on brand likability was not significant ( $F(1, 475) = 1.08, p = .30$ ). The Levene's test showed that the assumption of error variance was not violated (Levene statistic (3, 475) = .80,  $p = .49$ ). Therefore, hypothesis 3a was supported.

### 5.6.4. Study 3a Discussion

Results of Study 3a revealed that only emotional arousal had a significant effect on brand likability while participants' preexisting anthropomorphism toward the focal brand did not. The non-significant interaction effect between preexisting anthropomorphism and emotional arousal on brand likability revealed that the preexisting anthropomorphism to a focal brand may be a weak influential factor on likability and consumers may not be influenced by it when they feel aroused by the advertisement.

### 5.7. Study 3b

The purpose of Study 3b was to examine emotional valence influence consumers' brand likability to a brand and the effect of consumers' preexisting anthropomorphization in this relationship (*Hypothesis 3b*). An experiment with a 2 x (emotional valence: positive vs. negative) x 2 (preexisting anthropomorphism: high vs. low) between-subjects design was conducted.

#### 5.7.1. Study 3b Respondent Screening and Sample Characteristics

485 participants were recruited from MTurk in exchange for financial incentives. Participants were randomly assigned to one of the 2 emotional valence (positive vs. negative) x 2 preexisting anthropomorphism (high vs. low). Again, based on the results of pretest 3 (chapter IV) participants have higher preexisting anthropomorphism toward Pedigree<sup>®</sup> dog food than the fictitious brand Knaz<sup>®</sup> dog food. In negative (vs. positive) valence high preexisting ANTH (vs. low arousal high preexisting) condition, participants watched a 20-second advertisement of Pedigree<sup>®</sup> (vs. Knaz<sup>®</sup>) dog food, which showed a picture of a sad dog (vs. a serene dog park) with sad (vs. calming) background music. Then, participants reported their likability to Pedigree<sup>®</sup>/ Knaz<sup>®</sup> dog food and other measures. The study concluded with an-open-ended suspicion probe to identify hypothesis guessers.

To evaluate the quality of the data I checked the answers of the open-end suspicion probe and no participant was identified as a hypothesis guesser. To identify careless response. I evaluated responses by the total survey duration — participants' total respond time should be within one standard deviation of the average respond time ( $M = 407.65s$ , Std.

Deviation = 273.54s; Zhang and Conrad 2014), and I dropped 47 responses and received a total of 438 valid responses. Participants' demographic information was collected at the end of the study, including gender, age, race, education, and income. Based on the 438 valid samples, participants were 40 years old on average, with a minimum age of 19 and maximum age of 87. 50% of the participants were female. 71% of them were white, 10% of them were African American, 11% of them were Asian, and 4% of them were Hispanic. American Indian / Alaska native and native Hawaiian / Pacific islander were both less than 1%. Moreover, 69% of participants received bachelor's degree or above, and the medium of the annual income was between \$50,000 and \$59,999.

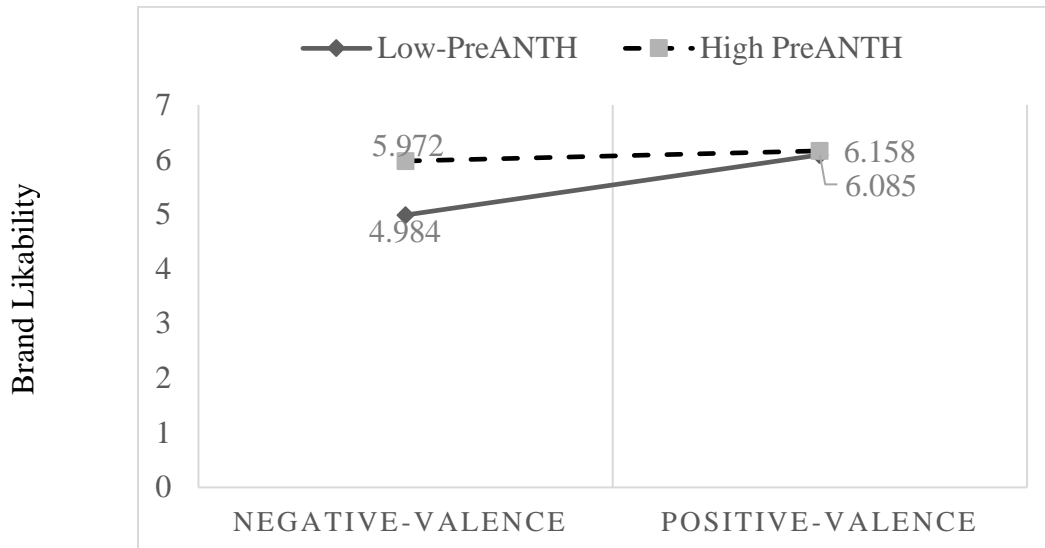
#### 5.7.2. Study 3b Measurement Quality Assessment

I measured participant's likability to the brand Pedigree®/Knaz® with five items on a 9-point semantic differential scale (Holbrook and Batra 1987) as in study 3a. The Cronbach's alpha of ANTH scale was .98, indicating that the internal reliability of the scale was built. The KMO (KMO = .93 > .50) and the Bartlett's test of Sphericity ( $\chi^2(21) = 4439.87, p < .001$ ) showed that the factor analysis was valid. The EFA results suggested a single factor solution accounting for 87.30% of the total variance. To measure felt arousal and felt valence, participants were asked to indicate their feelings by using affect grid as in study 2a, 2b, and 3a.

### 5.7.3. Study 3b Hypothesis Testing

*Brand Likability.* I ran a regression model with the emotional valence ad treatment and preexisting ANTH as independent variables and brand likability as the dependent variable. The Levene's test suggested a violation of homogeneity of variance assumption (Levene statistic (3, 433) = 10.04,  $p < .001$ ). I employed Huber-White (HC4) method to adjust the standard error of the coefficient. The main effect of emotional valence treatment on brand likability was not significant ( $b = -.19$ , robust SE = .30,  $t = -.62$ ,  $p = .53$ ;  $M_{positive-valence} = 6.12$  vs.  $M_{negative-valence} = 5.48$ ; Figure 5-3). Moreover, the main effect of preexisting ANTH was not significant on brand likability ( $b = -.07$ , robust SE = .27,  $t = -.27$ ,  $p = .79$ ;  $M_{high-anth} = 6.07$  vs.  $M_{low-anth} = 5.54$ ; Figure 5-4). Importantly, the interaction between emotional arousal and preexisting ANTH on brand likability was significant ( $b = -.92$ , robust SE = .45,  $t = -2.04$ ,  $p = .04$ ;  $M_{positive/low-anth} = 6.09$  vs.  $M_{negative/low-anth} = 4.98$ ). Specifically, participants with positive valence vs. negative valence were more likely to have high likability to a brand with low preexisting anthropomorphism. Participants have similar likability to a brand with which they have high preexisting anthropomorphism regardless of the emotion they experienced (Figure 5-3). These results partially supported hypothesis 3b which proposes that consumers with positive vs. negative emotion are more likely to have a higher likability to a brand with high preexisting anthropomorphism.

Figure 5-3 Study 3b Results



#### 5.7.4. Study 3b Discussion

Study 3b revealed that high preexisting anthropomorphism can be a buffer for a brand. That is, positive or negative emotion will not have influence on the likability to a brand with high preexisting anthropomorphism. On the other hand, consumers tend to have a higher likability to a brand with low preexisting anthropomorphism when they feel positive (vs. negative).



## CHAPTER VI

### DISCUSSION AND CONCLUSION

#### 6.1. Introduction

There are five sections in this chapter. The first section provides an overview of the chapter. In the second section, a summary of the research issues and hypotheses (Chapter IV), and a discussion of the research findings obtained from the data analysis (Chapter V) are provided. Then, the third section outlines the theoretical implications derived from the research findings. In the next section, I provide recommendations to marketing practitioners for increasing consumer evaluations that involve anthropomorphism or anthropomorphic designs. The last section is concluded by discussion of limitation and future research direction.

#### 6.2. Dissertation Overview and Findings

This dissertation serves the purpose of exploring the possibility that emotion can induce anthropomorphism and consequently influence consumer evaluations. After an extensive review of the literature, it was found that anthropomorphism is related to emotion. Anthropomorphism triggers emotion such as pleasure from consumers (Aggarwal and McGill 2007; Yuan and Dennis 2019). That is, the emotion elicited by an

anthropomorphic product or brand can transfer to consumers. However, minimal research examines the relation from the other direction—that emotion may trigger consumer anthropomorphism. This is the research gap that I attempt to fill.

This research gap is not only relevant to academics but also to managers. For academics, the study of emotion and anthropomorphism contributes to the understanding of the nomological network. For managers, this research sheds light on their understanding of consumer anthropomorphism in that using anthropomorphic designs is not the only way to induce anthropomorphism toward a product or brand. Managers can consider using emotional stimuli to achieve this purpose.

The main proposition in this dissertation rests on the comfort thesis and Epley's SEEK model, which suggests the need for social connections drive people to anthropomorphize objects. That is, attributing humanlike features to nonhuman object is a way to develop a connection with the external world. People feel comfortable through anthropomorphism which populates their surroundings (Loukatos 1976). According to emotion regulation theory, people attend social activities as a strategy to manage their bad mood, raise energy and reduce tension (Thayer et al. 1994). Therefore, I suggest that anthropomorphism, which is driven by sociality motivations (Epley et al. 2007; Waytz et al. 2010a), can serve as a way to regulate emotion. Specifically, when exposed to emotional stimulus, people anthropomorphize their surroundings to enhance positive feelings or raise their energy.

### 6.2.1. Discussion of Study 1a and 1b

To test the main proposition above, I conducted study 1a and 1b as parallel studies. Specifically, these studies tested the effect of emotional arousal stimulus and emotional valence stimulus on consumers' anthropomorphism toward a focal product respectively. To test hypothesis 1a, I manipulated high vs. low emotional arousal by video clips and kept the emotional valence as constant. The results of study 1a revealed that the emotional stimuli (i.e., video clips tested in pretest 1, Chapter IV) did not have a direct effect on participants' anthropomorphism to the focal product (i.e., iRobot), while the effect of felt arousal on anthropomorphism was significant. These results revealed that participants' felt arousal elicited by the treatment can induce anthropomorphism to the focal product. Importantly, the results provide evidence supporting the contention that consumers responses to emotional stimuli is idiosyncratic (Gross and John 2003; LaTour and Rotfeld 1997).

Study 1b was designed to test hypothesis 1b in which I manipulated positive vs. negative emotional valence by video clips tested in pretest 2 (Chapter IV). The results indicated that the direct effect of emotional valence treatment on anthropomorphism to the focal brand was not significant, but the indirect path from the treatment to anthropomorphism through participants' felt valence was significant. Similar to the correlation between felt arousal and anthropomorphism to the focal product, participants' felt valence was correlated with anthropomorphism. Therefore, hypothesis 1b was partially supported.

The difference between study 1a and 1b was that the emotional valence treatment, but not the emotional arousal treatment (study 1a), had a significant indirect effect on anthropomorphism to the focal product. Theoretically, the influence on anthropomorphism from both arousal and valence should occur in the same fashion. I suggest three possible

reasons for the difference observed in the results. The first possible reason is that it is relatively easier to manipulate participants' emotional valence than emotional arousal, especially in the online experiment setting via MTurk. Specifically, I manipulated emotional arousal level by employing video clips. Technically, it may be easier to create a significantly high vs. low level of arousal by asking participants do exercises in a lab than exposing participants to video clips online. The low effect size of the arousal treatment supported this proposition.

The second possible reason, derived from the first reason, is that it may be easier to sense and perceive emotional valence (e.g., pleasure or sadness) than emotional arousal (lower energy vs. higher energy). The difficulties between manipulations of valence and arousal lead to the observation that the emotional arousal treatment did not create high vs. low level of felt arousal in the main studies, despite doing so in the pretest. Lastly, participants' felt valence and felt arousal were measured by self-report scales. In this dissertation, I employed semantic differential scale by (Mehrabian and Russell 1974) in study 1a and 1b, and the affect grid (Jefferies et al. 2008) in study 2a, 2b, 3a, and 3b. In line with the second reason, participants reported their felt valence and arousal by the scales based on their feelings. It may be easier to indicate their felt valence than their felt arousal through a scale. I suggest that collecting participants physiological responses such as heart rate or blood pressure (Mehrabian and Russell 1974) may provide more information about participants' felt arousal.

### 6.2.2. Discussion of Study 2a and 2b

Study 2a and 2b examined the effect of emotional arousal or valence treatment on WTP through anthropomorphism to the focal brand. The results of study 2a indicated that emotional arousal treatment had a significant direct effect on LogWTP. Importantly, the indirect effect from the arousal treatment to LogWTP through felt arousal and anthropomorphism was not significant (Figure 5-1). The path was not significant because the arousal treatment did not create significantly different levels of felt arousal. However, the path from felt arousal to LogWTP via anthropomorphism was significant. That is, participants with high vs. low felt arousal were more likely to anthropomorphize the focal product and consequently increased logWTP. Again, these results implied that the participants' responses to emotional stimulus are idiosyncratic. From the technical point of view, it is difficult to ensure that each participant responds to a treatment in the same way, especially in an online survey setting.

Theoretically, both valence and arousal should increase WTP (Bagchi and Cheema 2012; Parboteeah et al. 2009). Study 2a and study 2b both show that the effect of felt emotional arousal/valence on WTP was significant as mediated by anthropomorphism. However, only the manipulation of high arousal vs low arousal emotions in Study 2a did not have a significant effect on felt arousal. This result could originate from measurement difficulties as discussed above or the results could suggest that the causal process predicting WTP may be different between the arousal manipulation and valence manipulation. More research is needed for this possibility. Moreover, the measurement of WTP in study 2a and 2b were slightly different. In study 2a, participants reported WTP after they watched the advertisement of the focal product and I used LogWTP to represent WTP in the data analysis.

On the other hand, WTP was measured by the percentage above or below the average price in study 2b. The difference between the measurement of WTP in these two studies may cause the different statistical results.

Further, different than the pattern showed in study 2a, the results of study 2b revealed a significant path from emotional valence treatment to WTP through felt arousal and anthropomorphism (Figure 5-2). The treatment created different level of felt valence so that the serial mediation path from treatment to WTP was significant. The reasons for the occurrence of the difference could be similar to those in study 1a vs. 1b. I have provided three possible reasons for this difference in section 2.3.1.

### 6.2.3. Discussion of Study 3a and 3b

Study 3a showed a significant effect of emotional arousal ad treatment on brand likability while the effect of preexisting anthropomorphism to the brand was not. On the other hand, study 3b revealed a non-significant effect of emotional valence ad treatment on brand likability. This difference implied that emotional arousal vs. valence may have a stronger effect to increase brand likability. More research is needed for this possibility. Interestingly, this difference is similar to those observed in study 2a and 2b that arousal vs. valence had a significant effect on WTP.

A different pattern was found in Study 3b. The interaction effect of the preexisting anthropomorphism and emotional valence manipulation was significant (Figure 5-3). Specifically, consumers with positive (vs. negative) emotion are more likely to have high likability to a brand with low preexisting anthropomorphism than to a brand with high

preexisting anthropomorphism. Importantly, compared with the brand with low preexisting anthropomorphism, likability to the brand with high preexisting anthropomorphism stays in a relatively high level regardless of consumers' emotion. Hence, I suggest that high preexisting anthropomorphism can be a buffer for a brand. That is, positive or negative emotion will not have significant influence on likability to a brand with high preexisting anthropomorphism. It is possible that consumers like a humanlike brand and this likability will not be influenced easily by their emotion.

On the other hand, consumers tend to have a higher likability to a brand with low preexisting anthropomorphism when they feel positive (vs. negative). Without the buffer from preexisting anthropomorphism, the likability to a brand can be influenced by consumers' emotion.

### 6.3. Theoretical Implications

This dissertation provides theoretical implications for the marketing literature in several ways. First of all, it broadens the understanding of consumers' anthropomorphism to a product/brand by exploring how emotional arousal and valence trigger anthropomorphism in marketing contexts. Prior research in marketing has primarily investigated how consumers response to anthropomorphic product/brand (e.g., Huang et al. 2020; Kim and McGill 2018; Puzakova and Kwak 2017), and examine emotion as an outcome variable (Aggarwal and McGill 2007). Minimal amount of research has explored the relation between anthropomorphism and emotion. Importantly, I examine the effect of emotional valence and arousal separately in this dissertation. It is valuable to scrutinize the effect of these two

dimensions respectively (Di Muro and Murray 2012) since they are independent from each other. In fact, the results across six studies revealed that valence and arousal did not influence consumers' anthropomorphism in the same way.

Second, few researchers have examined how anthropomorphism influences WTP. Yuan and Dennis's (2019) research focuses on the effect of anthropomorphic display of products on WTP. In this dissertation, I provided a new perspective to investigate the relationship between anthropomorphism and WTP. I addressed this issue by investigating the effect of anthropomorphism, which is triggered by consumers' emotion valence/arousal, on WTP. I found that both valence and arousal can trigger anthropomorphism to the focal product and consequently increase WTP. In addition, the serial mediation found in study 2a and 2b provided evidence to support the proposition that individuals' response to emotional stimulus is idiosyncratic.

Third, to the best of my knowledge, rare research investigates the influence of preexisting brand anthropomorphism on brand likability. Interestingly, I found that in general consumers have high likability to brand with high (vs. low) preexisting anthropomorphism regardless of the interference of emotion. I suggest that preexisting anthropomorphism may serve as a buffer for a brand. More research is needed for this possibility. Consumers tend to have higher likability to brands with low preexisting anthropomorphism under the influence of positive (vs. negative) emotion.



#### 6.4. Practical Implications

This research provides suggestions to marketing practitioners interested in consumer anthropomorphism. Marketing strategy mainly focuses on anthropomorphic designs for a brand or product, such as voice assistant Alexa, and expect these designs will induce consumer anthropomorphism and consequently increase brand evaluations. This research explores consumer anthropomorphism from the perspective of emotion and suggests that emotional arousal and valence can induce consumer anthropomorphism. Thus there are now more options for practitioners that desire to increase consumers' anthropomorphism to their brands. That is, building marketing strategy is not confined strictly to anthropomorphic design. Influencing consumers' emotion is another way to achieve the goal.

Further, the influence of preexisting anthropomorphism on brand likability can be a buffer for a brand that desires to use sadness in their persuasive appeals as is common among animal rights groups and pet food brands. As anthropomorphism is developed overtime by consumers, it becomes a valuable aspect of brand building. In the long run, it is worthy for firms to invest in product designs and marketing initiatives aimed to increase consumers anthropomorphism.

#### 6.5. Limitation and Future Research Direction

Despite its contributions, the present research has a few limitations that need to be cautiously considered when generalization the results to a broader marketing setting. First, effect size of emotional valence and arousal manipulations is relatively low. Stronger manipulations are needed to examine the effect of emotion, specially the manipulation of

arousal. Second, an in-depth analysis of the measurements of felt valence and felt arousal is needed. There are various ways to measure valence and arousal. only two measurements were employed in this dissertation. There is a concern about how well the affect grid and the scale by Mehrabian and Russell's (1974) scale to capture valence and arousal. Participants' physiological data should be considered a possible measurement of arousal in future studies. Lastly, I investigated the influence of emotional arousal and valence in separate studies. It is valuable to examine the interaction effect of between emotional valence and arousal on consumer anthropomorphism for future research.

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## APPENDICES

### Appendix A - Study 1a and 1b IRB Approval



#### Oklahoma State University Institutional Review Board

Date: 09/23/2019  
Application Number: BU-19-61  
Proposal Title: How emotions affect consumers' anthropomorphism toward brands  
Principal Investigator: Yingying Li  
Co-Investigator(s):  
Faculty Adviser: Kevin Voss, Ph.D.  
Project Coordinator:  
Research Assistant(s):  
Processed as: Exempt  
Exempt Category:

#### Status Recommended by Reviewer(s): Approved

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

Sincerely,  
Oklahoma State University IRB

## Appendix B – Study 2a and 2b IRB Approval



### Oklahoma State University Institutional Review Board

Date: 02/04/2021  
Application Number: IRB-21-62  
Proposal Title: How emotions affect consumers' willingness to pay  
  
Principal Investigator: Yingying Li  
Co-Investigator(s): Kevin Voss, Ph.D.  
Faculty Adviser: Kevin Voss, Ph.D.  
Project Coordinator:  
Research Assistant(s):  
  
Processed as: Exempt  
Exempt Category:

#### Status Recommended by Reviewer(s): Approved

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

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As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

Sincerely,  
Oklahoma State University IRB

## Appendix C – Study 3a and 3b IRB Approval



### Oklahoma State University Institutional Review Board

Date: 10/08/2020  
Application Number: IRB-20-447  
Proposal Title: How emotions affect consumers' likability to brand.

Principal Investigator: Yingying Li  
Co-Investigator(s): Kevin Voss, Ph.D.  
Faculty Adviser: Kevin Voss, Ph.D.  
Project Coordinator:  
Research Assistant(s):

Processed as: Exempt  
Exempt Category:

#### Status Recommended by Reviewer(s): Approved

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

Sincerely,  
Oklahoma State University IRB

## Appendix D – Study 1a & 1b Manipulations and Measurement Instruments

In this study you will be randomly assigned to watch a video. Some of these videos are not controversial. Other videos, while commonly experienced in everyday life, contain images that some people may prefer not to watch. If you decide to terminate participation in this research, you may stop at any time.

PLEASE PUT ON YOUR HEADPHONE NOW

Please watch this video carefully, and get into the emotion reflected in this video. After the video is done playing, please hit the arrow below the video to advance to the next question.

*High arousal positive valence condition:* <https://youtu.be/5JoMEJT5rac>

*Low arousal negative valence condition:* <https://youtu.be/Tvs30qIPR14>

*Low arousal positive valence condition:* <https://youtu.be/-6wa1XZ0mrc>

For each item below, please indicate your opinion of the iRobot by clicking the bubble that corresponds to what you believe.

	None at all (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Completely (11)
The iRobot has a mind of its own. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has intentions. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has free will. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has consciousness. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has desires. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has beliefs. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The iRobot has the ability to experience emotions. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How do you feel? For each pair of words, click the bubble closest to the adjective which you believe best describes your feeling. The more appropriate that adjective seems, the closer the bubble to be clicked.

	1	2	3	4	5	6	7	8	9	10	11	
Unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Happy
Annoyed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pleased
Tranquil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Delighted
Calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Frightened
Serene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fearful
Peaceful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sad
Contented	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Melancholic
Unaroused	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Aroused
Related	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Stimulated

How do you feel after watching the video? Please describe your feelings in details.

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This question is about the video clip that you watched. Please indicate what video did you watch in this study?

- A stand up show with funny jokes
- A sad movie in which a man died
- A horror movie in which twins showed up in the hallway
- An art exhibition
- None

This question is about the video clip that you watched. For each question below, click the circle under the number that best indicates the extent that you agree or disagree with the statement. The more you agree with the statement, the higher the number you should choose.

The more you disagree, the lower the number you should choose. In my opinion:

	1	2	3	4	5	6	7	8	9	10	11
The video is scary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The video is serene.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The video is funny.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The video is sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In your opinion, what is the purpose of this study?

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## Appendix E – Study 2a & 2b Manipulations and Measurement Instruments

Your honest and thoughtful responses are important to us and to the study.

Please make each item a separate and independent judgment.

Work at moderate speed through these scales.

Do not worry or puzzle over individual items.

It is your first impression, the immediate feelings about the items as they pertain to the product or the service that we want.

On the other hand, please do not be careless, because we want your true impressions.

Upon completion of the survey, you will receive feedback about the quality of your survey responses.

Your answers will be kept strictly confidential.

Vacuuming robots use smart sensors to navigate and detect the dirty spots and clean them thoroughly. Vacuuming robots clean everything from small particles to large debris, with a cleaning head automatically adjusting to clean carpet and hard floors effectively.



*What do you estimate is the average price of a vacuuming robot in this product category?*

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Please watch this video carefully, and get into the emotion reflected in this video. After the video is done playing, please hit the arrow below the video to advance to the next question.”

The links of the video clips are:

*High arousal positive valence condition:*

<https://www.youtube.com/watch?v=5JoMEJT5rac&feature=youtu.be>

*Low arousal negative valence condition:*

<https://www.youtube.com/watch?v=Tvs30qIPRI4&feature=youtu.be>

*Low arousal positive valence condition:*

<https://www.youtube.com/watch?v=-6wa1XZ0mrc&feature=youtu.be>

Please hit the play arrow to watch the product introduction video. You will be asked questions about this video later, so please watch it carefully. After the video is done playing, please hit the arrow below the video to advance to the next question.

Video link: <https://www.youtube.com/watch?v=Yf8MuJUGLII>

After watching the commercial, participants are asked to answer the following questions:

iRobot Roomba® 600 Series vacuuming robot.



What is the price you would like to pay for an iRobot Roomba® 600 Series vacuuming robot?

For each item below, please indicate your opinion of iRobot Roomba® 600 Series vacuuming robot by clicking the bubble that corresponds to what you believe.

	None at all (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	To a great extent (9)
iRobot Roomba has a mind of its own.	)	)	)	)	)	)	)	)	)
iRobot Roomba has intentions.	)	)	)	)	)	)	)	)	)
iRobot Roomba has free will.	)	)	)	)	)	)	)	)	)
iRobot Roomba has consciousness.	)	)	)	)	)	)	)	)	)
iRobot Roomba has desires.	)	)	)	)	)	)	)	)	)
iRobot Roomba has beliefs.	)	)	)	)	)	)	)	)	)
iRobot Roomba has the ability to experience emotions.	)	)	)	)	)	)	)	)	)
I am on vacation in Antarctica.	)	)	)	)	)	)	)	)	)

In this part of this study, you will use the “affect grid” to describe your feelings. It is in the form of a matrix of numbers — think of it as a kind of map for your feelings.

Your task will be to select the square that represents your sense of how pleasant and aroused you feel.

The horizontal dimension of the map represents degree of how much arousal or activated a person feels — independent of whether the feeling is positive or negative. The farther to the left, the lower arousal a person feels. The farther to the right the higher arousal a person feel. The vertical dimension of the map represents pleasant feelings. Lower numbers (toward the bottom) represent unpleasant feelings, whereas higher numbers (toward the top) indicate a higher level of pleasantness.

Extremely pleasant	91	92	93	94	95	96	97	98	99
	81	82	83	84	85	86	87	88	89
	71	72	73	74	75	76	77	78	79
	61	62	63	64	65	66	67	68	69
	51	52	53	54	55	56	57	58	59
	41	42	43	44	45	46	47	48	49
	31	32	33	34	35	36	37	38	39
	21	22	23	24	25	26	27	28	29
Extremely unpleasant	11	12	13	14	15	16	17	18	19
	Extremely low arousal				Extremely high arousal				

*After viewing the ad, how do you feel?  
In the box below, enter the number for the square from the above matrix that you think best captures your feelings:*

For each pair of words, click the bubble closest to the adjective which you believe best describes your feeling. The more appropriate that adjective seems, the closer the bubble to be clicked.

	Not at all (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	To a great extent (9)
Happy	)	)	)	)	)	)	)	)	)
Pleased	)	)	)	)	)	)	)	)	)
Frightened	)	)	)	)	)	)	)	)	)
Fearful	)	)	)	)	)	)	)	)	)
Sad	)	)	)	)	)	)	)	)	)
Sorrowful	)	)	)	)	)	)	)	)	)
Gloomy	)	)	)	)	)	)	)	)	)
Downcast	)	)	)	)	)	)	)	)	)
Aroused	)	)	)	)	)	)	)	)	)
Stimulated	)	)	)	)	)	)	)	)	)

In your opinion, what is the purpose of this study?

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Lastly, it is vital to our study that we only include responses from people that devoted their full attention to this study. Otherwise years of effort (the researchers' and the time of participants) could be wasted. You *will receive credit* for this study no matter what, however, please tell us how much effort you put forth toward this study.

I put forth \_\_\_\_\_ effort towards this study

- Almost no
- Very little
- Some
- Quite a bit
- A lot of

Often there are several distractions present during studies (other people, TV, music, etc.). Please indicate how much attention you paid to this study.

Again, you *will receive credit* no matter what. We appreciate your honesty!

I gave this study \_\_\_\_ attention.

- Almost no
- Very little of my
- Some of my
- Most of my
- My full

In your honest opinion, should we use your data in our analysis in this study?

- Yes
- No



Appendix F – Study 3a & 3b Manipulations and Measurement Instruments

In the next part of this study, you will use the “affect grid” to describe your feelings. It is in the form of a matrix of numbers — think of it as a kind of map for your feelings.

The center square, number 55 in the matrix below, represents a neutral, average, everyday feeling. It is neither positive or negative.

Your task will be to select the square that represents your sense of how pleasant and energetic you feel.

The horizontal dimension of the map represents degree of how much energy or activated a person feels — independent of whether the feeling is positive or negative. The farther to the left, the lower energy a person feels. The farther to the right the higher energy a person feel.

The vertical dimension of the map represents pleasant feelings. Lower numbers (toward the bottom) represent unpleasant feelings, whereas higher numbers (toward the top) indicate a higher level of pleasantness.

By choosing the number you can indicate the balance of the level of energy you feel and the pleasantness of your feelings.

Extremely pleasant	91	92	93	94	95	96	97	98	99
	81	82	83	84	85	86	87	88	89
	71	72	73	74	75	76	77	78	79
	61	62	63	64	65	66	67	68	69
	51	52	53	54	55	56	57	58	59
	41	42	43	44	45	46	47	48	49
	31	32	33	34	35	36	37	38	39
	21	22	23	24	25	26	27	28	29
Extremely unpleasant	11	12	13	14	15	16	17	18	19
	Extremely low energy				Extremely high energy				

Please put on your headphone, adjust the volume and watch the dog food advertisement carefully.

YouTube links of advertisements which participants are randomly assigned to:

- Knaz® dog food control condition  
[https://www.youtube.com/watch?v=VhlIuDHE8VQ&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=7](https://www.youtube.com/watch?v=VhlIuDHE8VQ&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=7)
- Knaz® dog food happy condition  
[https://www.youtube.com/watch?v=Ik9FdHeQHI8&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=9](https://www.youtube.com/watch?v=Ik9FdHeQHI8&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=9)
- Knaz® dog food sad condition  
[https://www.youtube.com/watch?v=PAmB4H9Daek&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=5](https://www.youtube.com/watch?v=PAmB4H9Daek&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=5)
  
- Pedigree® dog food control condition  
[https://www.youtube.com/watch?v=EULztb\\_8WEo&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=12](https://www.youtube.com/watch?v=EULztb_8WEo&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=12)
- Pedigree® dog food happy condition  
[https://www.youtube.com/watch?v=pOxYb4cT5Sg&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=10](https://www.youtube.com/watch?v=pOxYb4cT5Sg&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=10)
- Pedigree® dog food sad condition  
[https://www.youtube.com/watch?v=VEIQfEUsCPw&list=PLi6QDzOQv3lg1n16nhegl\\_8\\_6p4sEiQFD&index=11](https://www.youtube.com/watch?v=VEIQfEUsCPw&list=PLi6QDzOQv3lg1n16nhegl_8_6p4sEiQFD&index=11)

For each item below, please indicate your opinion of the advertisement you watched by clicking the bubble that corresponds to what you believe.

To me, the advertisement about Knaz®/ Pedigree® Dog Food is:

	1	2	3	4	5	6	7	8	9	10	11	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	
Dislike	)	)	)	)	)	)	)	)	)	)	)	Like
Negative	)	)	)	)	)	)	)	)	)	)	)	Positive
Bad	)	)	)	)	)	)	)	)	)	)	)	Good
Unfavorable	)	)	)	)	)	)	)	)	)	)	)	Favorable
Unpleasant	)	)	)	)	)	)	)	)	)	)	)	Pleasant

After viewing the ad, how do you feel?

In the box below, enter the number for the square from the above matrix that you think best captures your feelings:

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For each pair of words, click the bubble closest to the adjective which you believe best describes your feeling. The more appropriate that adjective seems, the closer the bubble to be clicked.

	Not at all (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	To a great extent (9)
Happy	)	)	)	)	)	)	)	)	)
Pleased	)	)	)	)	)	)	)	)	)
Sad	)	)	)	)	)	)	)	)	)
Sorrowful	)	)	)	)	)	)	)	)	)
Gloomy	)	)	)	)	)	)	)	)	)
Downcast	)	)	)	)	)	)	)	)	)
Aroused	)	)	)	)	)	)	)	)	)
Stimulated	)	)	)	)	)	)	)	)	)

In your opinion, what is the purpose of this study?

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VITA

Yingying Li

Candidate for the Degree of

Doctor of Philosophy

Dissertation: HOW EMOTIONS INFLUENCE ANTHROPOMORPHISM

Major Field: Business Administration

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Business Administration at Oklahoma State University, Stillwater, Oklahoma in July, 2021.

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Completed the requirements for the Bachelor of Science in Human Resource Management at South China University of Technology, Guangzhou, Guangdong, China in July, 2010.

Experience:

Graduate Research Assistant, Oklahoma State University, 2016-2021  
Research Assistant, South China University of Technology, 2020-2015

Professional Memberships:

American Marketing Association (AMA); Academy of Marketing Science (AMS); Association of Consumer Research (ACR).