CONSUMER LINGUISTICS: A MARKEDNESS APPROACH TO NUMERICAL PERCEPTIONS

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DISSERTATION ABSTRACT

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Marketing is about numbers but not necessarily just a number. From a *big* crowd to a *half empty* arena, adjectives carry numerical associations. The research within this dissertation builds on that idea while focusing on markedness, a linguistics theory, which has been called the evaluative superstructure of language. For example, asking "How tall is the person?" is not an indication that the person is tall but merely a neutral way to ask about a person's height. Tall, in this case, is considered an unmarked term given its neutral meaning. Asking "How short is the person?" however, implies the person is actually short in addition to asking for their height. Linguistics literature has touched on the power of language in numerical estimations but has not fully explored it, nor has linguistics literature transitioned to the marketing literature.

Study 1 begins to explore markedness in a consumer setting by using Google Trends to show that unmarked terms, such as *tall*, are searched more frequently than marked terms, such as *short*. Study 2 shows that using an *unmarked* term results in significantly higher estimates of crowd size than using a *marked* term but is not significantly different than using a neutral term. Study 3 incorporates numerical anchors, which reduce the markedness effects. Study 4 illustrates how an *unmarked* term results in a wider range of crowd size estimates than a *marked* term. Study 5 shows how markedness effects are largely eliminated based on the source of the message (team) and capacity constraint of the arena. Study 6 incorporates time to show that markedness effects are stronger in a judgment framed as per day than per year. Studies 7, 8 and 10 show how a *marked* term, such as *half empty*, results in significantly different numerical estimates over time. This effect is eliminated when reference to a point in time, such as “at halftime”, is removed (study 9). These findings highlight the role of markedness in consumer judgment and have important implications for a variety of marketing theories.

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CHAPTER I

INTRODUCTION

Marketing is about numbers but not necessarily *just a* number. It is a *big* crowd. A *short* cab ride. A *long* plane flight. An *old* car. A *cold* beer. A *half empty* stadium. Wherever consumers are in life, they are faced directly or indirectly with numbers. From a consumer behavior perspective, research often focuses on the numbers. Should the ticket price be $19.99 or $20.00? Should the package be 12 for $10 or 6 for $5? Although actual numbers are a very important part of consumer behavior, marketing research often overemphasizes the quantitative component of numbers and underestimates the qualitative cues that have numerical consequences.

Academic literature on numerical processing is beginning to emphasize qualitative components and conversational cues that extend beyond the simple numerical value presented in the frame. From exploring how people respond to using different units such as 1 year versus 365 days (Zhang and Schwarz 2012) or days versus weeks (Monga and Bagchi 2012), recent literature is emphasizing conversational cues and norms (Grice 1975) in addition to other qualitative aspects of the frame.

Numerical processing research (e. g., anchoring) has convincingly shown how low and high numbers presented in a variety of scenarios affect perceptions. Linguistics literature has touched on the power of language in numerical estimations but has not fully explored it, nor has it transitioned to the marketing literature. The goal of this research is to examine the qualitative cues that may affect numerical perceptions, propose a more systematic approach based on linguistics, and empirically test these linguistic subtleties.

Research Opportunity

Understanding numerical perceptions is critical to consumer behavior research given the prevalence of numbers in a variety of marketing contexts. From anchoring (Jacowitz and Kahneman 1995), to left digit effects (Thomas and Morwitz 2005; Manning and Sprott 2009) to right digit effects (Bizer and Schindler, 2005; Coulter and Coulter, 2007; Naipaul and Parsa, 2001; Schindler, 2006), research on actual numbers is extensive. Recent research, however, has called for a broader understanding of quantitative judgment, which includes qualitative cues. Zhang and Schwarz (2012, p. 258) state:

> *In short, there is more to quantitative judgment than numbers or units alone, and future research may fruitfully explore the interplay of numerical and conversational processes in context.*

Similarly, Epley and Gilovich (2010, p. 21) provided three ways in which anchoring, a primary theory within current numerical processing research, may be expanded moving forward:

(1) by analyzing more systematically the different types of anchors that occur in everyday life

(2) by identifying important contextual moderators of anchoring effects, especially social moderators

(3) by considering a wider variety of consequences of anchoring beyond an immediate influence on the extremity of a given judgment

Both Zhang and Schwartz (2012) and Epley and Gilovich (2010) emphasize further research into contextual and conversational factors of numerical judgment (e. g., linguistics, units, directional cues, magnitude). For example, asking how *big* a crowd is versus how *small* a crowd address is addresses Epley and Gilovich (2010) by exploring the different types of anchors in everyday life. Similarly, referring to an arena as *half full* versus *half empty* contributes to the Zhang and Schwartz (2012) call for research by addressing the interplay between numerical and conversational cues. A broadening of the traditional sense of quantitative judgments to include linguistics may be the foundation for a new approach to numerical perceptions. As such, the primary research question of this dissertation is:

"How do linguistics cues, specifically markedness, effect quantitative judgments?"

Contributions

This dissertation contributes to the existing marketing literature in a number of ways. First, this research brings the theory of markedness into mainstream marketing research. Markedness is a linguistics-based theory that has strong implications for marketing, given its emphasis on communication and how words are interpreted in a variety of settings.

Second, this research builds on markedness, referred to as the superstructure of language (Battistella 1996), by showing its effect on numerical perceptions in a variety of settings. The literature provides a strong overview of the breadth of numbers-based theories and the importance of linguistics, and specifically markedness, in judgment and decision-making. From estimating crowds at football games, to estimating time spent watching television, to exploring rates of attendance growth and decline over time, this research illustrates the effect of markedness in business scenarios. Furthermore, this research goes beyond numerical estimation to show how markedness plays out in real world contexts (such as search trends on Google), and inferences people draw from a slight deviation in a numerically equivalent frame such as something being *half empty* versus *half full*.

Finally, this research presents a road map to further explore the critically important role of linguistic cues in research on judgment and decision-making. Similar to the merging of psychology and marketing, this dissertation argues for a similar bond between linguistics and marketing with the goal of better understanding consumer behavior from a linguistics-based approach.

Document Framework

The document is broken into four primary chapters. Chapter I, the Introduction, includes a brief overview, research opportunity, contributions and document framework.

Chapter II, titled Literature Review and Theory Development, explores existing literature as it pertains to quantitative judgments. The chapter focuses on theories of quantitative perceptions of numbers, theories on qualitative perceptions of numbers, and contextual factors (speed, distance, etc.) in which quantitative and qualitative cues may both play a role. Various theories are discussed to highlight the importance of numerical judgment, while laying the groundwork for an expanded use of markedness theory in consumer judgment.

Chapter III, titled Experimental Studies, represents the experimental portion of the dissertation. Ten studies are conducted to test and expand on existing theories on numerical perceptions. More specifically, studies are conducted to explore the role of markedness on numerical perceptions. The results suggest that marked and unmarked adjectives play a significant, and sometimes surprising, role in how we perceive and estimate numbers. In addition, markedness plays a role in perceptions beyond numerical judgments, including scarcity and competiveness. The findings imply that marketers and consumers need to understand and appreciate better the role of subtle linguistic cues in marketing communications.

Chapter IV, the Discussion, discusses theoretical and managerial implications of the findings from Chapter III. A theory is proposed that incorporates markedness to explain how particular language cues influence numerical perceptions. In addition, Chapter IV discusses managerial implications and directions for future research.

CHAPTER II

LITERATURE REVIEW AND THEORY DEVELOPMENT

Theories on the Quantitative Perceptions of Numbers

Framing occurs when "equivalent descriptions of a decision problem lead to systematically different decisions" (Sher and McKenzie, 2006, p. 468). Interestingly, anchoring, which is generally considered a form of priming, offers a very similar definition. Tversky and Kahneman (1974, p. 1128) claim anchoring occurs when "different starting points yield different estimates, which are biased toward the initial values." Although anchoring is considered priming, the definitions suggest that the primary difference between anchoring and framing comes down to the starting point and to whether different versus equivalent information is presented. Similarly, priming is defined as an "initial exposure to a concept [that] subconsciously affects people's subsequent judgments and choices" (Miron-Shatz, Stone, and Kahneman, 2009, p. 888). New research is beginning to show, however, that the differences between framing, priming and anchoring (a specific form of priming) may not be as clear, thanks to conversational cues that have historically been overlooked in the marketing literature.

Sher and McKenzie (2006) show that equivalent frames are not as equivalent as past literature has suggested. The authors coin the term *information leakage* to suggest that a listener (or consumer) gains information from the speaker's choice of frame, and thus the information in the frames is not equivalent. The listener (or consumer) draws normative information from a (marketer's) choice of frame, although the two frames may appear logically equivalent. Given recent developments suggesting qualitative effects on numerical perceptions, a deeper exploration of conversational cues may yield patterns or results that effect existing research on numbers-based theories like anchoring.

Anchoring

The accolades for numerical anchoring are impressive. Furnham and Boo (2011) call it "one of the most robust cognitive heuristics." Wegener, Petty, Blankenship, and Detweiler-Bedell (2010) say "anchors influence just about any type of judgment." Kahneman (2003) says anchoring and adjustment effects are "among the most robust phenomena of judgment." The majority of these studies, and commentary on the robustness of anchoring, emphasize numerical anchors but largely ignore other linguistics cues within the judgment scenario.

As mentioned, anchoring occurs when "different starting points yield different estimates, which are biased toward the initial values" (Tversky and Kahneman, 1974, p. 1128). Interestingly, the Tversky and Kahneman (1974) quote does not specifically mention a numerical starting point, although the majority of initial studies following Tversky and Kahneman's (1974) groundbreaking article focused on numerical anchors. Although a discussion of anchoring could arguably lend itself to a discussion of variations of the numerical anchors themselves, such as left-digit effects (e. g., Manning and Sprott, 2009; Thomas and Morwitz, 2005) or right-digit effects (e. g., Coulter and Coulter, 2007; Schindler and Kirby, 1997), the present discussion primarily emphasizes linguistics additions to numerical anchoring, framing and priming.

Anchoring and adjustment is the original approach to this topic, in which people adjust, albeit insufficiently, from a provided anchor value (Tversky and Kahneman, 1974). A simple, yet powerful, exploration of this effect was conducted by Jacowitz and Kahneman (1995). Respondents were asked to estimate a variety of quantities from the amount of meat eaten per year by the average American to the height of the tallest redwood tree to the number of bars in Berkeley, California. A pre-test helped generate anchors based on responses in the 15th and 85th percentile. The 15th (low anchor) and 85th (high anchor) percentiles in the calibration group were used as anchors for a follow up study in which estimates were routinely biased in the direction of the high or low anchor. For example:

(A). Is the height of the tallest redwood more or less than 550 feet?

(B). Is the height of the tallest redwood more or less than 65 feet?

When respondents were asked whether the height of the tallest redwood tree was 550 feet (A), the median estimate was 400 feet. When respondents were asked whether the height of the tallest redwood tree was more or less than 65 feet (B), the mean estimate was 100 feet. Adjustment from an anchor occurs when an anchor is self-generated (i.e., not provided by the experimenter), but a different process of adjustment is utilized by a person when the anchor is provided by the experimenter (Epley and Gilovich 2001, 2005).

The traditional anchoring and adjustment paradigm has partially given way to other explanations of anchoring such as *selective accessibility* (Strack and Mussweiler

1997; Mussweiler and Strack 2001) or *confirmatory hypothesis testing* (Chapman and Johnson 1994). Both theories suggest that the anchoring effect is not solely based on the actual anchor (number) but on other accessible information. Chapman and Johnson (1994) showed that an extremely high anchor results in diminishing returns of the estimate, which suggests that the respondent is considering other available information that is cued by the anchor. Strack and Mussweiler (1997) showed an anchoring effect occurred if the anchor and target estimate were both in height or width but did not occur if one was height (width) and the other was width (height). In other words, being primed that the Brandenburg Gate was 150 meters tall had no effect on perceptions of the width of the gate. This study is particularly important for the purposes of this dissertation as it confirms that anchors do not simply work because of the actual number but are dependent on consistencies in other information such as dimension.

Given the shift to an accessible knowledge approach to anchoring, additional studies have looked at anchoring from an attitude and persuasion perspective (Wegener et al. 2001, 2010a, 2010b; Blankenship et al. 2008). When motivation and ability are high, people use accessible information that is relevant to the task at hand (Blankenship et al. 2008), which is similar to a selective accessibility approach. When cognitive load is increased, however, people are more susceptible to the numeric prime (Blankenship et al. 2008).

Simonson and Drolet, (2004) showed that the mechanisms of numerical arbitrary anchors work the same in buying (Willingness To Pay) and selling (Willingness To Accept) situations. Respondents were placed in a willingness to pay condition (“What is the highest price you would be willing to pay for this [toaster]?”) or willingness to accept

("What is the lowest price you would be willing to accept for this [toaster]?") and an anchor was present in the scenario. The authors primarily use arbitrary anchors such as social security numbers, as do others such as Ariely, Loewenstein, and Prelec (2003), and do not discuss the linguistics cues that are present in the various conditions. The transition to a knowledge, attitude, and accessibility-based approach, as opposed to one strictly emphasizing the specific numerical prime, suggests that the qualitative context of the anchor is important, which conceptually supports the emphasis of this research.

Chapman and Johnson (1999) describe anchoring as "a pervasive judgment bias in which decision makers are systematically influenced by random and uninformative starting points." Although it is easy to agree that it is a pervasive judgment bias based on years of literature, describing the starting points as random and uninformative seems inaccurate, particularly in a marketing setting. Are the purchase quantity limits in a grocery store (e. g., Wansink et al., 1998) random and uninformative, or perhaps, even more importantly, are there situations where marketers could provide starting points that are not random and/or uninformative? Surely, with today's technology, marketers could utilize sales data on the fly to adjust purchase quantity limits, in an ethical manner, based on the mean or median volume of purchases.

In a more real world scenario, Northcraft and Neale (1987) showed that a listing price anchor not only effected undergraduate students but also expert real estate agents. In their study, real estate agents were shown a list price of $65,900 (low anchor) or $83,900 (high anchor) and subsequently asked to provide their appraisal value, selling price, purchase price, and lowest acceptable offer. The anchor significantly influenced all estimates even though a real estate agent's evaluation of a property should be independent, as they argued themselves, of a list price. This study highlights the power of anchoring even in high-risk judgments such as real estate. Further studies of real world transactions have confirmed the anchoring effect in real estate (Genesove and Mayer 2001; Bokhari and Geltner 2011). In a study measuring actual consumer purchase decisions, Wansink, Kent, and Hoch, (1998) showed that purchase quantity limits (e.g., limit of 4 cans vs. limit of 12 cans) significantly influence the amount of soup cans consumers purchase. Customers who saw a limit of 12 purchased, on average, 7 cans of soup while customers who saw a limit of 4 purchased 3.5 cans. Although a high anchor reduced purchase incidence, the overall purchase quantity was still greatest with the highest quantity limit anchor (12 cans). Anchoring is a prominent numerical judgment theory but, as discussed, continues to incorporate more linguistic based cues and frames.

Framing

As mentioned, framing occurs when "equivalent descriptions of a decision problem lead to systematically different decisions" (Sher and McKenzie, 2006, p. 468). Framing research is often based on prospect theory (Kahneman and Tversky 1979; Tversky and Kahneman 1981), which suggests variations in loss and gain frames. For example, consider the following example based on Kahneman and Tversky (1979):

(A). 50% chance to win $1,000, 50% chance to win nothing

(B). $500 for sure

In the above scenario, respondents prefer the guaranteed gain (B). Next, consider a similar scenario framed as a loss:

(C). 50% chance to lose $1,000, 50% chance to lose nothing

(D). Lose $500 for sure

In this loss scenario, respondents typically favor the gamble (C). This change in preference based on loss or gain highlights prospect theory and many theoretical arguments behind framing. In a marketing or product context, framing is described as occurring when consumers' “product judgments vary as a function of the verbal labels used to define specific product attribute” (Levin and Gaeth, 1988). Marketing literature on framing with numbers has covered a range of applications from percentage-based discount frames (Heath, Chatterjee, and France 1995) to product attribute information, such as meat being 75% lean versus 25% fat (Levin and Gaeth, 1988). While discussed in more detail below, recent research suggests that frames may be logically equivalent but not informationally equivalent (Sher and McKenzie 2006) due to linguistic cues, conversational norms and assumptions about the speaker.

Numerosity

Numerosity is a “judgmental strategy in which people disproportionally base their judgments of area, quantity or probability on the number of units into which a stimulus is divided” (Pelham, Sumarta, and Myaskovsky, 1994, p. 125). Although numerosity does not necessarily change quantity (i.e., cutting 1 pizza into 8 slices instead of 6), it often has significant effects on perception of quantity. For example, Pelham and colleagues (1994) showed that people perceived a higher monetary value of coins when there were more total coins (e.g., nickels instead of quarters) displayed in spite of both conditions having the same monetary value. The numerosity effect, however, is primarily effective when people are under heavy cognitive load. Still, in the context of numerical perceptions, this effect may suggest that distances expressed in feet (e.g., 5,280 feet) may be perceived as longer than when it is expressed in miles (e.g., 1 mile) because the same distance is divided into more parts in the feet condition than in the miles condition.

Yamagishi (1997) showed that participants rated cancer as riskier when it was framed as “kills 1,286 people out of 10,000 people” as opposed to “kills 24.14 out of 100 people”. While Yamagishi (1997) argues it is difficult to use the numerosity heuristic as an alternative explanation due to differences in cognitive load from Pelham and colleagues' (1994) study, similarities can be drawn between the two studies. Pandelaere, Briers, and Lembregts (2011) suggest this type of effect occurs when people focus on the number of units and not the type of units. They argue that the unit effect is a basic form of the numerosity effect, which leads us to a further discussion of qualitative theories pertaining to numerical perceptions.

Theories on Qualitative Perceptions of Numbers

Linguistics is the scientific study of human natural language (Akmajian et al. 1995) or, as defined in the marketing literature, a “comparative study of the structure, interrelationships, and development of languages" (Winick, 1961, p. 54). Although linguistics is composed of a variety of subtopics from morphology to phonology to tropes (see Moltmann, 2009), semantics and pragmatics are arguably the most important from a marketing perspective. Marketing studies incorporating linguistics typically focus on framing of offers. Low consistency cues (e.g., "regularly price at") and high-distinctiveness cues (e.g., "compare at") have been shown to be quite robust in marketing (Grewal, Marmorstein, and Sharma 1996). Although linguistics has a wide range of sub-theories, a few key linguistic-based theories are discussed below, given their potential application to numerical perceptions.

Markedness

The theory of markedness goes back as far as the 1920's (Battistella 1996) but gained traction in the 1960's and 1970's with articles discussing the concept of marked and unmarked adjectives (Bierwisch, 1967). In a declaration of the importance of markedness, it has been billed as the evaluative superstructure of language (Battistella 1996). More recently, the notion of markedness has been called "as central to grammar as energy is to physics" (Smolensky 2006, p. 781). Huttenlocher, Higgins, and Clark (1971, p. 488) suggest an *unmarked* adjective "indicates the presence of a property which can extend indefinitely in an upward direction" while a *marked* adjective "indicates the absence of that property, the extreme lower bound being zero." While markedness includes a wide variety of parts of language (c.f., Battistella, 1996; De Lacy, 2006; Moravcsik and Wirth, 1986 for a broad view of *markedness*), this research emphasizes aspects of markedness with potential numerical interpretation. Consider these three questions:

(A) How tall is the man?

(B) How short is the man?

(C) What is the height of the man?

Clark and Card (1969) suggest there are two primary distinctions between unmarked (A) and marked (B) terms. First, unmarked adjectives can be used in a neutral sense. Asking, “How tall is the man?” (A) is not an indication of his height but merely a neutral way to ask the height of the man (C). Second, unmarked adjectives refer to both an area on a scale and the scale itself. For example, a scale from bad-good is a goodness scale and not a badness scale (Clark and Card 1969). As shown above, the unmarked term (A) seems equivalent to simply asking a man’s height (C). The marked term (B), however, seems to suggest the man is actually short. In another practical example, when stating “The board is six feet long”, *long* references a dimension of measurement but does not suggest that the board is actually long in length (Clark, 1969). Conversely, “The board is six feet short,” sounds conversationally awkward to the average person in spite of the use of *short*, suggesting that the board is actually short in length. According to Clark (1969), unmarked adjectives such as *long* have two senses (i.e., magnitude of the dimension and dimension of measurement), but marked adjectives such as *short* have only one (e. g., magnitude of the dimension). Simply stated, the *unmarked* word “is typically the usual, the normal, the positive, the common, and the neutral or less specific, compared to the marked member" (Fraenkel and Schul, 2008a, p. 520).

Building on previous work (Clark and Card, 1969; Clark, 1969), Lehrer (1985) suggests several criteria for markedness, particularly as it applies to antonyms, with several similarities to Clark and Card (1969). Frequency and context are two important criteria as they suggest unmarked words appear in more contexts and thus are more frequent. Any adjective (or antonym pair) that adds to the original word becomes a marked work. For example, *happy* is an unmarked term, but *unhappy*, by nature of the *un,* becomes a marked term. This phenomenon has particular implications for antonyms as the unmarked term, such as *friendly*, will be the positive term and the marked term, *unfriendly*, becomes a negative term.

One interesting criterion involves measurement and numbers, which deserves particular attention given its potential application to this research. Lehrer (1985) argues that, in conversationally appropriate dialogue, only *unmarked* terms can appear in measured phrases. For example, *7 feet tall* and *6 feet wide* are conversationally normal, but *7 feet short* and *6 feet narrow* are not. Lehrer (1985) states that only *unmarked* adjectives *can* appear in measured phrases, but from a marketing perspective the questions becomes, "Should this rule be followed?" Perhaps a *marked* term, or member as referenced by Lehrer (1985), such as a *6* feet *short* table, makes a particular attribute stand out to the consumer and thus has implications for the overall persuasiveness of the marketing message. See table 1 for additional properties of markedness.

Table 1. Properties of Markedness (reproduced from Lehrer, 1985)

1. Neutralization of an opposition in questions by *unmarked* member.
2. Neutralization of an opposition in nominalizations by *unmarked* member.
3. Only the *unmarked* member appears in measure phrases of the form Amount Measure Adjective (e.g., three feet tall).
4. If one member of the pair consists of an affix added to the antonym, the affix form is *marked*.
5. Ratios can be used only with the *unmarked* member (e.g., twice as old).
6. The *unmarked* member is evaluatively positive; the *marked* is negative.
7. The *unmarked* member denotes more of a quality; the *marked* denotes less.
8. If there are asymmetrical entailments, the *unmarked* member is less likely to be 'biased' or 'committed'. Cf.
    a. A is better than B. A and B could be bad.
    b. B is worse than A. B must be bad, and A may be as well.

As shown in the list above, markedness offers a theory to arrange words systematically into categories and to study how they are perceived in a variety of marketing contexts. Although existing consumer literature has looked generally at implications of various framing and word choices, this research emphasizes a linguistic approach based on the theory of markedness.

Similar Concepts to Markedness

Although markedness has similarities with other theories such as perceptual salience and code switching, it does not appear to have been used in a systematic way to study consumer response to numerical information. Perceptual salience has been proposed in some parts of literature as being analogous to markedness (Luna and Peracchio 2005). Other literature, however, has suggested that given an unmarked element could be high salience or low salience, there is not a strong relationship between markedness and perceptual salience (Hume 2008). Thus, there is not a direct relation between marked and perceptual salience, which is more commonly found in the marketing literature.

Code switching is another term that is used in conjunction with markedness, but it focuses on bi-lingual exchanges in which a person chooses to converse in a different language depending on the situation (Myers-Scotton 1995, 2000). In other words, code switching involves the decision by a bilingual individual to literally switch to a different language (*marked*) as part of a conversation (Luna and Peracchio 2005). As such, the newly adopted language or word becomes *marked* as it stands out from the rest of the language of the conversation. Although code-switching is one of the few markedness approaches found in a marketing context (Luna and Peracchio 2005; Luna, Lerman, and Peracchio 2005), it emphasizes actual language preferences (e. g., Spanish or English) and does not emphasize numerical cues or estimates.

Argumentative Orientation

Argumentative orientation, largely credited to Ducrot (1980), "relates the value for the adjectival variable to a conclusion that the speaker wishes to support by uttering the sentence containing the gradable adjective" (Maat 2006, p. 30). Similarly, it is defined as the "tendency for speakers to choose the profile in line with the conclusion one wants to draw and for hearers to interpret the profile accordingly" (Holleman and Pander Maat 2009, p. 2204). In other words, speakers (or marketers) choose a particular frame with the goal of having the respondent (or consumer) respond in a particular way. From a markedness perspective, Holleman and Pander Maat (2009) argue that an unmarked word corresponds to the goal and thus choosing one frame over another guides the respondent to a particular conclusion. For example, in one of their studies they used the following prompt:

> *For tennis pro Melle van Gemerden, 2005 was a good/bad year. He (A) won 2 (B) lost 5 out of his 7 international tournament matches.*

When respondents saw "good year," they indicated (A) "won 2" was an appropriate response but when they saw "bad year" they indicated (B) "lost 5 out of his 7 international matches" was a better response. In other words, the frame the speaker uses argues on behalf of a particular response. As such, the authors refer to framing effects as profiling effects as they paint a semantic picture. Furthermore, the authors propose a heuristic to handle argumentative orientation (reproduced from Holleman and Pander Maat, 2009):

> *Speaker's maxim: when a situation lends itself to description in terms of a two-valued variable, profile the component carrying the value that best fits the direction of the conclusions one would prefer to be drawn from the utterance.*

> *Recipient's corollary: when a situation lends itself to description in terms of a two-valued variable, the component that is profiled indicates the direction of the conclusions the speaker would prefer to be drawn from the utterance*

As such, a marketer choosing the word *many* results in the consumer interpreting the information in a similar vein. Conversely, the use of *few* guides the consumer to draw a conclusion in line with that profile. Consider another sports example:

(A) The team is 10-2. How [many/few] fans do you expect to attend each of the final four games of the season?

(B) The team is 2-10. How [many/few] fans do you expect to attend each of the final four games of the season?

Although the speaker's maxim suggests a two-valued variable, it is possible that based on fuzzy trace theory (Reyna and Brainerd, 1991; Reyna and Brainerd, 2011) the record of the team is quickly stored as *good* or *bad*. When a 2-10, or *bad*, record (A) is discussed followed by a question on attendance, the speaker frame may be suggesting, or arguing, on behalf of lower attendance. Similarly, *few* fans, a marked term, may argue on behalf of lower attendance as well. Argumentative orientation theory is an important component of this dissertation as it falls in line with information leakage, in suggesting a frame not only leaks information, but it also provides a direction in which the speaker, or marketer, wants the consumer to respond.

Fuzzy-Trace Theory

Fuzzy-Trace theory is a dual-processing theory that argues people store both verbatim (i.e., quantitative) and gist (i.e., qualitative) information in parallel (Reyna and

Brainerd 1995, 2008; LaTour, LaTour, and Brainerd 2014). Based in psycholinguistics, the theory distinguishes between verbatim, exact wording, and gist, essential meaning, forms of information (Reyna 2012b). The theory states that encoding and storage of verbatim or gist representation is based on the task (Reyna 2012a).

Fuzzy-trace theory argues that understanding the gist of the information is more important than understanding the information verbatim (Reyna and Brainerd, 1991). A verbatim view is seen as precise and quantitative while a gist view is seen as vague and qualitative (Reyna 2008). Gist to verbatim processing is a continuum but preference, when possible in the decision making task, is given to gist representations. For example, consider the classic Asian disease problem (Tversky and Kahneman, 1981):

(1A) If Program A is adopted, 200 people will be saved.

(1B) If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.

(1C) Program C: If Program C is adopted, 400 people will die.

(1D) Program D: If Program D is adopted, there is a 1/3 probability that nobody will die, and 2/3 probability that 600 people will die.

In the above example, the guarantee is preferred in the positive frame (1A), but the risk is preferred in the negative frame (1D). Now, consider the problem again, but from a fuzzy-trace perspective:

(2A) If Program A is adopted, some people will be saved.

(2B) If Program B is adopted, some people will be saved or no one will be saved

(2C) If Program C is adopted, some people will die.

(2D) If Program D is adopted, nobody will die or some people will die.

As Reyna and Brainerd (1991) showed, in the above example, the guaranteed option in the positive frame (2A) and the risky option in the negative frame (2D) are still preferred but the preference and effect is even stronger. In other words, a greater percentage of the people preferred Program A and Program D in the gist representation than in the verbatim representation. While the above example was a choice task, the fuzzy-trace theory potentially has implications for other numerical processes in terms of how words and numbers are interpreted and retrieved by consumers. Consider the following sports-related example:

(A) The basketball team is expecting a crowd of 12,000 people.

Potentially the verbatim information (12,000) in the above example is more important in a judgment task such as “How many people do you expect to attend the event?” because the answer involves a number but less important in a decision task such as “Would you attend the event?” Fuzzy-trace theory explores how people process numerical information in gist or verbatim and thus has implications for the research conducted in this dissertation.

Qualitative Applications of Numerical Framing

Literature emphasizing numbers, particularly anchoring, focuses on the effect of actual numerical digits but often ignores a qualitative context such as markedness (e.g. tall vs. short) or other linguistics cues such as conversational norms (Grice 1975). Asking whether a building is old or new, or whether a crowd is big or small, has been shown to result in different answers (Harris 1973), which highlights the power of qualitative adjectives and adverbs. This phenomena was further emphasized by Bass, Cascio, and O'Connor (1974), who showed that varying qualitative expressions of frequency and amount result in different numerical estimations. For example, in the Bass, Cascio, and O'Connor (1974) study, an expression such as "an exhaustive amount of" results in a quantitative value of 59.27 units, but an expression such as "hardly any" results in a value of 2.28. Although not in a marketing or real world scenario, these studies open the door for a systematic and broad theory of qualitative and quantitative based numerical processing.

Speed and Strength

In a very popular psychology experiment on language and memory, Loftus and Palmer (1974) showed that words such as "smashed" (40.5 miles per hour) resulted in different mean speed estimates than words like "contacted" (31.8 miles per hour). Although the article is titled "Reconstruction of automobile destruction: An example of the interaction between language and memory," it also emphasizes a language effect on quantitative responses. In other words, language has numerical cues that effect judgment and decision-making. The majority of articles building on Loftus and Palmer (1974) emphasize memory as opposed to the potential for language to play a major role in real-time, marketing-based, numerical judgments.

The Loftus and Palmer (1974) study highlights the power of words but did not utilize a markedness approach in determining what verbs to utilize to indicate speed. A markedness approach, using opposing adjectives, could involve questions such as “How fast were the cars going?” versus “How slow were the cars going?” Other studies have since taken a markedness approach (Kallio and Cutler 1987) but emphasize memory tasks, do not incorporate anchoring, and are not in a marketing context. Building on Loftus and Palmer (1974), markedness has been shown to effect the accuracy of response to questions about a crime (Hovancik 1984). Respondents who were asked questions with unmarked adjectives, such as “How tall was the man?” responded with more accurate answers than those respondents who were asked questions with marked adjectives, such as “How short was the man?” The verbal cues of speed could have marketing implications for plenty of industries, including insurance, which could encourage higher adoption by framing accidents in different manners. Or the effect could also influence a car sales context with a similar framing, in which both the verbal and numerical cues are utilized to elicit different responses pertaining to the safety of a new vehicle.

Directional Cues

The majority of research on anchoring utilizes examples with a *neutral* qualitative form of measurement such as asking the *length* of something rather than how *long* or *short* which has markedness implications. For example, in the classic Jacowitz and Kahneman (1995) study, respondents were asked for estimates on the *length* of the Mississippi River, *distance* from San Francisco to New York, *number* of United Nations members, and other generally neutral forms of measurement. The qualitative effect on anchoring in these tasks is largely ignored in the literature. In the Mississippi River example (Jacowitz and Kahneman, 1995), the respondent was asked, "Is the length of the Mississippi River more or less than [2,000/70] (in miles)"? The same question could be framed utilizing *unmarked* and *marked* terms such as *long* and *short*.

(A) Is the Mississippi River *longer* than *2,000* miles?

(B) Is the Mississippi River *shorter* than *2,000* miles?

(C) Is the Mississippi River *longer* than *70* miles?

(D) Is the Mississippi River *shorter* than *70* miles?

Conceptually, the four different expressions seem to generate a different sense of the *length* of the Mississippi River while framing the question using unmarked and marked terms. Pairing an unmarked term with a high (A) or low (C) numerical anchor may result in significantly different estimates than combining a marked term with a high (B) or low (C) numerical anchor. Combining the power of numerical anchoring (e.g., Jacowitz and Kahneman, 1995) with markedness cues (Lehrer 1985; Battistella 1996) could enhance existing anchoring effects if the qualitative term (e.g., long) and numerical anchor (e.g., 2,000 miles) are in agreement and reduce effects if they are not.

Magnitude

A fairly new and understudied area of anchoring is that of magnitude priming. Conventional research suggests a numerical anchor results in a numerical response biased by the initial anchor. Recently, Oppenheimer and colleagues (2008) showed that anchoring is not just a numerical phenomena but a magnitude prime that crosses modalities. In their study, they illustrated how drawing a short (long) line resulted in short (long) estimates of the Mississippi River. In addition, the authors showed that physical anchors activated "mental representations of magnitude that are independent of target or rating scale" (p. 22). In other words, anchoring is more than a numerical starting point that biases a numerical estimate, but a magnitude prime that could bias a host of judgments and decisions in both the mental and physical world. The authors brainstorm future studies and applications like the size of pencil effecting student evaluations or the length of a line's effect on perception of price at a movie theater.

In another example of anchoring as a magnitude prime, Wong and Kwong (2000) showed that the anchor serves as a relative-size prime but not as an absolute-numerical anchor. The authors showed the absolute value of the anchor is more important. In addition, the authors show that the same numerical anchor could be used as the high or low anchor based on the absolute value of the number. Although more studies are needed to better understand anchoring as a magnitude prime, it represents a very promising direction while also highlighting the power of anchoring beyond the conventional paradigm.

Recent literature (Wong and Kwong 2000; Oppenheimer et al. 2008) suggest magnitude priming is an interesting future direction for numerical judgment research. A markedness approach may provide a structure to magnitude priming and build off studies like Wong and Kwong (2000), which evaluated anchoring effects when the person saw 7.3 kilometers versus 7,300 meters. Numbers can cue magnitude and, as previously discussed, words can as well. Does the combination of a high number and large qualitative cue result in a bigger magnitude prime? This research begins to address this question by systematically pairing qualitative cues with numbers.

Unit Framing

The formal concept of *unitosity* is relatively new to marketing literature and refers to a "reliance on units as cues for making judgments" (Monga and Bagchi 2012). For example, 5 feet and 60 inches are mathematically equivalent, but consumers may rely on the units (feet vs. inches) in some situations and numbers (5 vs. 60) in others. The preference for units or numbers can be cued based on perceptual salience (e.g., charts showing units or numbers) or cognitive salience (e.g., concrete vs. abstract mindset). The unit effect can be eliminated by reminding consumers that information can be presented in multiples such as 1 year equals 365 days (Pandelaere et al. 2011). The authors used comparisons where the units were the same in the comparison, and no mathematical calculation was necessary in order to make a decision. More advanced decisions such as making a food choice may bring in multiple units (calories per serving, servings per container), which could complicate the unit and number effects.

While arguably a magnitude prime as well, Zhang and Schwarz (2012) illustrate the difference between 1 year, 12 months, and 365 days in terms of granularity. As an example, they suggest a conversation over a jail term in which one person says the sentence was “1 year,” but another says “366 days.” The question they answer is, “Who seems more knowledgeable?” Finer-grained estimates are typically viewed as more precise and accurate, although the effect can be eliminated if the entity communicating the information does not follow conversational norms established by Grice (1975). For example, when the speaker’s knowledge was assumed to be low, the unitosity effect goes away as the level of granularity (e. g., smaller units) exceeds the perceived knowledge of the speaker (Zhang and Schwarz 2012). The reliance on units in certain situations has implications for a host of marketing initiatives such as construction projects, timelines and even package pricing (e.g., multi-price strategies). Bagchi and Davis (2012) looked at order effects of $29 for 70 items versus 70 items for $29 and found that the first piece of information is salient if packages are large and price calculations (e.g.. 70/$29) are difficult. Future work can look at unit effects on perceptions of package (multi-price) pricing and when the number versus the units becomes salient.

Units are interesting as well because they can convey math equivalence (e.g., days per year) or lack of math equivalence (e.g., feet per floor). Burson, Larrick, and Lynch (2009) showed that increasingly the size of the scale or units (e.g., per week to per year) effects preferences and valuations. In a concept they call discriminability, the authors propose that expanded scales help people tell the difference between choices more than smaller scales. For example, making a choice between products that are $8 per month ($96 per year) versus $10 per month ($120 per year) might be easier in the per year framing. While the authors suggest scales can be multiplied by arbitrary numbers and maintain the same ratios, the studies experimentally looked at dropped calls and movies per week. There is additional opportunity to look at the interaction of mathematically equivalent units (e. g., hours per day) or units that combine expanded and contracted scales (e.g., days per year).

Monga and Bagchi (2012) look at comparisons between information with different units (e.g., 42 inch table vs. 5 foot table). Respondents were exposed to both units in dollars (price of the table) and units in length (either inches or feet but not both). In a comparison setting, however, it is not unreasonable for consumers to make decisions between items with different units. Thus, the study could be expanded to decision tasks that involve comparisons between products with different units. As previously mentioned, there is also an opportunity to further explore ratio units that are mathematically equivalent or constricted (e.g., hours per day) versus those units that are not (e.g., miles per day).

Further expanding on Grice's (1975) conversational norms, Monga and Bagchi (2012, p. 187) suggest that “People usually communicate small changes via small units and large changes via large units.” Days, rather than weeks, would customarily be used to indicate a change of less than 7 days. In other words, 3/7 or 4/7 of a week is not used in general conversation or marketing campaigns. Thus, units can help signal the size of a change in addition to, or possibly in contrast to, strictly numerical information. While emphasizing numerical precision and signaling of advertiser competence, Xie and Kronrod (2012) also call for more research examining familiarity with various units. One question that arises is at what point do consumers switch units? For example, it might be odd to say something is 60 inches away, but using 60 inches in reference to the size of a television screen is perfectly normal.

Monga and Bagchi (2012) suggest future research could look at classes of units or quantities that elicit unitosity. For example, Chandran and Menon's (2004) work could lead to classification of temporal units. As the authors discuss, what constitutes near future? Where do minutes, hours, days, weeks, months or years fall into temporal categories in terms of the anchoring/magnitude effects or their importance in decision making (unitosity)? Such an investigation could lead to significant developments in studies on temporal construal (Liberation and Trope 1998; Trope and Liberman 2003). A theoretical approach from linguistics and markedness may help develop a better understanding of how consumers use information beyond simple numerical cues to make judgments and decisions. If taking a broad approach to markedness, in which the *unmarked* term is conversationally normal (Fraenkel and Schul, 2008a), future studies could determine the appropriateness of particular units and how it effects consumer perceptions. For example, *inches* or *feet* are arguably *unmarked* terms when evaluating table length, but *yards* is arguably a *marked* term. Utilizing markedness theory may help address many of the questions that have been raised from recent research into units and numerical framing.

Temporal Framing

Chandran and Menon (2004) show that framing a health issue as per day (compared to per year) makes the risk appear more concrete. Per day messaging increases self-risk perceptions, intentions to exercise cautionary behavior, and the effectiveness of risk communication. Conversely, Bonner and Newell (2008) showed that the per year format resulted in higher perceptions of the risk of cancer. Gourville (1998) showed that pennies-a-day framing reduced the magnitude of the financial commitment relative to a per year framing. Although the study also explored monthly frames, the authors acknowledged additional research was necessary to determine when particular frames are more effective based on consumers' familiarity of the frame (e.g., rent per month). Ülkümen, Thomas, and Morwitz (2008) found temporal effects with budgeting as consumers' budgets were lower than expenses when framed in terms of the next month but much closer to expenses when framed in terms of the next year. There is additional opportunity to study temporal units to determine the point at which processing switches from low level construal or concrete to high level construal or abstract (Trope and Liberman 2003).

The previously mentioned studies focus on individual unit framing such as "per day" or "per year," but what about framing that not only involves multiple temporal units but also incorporates numbers? For example, "hours per day" incorporate two different temporal units and also provides a mathematical limit of 24 hours in a day for an individual. In a sustainability example, energy usage (or savings) could be framed as hours per day, hours per week, hours per year, or days per year. "The LED bulb saves 1 hour worth of energy per day." versus "The LED bulb saves 365 hours of energy per year." Combining multiple temporal units puts mathematical constraints on what the consumer is able to perceive (e.g., maximum of 24 hours in a day) while also combining two different units (e.g., hours and days). Given a recent call for classification of units (Monga and Bagchi 2012), there is plenty of opportunity for additional research looking at qualitative components of numerical frames, with markedness offering a unique lens to analyze the linguistic makeup of the frame.

Related Theoretical Areas

There are a number of other potential theories that may tie into the interaction of anchoring and markedness. From processing systems (Kahneman 2003) to scarcity (Cialdini 1993), additional points of consideration are discussed below.

Fluency and Processing

In dual system processing (e.g., Kahneman, 2003, 2011), System 1 processes are described as fast, automatic and effortless while System 2 processes are more deliberate, effortful and controlled. In other words, System 1 works with perception and intuition while System 2 handles reasoning. Based on conversational norms (Grice 1975), it is possible that *marked* terms activate a more thorough processing of the information (System 2) given they are not as conversationally common. For example, “How short is the man?” is not a typical conversation manner in which to ask about a person’s height. By asking a question in a marked manner or using a marked adjective, it may cue a different level of processing. Conversely, using *unmarked* terms may be quickly processed by System 1 because they are more common in everyday communication.

Recently, Schuldt, Muller, and Schwarz (2012) showed that package labeling (e.g., fair trade) effects perceptions of calorie content in the food. The authors call for additional research on how and when heuristic or systematic processing is utilized in evaluating these types of linguistic descriptions with food decisions. Markedness may offer one categorization system or prediction theory for when particular systems are active. For example, the term *vegetable* is *unmarked* as that is how consumers customarily refer to it, in contrast to *organic vegetable*, which is the *marked* term given the organic nature of a vegetable is not assumed and thus it provides additional information. What happens when vegetable becomes an *unmarked* term (and organic is assumed) and non-organic becomes the *marked* term? A similar argument can be made for genetically modified organisms (GMO) products. Currently non-GMO is a *marked* term given that it provides additional information beyond the default, but at some point the term may switch to where non-GMO is assumed and GMO becomes the *marked* term. At a broad level, what are the best marketing practices for *marked* versus *unmarked* terms? A markedness approach may yield a host of broader marketing research questions based on differences in linguistics and conversation cues.

Scarcity

Scarcity represents a very interesting theory to study in the realm of quantitative judgment. In anchoring, the numerical value is explicitly stated (i.e., a crowd of 700), but with a marked or unmarked adjective the numerical value is not explicitly stated (i.e., a big crowd) and thus is inferred by the individual. According to the scarcity principle (Cialdini 1993), opportunities seem more valuable when they appear more limited, and scarcity techniques predominantly fall into two categories in marketing: limited quantity and limited time.

Limited Quantity. Limited-quantity scarcity appeals effect purchase intention to a greater extent than limited-time scarcity appeals (Aggarwal, Jun, and Huh 2011). Limited edition is a type of limited quantity appeal and has been modeled to show a positive effect on brand profits but a negative strategy effect by increasing price competition (Balachander and Stock 2009). In addition, scarcity restrictions can improve perceptions of a deal (Inman, Peter, and Raghubir 1997). The studies focus on quantity limits in the numerical sense, however, and don't systematically explore quantities in the qualitative sense (i.e., markedness) beyond the word *limited* nor the potential interaction between the two. For example, stating "only a few left" versus "only 3 left" may effect perceptions of quantity-based scarcity.

In a sports marketing example, Wann, Bayens, and Driver (2004) showed respondents a scenario at an arena that seats 20,000 people and told participants that either 25 tickets remain (scarce condition) or 2,000 tickets remain (not scarce condition). In support of commodity theory (Lynn 1991), which states that scarcity enhances desirability and value, there was a significant difference in likelihood of attending the event. One could argue both conditions are considered *scarce*, and 25 tickets remaining represents a more extreme form of scarcity. Furthermore, how would the results be different if *many* versus *few* tickets were available or the arena was expecting a *big* versus *small* crowd? Based on fuzzy-trace theory, perhaps 25 tickets remaining is encoded as *very few* while 2,000 tickets, as *few* and thus the effect could be qualitative in nature as well.

Limited Time. In an analysis of newspaper retail advertisements, Howard and Kerin (2006) showed the that 87.2% of ads that included a reference price (e.g. "Was $___. Now $__") also include reference to limited time scarcity (e.g. "Three days left."). This pattern potentially has implications for anchoring with multiple numbers in addition to markedness based on the words and phrases used in the retail advertisements. The authors also suggest that future search should look at other variables that could magnify the effects, which has implications for this dissertation research. As Spears (2001) notes, time pressure can be explicit ("3 days only") or implicit ("limited time only"). Although not discussed in the article, this type of comparison has strong ties to anchoring (explicit scarcity) and markedness of adjectives (implicit scarcity).

Numeracy

Numeracy, defined as "how facile people are with basic probability and mathematical concepts," (Lipkus, Samsa, and Rimer 2001) is an important consideration when looking at anchoring given the perception of numbers, ratios and percentages that are often involved. There are a variety of numeracy tests ranging from the Berlin Numeracy Test (Cokely, Galesic, and Schulz 2012), which emphasizes statistical numeracy, to numeracy tests that have been shown to be particularly applicable to judgment and decision making tasks (Peters, Västfjäll, and Slovic 2006). For example, Schwartz, Woloshin, Black, and Welch (1997) showed that numeracy was strongly related to understanding the benefits of mammography.

Research on individual difference variables, such as openness to experiences (McElroy and Dowd 2007), suggests that individual differences could effect quantitative judgments such as anchoring. For example, when an individual considers an estimate (e.g., height of a redwood tree), the difference between an individual's reference point and the presented anchor represents a ratio similar to the anchoring index described by Jacowitz and Kahneman (1995): *anchoring index = median (high anchor) – median (low anchor) / high anchor – low anchor.* Although this equation is used to assess the power of an anchor across multiple respondents, an individual potentially makes a similar type of numerical comparison (reference point / anchor) in deciding the plausibility of an estimate. Thus, an individual's ability, or lack thereof, to consider mathematical relations on the fly, in addition to their comfort with numbers, may have implications for understanding of linguistics cues such as *big*, which require numerical interpretation. Similarly, there are likely additional implications when the scenario involves units given the potential need to convert between units. For example, consider being a scenario framed in minutes but making a judgment based on hours.

In addition, the numeracy literature largely focuses on actual numbers. Lipkus and colleagues' (2001) definition of numeracy, however, could be applied to how facile people are with numerical expressions of a qualitative nature rather than purely quantitative information. For example, independent of knowledge, some people may allocate a wider range to *big* than *small*. This allocation is in line with the markedness literature, but markedness is a linguistic effect, not an individual difference variable that is measured in terms of comfort level with a variety of different adjective or linguistic structures.

Latitude of Acceptance

Hovland, Harvey, and Sherif (1957) suggest that latitude of acceptance is the range of acceptable answers that not only includes the individual's stance but also that of other acceptance positions. For example, a citizen who is a Democrat may be willing to accept (i.e., latitude of acceptance) ideas that have aspects of Republican ideals but may reject (i.e., latitude of rejection) ideas that stray too far to the Republican side.

The latitude of acceptance theory was recently adopted by Simonson, Bettman, Kramer, and Payne (2013) as a means to explain comparisons in judgment and decision making tasks. The authors describe latitude of acceptance as "the range and concentration of task-acceptable comparisons" (p. 140), which is similar in nature to the original definition but emphasizes comparison. Strack and Mussweiler (2000) designed a study using plausible versus implausible anchors to show the diminishing returns of anchoring beyond a plausible limit. Although they term the range of the anchor as implausible or plausible, one other explanation based on literature may be latitude of acceptance.

Social cues may potentially play a role in the intersection of anchoring, linguistics and latitude of acceptance. Consider the following example:

> *One agency suggests Americans recycle 10 [or 100] tons of cans per year. How many [few] tons of cans do you think Americans recycle per year?*

One could argue the high anchor is more powerful because it is a more socially desirable outcome (Goldstein, Cialdini, and Griskevicius 2008), in addition to aligning with self-interests (i.e., people should recycle). Thus, people may be more swayed by both the numerical and qualitative anchor in the direction of self-interest or social norms. In terms of latitude of acceptance, social norms and self-interest may shift the range of the latitude acceptance. A person who recycles often may be more inclined to believe higher values of recycling numbers by the average American than somebody who does not.

McElroy and Dowd (2007) showed that respondents high on the Big-Five personality trait openness to experience were more susceptible to anchoring effects. The argument is that people who are high on openness to experience are more likely to adjust behaviors and beliefs, which, in an anchoring scenario, means they are more susceptible to then initial number provided. Although still needing empirical testing, a person with openness to experience may respond in a similar way to someone who is presented with an anchor inside his or her latitude of acceptance.

In addition, the range of the latitude of acceptance for *small* may be smaller than the range of *big*. For example, for a stadium that holds 10,000 fans a *big* crowd may be perceived to range from 5,000 to 10,000, but a *small* crowd may only range from 3,000 to 5,000. In other words, the latitude of acceptance of a *big* crowd is much wider than that of a *small* crowd. Thus, conversational cues (e. g., *big* vs. *small*) for numerical judgments may potentially be constrained by a person's latitude of acceptance.

Conclusion

This literature review explores a variety of contexts and theories that have implications for numerical judgments and are intertwined with the markedness approach to the research conducted in this dissertation. Although anchoring has largely focused on quantitative effects and markedness has largely focused on qualitative effects, this literature review illustrates the overlapping characteristics of a variety of qualitative and quantitative theories. Numerical perceptions go beyond a number to include processing theories such as fuzzy trace theory, profile theories such as argumentative orientation, and markedness theories of language in terms of how people encode and store numerical information. This literature review opens the door for a better understanding of non-numeric cues that effect judgment and decision making while making a case to empirically test these ideas in Chapter III.

CHAPTER III

EXPERIMENTAL STUDIES

Overview

As the role of conversational norms and information leakage gains traction in the marketing literature, effects of numerical expressions may be explored in exciting new ways. A linguistics-based approach, emphasizing markedness theory, yields several interesting research questions:

- How do qualitative cues (*marked* and *unmarked* adjectives) effect numerical estimates?
- How do qualitative cues (*marked* and *unmarked* adjectives) interact with other cues (numbers, etc.)?

Literature on anchoring effects largely focuses on quantitative estimation. Jacowitz and Kahneman (1995, p. 1161) state, “An anchor is an arbitrary value that the subject is caused to consider before making a numerical estimate.” By value, however, the authors are referencing a number. One could twist that definition to reflect the efforts in this research to incorporate words before making a numerical judgment.

The initial inspiration for a deeper look into linguistic effects on quantitative expressions and numerical processing was based on Harris' (1973) article, “Answering questions containing marked and unmarked adjectives and adverbs.” The article, which appears to be grossly under-cited given its potential influence, is interesting for two primary reasons. First, the article looks at quantitative expressions such as *big* and *little* to illustrate that using one or the other (i.e., a frame or an anchor) results in different numerical estimations. Second, and more profound from a theoretical perspective, the article presents new interpretation of numerical judgments based on the concept of *marked* and *unmarked* adjectives.

Harris (1973) added a numerical component to the discussion of marked and unmarked adjectives by measuring respondents' estimates to a variety of questions based on the *unmarked* or *marked* version of an adjective. For example, consider the two questions:

(A) How old is the man's car?

(B) How new is the man's car?

Participants who responded to the old framing (A) estimated the car's age was 5.46 years, but those respondents who saw the new framing (B) estimated the car's age was only 2.04 years. The author tested a variety of other scenarios including time between planes, width of a street, and age of a grandmother. The author also tested how big or little "the crowd at the football game" was, but the difference was not significant. Although the study suggests the power of words, and generally supports the *unmarked* versus *marked* adjective discussion, it did not measure any *neutral* framing of questions. Some linguistic researchers argue there is no such thing as a neutral frame. For example, Clark and Schober (1992) claim:

It is futile to search for truly neutral questions. They don't exist. Every question carries presuppositions, so every question establishes a perspective.

While discussing that statement could generate its own line of research and generate significant disruption in marketing research, neutral frames have been used in markedness studies to reflect the unit or number in question. For example, *age* is the ultimate goal of asking how old (2A) or how new (2B) something is. Therefore, a neutral frame would be:

(2C): What is the age of the man's car?

The neutral framing asks for the same information (age) but does it without using a qualifying adjective such as *new* or *old*. Thus, it is an important absence from Harris's (1973) work as markedness suggests people respond to the unmarked adjective (old) similar to the neutral question.

McKenzie and Nelson (2003) argue that frame selection serves an efficient communicative function by reliably conveying implicit information in addition to explicit information. For example, Levin and Gaeth (1988) showed that consumers responded more favorably to beef framed as "75% lean" than "25% fat." Although traditional views of framing suggest the frames are equivalent, McKenzie and Nelson (2003) argue that the frame has a function beyond the outwardly present information. A consumer may infer in the "25% fat" frame that ground beef typically has less fat and thus "25% fat" is not that appealing. Said another way, “logically equivalent descriptions, or frames, in inference tasks leak normatively relevant information about event rarity” (McKenzie, 2004, p. 883). The frame may effect the consumer’s reference point in a matter that is not apparent in the explicit information, but it still influences the consumer's response. This research highlights the importance of better understanding linguistics cues in judgment and decision making tasks.

McKenzie, Liersch, and Finkelstein (2006) explored the popular Johnson and Goldstein (2003) default option study, which showed that countries with an opt-out form had significantly more citizens consenting to donate their organs than countries with opt-in forms. McKenzie and colleagues (2006) showed that policy makers’ attitudes are leaked based on the frame they choose, and people assume the default framing is the recommended response. Linguistic cues in the answer options may be responsible for previous effects attributed to numerical anchors and framing as well (Frederick and Mochon 2012). Given that the marketing literature recently began to emphasize language and conversation cues, investigating numerical priming through a linguistics approach may help differentiate between effects caused by a numerical anchor and ones caused by linguistics or markedness cues.

The previous discussion falls in line with more recent discussions of suggested and or leaked information. For example, Kayne (2007, p. 832) states:

> *There is more to syntax than meets the eye is clear. One important way in which this holds involves the presence of elements that are syntactically and interpretively active, but yet not pronounced.*

Furthermore, Kayne (2007) shows that words such as *several*, *few* and *many* are modifiers of the unpronounced number. Consider the following two examples discussed by the author:

(A) John has too few friends.

(B) John has too small a number of friends.

The sentences are similar in intent but different in linguistic structure, which may effect interpretation. The word *few* (A) arguably modifies the unmentioned number which is more explicit in (B). This type of example shows, similar to *information leakage*, that sentences that seem equivalent may be logically equivalent but are not informationally equivalent.

Tying the findings to a study on adjectives (e.g., Harris, 1973), asking, "How small is the crowd?" may suggest that the crowd is typically smaller. Given *big* is an *unmarked* adjective, however, asking "How big is the crowd?" may not effect the reference point because it is seen as conversationally equivalent to, "What is the size of the crowd?" From an anchoring perspective, the respondents may anchor down from their reference point in the "How small is the crowd?" condition, but the reference point remains unchanged in the "How big is the crowd?" example as it is not suggestive of the magnitude of the quantity. To further complicate judgment and processing, adding numerical anchors may have different effects based on the use of marked and unmarked adjectives. Although some may not be conversationally normal, asking, "Is the crowd [smaller/bigger] than [30,000/2,000]?" may result in some interesting anchoring effects given the relation between markedness and numerical anchoring. Several studies are conducted to further understand linguistic cues in quantitative expressions.

Study 1: Markedness + Google Trends

The purpose of study 1 is to identify frequency of adjective use due to its association with markedness. One general principle of markedness is that *unmarked* terms can be used in more contexts and thus are seen more frequently (Greenberg 2005). A modern way to test this hypothesis is by using Google Trends. Google Trends data have been used to predict disease outbreak (Polgreen et al. 2008; Carneiro and Mylonakis 2009), economic indicators (Choi and Varian 2012), and as a proxy for interest in product categories (Moe and Schweidel 2012). Thus, it represents a formidable method, and the first to use Google Trends, to analyze the frequency and popularity of various *marked* and *unmarked* pairs. Based on the previous discussion of markedness the following hypothesis is proposed:

H1: The unmarked term will appear significantly more often in searches than the marked term.

Method

Study 1 uses Google Trends data to determine how often given *marked* and *unmarked* terms of searched. Each pair of *marked* and *unmarked* terms was searched in Google Trends for the result index score of search volume. The Google Trends site describes each number as “represent[ing] search volume relative to the highest point on the chart, which is always 100.” For example, *much* and *little*, used in the Harris (1973) study as well, were input to provide an index score for those specific terms on Google. Several terms such as *frequently* and *infrequently* did not have enough search volume to allow Google Trends to provide an index. Thus, they were left out of the analysis and only markedness pairs that Google Trends provided results for, shown in table 2, were included in the analysis.

Results

Table 2 shows the Google Trends analysis of common markedness comparisons. An ANOVA was run for each marked and unmarked comparison. The sample of 489 represents an index score for each week of searches from January 2004 until May 2013. In summary, the *unmarked* term was searched more frequently in six of the eight comparisons. Furthermore, if the results are collapsed across all adjective pairs, the unmarked adjective ($M = 61.76$) is searched more frequently than the marked adjective ($M = 33.94$), $F(1,977) = 5765.13$, $p < .001$.

Table 2. Frequency of marked and unmarked searches on Google (study 1)

Adjective	Markedness	Mean	SD	N	F	df	Sig.
Much	*Unmarked*	49.8	23.5	489	305.68	1	p < .001
Little	*Marked*	69.6	8.9				
High	*Unmarked*	74.7	8.7	489	19790.92	1	p < .001
Low	*Marked*	17.9	1.8				
Hot	*Unmarked*	64.8	13.5	489	7836.85	1	p < .001
Cold	*Marked*	10.2	1.4				
Wide	*Unmarked*	71.8	8.9	489	23597.82	1	p < .001
Narrow	*Marked*	9.3	1.1				
Old	*Unmarked*	72.5	9.9	489	3764.07	1	p < .001
Young	*Marked*	42.9	4.1				
Long	*Unmarked*	65.3	14.4	489	4023.44	1	p < .001
Short	*Marked*	23.5	2.2				
Tall	*Unmarked*	20.7	4.3	489	23057.48	1	p < .001
Short	*Marked*	80.5	7.6				
Big	*Unmarked*	74.5	7.9	489	24291.86	1	p < .001
Small	*Marked*	17.6	1.7				

Discussion

Study 1 utilizes a modern method to study the frequency assumption consistent with markedness research. Furthermore, it begins to bring the markedness theory into a marketing and consumer behavior context (using Google as a search engine). It should be noted that the data may have noise and thus represent a broad look at the frequency of search terms. For example, Old Navy appears in search terms for *old* while Neil Young appears in searches for *young*. Comparisons were conducted without popular terms (e. g., Old Navy, Neil Young, High School) and the general conclusions did not deviate from table 2. Thus, *marked* and *unmarked* terms, in a broad sense, are shown in table 2 and confirm suggestions in past articles (Greenberg 2005) that *unmarked* terms can be used in more contexts and more frequently than *marked* terms, thereby supporting hypothesis 1.

Study 2: Markedness + Quantitative Estimates

This study is inspired by Harris (1973) but expands on it to make the findings clearer. First, the questions in the article were hypothetical in nature with no specific context. For example, "How tall is the basketball player?" was not in reference to any specific basketball player but a general assessment. Similarly "How little was the crowd at the football game" was not clear, nor statistically significant in their study, and thus worthy of further exploration. Respondents were simply told that the "experiment was a study in the accuracy of guessing measurements and that they should make as intelligent a numerical guess as possible to each question," (Harris, 1973, p. 401), yet the object and context of the estimations were unclear.

Second, the purpose of the study was to distinguish between marked and unmarked adjectives, but it did not substantially explore Clark's (1969) claim that unmarked adjectives have two senses, measurement and magnitude. Although Harris' (1973) study established that asking questions such as "How [high/low] was the plane flying?" resulted in different answers, it did not ask neutral questions such as "At what height was the plane flying?" Granted, markedness theory suggests that the unmarked term acts as a neutral term (Battistella 1996), and thus would constitute a neutral question in itself, asking a question without a directional adjective will help support the general discussion. Kallio and Cutler (1987) asked a neutral question, but the study was an eyewitness memory application. The authors found no main effects in the study with a marked, unmarked and neutral condition. Adding a neutral question into the study design could contribute to markedness theory by showing how questions without an adjective suggesting magnitude differ from traditional marked and unmarked terms, which include a form of magnitude (e. g., *big* and *small*).

Third, a question such as "How [tall/short] is the man?" is an interesting question but potentially has fewer marketing applications than questions like "How [big/small] was the crowd at the football game?" "How [many/few] watts of energy are saved by using a LED light bulb?" or "How [much/little] meat is consumed by the average American?" In a real world context, sports organizations often try to manage crowd expectations by indicating the expected size of a crowd based on qualitative cues (big or small) or quantitative cues (actual attendance number). Similarly, testing the markedness theory in a scenario with marketing-based applications will illustrate its power in a business context.

Fourth, few studies, particularly in marketing literature, have associated numbers with linguistics in any systematic or categorical fashion. Although willingness to pay (Krishna 1991) is a reasonable dependent variable for this type of approach, the majority of the literature has not looked at marketing through the lens of markedness or conversational cues. Recently, Monga and Bagchi (2012) and Zhang and Schwarz (2013) have called for increased attention to qualitative cues in framing that may effect how information is interpreted. From a theoretical perspective, this finding has potential implications for anchoring (Jacowitz and Kahneman 1995) and markedness (Battistella 1990, 1996), in addition to other theories such as those on processing (Kahneman 2003) and persuasion (Cialdini 1993; Friestad and Wright 1994; Boush, Friestad, and Wright 2009).

Subsequent studies, referencing *marked* and *unmarked* adverbs, have shown that varying the adverb (fast or slow) can have significant effects on estimates of the speed of the crash as well (Lipscomb, McAllister, and Bregman 1985). Neither study uses a baseline or neutral condition to gauge whether the unmarked adverb or verb is significantly different from a neutral framing of the question. For example, respondents could be asked, "What was the miles per hour of Car 1?" or another similarly framed question that attempts to remove leading information. The power of *marked* and *unmarked* framing is important to establish theoretically as it suggests a more complicated relation between the linguistics literature and the marketing literature.

In addition, several of the studies focus on eyewitness testimony or memory and thus could benefit from further justification in a marketing context. Given the breadth of languages and perspectives on linguistics, there are a variety of opinions on markedness, (see Evans and Levinson, 2009; Haspelmath, 2006a; Levinson and Evans, 2010 for other perspectives), much like many social psychology theories, but it does present an interesting lens through which to look at framing in a marketing context. Based on the previous literature review of markedness, the following hypotheses are proposed:

H2A: The marked adjective frame will result in significantly lower estimates than the unmarked adjective frame.

H2B: The marked adjective frame will result in significantly lower numerical estimates than the neutral frame.

Method

One hundred and forty eight adults (71% male; M_{age} = 31 years) participated via Amazon mTurk which has been shown to be a reliable substitute for student subjects (Paolacci, Chandler, and Ipeirotis 2010; Buhrmester, Kwang, and Gosling 2011). Respondents were asked to provide an estimate of crowd size and were randomly assigned to one of three conditions (unmarked adjective, marked adjective, or control/neutral condition). Specifically, respondents were randomly assigned to the question "How [big/small] is the average crowd at a college football game?" In the neutral condition, respondents were asked: "What is the size of the average crowd at a college football game?" Subsequently, all participants were asked knowledge questions including "I am knowledgeable about college football." "I frequently watch college football games.", and "I frequently attend college football games." with responses on a Likert scale (1 = strongly disagree; 7 = strongly agree). Finally, response time was measured to determine whether markedness effects processing time, which builds on a literature looking at processing time (c.f., Viswanathan and Narayanan, 1994) based on numerical and verbal pairs.

Results

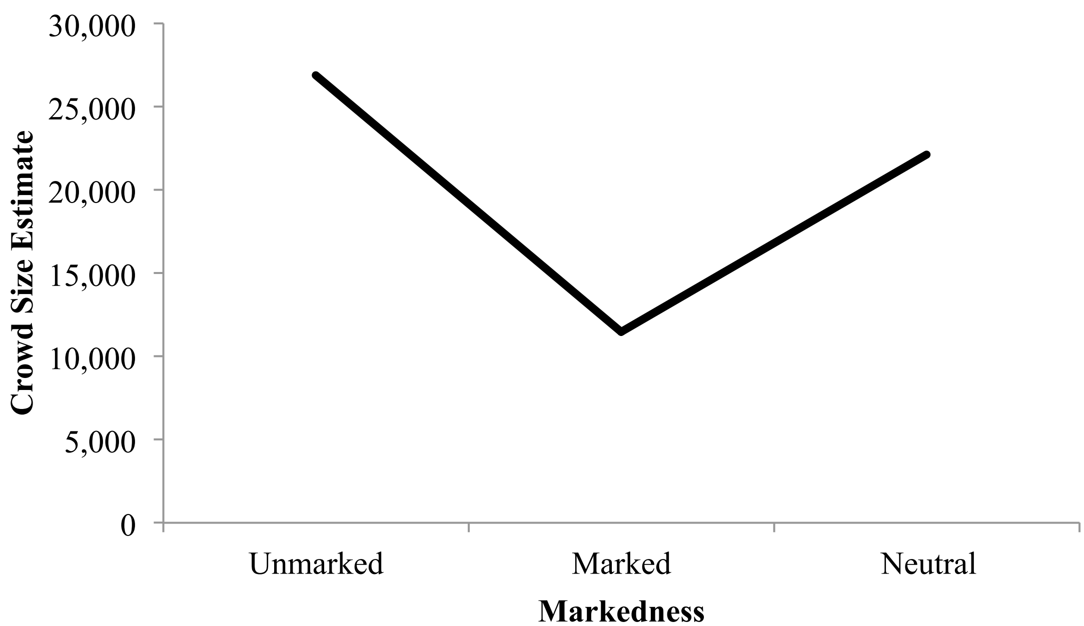
Numerical Estimate. A one-way analysis of variance revealed a main effect of markedness, $F(2,147) = 5.87$, $p = .004$. Means and standard deviations are reported in table 3, and figure 1 visually presents the information. Post-hoc tests confirm that the unmarked frame (M = 26,887) is significantly different than the marked frame (M =

11,452), *p* = .003. The neutral frame (*M* = 22,111) was not significantly different than the marked frame (*M* = 11,452), although it was marginally directionally significant, *p* = .061. Finally, the unmarked frame (*M* = 26,887) was not significantly different than the neutral frame (*M* = 22,111), *p* = .562.

Table 3. Estimates of crowd size by condition (study 2)

	Mean	SD	N
Unmarked (Big)	26,887	27,480	50
Marked (Small)	11,452	15,144	50
Neutral	22,111	24,752	48

Figure 1. Effects of markedness on estimates of attendance at a college football game (study 2)



Response Time. Given the differences in sentence length with the neutral condition, only the unmarked frame and marked frame were compared in response time analysis. There was no main effect of markedness, $F(1,100) = 0.28$, $p = .601$) as the unmarked frame ($M = 11.87$) was not significantly different than the marked frame ($M = 12.98$). See table 4 for means and standard deviations.

Table 4. Response time by condition (study 2)

	Mean	SD	N
Unmarked	26,887	27,480	50
Marked	11,452	15,144	50
Neutral	22,111	24,752	48

Discussion

The results show that *marked* and *unmarked* adjectives result in different numerical estimations, thereby supporting hypothesis 2a. Hypothesis 2b was not supported, however, as the *neutral* frame and *marked* frame did not result in significantly different numerical estimates. The results from this study illustrate that a *marked* term such as *small* effects numerical estimates differently than *unmarked* terms such as *big*. Furthermore, the results suggest that there is no difference between unmarked (such as *big*) framing and a neutral framing, which empirically supports conceptual suggestions in markedness theory (c.f., Clark, 1969; Lehrer, 1985).

Although there was no significant difference in response time, it remains an interesting variable worthy of future exploration. As Huttenlocher, Higgins, and Clark

(1971) suggest, the extreme lower bound of a marked adjective is zero. In terms of computational processing, this fact suggests the marked adjective focuses judgment to a smaller range of plausible answers; thus, a quicker response may occur. Conversely, the marked term is less common, as shown in study 1, and thus may take longer to process. Results from study 2 suggest that markedness does not effect response time but it is examined further in study 3.

Study 3: Markedness + Numerical Anchoring

Study 3 expands on study 2 by including numerical anchors as another condition in the experimental design. In study 1, respondents were presented with a question with either an unmarked (*big*), marked (*small*), or *neutral* frame. Study 2 showed that *unmarked* terms resulted in significantly higher numerical estimates of attendance than *marked* terms. This study introduces numerical anchors to test potential interactions with marked and unmarked terms. Given that the power of numerical anchors has long been established (e. g., Jacowitz and Kahneman, 1995; Mussweiler and Strack, 2000; Tversky and Kahneman, 1974), this study examines how these numerical anchors interact with *marked* and *unmarked* expressions (e.g., *big* and *small*). Study 3 is the first study to combine anchoring and markedness theories which, given the potential of each to individually effect numerical perceptions, advances theory by exploring the interplay between the two. It is expected that in the presence of both high and low anchors, markedness effects will still occur.

H3: The marked adjective frame will result in significantly lower estimates of attendance than the unmarked adjective frame in the high and low anchor conditions.

Method

Three hundred and twenty four adults (70% male; M_{age} = 30 years) participated via Amazon mTurk in exchange for monetary compensation. Study 3 used a 3 (Adjective: Marked vs. Unmarked vs. Neutral) by 2 (Numerical Anchor: High vs. Low) between-subjects design. Respondents were presented with the same questions as in study 2 in a random order, but numerical anchors were added. In order to incorporate the anchor, a preliminary statement referenced an estimate from another person. For example, respondents saw a variation of the following question depending on the condition they were randomly assigned to:

One person estimates the average crowd at a college football game is [40,000/4,000] people. How [big/small] is the average crowd at a college football game?

Similar to study 2, an answer space was provided for each respondent to indicate his or her answer. Response time was measured as well to determine whether the condition effects processing time. In addition, knowledge about college football and demographics were asked in order to control for these as covariates. Finally, response time was measured to determine whether markedness effects processing time.

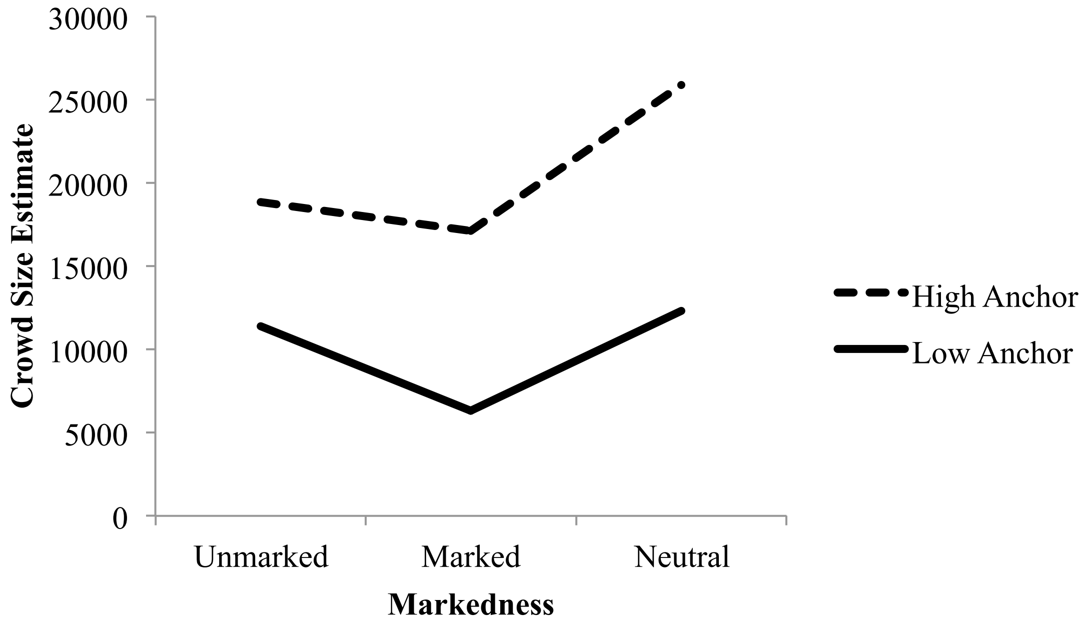
Results

Numerical Estimate. There was a main effect of markedness, $F(2,323) = 4.71$, $p = .010$, and a main effect of anchoring, $F(1,323) = 29.06$, $p = .000$, on numerical estimates of crowd size but no significant interaction, $F(2, 323) = 0.82$, $p = .443$. Respondents in the marked condition ($M = 11,708$) had significantly smaller estimates of crowd size than those respondents in the neutral condition ($M = 19,106$), $p = .009$. Interestingly, there was no significant difference between estimates in the unmarked condition ($M = 15,110$) and marked condition ($M = 11,708$), $p = .375$, although mean differences follow expectations. Finally, there was no significant difference, as expected, between the unmarked condition ($M = 15,110$) and the neutral condition ($M = 19,106$), p = .236. Respondents in the high anchor condition ($M = 20,610$) estimated a significantly larger crowd size than those in the low anchor condition ($M = 10,006$), $p = .000$. Table 5 includes the means and standard deviations, and figure 2 visually illustrates the results.

Table 5. Estimates of crowd size by condition (study 3)

	High Anchor			*Low Anchor*		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Unmarked	55	18,834	18,868	54	11,386	14,833
Marked	55	17,106	19,357	51	6,309	9,541
Neutral	54	25,889	22,310	55	12,322	18,033

Figure 2. Estimates of crowd size by markedness anchoring (study 3)



Response Time. Given the variation in word count and word meaning associated with neutral conditions, analysis of the processing time was restricted to a 2 (markedness: *marked* vs. *unmarked*) by 2 (numerical anchor: *high* vs. *low*) analysis. Means and standard deviations are included in table 6. There was no main effect for markedness $F(1,214) = .001$, $p = .977$), no main effect for anchor $F(1,214) = .037$, $p = .848$), nor a significant interaction $F(1,214) = 1.287$, $p = .258$).

Table 6. Response Time (seconds) By Condition (study 3)

	N	Mean	Std. Error
Unmarked	91	18.75	1.06
Marked	84	23	1.09

Discussion

Study 3 resulted in some interesting findings regarding numerical estimates. Contrary to study 2, there was no significant difference between the *unmarked* condition and the *marked* condition, thereby failing to support hypotheses 3. Although the results were directionally as anticipated, the lack of significant differences suggest the numerical information may overpower linguistic cues and/or alter the interpretation of the linguistic cues in a meaningful way.

As discussed, and arguably most profound, it appears that the mere presence of a number effects markedness. The *neutral* markedness condition resulted in the highest estimates of crowd size, which goes against the findings in study 2. Two possible theoretical explanations that are worth further exploration are the Persuasion Knowledge Model (Friestad and Wright 1994; Boush et al. 2009) and the Elaboration Likelihood Model (Petty and Cacioppo 1986). Although we need additional experimental support, past literature has shown reactance to persuasion attempts (Fitzsimons and Lehmann 2004; Laran, Dalton, and Andrade 2011). In study 3, it is possible the respondents recognized a persuasion attempt when a qualitative cue (*big* or *small*) was partnered with a quantitative cue (*40,000* or *4,000*) and thus reacted with smaller crowd size estimates. Study 3 challenges markedness theory as well by suggesting unmarked, marked and neutral terms do not behave in the same way in the presence of a number. In study 2, with no anchors, there was a significant difference between the *unmarked* and *marked* condition; however, study 3 shows how the presence of numerical anchors effects markedness as there was no significant difference between the *unmarked* and *marked* condition.

In addition, study 3 hints at other phenomena that may be worth exploring further in future studies. The difference between a *marked* and *unmarked* word seems to be different when a high number is present than when a low number is present. In the high anchor condition, the difference between estimates in the *marked* and *unmarked* condition was 1,727, but in the low anchor condition, the difference between the *marked* and *unmarked* estimates was 5,076. These findings represent an intriguing option for further study and may suggest that a numerical anchor effects the interpretation of other descriptive information (e.g., the *marked* or *unmarked* term) within the sentence.

Finally, study 3 (with numerical anchors) showed that there was no significant difference in response time between the unmarked and marked conditions, which confirms the findings from study 2. This result appears to rule out any fluency issues associated with markedness as response time is generally an indicator of fluency. A more information-based processing theory, such as fuzzy trace theory (Reyna and Brainerd, 1991) may be a better explanation to focus on moving forward given its emphasis on gist (generally word associations) versus verbatim (generally numbers based) processing styles. Although numerical pairs have been shown to result in quicker processing time than verbal pairs or numerical/verbal pairs (Viswanathan and Narayanan 1994), this past research is not supported by study 3. Nonetheless, response time remains an intriguing area of study given the lack of response time metrics associated with markedness, in addition to better understanding the processing mechanisms behind the numerical estimate effects.

Study 4: Markedness + Range

Study 4 expands on the previous studies by exploring the numerical range of marked and unmarked words. As Harris (1973) and others have noted, a marked term has a lower bound of zero while an unmarked term has an indefinite upward bound. As such, this potentially has interesting effects on the range of plausible answers to a scenario. Take the following scenarios for example:

(4A) The crowd was big.

(4B) The crowd was small.

As previously shown, the use of unmarked versus marked terms can result in significantly different numerical estimates of the size of the crowd. One additional question is whether markedness effects the *range* of possible numerical estimates, Inspired by Cummins (2011), study 4 explores the range of values the respondent would consider based on a "From _________ to _______. Most likely _____." One argument is that the range should make no difference as a respondent that is told a crowd is small could easily estimate values from 5,000 to 20,000 (difference of 15,000) while a respondent that is told a crowd is big could estimate values from 25,000 to 40,000 (difference of 15,000). Thus, the range of the values that are considered are the same regardless of the frame. Given the markedness effects already explored, it is expected that markedness will not only influence the mean estimate but also the range of values the respondent considers. Therefore:

H4: The unmarked frame will result in a significantly larger range of values than the marked frame.

Method

One hundred and thirteen adults (60% male; M_{age} = 35 years) participated via Amazon mTurk. Study 4 used a 2-way (Markedness: Marked vs. Unmarked) between-subjects design. Respondents were presented with the following scenario in which an unmarked term (big) or a marked term (small) were used depending on the condition the respondent was randomly assigned:

Imagine you are talking with a friend about a Major League Baseball game he recently attended. While talking about the attendance at the game, your friend says:

"It was a [big/small] crowd."

Please indicate the number of people you think were in the stadium using the following format: From ______________ to ______________ but most likely ______________.

Similar to the previous studies, answer spaces were provided for each respondent to indicate his or her answer. Response time was measured as well to determine whether the condition effects processing time. In addition, knowledge about Major League

Baseball and demographics were asked in order to control for these as covariates. Finally, response time was measured to determine whether markedness effects processing time.

Results

There was a main effect of markedness on the *from* estimate $F(1,112) = 14.40$, $p = .000$; *to* estimate, $F(1,112) = 12.28$, $p = .001$; and *most likely* estimate $F(1,112) = .000$, $p < .01$. The range of estimates was calculated by subtracting the *to* estimate (the higher value) by the *from* estimate (the lower value). Subsequently, there was a significant main effect on the range of numerical estimates, $F(1,112) = 4.32$, $p = .040$. The marked term (i.e., *small*) resulted in a significantly narrower range of estimates ($M = 6{,}219$) than the unmarked term ($M = 9{,}538$). Finally, there was no significant effect of markedness on response time, $F(1,112) = .118$, $p = .732$; see figure 3 and table 7 for a summary of these results.

Figure 3. Range of response based on markedness (study 4)

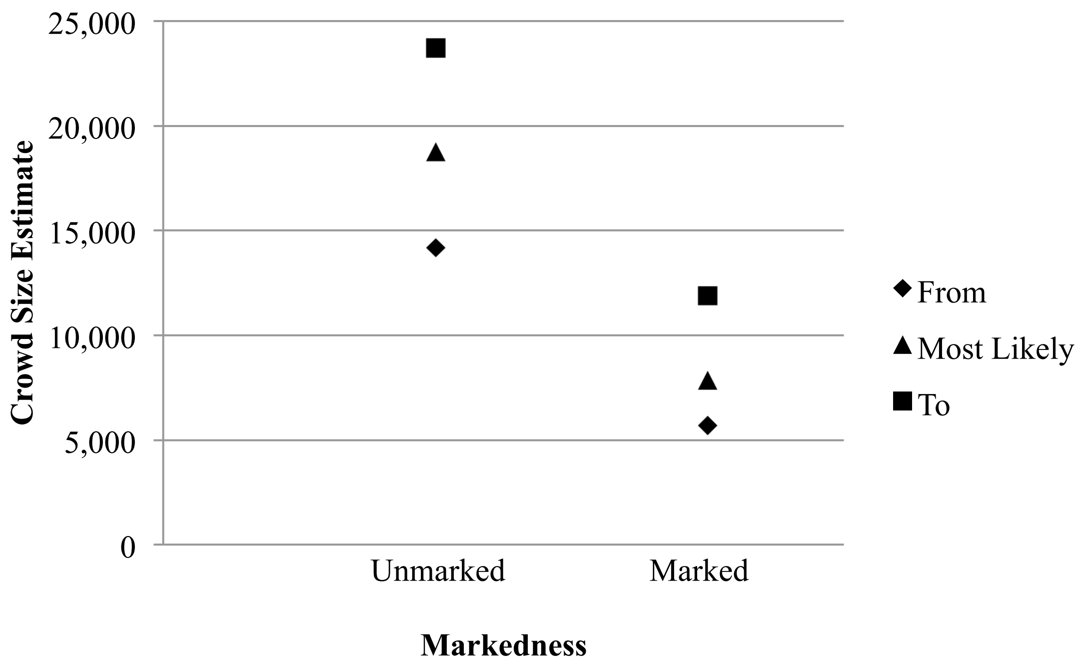


Table 7. Estimates of crowd size by condition (study 4)

		Unmarked	*Marked*
From	Mean	14,173	5,679
	SD	15,307	7,097
To	Mean	23,712	11,898
	SD	22,006	12,689
Most Likely	Mean	18,778	7,864
	SD	18,774	8,238
Range (From - To)	Mean	9,538	6,219
	SD	9,632	7,195

Discussion

Study 4 expands on the previous studies by showing that markedness not only results in differences in numerical estimates but also the *range* of plausible answers.

Respondents estimated a more narrow range of possibilities in the marked frame than in the unmarked frame. When respondents were told the crowd was *big*, the difference between their low estimate and high estimate was 9,538, but when they were told the crowd was *small*, the difference between the low estimate and high estimate was only 6,219, thereby supporting hypothesis 4.

This study shows that markedness and framing not only effect a specific estimate (as shown in study 2 and study 3) but also the *range* of estimates a person considers in a judgment task. Although respondents provided a numerical estimate, the goal was to understand the *range* of considerations and how markedness plays a role. From a marketing perspective, this result potentially has implications for language use in situations in which a marketer wants the consumer to consider a smaller range of possibilities. A marketer may advertise a low price but inadvertently reduce the range of prices the consumer processes. As another example, an announcement of cold weather gear may restrict a consumer's perceptions of the opportunity to wear the gear relative to warm weather gear. Although markedness is susceptible to differences in the context, the results from this study suggest that verbal cues not only influence strictly numerical estimates but also the range of estimates a consumer may consider.

Study 5: Markedness + Anchoring + Constraint/Scarcity

In their study, Jacowitz and Kahneman (1995) note, "An unexpected observation is that the effects of high and low anchors were not equally strong; the mean AI was .51 for the high anchors and .40 for the low anchors." Similarly, in his work on marked and unmarked adjectives, Harris (1973) notes, “Many of the distributions had a lower bound of zero and an unlimited, or at least far more indefinite, upward bound.” Gretchen, Chapman, and Johnson (1994) showed that implausibly large anchors had a smaller effect than more reasonable anchors. From a markedness perspective, Tribushinina (2009) highlights the importance of zero as a lower bound on marked terms. As the authors note, the zero reference point can account for markedness asymmetry because a *marked* term such as *short* is bound by zero, but an *unmarked* term such as *tall* can range to infinity. In order to control for this artifact, an upper bound is incorporated to limit numerical estimates that range towards infinity in both anchoring and markedness cues. Given potential relations between explicit (“3 days only”) and implicit (“limited time only”) scarcity (Spears, 2001), it is hypothesized that implicit cues (i.e., markedness) generate a stronger sense of scarcity a subsequently willingness to pay (Cialdini 1993).

H5A: The unmarked (marked) frame will result in significantly higher (lower) estimates of willingness to pay.

H5B: The unmarked (marked) frame will result in significantly higher [lower] perceptions of scarcity than the high (low) anchor.

Method

Two hundred and sixty nine adults (66% male; M_{age} = 30 years) were recruited via Amazon’s mTurk to participate in the study. The study utilized a 3 (markedness: marked vs. unmarked vs. neutral) by 3 (numerical anchor: high vs. low vs. none) between-subjects design in a mathematically constrained (i.e., scarce) scenario. Respondents saw a variation of the following scenario depending on condition:

> *Imagine your favorite basketball team is playing at a nearby venue that seats 10,000 people. The team releases the following statement:*
> *"We are expecting a [small/big/none] crowd of [2,000/8,000/none] people."*

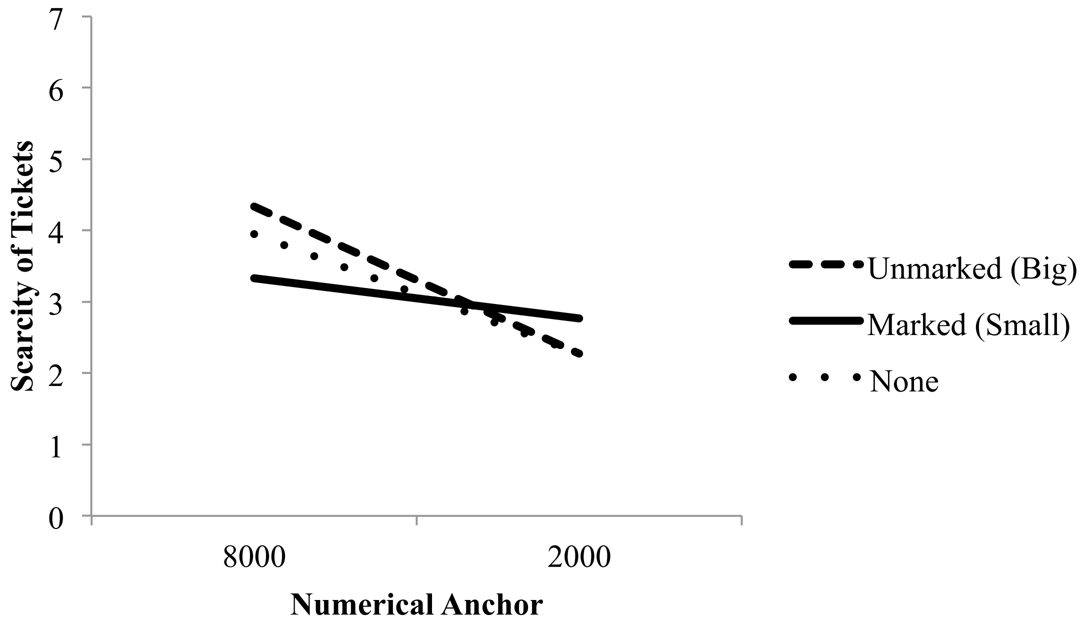
Dependent variables included estimates of attendance, willingness to pay for a ticket, purchase intention, likelihood of attending the event and perceptions of scarcity. The scarcity questions, based on Aguirre-Rodriguez (2013), included "Tickets to the game are in limited supply." and "Tickets to the game are in high demand." with responses on a Likert scale (1 = strongly disagree; 7 = strongly agree). The additional dependent variables were included in order to study the effects of anchoring and markedness in one modality (i.e., crowd size) on numerical judgments (i.e., willingness to pay) in another modality. Furthermore, the addition of willingness to pay as a dependent variable further strengthens the marketing applicability of the proposed research on markedness and anchoring theories.

Results

Given inconsistencies in phrasing associated with the no anchor and no adjective condition, the analysis was reduced to focus on a 3 (markedness: marked vs. unmarked vs. neutral) by 2 (numerical anchor: high vs. low) between-subjects design. There was a significant main effect of anchoring on expected attendance, $F(1,183) = 575.91$, $p = .000$, but no main effect of markedness, $F(2,183) = .871$, $p = .420$, nor any interaction effect $F(2,183) = .635$, $p = .531$. There was a significant main effect of the numerical anchor on willingness to pay ($F(1,183) = 5.49$, $p = .020$) but no significant main effect of markedness, $F(2,183) = 1.16$, $p = .316$, nor interaction effect $F(2,183) = .658$, $p = .519$.

Scarcity. In spite of no effect of markedness on expected attendance or willingness to pay, there was a significant interaction effect between markedness and anchoring on perceived scarcity of tickets, $F(2,177) = 4.92$, $p = .008$. As shown in figure 4, in the high anchor condition, the unmarked adjective resulted in significantly higher perceptions of scarcity ($M = 4.34$, $SD = 1.22$) than the marked condition ($M = 3.33$, $SD = 1.15$), $F(2,89) = 4.29$, $p = .017$. There was no significant difference, however, between the unmarked condition and the neutral (no adjective) condition ($p = .500$). In the low anchor condition, there was no significant effect of markedness, $F(2,87) = 1.27$, $p = .287$.

Figure 4. Interaction between markedness and anchor on perceptions of ticket scarcity (study 5)



Discussion

The hypotheses for study 5 were generally not supported, and there are a variety of potential reasons why study 5 did not result in many meaningfully significant findings. As discussed, including a constraint reduces the amount of variance as all of the frames included an expected attendance combined with a capacity for the venue. Thus, respondents presumably had very high knowledge or awareness of the ticketing situation for the event. As such, there was no significant main effect of markedness on willingness to pay or estimates of attendance, thereby failing to support hypothesis 5a.

Another important distinction with study 5 is the source of the message. In terms of estimated attendance, the team provided explicit numerical information and, as a result, the effect of the adjective cues (*big* and *small*) was mitigated. A quick review of the study shows that, when no numerical information is present, expecting a big crowd versus small crowd results in significant differences in attendance estimates and scarcity. Finally, the study raises an interesting question about the effect of the capacity constraint. The results would likely be different without a capacity because *big* versus *small* would provide additional information to the user regarding scarcity of tickets.

The most meaningful result is the interaction between markedness and anchoring on perceptions of scarcity (see figure 4), thereby providing partial support for hypothesis 5b. In spite of numerical information, or explicit scarcity, remaining the same using the word *big* or *small* resulted in significantly different perceptions of scarcity in the high anchor condition. The effect may occur because respondents in the low anchor condition (2,000) are more certain about the (lack of) scarcity and thus are not receptive to additional cues, but in the high anchor condition (8,000) the scarcity is a bit unclear and thus respondents rely on the qualitative cues for help.

An alternative, and a more theoretically driven explanation, is the marked term (small) is linguistically more powerful and thus decrease perceptions of scarcity but the unmarked term cannot increase the numerical estimate. For example, in the high anchor (8000) condition, perceptions of scarcity may be lower in the marked condition because of the marked, and powerful nature of *small*. Following the same reasoning, in the low anchor condition (2000), the unmarked condition cannot increase perceptions of scarcity because of the default, and subsequently less powerful, nature of *big*. The linguistic power, and subsequent potential for asymmetric responses, is explored further in subsequent studies.

Study 6: Markedness + Anchoring + Temporal Unit Framing

How many hours are there in a day? The answer, as almost any consumer knows, is 24. How many hours are there in a year? While the answer can be mathematically calculated, it is not as salient in the minds of consumers (answer is 8,760). Traditional anchoring studies typically involve little or no salient numerical constraint given questions such as the record high temperature for a day in Seattle, Washington (Wegener et al. 2001; Blankenship et al. 2008), the year George Washington was elected president (Epley and Gilovich 2001, 2005, 2006), and length of the Mississippi River (Jacowitz and Kahneman 1995; Epley and Gilovich 2006). In the traditional anchoring example, the respondent is tasked with estimating a given value from a theoretically unlimited number of possibilities. Consider an estimation task based on the length of a whale in meters, which has previously been used (Strack and Mussweiler 1997; Mussweiler and Strack 2000). Mussweiler and Strack (2000) designed a study using plausible versus implausible anchors to show the diminishing returns of anchoring beyond a plausible limit. The authors define plausible as a "target with a value that lies within the distribution of possible values for the target" (p. 499). This definition emphasizes the mental plausibility of a number and not the mathematical possibility of a number. Assume a person estimates that a whale is 10 meters long. What does that suggest the whale is not? 11 meters. 100 meters. 1,000 meters. Contrast this problem with a judgment in a constrained setting (e. g., hours in a day). For example, consider the following two questions:

(A) How many hours *per day* does the average person spend watching television?

(B) How many hours *per year* does the average person spend watching television?

Assume the estimate of time the average TV *is watched* is for 5 hours per day. What does that suggest about the time the TV is not watched (i.e., off)? There is only one answer. Simple math (24 – 5 = 19) suggests the person estimates the TV *is not* watched for 19 hours per day. Negated adjectives, such as *not on*, can influence perceptions in counter intuitive ways, such as a mitigated sense of the alternative, which in this example would be *off* (see Bianchi, Savardi, Burro, and Torquati, 2011; Fraenkel and Schul, 2008; Paradis and Willners, 2006; Schul, 2011). Although knowledge may effect susceptibility to the anchor (Wilson, Houston, Etling, and Brekke, 1996), there are other ways to ask questions with mathematical constraints (e. g., hours per day vs. hours per year) where knowledge may not be as strong due to difficulty in calculations or numerical processing.

Hours per day can be mathematically converted to hours per year, but it raises an interesting point, as previously discussed, about logical versus informational equivalence (McKenzie and Nelson 2003). In addition, exploring unit framing builds on other research on temporal construal/distance (Monga and Bagchi 2012) in studies on quantitative expressions by incorporating conflicting distances (hours and years). Study 5 is designed to determine the effect of constraints on markedness while incorporating potential knowledge effects (Wilson, Houston, Etling, and Brekke, 1996) given differences in unit presentation. Thus:

H6: The unmarked (marked) condition will result in significantly higher (lower) estimates. The effect will be magnified as the units become more granular.

Method

Four hundred and sixty five adults (64% male; M_{age} = 30 years) participated via Amazon's mTurk. The study utilized a 2 (Markedness: Marked vs. Unmarked) by 2 (First Unit: Minutes vs. Hours) by 2 (Second Unit: Per Day vs. Per Year) between-subjects design. The goal was to illustrate the effects of markedness when a constraint is clear (i.e., hours per day) and when units are not (i.e., minutes per year). For example, depending on the condition the respondent was randomly assigned, they saw:

> *How [few/many] [minutes/hours] per [day/year] does the average person spend watching television?*

The goal of the study is to look at the interaction of markedness when the salience of the unit constraint is different. Given there are only 24 hours in a day and 8,760 hours in a year, the mathematical constraints may limit the effect of markedness depending on how the units are communicated. Furthermore, the study tests *few* and *many* in a consumer situation to better show the effect across a variety of markedness pairs and marketing scenarios.

Results

Numerical Estimate. There was a marginally significant main effect of markedness, $F(1,470) = 3.19$, $p = .075$, a significant main effect of first unit (minutes/hours), *F*(1,470) = 25.14, *p* < .001, and second unit (per day/per year), *F*(1,470) = 42.24, *p* < .001, on numerical estimates of the amount of time spent watching television. On a per day basis, respondents in the unmarked condition (*M* = 2.52, *SD* = 2.13) made higher estimates than those estimates in the marked condition (*M* = 2.19, *SD* = 2.16). In addition, there was a significant interaction between markedness and the second unit (per day/per year), *F*(1,470) = 8.71, *p* = .003, and a significant interaction between the first (minutes/hours) unit and the second unit (per day/per year), *F*(1,470) = 6.30 *p* = .012. Figure 5 shows the markedness and second unit interaction while figure 6 illustrates the estimated hours of television viewing by conditions.

Figure 5. Interaction between markedness and second unit on estimated hours of television viewing. Normalized to hours per day equivalent for ease of interpretation (study 6)

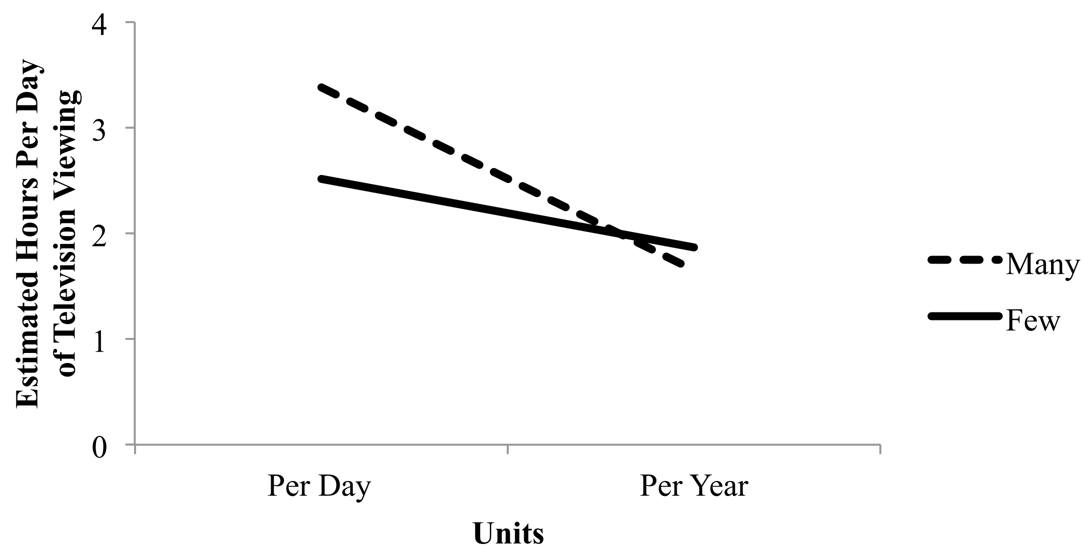
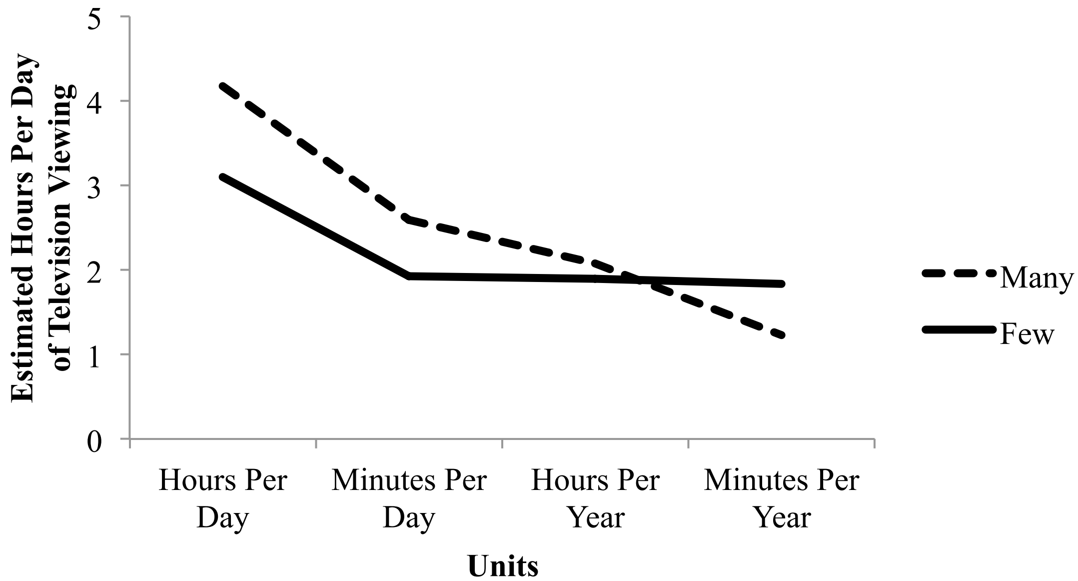


Figure 6. Estimates of hours spent watching television.
Normalized to hours per day equivalent for ease of interpretation
(study 6)



Response Time. There was no main effect of markedness (F(1,470) = .011, p = .916) on response time. There was, however, a main effect of the second unit (per day/per year), F(1,470) = 21.81 p < .001, but not the first unit, F(1,470) = 1.31, p = .254. There were no significant interactions (all p's > .08).

Discussion

Study 6 shows how markedness works in another context, television viewing, and with other factors such as units. As figure 6 shows, the difference between the unmarked term and the marked term actually becomes smaller as the units get more granular, thereby rejecting hypothesis 6. The assumption was that cognitive load was highest in the minutes per year condition as, mathematically, it is tough to compute 60 minutes per hour times 24 hours per day times 365 days per year to make a numerical judgment. The response time was longest in the minutes per year condition, which confirms that the minutes per year condition required the most processing. The numerical estimates, however, suggest the biggest effect occurred in the hours per day condition.

As confirmed by the significant interaction between markedness and the second unit (per day/per year), markedness had a bigger effect in the per day condition than the per year condition. Again, this is surprising as the per year condition requires more cognitive processing which would presumably make the respondent more susceptible to the markedness differences as it has in other numerical judgment research (Blankenship et al. 2008).

Study 7: Markedness + Half Full/Empty

"Is the glass half full or half empty?"

The question is a staple of cultural wisdom purporting to reflect one's outlook on life. If the glass is *half full*, one is considered an optimist; but if the glass is *half empty*, one is considered a pessimist (Henninger 1944). From a strictly numerical perspective, or logical equivalence (Johnson-Laird and Shafir 1993; Shafir 1993), there is little argument that either way the glass has 50% of its maximum capacity. Recent academic literature, however, suggests that there may be more to this piece of cultural wisdom.

The prior research in this dissertation has focused on the effects of markedness on pairs such as *big* and *small*. Study 2 suggested that *big* results in larger numerical estimates than *small*. Study 7 now explores the same concept but utilizes *full* and *empty* in order to explore their linguistic differences. Consider the following examples:

(A) The arena is 75% full.

(B) The arena is 75% big.

Statement (A) is considered a linguistically acceptable statement as *full* is allowed to be numerically quantified (Holleman and Pander Maat 2009) unlike *big* (B). Similarly, stating "the arena is very full" seems to decrease the amount of fullness while stating "the arena is very big" increases the amount of big (Tribushinina 2011). Thus, it raises an interesting research question to determine the effects of markedness on different types of adjectives. Now consider these examples in a questioning context:

(C) How full is the arena?

(D) How empty is the arena?

In the above pair, (C) would be considered the unmarked condition while (D) would likely be considered the marked condition based on the frequency (Waugh 1982; Hume 2004, 2011), the preference for the unmarked term in question form (Lehrer 1985), and the goal of the arena being full (Holleman and Pander Maat 2009). Consider this new set of paired statements:

(E) The arena is full.

(F) The arena is empty.

In the above example, the numerical interpretation is straightforward. (E) suggests that the arena is at, or very near, 100% capacity while (F) suggests the arena is at, or very near 0% capacity based on linguistic interpretation of full and empty by Kennedy and McNally (2005). What happens, however, if you slightly alter the information with a numerical cue or qualifier? For example:

(G) The arena is half full.

(H) The arena is half empty.

The use of *half* brings full and empty to an equivalent level in terms of numerical information. An arena that is *half full* is 50% full and 50% empty, but an arena that is *half empty* is also 50% full and 50% empty. McKenzie and Nelson (2003) explored a similar framing relative to choice but focused on an actual glass:

> *Imagine a 4-ounce measure cup in front of you that is completely filled with water up to the 4-ounce line. You then leave the room briefly and come back to find that the water is now at the 2-ounce line. What is the most natural way to describe the cup now?*

In this particular listener scenario, respondents were more likely to describe the cup as *half empty* given it had previously been full, and *half full* when the cup was previously empty. In the same article, the author's varied the scenario so half full and half empty were used in the speaker's frame. In both studies, however, the half full versus half empty distinction came down to a choice or decision, as opposed to a judgment or numerical estimate of attendance.

Study 7 uses this premise to further explore the implications of markedness when additional information (e.g., *half*) bring the bidirectional cues to numerical equivalence, in addition to having the respondent indicate a numerical value based on the half full or half empty frame.

H7A: The unmarked (marked) term will result in significantly higher (lower) numerical estimates.

Furthermore, there is potential for another interesting interpretation of the half empty versus half full framing. Essentially no research has empirically looked at the force, or *rate of change*, of markedness as briefly discussed in future research suggestions by Holleman and Pander Maat (2009). Similarly, Moxey (2010, p. 130) conceptually suggests "half full should be more ambiguous in terms of information 'leaked' about the reference point while half empty should lead to a relatively strong bias towards full as the reference point". As an example, consider the following statements:

(I) The arena will be half full at halftime.

(J) The arena will be half empty at halftime.

The statements are numerically equivalent in terms of suggesting a 50% capacity but, consistent with Sher and McKenzie (2006), they do not appear to be informationally equivalent. Statement (I) seems to imply that the attendance will be *increasing* at the time halftime occurs, but (J) seems to imply that the attendance will be *decreasing*. Previous research has shown that a 2 oz. cup of water is described as *half empty* if it was previously full of 4 oz. of water but is described as *half full* if it previously was empty (McKenzie and Nelson 2003). The primary piece that previous research ignores, however, is the rate at which the increase or decrease is perceived. Similarly, previous research ignores the bidirectional asymmetry (i.e., *big* and *small* are not interpreted as complete opposites) associated with markedness that has previously been documented in this dissertation. In other words, *half empty* (J) may suggest that attendance in the arena is declining at a *faster* rate than when the half full frame (I) is used.

H7B: The unmarked (marked) term will result in significantly slower (faster) decline of attendance over time.

Method

One hundred and seven adults (72% male; M_{age} = 31 years) participated via Amazon mTurk. The study uses a simple markedness (Marked vs. Unmarked) between-subjects design. Respondents were presented with the following scenario:

Imagine you are thinking about going to a professional basketball game with a friend. A few days before the game, your friend says:

"The arena will probably be half [full/empty] at halftime."

Please indicate the number of people you think will be in the arena at each point of the game.

Respondents were then asked to indicate the number of people in the arena at four points in the game: first quarter, second quarter, third quarter, and fourth quarter. In addition, respondents were then asked a variety of questions including likelihood of attending, willingness to pay for a ticket, and a variety of scarcity scales adapted from previous research (Aggarwal et al. 2011; Aguirre-Rodriguez 2013) that were used previously in this dissertation. Dunegan (1993) suggested the use of *half empty* might result in more controlled and systematic decision processes. As such, response time was recorded to rule out processing differences between the two conditions.

Results

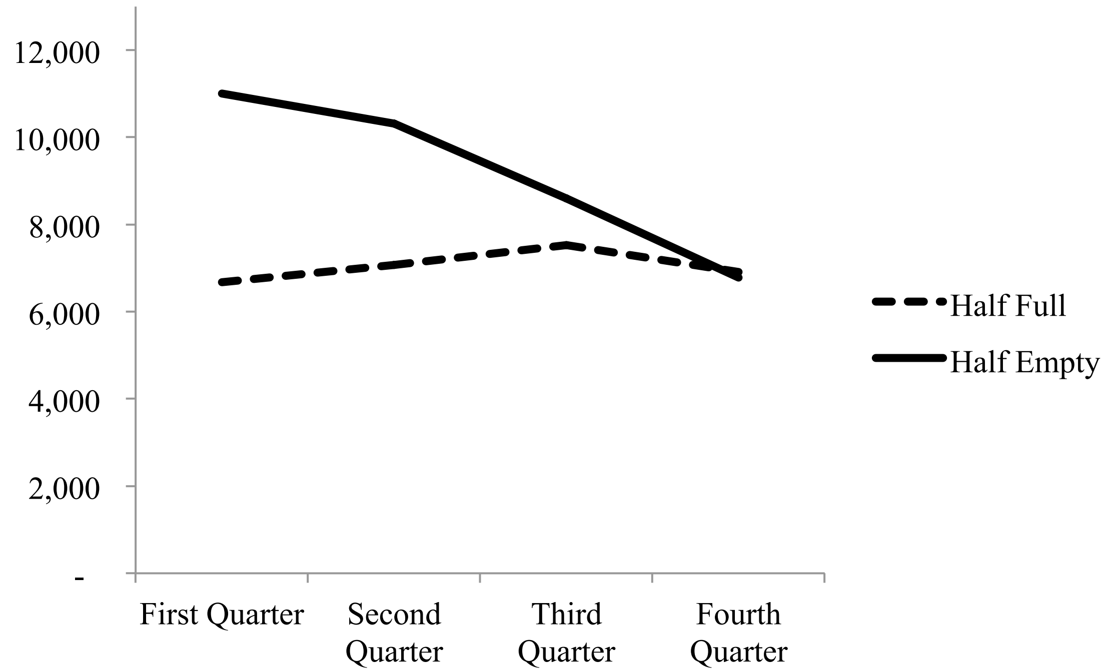
Numerical Estimate and Rate of Change. There was no significant main effect of markedness on numerical estimates, $F(1,105) = 1.84$, $p = .179$. However, there was a significant effect of quarter, $F(1,105) = 14.85$, $p < .001$ In addition, there was a significant interaction between markedness and quarter , $F(1,105) = 20.61$, $p < .001$, which confirms differences in the rate of change. Table 8 shows the means and standard deviations of estimates by markedness and quarter. In addition, figure 7 visually presents the results.

Other Dependent Variables. There was a significant effect on perceptions of competitiveness and closeness of the score of the game. Respondents in the unmarked (half full) condition indicated the game would be significantly closer and more competitive (M = 4.45, SD = 1.33) than respondents in the unmarked condition (M = 3.50, SD = 1.58), F(1,106) = 11.49, p = .001. There was, however, no significant difference between the final score estimates of the home team and away team, F(1,106) = 1.13, p = .289. Respondents in the half full condition perceived tickets as more scarce (M = 4.07, SD = 1.36), in contrast to respondents in the half empty condition (M = 3.12, SD = 1.56), F(1,106) = 11.51, p = .001. Finally, there was no significant difference in response time, F(1,106) = 1.24, p = .725.

Table 8. Estimates of crowd size by quarter and condition (study 7)

	Half Full			Half Empty		
	Mean	SD	N	Mean	SD	N
First Quarter	6,676	7,852	55	10,999	10,084	52
Second Quarter	7,076	8,199	55	10,313	8,988	52
Third Quarter	7,534	8,642	55	8,600	7,971	52
Fourth Quarter	6,914	8,355	55	6,783	6,851	52

Figure 7. Estimates of crowd size by quarter and condition (study 7)



Discussion

Study 7 is interesting for a variety of reasons. First, it illustrates how markedness effects numerical estimates at a point in time that was not referenced in the prompt. In other words, providing information about attendance at *halftime* (e.g., half full vs. half empty) resulted in significantly different numerical estimates in the *first quarter*. In addition, both scenarios provide numerically equivalent information (50% capacity) yet resulted in different numerical estimates, thereby partially supporting hypothesis 7a.

Second, the study illustrates that markedness not only effects numerical estimates, as shown in previous studies in this dissertation but also the slope of estimates over time. The half full condition resulted in similar numerical estimates throughout the game while the half empty condition resulted in significant decline in attendance estimates throughout the game. These results show that markedness not only effects numerical perceptions at one time but also effects rate of change over time, thereby supporting hypothesis 7b.

Third, the results further support the notion of information leakage (Sher and McKenzie 2006) in a variety of ways. As discussed, framing the arena as half full versus half empty resulted in significantly different numerical estimates in the first quarter, which shows that information is leaked. Stating, "The arena will be half empty at halftime," seems to suggest the arena will be declining in attendance, while stating "The arena will be half full at halftime" suggests attendance will be increasing, or at the very least, attendance will remain stable. Furthermore, inferences were drawn about the competitive nature of the game based on a description of attendance at halftime. Respondents in the *half full* condition assumed the game would be much more competitive than the *half empty* scenario. This further highlights a theory beyond information leakage as respondents drew different conclusions about the competitiveness of the game based on a frame.

Study 8: Markedness + Half Empty/Full + 20,000 Capacity

Study 8 is similar to study 7 in that both emphasize markedness in numerical perceptions but answer several pertinent questions: *What is the capacity of the arena? How does this additional numerical information influence attendance estimates?* Study 8 did not include any information about the capacity of the arena. Thus, including the capacity of the arena may put the emphasis back on the numerical interpretation (i.e., 50% of 20,000) as opposed to the linguistic cues inherent in the half empty vs. half full framing. For example:

(A) The arena holds 20,000 people. It will probably be half full at halftime.

(B) The arena holds 20,000 people. It will probably be half empty at halftime.

Similar to study 7, (A) and (B) once again are different in their markedness but incorporate a capacity which provides additional numerical information. Given that the numerical information references the capacity of the arena and not the expected attendance at halftime, although it can clearly be calculated, it leaves open the potential for markedness effects in the presence of numbers.

Method

One hundred and eleven adults (61% male; M_{age} = 29 years) were recruited via Amazon's mTurk. The study uses a very similar procedure to study 7 with a slight variation to include the capacity of the arena. For example, respondents were presented with the following scenario:

Imagine you are thinking about going to a professional basketball game with a friend. A few days before the game, your friend says:

"The arena holds 20,000 people. It will probably be half [full/empty] at halftime."

Please indicate the number of people you think will be in the arena at each point of the game.

Similar to study 7, respondents were then asked to indicate the number of people in the arena at four points in the game: first quarter, second quarter, third quarter, and fourth quarter. In addition, respondents were then asked a variety of questions including likelihood of attending, willingness to pay for a ticket, a variety of scarcity scales adapted from previous research (Aggarwal et al. 2011; Aguirre-Rodriguez 2013), and their perception of the competitiveness of the game. Dunegan (1993) suggested the use of half empty might result in more controlled and systematic decision processes. As such, response time was recorded once again to explore processing differences between the two conditions.

Results

Numerical Estimate and Rate of Change. There was a significant main effect of markedness on numerical estimates, $F(1,109) = 4.91$, $p < .029$, and quarter on numerical estimates, $F(1,121) = 7.51$, $p = .007$. Respondents in the unmarked condition estimated a significantly higher attendance ($M = 11,864$) than respondents in the marked (i.e., half empty) condition ($M = 9,377$). There was also a significant markedness and quarter interaction, $F(1,109) = 11.28$, $p = .001$, which confirms differences in the rate of change.

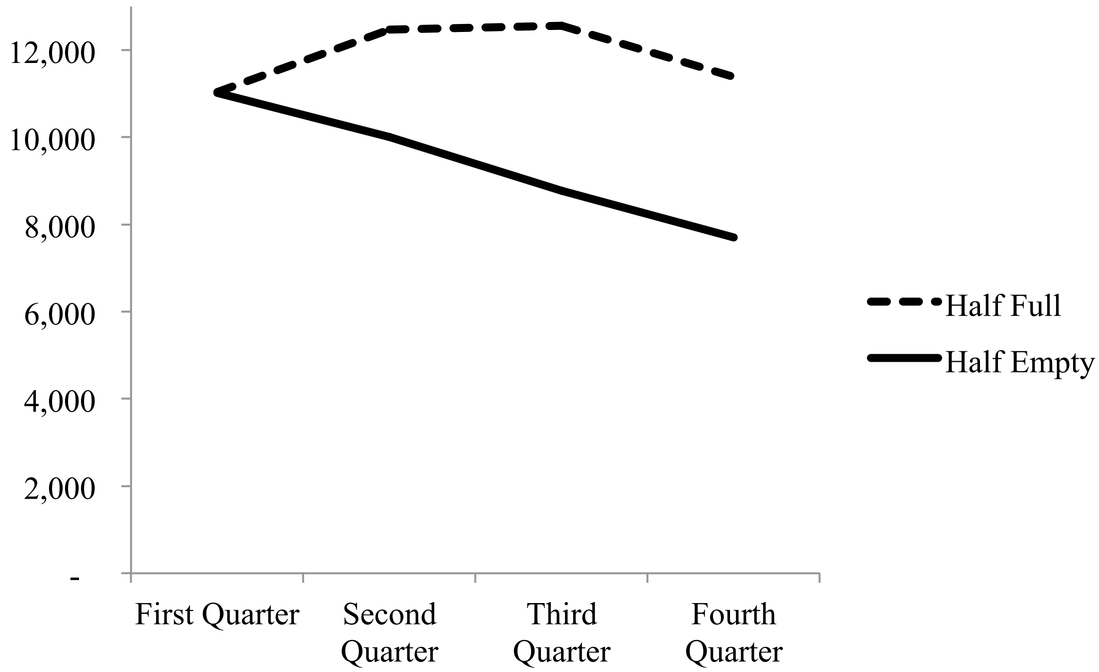
Table 9 shows the means and standard deviations of estimates by markedness and quarter, and figure 8 visually presents the results.

Other Dependent Variables. There was a significant main effect of markedness on perceptions of the competitiveness of the game, $F(1,110) = 10.57$, $p = .001$), and estimates of the difference of the final outcome, $F(1,110) = 7.39$, $p = .008$. Respondents in the unmarked condition estimated the home team would *win* the game by 6.43 points, but respondents in the marked condition estimated the home team would *lose* by 1.79 points. Furthermore, respondents in the unmarked condition perceived tickets as more scarce ($M = 4.09$, $SD = 1.43$) than respondents in the marked condition ($M = 3.22$, $SD = 1.52$), $F(1,110) = 9.61$, $p = .002$. Finally, there was no significant difference in response time between the two conditions, $F(1,110) = 2.52$, $p = .115$.

Table 9. Estimates of crowd size by quarter and condition (study 8)

	Half Full			Half Empty		
	Mean	SD	N	Mean	SD	N
First Quarter	11,039	5,972	55	11,025	7,217	56
Second Quarter	12,469	6,445	55	10,005	6,571	56
Third Quarter	12,559	6,539	55	8,778	5,892	56
Fourth Quarter	11,388	6,212	55	7,701	6,276	56

Figure 8. Estimates of crowd size by quarter and condition (study 8)



Discussion

Study 8 largely confirms the effects witnessed in study 7, thereby supporting hypotheses 7a and 7b. Rather than the additional numerical information removing the effect of the half empty versus half full framing, it confirms it. This study is uniquely different than study 7, for one primary reason: capacity. Although *half empty* still shows a significantly different rate of change than *half full*, the largest difference in numerical estimates occurs in the *fourth quarter* in this study rather than the *first quarter* in study 7. In other words, including the capacity of 20,000 moved the primary numerical estimate effect from the first quarter to the fourth quarter.

One potential theory is the capacity (20,000) provides a goal for the half full condition to reach but that goal does not apply to the half empty condition as it is assumed that attendance will decline over time. Another argument is the capacity (20,000) combined with half (50%) provides a starting point for a numerical estimate and thus respondents utilize the information for estimates in the first quarter. In study 7, with no capacity, the two conditions are perhaps more reliant on the linguistics cues as there is no clear numerical starting point based on the information provided.

Study 9: Markedness + Half Full/Empty + No Halftime

Study 9 once again attempts to test approaches to remove the effect of markedness. Study 8 looked at *adding* information (a number) to further emphasize the numerical component of the scenario. Study 9 aims to *subtract* information to test methods to remove the overall effect. To illustrate this, consider the following example:

(A) The arena will probably be half empty at halftime.
(B) The arena will probably be half empty.

In this context, (A) references half empty but seems to imply, as previous studies confirm, that a change is occurring. The other statement (B) seems to imply that no change is taking place and the arena will remain half empty throughout the game. As such, the following hypothesis is proposed:

H9: The unmarked (marked) term will result in significantly higher (lower) estimates of attendance.

Method

One hundred and nine adults (71% male; M_{age} = 31 years) participated via Amazon mTurk. Study 9 uses very similar condition wording to study 7 with one exception - "at halftime" is removed from the scenario:

Imagine you are thinking about going to a professional basketball game with a friend. A few days before the game, your friend says:

"The arena will probably be half [full/empty]."

Please indicate the number of people you think will be in the arena at each point of the game.

Results

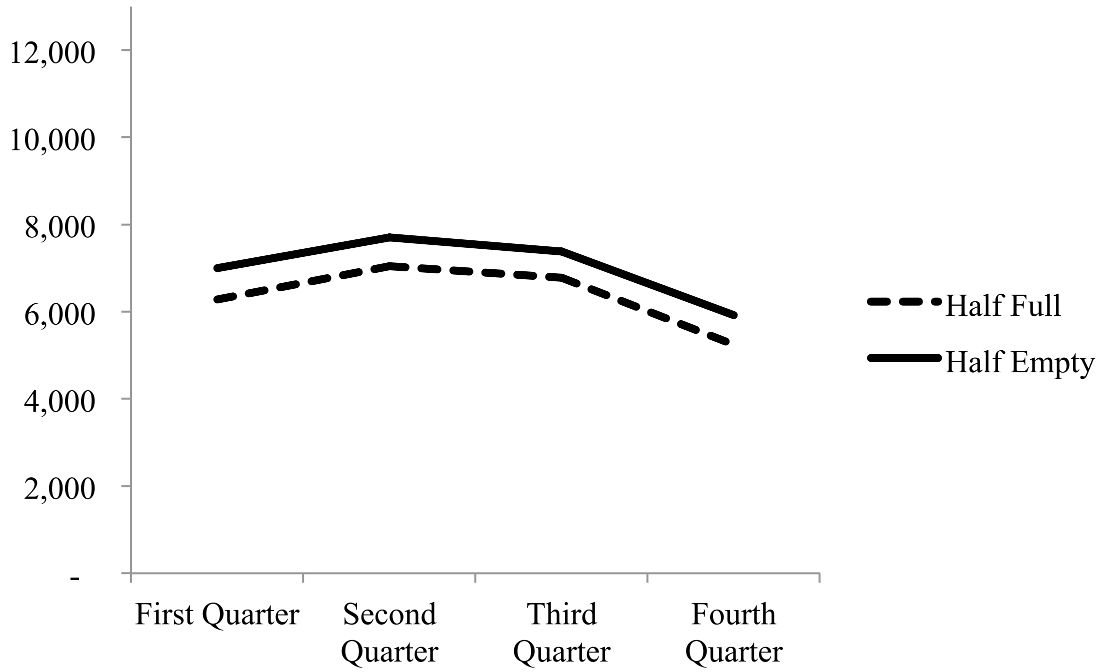
Numerical Estimate and Rate of Change. There was no significant effect of markedness on numerical estimates, $F(1,107) = .355$, $p = .553$. There was a significant effect of quarter, $F(1,107) = 9.79$, $p = .002$. Finally, there was no significant markedness and quarter interaction, $F(1,107) = .007$, $p = .935$, suggesting markedness did not effect the rate of attendance over time. Table 10 shows the means and standard deviations, and figure 9 illustrates the numerical estimates of attendance in each quarter by markedness.

Other Dependent Variables. There was no significant main effect of markedness on perceptions of the competitiveness of the game, $F(1,108) = 1.50$, $p = .223$. There was a marginal effect of markedness on estimates of the difference of the final score, $F(1,107) = 2.81$, $p = .097$. Interestingly, respondents in the unmarked (i.e., half full) condition estimated the home team would win the game by 2.04 points while respondents in the marked condition estimated the home team would win the game by 5.67 points. In addition, in spite of no significant difference in attendance estimates, respondents in the unmarked condition perceived tickets as more scarce ($M = 3.59$, $SD = 1.62$) than respondents in the marked condition ($M = 2.76$, $SD = 1.43$), $F(1,108) = 7.91$, $p = .006$. Finally, there was no significant difference in response time between the two conditions, $F(1, 107) = 1.18$, $p = .280$.

Table 10. Estimates of crowd size by quarter and condition (study 9)

	Half Full			Half Empty		
	Mean	SD	N	Mean	SD	N
First Quarter	6,276	5,836	52	6,996	5,964	57
Second Quarter	7,050	6,130	52	7,699	6,747	57
Third Quarter	6,786	5,827	52	7,384	6,789	57
Fourth Quarter	5,245	4,761	52	5,921	5,720	57

Figure 9. Estimates of crowd size by quarter and condition (study 9)



Discussion

Study 9 removes the effect experience in studies 7 and 8. The only difference between the previous studies is the removal of "at halftime" from the scenario. The combination of the three studies highlights the importance of having a point at which the arena is *half empty* or *half full*. As discussed, stating, "The arena will probably be half full [half empty]," seems to imply the arena is always that way as opposed to, "The arena will probably be half full [half empty] at halftime," which suggests significant change occurs at halftime. Although markedness did not effect overall numerical estimates in the study, additional information was still communicated, or *leaked* (Sher and McKenzie 2006). Differences in perceptions of scarcity and estimates of the final score were observed, which further illustrates that, in spite of the frame providing information on attendance, information is leaked that significantly influences perceptions of related inference such as scarcity and score of the game, thereby supporting hypothesis 9.

Study 10: Markedness + Half Empty/Full + 10,000 Capacity

Study 10 is similar to study 8 in emphasizing markedness in numerical perceptions but answers a pertinent question: *How does changing the reference point effect how unmarked and marked terms operate?* Study 7 suggests that the reference point for an arena is roughly 16,000 based on the average halftime attendance prediction being 8,300. Study 8 showed how the reference point could be moved upward based on a provided capacity of 20,000. Study 10 aims to manipulate the reference point by stating a lower arena capacity. Given respondents in the half full condition estimated attendance as high as 12,559, from an absolute numerical perspective, they presumably believe that an arena that seats 10,000 could sell out. As such, the *half full* condition may experience a more positive slope, but the *half empty* frame may not work as well given a professional basketball game with less than 5,000 seems unreasonable.

Method

One hundred and five adults (69% male; M_{age} = 29 years) were recruited via Amazon's mTurk. Study 10 uses an identical setup to study 8 with one change: the capacity of the arena is reduced to 10,000.

Imagine you are thinking about going to a professional basketball game with a friend. A few days before the game, your friend says:

"The arena holds 10,000 people. It will probably be half [full/empty] at halftime."

Please indicate the number of people you think will be in the arena at each point of the game.

The same dependent variables used in the previous three studies are used in study 10 including numerical estimates in each quarter, competitiveness of the game, and scarcity of tickets.

Results

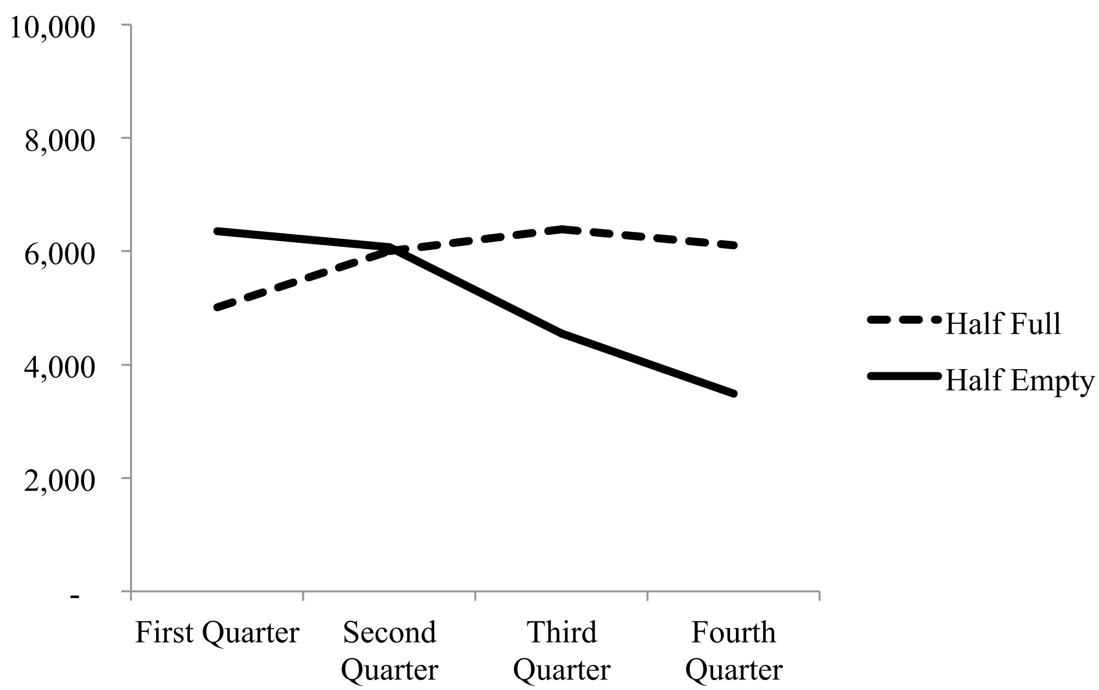
Numerical Estimate and Rate of Change. There was no significant main effect of markedness on numerical estimates, $F(1,103) = 2.30$, $p = .132$. However, there was a significant effect of quarter $F(1,103) = 8.66$, $p = .004$. Finally, there was a significant markedness and quarter interaction, $F(1,103) = 2.30$, $p < .001$, suggesting markedness influenced the rate of attendance over time. Table 11 shows the means and standard deviations, and figure 10 illustrates the numerical estimates of attendance in each quarter by markedness.

Other Dependent Variables. There was a significant main effect of markedness on perceptions of the competitiveness of the game, $F(1,104) = 5.48$, $p = .021$. There was no significant effect of markedness on estimates of the difference of the final score, $F(1,104) = .028$, $p = .868$, nor a significant difference in the perceived scarcity of tickets, $F(1,103) = 2.50$, $p = .117$. Finally, there was no significant difference in response time between the two conditions, $F(1,104) = .327$, $p = .569$.

Table 11. Estimates of crowd size by quarter and condition (study 10)

	Half Full			Half Empty		
	Mean	SD	N	Mean	SD	N
First Quarter	5,008	2,713	54	6,351	3,657	51
Second Quarter	6,008	2,773	54	6,071	3,365	51
Third Quarter	6,384	2,879	54	4,545	2,565	51
Fourth Quarter	6,111	3,052	54	3,486	2,245	51

Figure 10. Estimates of crowd size by quarter and condition (study 10)



Discussion

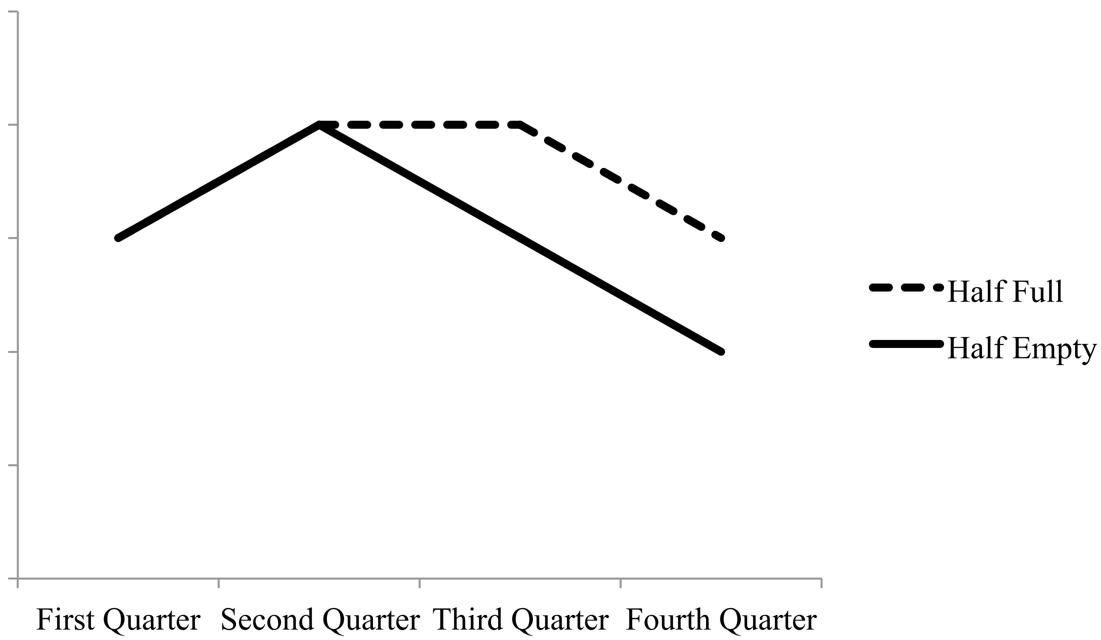
The three studies utilizing halftime (i.e., studies 7, 8, and 10) generate substantial new information and theories on markedness and adjectives. The studies on *half empty* and *half full* confirm a couple theories:

1. The *half full* condition must never end *below* 50%.
2. The *half empty* condition must never end *above* 50%.

The question is, “Why?” Half full does not end below the reference point because that would violate the term. *Half* implies 50%, but *full* implies 100%. Thus, the numerical estimate for *half full* must fall between 50% and 100%, which is confirmed in study 8 and study 10. Similarly, empty implies 0% and thus *half empty* must fall between 50% and 0%. Where this result does not hold true is the first half of the game, *before* the time at which the reference information is pertinent. Combined with the goal of an arena being *full*, the half *empty* condition remains above the reference point in the first half.

In the three studies referencing halftime, and regardless of the capacity provided, the *half empty* term resulted in an attendance decline in *every* quarter. If *half empty* and *half full* were both numerically and informationally equivalent, the patterns of attendance over the four quarters would look nearly identical or, at the very least, exhibit similar behavior up until the point new information is provided (halftime) and then change course as illustrated in figure 11.

Figure 11. Illustration of intuition based on provided information in prompt



The results of the three studies, however, confirm otherwise. *Full* is unmarked given it is the more positive term and consistent with the goal of filling an arena (Holleman and Pander Maat 2009), but *empty* is the marked term. This result leads to another theory that is confirmed by the three studies.

3. *Marked terms, such as half empty, are inherently more meaningful and thus continually reflect a rate of change consistent with that term.*

The argument is that an unmarked term does not carry enough information because it is used frequently and represents the goal; hence, it is loses its meaning. Similar to “How tall are you?” losing any suggestion of the magnitude of a person’s height, *half full* operates in a similar fashion. Conversely, *half empty* is similar to asking "How short are you?", and thus carries additional magnitude related information that is showcased in the previous studies. The experiments in Chapter III illustrate the power of a markedness approach and present an opportunity for new theory on numeric judgment that is discussed in Chapter IV.

CHAPTER IV

THEORETICAL AND MANAGERIAL IMPLICATIONS

Study Summaries

This dissertation incorporated ten studies with a progressive goal of further understanding the role of markedness on numerical perceptions. The first study aimed to confirm theoretical arguments that frequency of language use is a component of markedness (Greenberg 2005). A modern method, Google Trends, was used to explore this question given it's use in predicting disease outbreak (Polgreen et al. 2008; Carneiro and Mylonakis 2009) and economic indicators (Choi and Varian 2012) among other consumer related scenarios. The results showed that *unmarked* terms were searched more frequently than *marked* terms. This finding was a critical first step as the remainder of the dissertation builds off the assumption that markedness is a prevalent component of interpersonal communication and, subsequently, marketing communication.

Once one of the primary tenets of markedness, frequency, had been illustrated in study 1, the next couple studies focused on *how* word usage effects numerical perceptions. Study 2 incorporated a design to test an *unmarked* term, *marked* term, and also a more neutral term to illustrate how word choice effects numerical perceptions. As hypothesized, the unmarked term resulted in larger numerical estimates than the marked term. Furthermore, there were no significant differences between the unmarked term and the neutral term. As discussed, this result is similar to asking a person "How tall are you?" versus "What is your height?" Study 2 confirmed the unique relationship between unmarked, marked, and a neutral framing associated with markedness and opened the door for further exploration of additional effects or variables that may play a role in understanding linguistic cues.

Given the intertwining of words and numbers discussed in the literature review, study 3 was developed to explore how markedness interacts with other numerical based theories such as anchoring. One limitation of study 2 was that no numbers were present, and thus the respondent was solely relying on word cues. Study 3 illustrates that even when numbers (or anchors) are present, markedness effects still occur. At a broader level, the results from study 3 continued to support the premise of this dissertation, which is that markedness effects perceptions in a unique fashion.

The previous studies (studies 1-3) established that frequency was a component of markedness and markedness effected numerical estimates. Study 4 aimed to explore whether markedness and adjectives effect the *range* of potential estimates. Admittedly, there are other ways to test this theory but one additional goal was to move away from the question form of the previous two studies. Study 4 confirmed that people perceive a smaller range of numbers in the marked condition than in the unmarked condition. The results have implications not only for markedness research but other prominent consumer research theories such as latitude of acceptance (Hovland et al. 1957; Simonson et al. 2013). This finding goes beyond traditional framing literature to provide a theory, markedness, to argue why one word over another results in a significantly smaller consideration of numerical possibilities.

The goal of study 5 was to further explore markedness in a more real world scenario while also exploring effects beyond numerical estimates. Furthermore, study 5 used capacity as a constraint due to similarities between how unmarked (Tribushinina 2009) and high anchors (Jacowitz and Kahneman 1995) are interpreted. As discussed, both unmarked terms (e.g., *big*) and high anchors (e.g., 8,000) guide a user to consider an unlimited range of upward possibilities. Adding a capacity constraint, however, reduces the ability to consider an unlimited range of numbers. Although the results of study 5 were disappointing relative to expectations, it sparked a meaningful direction for future studies including a temporal component and further exploration of capacity constraints. For example, it inspired the question, "How does markedness effect numerical perceptions over perceived time (i.e. unit framing) and actual time (e.g., first quarter to fourth quarter)?" Furthermore, study 5 suggested an effect of capacity on numerical perceptions. Both time and capacity, in addition to markedness, became key components of the effects witnessed in the remainder of the studies (studies 6-10).

Study 6 began further exploration of capacity constraints. As discussed, study 6 incorporated an actual capacity constraint (hours per day), but the perception of the capacity is changed based on the units that are used (e.g., hours per day versus minutes per year). In other words, there is a numerical constraint to the number of hours someone could watch television in a given time period (e.g., 24 hours per day). Changing the units in which the question is framed, however, changes the understanding of the capacity constraint. Interestingly, markedness effects were stronger when respondents were asked to indicate the number of *hours per day* the average person watches television compared to the number of *minutes per year*. As shown in the results for study 6, both scenarios are mathematically constrained (e.g., 24 hours in a day and 525,600 minutes in a year), yet markedness effects are different depending on the temporal framing.

Study 7 marks a slight transition to a scenario, *half empty* versus *half full*, in which the numerical interpretation, 50%, is identical. In doing so, it further controls the numerical information present in the frame and highlights the potential for linguistic cues to effect perceptions. Study 7 showed the counterintuitive effects of using an unmarked (half full) versus a marked (half empty) frame. Furthermore, not only did the frame, which communicates *numerically* equivalent information on attendance, effect perceptions of attendance, but the frame also influenced the perceived scarcity of tickets and competitiveness of the game. One question unaddressed in study 7 was the capacity of the arena, which was the inspiration behind study 8.

The impetus behind study 8 was the potential for a number (20,000) to negate the effect of word cues. The results from study 8, however, still show a strong difference between half full (unmarked) and half empty (marked) on estimates of crowd size throughout the game. Furthermore, the framing drastically effected perceptions of the final score of the game as respondents in the unmarked condition estimated the home team would win by 6.43 points while respondents in the marked condition estimated the home team would lose by 1.79 points. Study 8 highlights a spillover effect associated with markedness as information on attendance spilled over to effect perceptions of the game.

The goal behind study 9 was to remove the effect seen in studies 7 and 8. Study 9 removed the "at half time" component of the scenario and highlighted the temporal aspect of the effects in studies 7 and 8. Stating "at halftime" communicates that a change will likely occur at that point. In other words, this conversational cue breaks the perceived pattern of what a user would expect the attendance to look like over time as it indicates a specific point in time when a change is expected. Thus, the strong *half empty* versus *half full* effect seen in studies 7 and 8 was not present in study 9.

Study 10 further explores the power of *half full* versus *half empty* by introducing a lower capacity constraint of 10,000. The idea was to reduce the capacity constraint enough to where *half empty* might not be as effective. In other words, 5,000 fans, representing 50% of the 10,000 capacity, is not very many for a professional basketball game and thus the *half empty* framing might not have as strong of a negative effect as observed in the previous studies. Although the reduced capacity shifted the interaction from the first quarter to the second quarter, the general conclusions and power of *half empty* versus *half f*ull framing remained the same. Regardless of whether there was no capacity (study 7), a capacity of 20,000 (study 8), or a capacity of 10,000 (study 10) there were still strong differences in the perceived attendance over the course of the game. In spite of the scenario only referencing attendance, respondents inferred additional information about the competitiveness of the game.

The studies in this dissertation were structured in a manner that illustrated how markedness plays out in the real world (study 1), tested how markedness effects numerical perceptions in a single point in time (studies 2-5), and finally added a temporal component (studies 6-10). Although not every study led to the expected results, the progression of studies was critical to better understanding linguistic cues and exploring new angles (e.g. temporal, competitiveness of the game, etc.) to further advance a markedness approach to consumer behavior.

Major Conceptual Contribution

The primary goal of this dissertation was to illustrate the effect of language on how people perceive and estimate numbers. This dissertation shows how markedness and language cues influence:

1. Numerical estimates at a single point in time (studies 2 through 4).
2. Numerical estimates over time (studies 6, 7, 8, and 10).
3. Additional inferences associated with the task (studies 6 through 10).

For example, language influenced attendance estimates at one point in time (a game), estimates over a period of time (four quarters throughout a game), and other judgments associated with the situation (score and competitiveness of the game). From a theoretical perspective, there are several takeaways from the studies presented in this research:

1. The marked frame cues a strong response
2. The marked response is opposing and asymmetric
3. The marked frame spreads meaningful information regarding other judgments
4. The marked response transcends the point in time of the cue

The *curveball effect* is proposed as a simple, marketing friendly, term that represents a response that is opposing, asymmetric, carried out over perceived time, and influences other inferences associated with the scenario. Much like a fastball is the default, or unmarked, pitch in a baseball game, a curveball, or marked, pitch alters the predicted sequence of events. Furthermore, a curveball often spills over to other aspects of the game (runners stealing, etc.) and thus is consistent with the effects seen in study 6 through study 10.

Consumers have an expectation of a particular sequence. In a sporting event context, consumers expect fans will enter the arena, stay for a while, and then exit. Thus, in the *half full* condition responses follow a typical sequence of event attendance. Crowd size rises early on, stabilizes toward the middle of the game, and falls toward the end. *Half empty*, on the other hand, does not follow this typical sequence but behaves as if a *curveball* was thrown. The *curveball effect*, is more than "information leakage" (Sher and McKenzie 2006) and builds on markedness (Holleman and Pander Maat 2009) because the language cue influences responses over a period of time, in an asymmetric fashion, and spills over to alter other perceptions associated with the situation such as the competitiveness of the game.

Implications For Introduced Theories

A variety of theories have been discussed in this dissertation. This section addresses the viability of each in the context of the results of this program of research.

Markedness

Markedness was the central focus of this dissertation and, based on the studies in Chapter III, represents a very powerful theoretical approach to consumer judgment. Although discussed in further detail below, virtually every study in this dissertation illustrated a markedness effect. The most profound are the latter studies that incorporate numerical equivalence (50%) but subtle linguistics differences in the *half empty* versus *half full* framing. Effects of markedness resulted in strikingly different estimates of attendance, perceived scarcity of tickets, and perceived competitiveness of the game. Although markedness was the primary theory of this dissertation, and discussed in more detail later in this chapter, the results from Chapter III have implications for several other theories as well.

Anchoring

Anchoring remains a very prominent theory and there is little in this dissertation that disputes its powerful effect. Study 3 showed the power of an anchor on numerical estimates which is consistent with past anchoring research such as Jacowitz and Kahneman (1995). Where this dissertation potentially raises questions regarding anchoring is in studies 7, 8 and 10. These studies effectively anchor the respondent at 50% attendance at halftime yet the numerical estimates vary greatly depending on the linguistic cues. For example, study 8 used a capacity of 20,000 which, given the *half empty* and *half full* scenario, indirectly anchored the respondent at 10,000 fans at halftime. The linguistic cues, however, drastically effected estimated of crowd size throughout the game and, in many cases, away from the numerical information provided in the scenario.

Processing Theories

Although not a key component of this dissertation, fuzzy trace theory represents an interesting explanation for how consumers process numbers and words. The studies show a varying preference for words and numbers. Study 3, for example, shows a strong effect of the number while study 8 shows a strong effect of the marked word. Furthermore, there was no indication that fluency, often associated with processing and response time (Schooler and Hertwig 2005; Oppenheimer 2008), played a role in the results. Response latency literature also suggests positive judgments are made more quickly than negative judgments (e.g. Herr and Page, 2004). If this outcome were the case, there would be a consistent pattern of response time differences in the studies assuming the unmarked term is generally considered positive while the marked term, in an adjective sense, is considered negative. For example, in study 2, there was no significant difference in response time between "How big is the average crowd…" and "How small is the average crowd…" in spite of numerical differences in attendance estimates. Similarly, System 1 versus System 2 processing is often measured via response time, and again, this dissertation did not illustrate any significant processing differences between conditions. Processing theories, and subsequently response time, remain an area worth studying to further determine the processing mechanisms behind the differences in numerical estimates displayed in this dissertation.

Latitude of Acceptance

Although markedness was the primary focus of this dissertation, latitude of acceptance may play a role, as study 4 suggests, in numerical perceptions. In study 4, respondents in the *marked* condition estimated a narrower range of crowd size than respondents in the *unmarked* condition. This falls in line with latitude of acceptance (Hovland et al. 1957; Simonson et al. 2013) which is described as "the range and concentration of task-acceptable comparisons" (Simonson et al., 2013, p. 140). Thus, study 4 illustrates a latitude of acceptance effect, and suggests linguistic cues may play an even larger role in the range of considerations in a judgment task.

Broader Theoretical Contributions

Markedness is a theory that is buried deep in our culture, our language, our life, and our marketing. It is more than just a fun effect that shows up when you ask people to estimate the crowd size at a football game. It is more than an unexpected result when you frame a scenario as *half empty* or *half full*. At a broad level, a markedness approach to marketing has major theoretical implications. In some ways markedness represents the default option of marketing. The power of the default option in choice has been well documented (Johnson and Goldstein 2003), and markedness represents a potentially similar corollary. Similar to Gricean norms (Grice 1975), people communicate in predictable ways. We talk in how *big* things are, not in how *small* things are. We ask how *many* of something there are, not how *few*. A markedness approach to marketing encourages academic researchers and marketing practitioners to pay closer attention to linguistic assumptions and cues in marketing efforts.

As Battistella (1990) points out, markedness appears in physical form too. We shake hands with our right hand, we salute with our right hand, and more often than not, we write with our right hand. In a sports context, take a pitcher for example. The assumption is that the pitcher is right-handed. What do we call a left-handed pitcher? A southpaw (Battistella 1996). How does this translate to marketing? Consider a baseball glove. Without any additional information, it is assumed the glove is for a person that throws right-handed. A glove for someone who throws left-handed is a special kind of glove. From a marketing perspective, gloves are not for a right-handed person and a left-handed person. A *glove* is for a right-handed person. A *left-handed glove* is for a left-handed person, because left-handed is unusual. We speak in default options, we market in default options, and this dissertation shows what can happen when we do not operate on the default assumption.

Given recent calls for a more systematic approach to "explore the interplay of numerical and conversational processes in context" (Zhang and Schwarz, 2012, p. 258) and to "form classes of units or quantities" (Monga and Bagchi, 2012, p. 196), this research uses a markedness approach to explore numerical judgments. Although not specifically emphasizing units, a markedness approach has potential implications for unit differences as well, given conversational preferences for selection of one unit (e.g., hours) over another unit (e.g., milliseconds). Markedness theory has vast implications beyond numerical processing and thus highlights the importance of a better understanding of linguistics cues within the marketing literature.

Other Contributions to Theory

This research makes several other theoretical contributions. First, in their typology of framing effects, Levin and colleagues (1998) argue that qualitative differences in linguistics may influence the results of frames. Although they propose a typology of framing effects (i.e., risky choice, attribute, and goal) and suggest linguistic variations may play a role, they only briefly discuss linguistic structure or categories (i.e., markedness) that may effect responses to frames. Furthermore, as these studies show, and in support of an information leakage (Sher and McKenzie 2006) approach, there is much more to framing from a linguistic and informational equivalence perspective than previously recognized by marketing literature.

A linguistics approach furthers marketing research by offering a classification system for various types of words and expressions that are often utilized in marketing efforts. Results from popular social psychology principles, such as the default option (Johnson and Goldstein 2003), have been interpreted differently when viewed from a linguistics based lens (McKenzie et al. 2006), given assumptions about the speaker's intent. There are likely many more results within the framing literature that could be re-evaluated based on a linguistics and markedness approach, given that the questions or scenarios may not be informationally equivalent (McKenzie and Nelson 2003) as shown in this dissertation.

Recent articles acknowledge a response asymmetry in like and dislike judgments (Herr and Page 2004; Herr et al. 2012) but do not explore the linguistic underpinnings of why such an effect may occur. Articles exploring a like versus dislike Likert scale would be remised to ignore the asymmetry associated with markedness and linguistics. As shown, responses to *big* and *small*, *many* and *few*, and *half full* and *half empty* are asymmetrical. The unmarked term (*big*, *many*, *full*) results in behavior that is consistent with a neutral frame, while the marked term (*small*, *few*, *empty*) results in significantly smaller estimates and differences in slope.

This research highlights the importance of considering qualitative cues (i.e., conversation cues) in the numeric judgment. As Critcher and Gilovich (2008) suggest in their work on incidental environmental anchors:

> *Modern environments assault us with numbers. Jersey numbers, model numbers, and restaurant names to be sure, but also street addresses, product names, and contestant ID numbers, all of which have the potential to incidentally and inadvertently influence unrelated numerical judgments.*

In Critcher and Gilovich's (2008) study, consumers estimated they would spend more money at a restaurant called Studio 97 than one called Studio 17. Based on the findings in this dissertation, would consumers be willing to spend less at a restaurant called Lower 97 versus Upper 97 or a restaurant called Studio 97 on Low Street versus Studio 97 on Elm Street? This research begins to explore the added effect qualitative words have on numerical perceptions and thus contributes to research on incidental environmental anchors as well.

Magnitude priming (Oppenheimer et al. 2008), which has been associated with numerical perceptions, is a promising direction of research and, when combined with linguistics cues, opens the door to look at potential stimuli that may indirectly effect product perceptions and willingness to pay. For example, what aspects of product labeling or marketing are not effective because they are used so often they lose their meaning? Words such as *big* and *tall* lose their meaning because they are used so frequently in communication. This research presents the opportunity to reexamine marketing communication from the lens of linguistics to determine whether language cues are really influencing consumers in the way marketers strive for.

The research in this dissertation also has implications for research on goals. The goal-gradient theory (Kivetz, Urminsky, and Zheng 2006) argues that the closer you are to a goal, the more motivated you are to finish. The goal gradient effect suggests that motivation increases as the distance to the goal decreases. In other words, a person will run faster if they are 1 mile away from a 10 mile goal as opposed to being 9 miles away. In a health context, one could extrapolate that a consumer will be more motivated to lose 10 pounds when they are 2 pounds away from his or her weight loss goal than when they are 8 pounds away. Based on the research in this dissertation, linguistic cues, although logically equivalent, may leak additional information that effects motivation. Perhaps a person will be more motivated to participate in healthy behaviors when his or her weight loss is framed in how *few* pounds they have to reach their goal as opposed to how *many* pounds.

A similar, but orthogonal, theory is the small-area hypothesis (Koo and Fishbach 2012), which argues that the framing of the goal influences motivation. The small-area hypothesis distinguishes between a framing of actions that have already been completed toward a goal versus actions that have not yet been completed (Koo and Fishbach 2012).

For example, consider a loyalty card in which a consumer has completed 80% of the visits to achieve the goal versus needing 20% more visits to complete the goal. The small-area hypothesis suggests that users are more motivated to complete a goal when their attention is directed to the smaller size (whether 20% completed or 20% remaining). Again, linguistics cues such as "How *many* stamps…" versus "How *few* stamps…" to achieve a goal may influence consumer motivation.

Finally, this research provides a thorough overview of the theoretical underpinnings of quantitative and qualitative effects on numerical estimates. Similar to past reviews in top marketing journals on loyalty programs (e.g., Henderson, Beck, and Palmatier, 2011), signaling and product quality (Kirmani and Rao 2000), sponsorship (Cornwell, Weeks, and Roy 2005), or anchoring (Epley and Gilovich 2010), the literature review herein synthesizes multiple theories to show that numerical perceptions are more than just a number but incorporate a variety of other linguistic and conversational cues.

Opportunities for Future Research

This dissertation proposes several directions for further research of benefit to both the marketing and psychology literature.

Numerical Judgments

As discussed, markedness is largely a new concept in the marketing literature. As such, there are a plethora of future directions for the study of markedness in marketing and consumer behavior. Similarly, argumentative orientation and information leakage are relatively new to the marketing literature and combining the three (markedness, argumentative orientation, and information leakage), particularly given their relationship to each other, may yield interesting future studies. For example, in the *half empty* versus *half full* scenario, what other information may influence how the information is perceived? How do negations (Paradis and Willners 2006; Bianchi et al. 2011), units (Pandelaere et al. 2011; Monga and Bagchi 2012) and other linguistics cues interact with a markedness based approach to numerical judgments. A small piece of information results in the consumer drawing a wide array of inferences, and thus future research is needed to identify what other effects result from a slight change in a linguistic cue.

Emotions

There are many potential directions for further research exploring the relationship among linguistic cues, specifically markedness and emotions. Consider the example:

(A.) The arena is half full.

(B.) The arena is half empty.

Half full (A) seems to generate more positive emotions, or at least neutral emotions, than the half empty framing of (B). Future research may look at the emotional influence of markedness. Given there is an information asymmetry associated with the linguistic cues, is there also an emotional asymmetry? How might this be demonstrated?

There has been very little research integrating markedness and emotional scales such as PANAS (Watson, Clark, and Tellegen 1988) in marketing or psychology journals.

Processing Theories

The two primary processing theories discussed are both dual-processing theories but emphasize different aspects of processing. Tversky and Kahneman (1974) largely argue for a *fast* versus *slow* processing approach, while Reyna and Brainerd (1991) essentially argue for a *gist (words)* versus *verbatim (numbers)* approach. Although this research does not provide conclusive evidence to end the processing debate, or persuasion knowledge (Friestad and Wright 1994; Boush et al. 2009), it may provide additional information to advance the study of processing theories. Study 2 utilized two words that are considered antonyms, with one (*small*) being less common, yet the processing times were not significantly different. This seems to suggest, at the very least, that *big* and *small* are interpreted through the same processing path. Or that differences in processing theories need to be measured at a more granular or specific rate (hundredths of milliseconds) as opposed to more coarse response rates provided by survey software such as Qualtrics that is frequently used at universities. In addition, cognitive load (Sweller 1988) may play a role in how markedness and information leakage is perceived. Study 6 seemed to suggest that the more cognitive load (i.e. granularity of units), the smaller the effect of markedness. Cognitive load may decrease the effect of markedness as respondents are to cognitively busy to interpret semantic cues while making a judgment.

Marketing and Managerial Implications

Marketing is a discipline that is built on communication. In fact, the definition of marketing, according to the American Marketing Association (2013), incorporates communication:

> *Marketing is the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large.*

From a billboard on a highway to a commercial on a television and a banner ad on a website to a 140 character tweet in a timeline, marketing is about *communicating*. As such, it is critically important to understand the linguistic cues that may alter perceptions of marketing messages. Marketers are often confronted with how to present numerical information; whether it be the framing of package pricing (Bagchi and Davis 2012) or pricing of sizes of goods (e.g., small vs. large), there are a plethora of opportunities to integrate linguistics cues (i.e., markedness) with numerical frames. The research in this dissertation helps marketers better understand how linguistics and numerical frames interact in a systematic way under the theoretical framework of markedness.

Real world implications of anchoring have been established in real estate (Northcraft and Neale, 1987) and with purchase limits and quantity limits (Wansink, Kent, and Hoch, 1998), which opens the door for a linguistic approach to marketing to have similar real world effects. What other scenarios might words anchor respondents one way or another? As shown, a simple change from *half full* to *half empty* has drastic implications for how people perceive numerical estimates, competitiveness of a game, and scarcity of tickets. Consider a project management scenario in which the term *early* versus *late*, another markedness pair (Lehrer 1985), is used in communication or estimating project completion dates. Zhang and Schwarz (2012) showed that respondents were more likely to predict a project would be late than early, but the results may also be the result of markedness in the questioning, which used the adjectives earliest and latest.

Following the sales and management implications, the research may effect managerial myopia (Larwood and Whittaker 1977), a well documented finding in which managers are overly optimistic when planning for the future. Recent research has shown that managerial overconfidence can lead to managers making poor financial decisions and investments (Ishikawa and Takahashi 2010). Although projections are largely analyzed via computers in today's environment, there is still an opportunity to apply the research in this dissertation to a sales context. For example, asking a manager "How *few* sales do you predict you will make next month?" versus "How *many* sales do you predict you will make next month?" may effect the accuracy of forecasting and reduce overconfidence in sales which has negative effects on the business.

There are a variety of implications in the public health context as well. Are practitioners and businesses asking the right questions? "How *often* do you go to the doctor?" or "How *many* drinks have you had tonight?" may be cueing the wrong response. Given recent discussion on changes to blood alcohol content (BAC) limits in the United States, markedness may change the way in which information on alcohol consumption is perceived. For example, markedness (e.g., how *many* drinks vs. how *few* drinks) may interact with numerical cues (*.05 BAC* vs. *.08 BAC*) or temporal cues (*120 minutes* vs. *2 hours*) in estimates of an appropriate consumption level of alcoholic beverages.

As previously discussed, this research has implications for goal pursuit at a practical level. When faced with a goal (e.g., losing weight, running a particular distance, completing a task), there is an opportunity to frame the achievement, or lack thereof, in a particular context. Technology can be utilized to tell a runner how *few* steps remain rather than how *many* steps remain in a consumer's daily step goal. In conjunction with theories such as the small-area hypothesis (Koo and Fishbach 2012), which largely focuses on numerical differences, linguistic cues may further enhance the motivation to achieve a goal.

Marketing research is another area where this dissertation presents a strong contribution. Are the questions marketers are asking truly neutral? Are the questions biasing respondents one way or another? A linguistics-based approach to marketing research could have drastic implications. Practitioners sending out marketing research surveys may be inadvertently biasing results by leaking meaningful information. Subsequently, the conclusions from the research may be a reflection of how the question is framed, even more than previously understood, and severely mask consumers' true perceptions.

Perhaps the broadest, yet most powerful, marketing application deals with competition. The *marked* term, by definition, is negative. As such, it presents a unique opportunity to use an *unmarked*, or positive, term in reference to a firm's own business but a *marked* term in reference to a competitor. For example, a season ticket salesman may say (in reference to a competitor), "Their arena is half empty". A gym may ask, "How few pounds did you lose at [competitor]?" Given the unique power of the marked term displayed in this dissertation, it presents an opportunity to selectively use linguistic cues in reference to a competitor.

Finally, in a marketing and communications environment with 140 character messages (Twitter), six second (Vine) or 15 second (Instagram) video, and 10 second multimedia messages that disappear (SnapChat), the importance of understanding language is even more critical as each word becomes more important to understanding the intent of the message. In a sports context, one word in a 1000+ character long description of ticket plan on a website may not be critical but one word in a 140-character tweet about ticket plans is significant. In a scrolling economy in which consumers scroll through Facebook posts and Twitter feeds, language is increasingly important in communicating the intended message.

Conclusion

Linguistics cues are embedded in language and conversation while representing a critical component of human interaction across a broad set of disciplines. Similar to the combination of business and psychology in the development of *consumer psychology*, the combination of business and linguistics shows similar promise. As such, the term *consumer linguistics* is proposed to encourage the scientific study of language in consumer-based scenarios. The markedness approach discussed in this research is a preliminary step to illustrate the implications of a systematic linguistics approach within consumer behavior. The research provided in this dissertation further explores the relationship between linguistics cues, such as markedness, and how consumers make numerical judgments. A *big* crowd is different than a *small* crowd. A *half empty* arena is different than a *half full* arena. Marketing is about numbers but not necessarily *just a* number.

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