Specification Seeking: How Product Specifications Influence Consumer Preference

CHRISTOPHER K. HSEE
YANG YANG
YANGJIE GU
JIE CHEN*

We offer a framework about when and how specifications (e.g., megapixels of a camera and number of air bags in a massage chair) influence consumer preferences and report five studies that test the framework. Studies 1–3 show that even when consumers can directly experience the relevant products and the specifications carry little or no new information, their preference is still influenced by specifications, including specifications that are self-generated and by definition spurious and specifications that the respondents themselves deem uninformative. Studies 4 and 5 show that relative to choice, hedonic preference (liking) is more stable and less influenced by specifications.

What's in a name? That which we call a rose
By any other name would smell as sweet.
(Shakespeare, *Romeo and Juliet*, 2.2.1–2)

This article seeks to address a marketing-relevant yet largely under-studied topic—how quantitative specifications influence consumer preferences. Virtually all consumer products carry quantitative specifications—numbers that describe their underlying attributes. Examples include the ISO rating of print film, the resolution (pixel count) of a digital camera, the output wattage of an audio amplifier, the calorie count of a serving of cookies, the number of air bags in a massage chair, the contrast ratio of a computer monitor, the horsepower of a sports car, and so on. Such specification information is ubiquitous—it is printed on the box of a product or on the body of the product itself, it is circulated in advertisements, it is posted online, and it is communicated to us by our friends. Despite their widespread existence, however, we know little about how quantitative specifications affect consumer behavior. This article seeks to fill this gap.

In many situations, quantitative specifications provide useful information for potential buyers to predict their consumption experience with the products they consider buying. For instance, suppose that a person shopping for a laptop computer chooses between a model with a weight specification of 3 pounds and another model with a weight specification of 4 pounds. He is shopping online and cannot directly experience the actual weight, but he has owned laptops in the past and knows what it feels like to carry a 3-pound laptop and what it feels like to carry a 4-pound laptop. Under these conditions, the weight specifications—3 versus 4 pounds—are highly informative, and he should use the information to guide his choice. Likewise, suppose that a person shopping for snacks chooses between a brand of cookies with a calorie count of 100 per serving and another brand with a calorie count of 50 per serving. Obviously, at the time of choice, it is impossible for her to experience the future health consequences of consuming these two types of cookies. Yet we assume that she is knowledgeable about calories and knows the expected health consequences of consuming different amounts of calories. Under these conditions, it is perfectly reasonable for her to use specified calorie counts to guide her purchase decision.

In other situations, however, buyers can immediately and directly experience the consequences of using the products

under consideration, and at the same time they are unfamiliar with the provided specifications and do not know how to translate these numbers to their consumption experience. In these situations, the specifications carry little or no additional useful information. For example, when shopping for an MP4 player in a physical store, consumers can usually view the relevant models and experience the quality of their screens, yet few know how to map a given resolution specification (e.g., 76800) onto their viewing experience. Likewise, when buying a stereo system in an audio store, consumers can usually audition the interested models, yet few have the knowledge of how specifications such as "an output power of 200 watts" or "a distortion rate of 0.08%" relate to their listening experience. As one more example, when purchasing a massage chair, consumers can usually try the available models and experience the movements, yet few understand what it means for a chair to have "36 air bags." In situations like these, specifications convey little or no additional information to help the buyers to predict their future consumption experience beyond what they have already known by directly trying the product. In these situations, buyers should base their purchase choice on their direct experiences rather than on specifications.

The present research resembles yet differs from existing research comparing experiential and nonexperiential information, such as research on direct and indirect experience (e.g., Hamilton and Thompson 2007; Thompson, Hamilton, and Rust 2005), on search and experiential attributes (e.g., Kempf and Smith 1998; Wright and Lynch 1995), and on advertisement and evidence (e.g., Deighton 1984). In most prior research, nonexperiential information and experiential information pertain to different attributes. For example, a search attribute of a pillow is its price, and an experiential attribute of a pillow is its softness. In the current research, quantitative specifications and consumption experience concern the same underlying attribute, for example, softness of a pillow. Moreover, existing distinctions, such as the one between direct and indirect experiences, are proposed to test different hypotheses than ours. For example, Thompson and her coauthors (e.g., Hamilton and Thompson 2007; Thompson et al. 2005) hypothesized and demonstrated that an indirect experience with a product (e.g., reading about it) triggers a high-level mental construal and prompts the consumer to focus on its desirability, whereas a direct experience with the product (e.g., trying it) triggers low-level mental construal and prompts the consumer to focus on its feasibility. In the present research we are not interested in testing the construal-level theory.

The rest of the article is organized as follows. We first review relevant literature, offer our first general hypothesis (hypothesis 1) about the basic effect of specifications, and examine its two concrete corollaries (hypotheses 1a and 1b). We then offer another general hypothesis (hypothesis 2) about a boundary condition of the basic specification effect. Next, we report five experiments, including one that involves real consumption (eating potato chips). Finally, we discuss the implications of this research for marketing practice and consumer welfare.

HYPOTHESIS 1: THE SPECIFICATION EFFECT

In this research, we attempt to demonstrate that even in situations in which consumers can directly experience the consumption consequence of the relevant options and specifications add little or no additional information, they still seek specifications—choosing options with better specifications at the expense of other considerations.

Our notion of specification seeking is inspired by several existing lines of research. The distinction between specifications and underlying experiences is similar to the distinction between proxy and fundamental attributes (Fischer et al. 1987; Keeney 1994; Keeney and Raiffa 1976). A fundamental attribute refers to an objective with which the decision maker is concerned, and a proxy attribute is an indirect and imperfect measure of the fundamental attribute. Decision makers often fail to sufficiently distinguish proxies from fundamentals. For example, in a study conducted by Fischer et al. (1987), participants evaluated alternative pollution control programs either when informed of the fundamental consequences of these options (pollution-related illness) or when informed of a proxy consequence (emission levels) and the relationship between the proxy and the fundamental variables. They failed to adequately take into consideration the imperfect relationship between the proxy and the fundamental attributes and weighted the proxy attribute more heavily than normatively warranted.

Our research extends the literature on proxy and fundamental attributes in two directions. First, it relates it to one of the most relevant topics in marketing—the relationship between specifications (proxies) and the underlying experiences (fundamentals). Second, our research has a different objective than prior research. Prior research (e.g., Fischer et al. 1987) tests whether decision makers who are provided only with proxy attributes are able to convert those proxies into the underlying fundamentals. Our research tests whether decision makers who are presented with both the underlying experiences and superfluous specifications are able to ignore those specifications. Our research also extends prior literature on advertisement and experience showing that consumers who can assess the quality of a product through direct experience are unaffected by advertisements (Hoch and Ha 1986). Our research seeks to show that even consumers who can assess the quality of a product through direct experience may still be influenced by its specifications.

The present work also builds on existing research on medium maximization (Hsee, Yu, et al. 2003; Kivetz and Simonson 2003; Van Osselaer, Alba, and Manchanda 2004). A medium is a reward people receive after they exert effort, and it has no intrinsic value except that it can be exchanged for desired goods. Examples of a medium include points from loyalty programs and miles from frequent flyer programs. Decision makers often choose options that award

more media rather than options that correspond to more desirable final outcomes. For example, in a study reported in Hsee, Yu, et al. (2003), participants were given a choice between a short proofreading task that would award 60 points and a longer proofreading task that would award 100 points and were told that 60 points would entitle them to a serving of vanilla ice cream and 100 points would entitle them to an equally large serving of pistachio ice cream. Most participants opted for the longer task. But when asked later which flavor they would enjoy more, most favored the vanilla ice cream. Medium maximization can be considered as a special case of specification maximization. Like a specification, a medium has no intrinsic value. Decision makers ought to ignore media if they know which option corresponds to what final outcome and know which outcome they will enjoy more. Likewise, buyers ought to ignore specifications if they can experience the underlying attributes and know which option carries more consumption utility. But in reality such normatively superfluous numbers have a profound influence on decision makers.

Another line of research that has inspired the present work is on money illusion—a tendency to base judgment on the nominal value of money rather than on its real purchasing power (Fehr and Tyran 2001; Raghubir and Srivastava 2002; Shafir, Diamond, and Tversky 1997; Wertenbroch, Soman, and Chattopadhyay 2007). For example, travelers rely on the nominal value of a foreign currency relative to their home currency to make purchasing decisions, even though they are aware of the exchange rate between the foreign currency and their home currency. This, as well as other research (e.g., Chinander and Schweitzer 2003; Silvera, Josephs, and Giesler 2001), suggests that people pursue specious proxies. Our research extends the prior research by positing that consumers pursue specious specifications even when fundamental experiences are available.

To summarize, our proposition here is that consumers seek quantitative specifications even in situations in which they do not know how to use these numbers yet they can directly experience the relevant products. This proposition leads to our first general hypothesis:

H1: Specifications can change consumer choice even if experiences are available and specifications provide little or no additional predictive information.

Formally, let s_A and s_B denote the specifications of two products (A and B) on a given attribute, for example, the specified screen resolutions of two MP4 players. Let e_A and e_B denote the corresponding direct experiences, for example, the experienced screen sharpness of the two MP4 players. Let $P_{A>B}$ denote the likelihood that the buyer will purchase product A instead of B. The likelihood can be modeled roughly as

$$P_{A>B} = w\frac{s_A}{s_B} + (1-w)\frac{e_A}{e_B}, \quad (1)$$

where w, the weight of specifications, is greater than zero.

We adopt a ratio form because people largely evaluate the advantage of one option over another in relative terms (e.g., Hsee, Yu, et al. 2003; Shafir, Osherson, and Smith 1993). In the equation we assume greater s's and e's are better. The equation should be reversed in cases in which smaller s's and e's are better, for example, with the noise of an air conditioner.

Normatively, if buyers have full access to e's, and s's offer no additional predictive information, they should ignore the s's and base their decisions on the e's. That is, w should be zero. Contrary to the normative perspective, what our first general hypothesis (hypothesis 1) posits is that even in these situations buyers base their purchase decisions on s's or on some combination of e's and s's. In other words, w is not zero.

It is important to note that if s_A/s_B were equal to e_A/e_B, then $P_{A>B}$ would be the same regardless of whether buyers base their decisions on s_A/s_B or on e_A/e_B, that is, regardless of what w is. In reality, however, s_A/s_B and e_A/e_B often differ, and, therefore, the resulting $P_{A>B}$ will also differ depending on whether buyers rely on s_A/s_B or on e_A/e_B. For example, suppose that a jade shopper who is fond of green jade encounters two pieces of jade. By just looking at the jewelry, one piece looks only slightly greener than the other. But by some greenness index (a type of specification) ascribed by the jade producer, the greener piece has a much higher index number. According to our model, the jade shopper is more likely to buy the greener jade if she attends to the index than if she ignores it.

The above general hypothesis yields two concrete and testable subhypotheses (corollaries). The first concerns the presence or absence of specifications and can be easily inferred from our model (eq. 1):

H1a: Holding the underlying attributes constant, the presence or absence of specifications can change consumer preference. Specifically, when faced with two options, A and B, where s_A/s_B is greater (smaller) than e_A/e_B, people will be more (less) likely to choose A over B if the s's are presented than if they are not.

The second subhypothesis concerns how the specifications are described. The same attributes may be described in different ways, yielding different s_A/s_B ratios. For example, the size of a circle can be specified either by its area or by its diameter. Because area is a function of diameter squared, the ratio of a large circle over a small circle, when expressed in area versus in diameter, would be different. A circle with a diameter of 4 centimeters is the same as one with an area of 12.56 square centimeters; a circle with a diameter of 2 centimeters is the same as one with an area of 3.14 square centimeters. In terms of areas, the ratio of the large circle over the small one is 4; in terms of diameters, it is only 2.

Normatively, describing the same attributes differently should not affect consumer preference. A rose will smell as sweet, regardless of what it is called. However, according

to our model (eq. 1), it will make a difference. This is our second subhypothesis:

> **H1b:** Holding the underlying attributes constant, different specifications can lead to different preferences. Specifically, when faced with two options, A and B, where s_{A1}/s_{B1} is greater than s_{A2}/s_{B2}, people will be more likely to prefer A over B if s_{A1} and s_{B1} are presented than if s_{A2} and s_{B2} are presented.

Hypothesis 1b is corroborated by a number of existing studies. In a scenario study conducted by Kwong and Wong (2006), participants exhibited a stronger preference for one fictitious Internet service over another when the quality of these services was compared in terms of their failure rates (0.3% vs. 1.0%) rather than in terms of their complementary success rates (99.7% vs. 99.0%). In another study conducted by Krider, Raghubir, and Krishna (2001), participants were willing to pay more for a large pizza relative to a small pizza, if the sizes of the pizzas were described in terms of their areas (e.g., 100 vs. 150 square inches) rather than in terms of their diameters (e.g., 11.25 vs. 13.75 inches). In these studies, however, participants could not directly experience the underlying attributes. In our study, we show that even if consumers can experience the underlying attribute, the format of external specifications will still matter.

HYPOTHESIS 2: CHOICE VERSUS LIKING

Our first general hypothesis (hypothesis 1) resonates with extensive extant literature demonstrating that preferences are malleable and can be easily influenced by descriptively variant but normatively equivalent manipulations (e.g., Ariely, Loewenstein, and Prelec 2006; Bettman, Luce, and Payne 1998; Slovic 1995; Slovic and Lichtenstein 1983; Soman and Gourville 2001; Yeung and Soman 2005). However, more recent research suggests that preferences are not as malleable as previously believed, and some preferences are more stable and more resistant to external contextual influences than others (Hsee et al., forthcoming; Morewedge et al. 2007; Simonson 2008).

Our second general hypothesis (hypothesis 2) concerns the relative stability of different types of preferences. Two of the most important and common types of preferences are (*a*) revealed preference or choice ("Which television will you buy?") and (*b*) hedonic preference or liking ("Which television do you like more when you watch it?"). Sometimes, researchers use words like "enjoy" instead of "liking" to elicit hedonic preference (e.g., Amir and Ariely 2007; Hsee, Zhang, et al. 2003).

In this research, we seek to show that relative to liking, choice is less stable and more susceptible to the influence of specifications. Existing research suggests that when making a choice people seek reasons, and when expressing affect they simulate experiences. For example, when making a choice, people tend to select an option that dominates at least another option or an option that constitutes a compro-

mise between two conflicting alternatives (Huber, Payne, and Puto 1982; Shafir, Simonson, and Tversky 1993; Simonson 1989; Simonson and Tversky 1992). Choosers also tend to base their choices on apparently sound and rational choice rules, such as do not pay for delays (Amir and Ariely 2007), seek value (Hsee 1999), waste not (Arkes and Ayton 1999), and choose the higher quality product (Luce, Payne, and Bettman 2000).

Furthermore, choosers tend to shun soft experiential attributes and seek apparently objective and hard attributes (e.g., Hsee, Zhang, et al. 2003). For example, when given a choice between two fictitious stereo systems, one having a higher wattage rating (an apparently objective specification) and the other described as delivering a richer sound (an experiential attribute), most respondents chose the model with the higher wattage rating, yet when asked which model they anticipated to enjoy more, they favored the one described as having a richer sound.

Specifications are objective, quantifiable, and "out there" and therefore are sound grounds on which choosers can justify their choice to themselves or to others (Hsee, Zhang, et al. 2003). One could say, "This stereo sports 300 watts rather than 200 watts, and therefore I will buy it." Therefore, when making a choice, consumers resort to specifications.

Contrary to making a choice, when expressing attitude ("Which stereo do you like more when you listen to it?"), people resort to and simulate their hedonic experiences. For most sensory attributes, people know what levels make them happy and what levels do not (Diener and Biswas-Diener 2002; Stigler and Becker 1977; Veenhoven 1991), and they do not need external specifications to inform them of their experiences. For example, when taking a shower, people know whether the water coming from the shower head feels too hot or too cold and do not need the temperature specification, for example, 88°F, to inform them how comfortable it is (e.g., Hsee et al., forthcoming). Thus, relative to choice, hedonic preference with sensory input is less dependent on external specifications. In summary, we propose our second general hypothesis as follows:

> **H2:** Specifications have a greater effect on choice than on liking. Specifically, the effect hypothesized in hypothesis 1 will be greater if people are asked which option they will choose than if they are asked which option they like more.

Several clarifications are in order. First, hypothesis 2 does not imply that specifications have absolutely no influence on liking. Indeed, recent research by Lee, Frederick, and Ariely (2006) illustrates that specification (labels) can influence liking if the labels are given prior to experience. What we propose is that compared with choice, liking is relatively more stable and less susceptible to the influence of external specifications.

Second, our research should not be confused with prior work showing that common and alignable attributes exert more influence on choice than do unique or nonalignable attributes (e.g., Markman and Gentner 1993; Markman and

TABLE 1

OVERVIEW OF STUDIES

Study	Product	Specification manipulation	Dependent variable	Tested hypothesis
1	Digital cameras	Picture resolution: 　No specification 　Total number of dots 　Number of dots on diagonal	Choice	1
2	Towels	Towel softness: 　No specification 　Area of a self-generated circle 　Diameter of a self-generated circle	Choice	1
3	Sesame oil	Sesame oil aroma: 　No specification 　Large ratio specification 　Small ratio specification	Choice	1
4	Cellular phones	Screen vividness: 　No specification 　An unknown index	Choice and liking	1 and 2
5	Potato chips	Chip thickness: 　No specification 　Millimeter specification	Choice and liking (real consumption)	1 and 2

Medin 1995). Quantitative specifications are generally common and alignable attributes among the choice alternatives, and so are the underlying consumption experiences. Thus, alignability is not a sufficient condition for either of our hypotheses.

Likewise, our research is not a derivate of prior research on evaluability, even though hypothesis 2 of this research seems similar to the evaluability hypothesis. The evaluability hypothesis (Hsee 1996; Hsee et al. 1999) is concerned with differences in preference between the joint evaluation mode (JE; e.g., when two computer monitors are juxtaposed and compared side by side) and the single evaluation mode (SE; e.g., when each monitor is presented and evaluated alone). The hypothesis posits that relative to an easy-to-evaluate attribute (e.g., whether a monitor has a built-in speaker system), a difficult-to-evaluate attribute (e.g., the contrast ratio of a monitor) carries more weight in JE than in SE. Our hypothesis 2 is complementary to but qualitatively different from the evaluability hypothesis. While the evaluability hypothesis compares responses between two evaluation modes (JE vs. SE), hypothesis 2 compares responses between two preference types (choice vs. liking). In our studies testing hypothesis 2, evaluation mode was always held constant at JE, namely, both choice and liking were elicited when the target products were juxtaposed and directly compared. Furthermore, while the evaluability hypothesis is typically concerned with two independent attributes (e.g., the presence or absence of speakers in a monitor and the contrast ratio of a monitor), hypothesis 2 of the current research is concerned with two forms of one underlying attribute (e.g., contrast ratio as a numerical specification vs. contrast ratio as its experiential effect on the viewer). In terms of evaluability, both the quantitative specification and the consumption experience can be difficult to evaluate in SE. Thus, the effect hypothesized in hypothesis 2 cannot be attributed to difference in evaluation mode or

in evaluability; instead, it reflects a difference in stability between different types of preferences.

OVERVIEW OF STUDIES

We present five studies that tested our hypotheses. These studies tapped different product categories, adopted different specification manipulation methods, and measured different types of preferences. In all the studies the respondents could experience the relevant attributes before expressing their preferences. Table 1 summarizes the key features of these studies.

STUDY 1: DIGITAL CAMERAS

Study 1 was designed to test hypotheses 1a and 1b. Participants chose between two digital cameras with different levels of sharpness (resolution), and they could directly view and experience the sharpness of the photos from these cameras. Sharpness was either unspecified or specified in terms of total number of dots on the image or in terms of number of dots on the diagonal of the image (which was objectively equivalent to total number of dots). We assumed that the respondents could not map these unfamiliar specifications onto their viewing experience, and so the specifications carried no additional predictive information. It should be noted that in study 1 this assumption may not be true for all participants. To further rule out the possibility that specifications carried any useful information, we designed studies 2 and 3 differently, as will be described below.

Method

Participants (112 college students recruited from a large public university in China) were asked to imagine that they were in the market for a digital camera and had narrowed

their options to two models, A and B. The two models were identical in all aspects, including price, except for sharpness and vividness. Photos taken by model A were sharper, and photos taken by model B were more vivid. Participants were then presented with two representative photos, one by each camera. The scenes of the photos were identical (of Tiananmen Square), and the size was also identical (10 inches). We used Photoshop to vary the sharpness (resolution) and vividness (saturation) of the photos so that model A's photo was indeed sharper than model B's, and model B's photo was indeed more vivid than model A's. By viewing these photos, participants could directly experience the sharpness and the vividness offered by those cameras.

Sharpness was the only attribute on which specifications were manipulated. Vividness was included merely as a trade-off attribute to prevent a ceiling effect. Had there not been a trade-off, then everyone would have chosen the sharper camera (model A).

Participants were randomly assigned to one of three sharpness specification conditions: no specification, total-dot specification, and diagonal-dot specification. In all the conditions (including the no specification condition), participants were told that model A's photos were sharper and that model B's photos were more vivid. In the no specification condition, no additional information was offered. In the total-dot condition, participants were told that the sharpness of a photo could be indexed by the total number of dots on the image and were given a visual illustration of a digital image composed of dots. They were told that the total number of dots for model A was 4.037 million and that for model B it was 2.097 million. In the diagonal-dot condition, participants were told that the sharpness of a photo could be indexed by the number of dots on the diagonal line of the image and were shown the same visual illustration as in the total-dot condition except that the dots on the diagonal line of the image were highlighted. Participants were then told that the number of diagonal dots for model A was 2,900 and that the number for model B was 2,090.
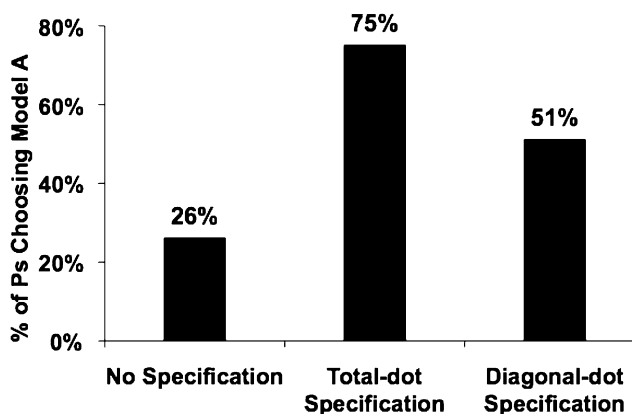
Notice that the number of dots on the diagonal was derived directly from the total number of dots, so that, objectively, they were equivalent. Nevertheless, the ratio was different: in the total-dot condition, the ratio in sharpness of model A over model B was 4.037/2.097, or 1.93, whereas in the diagonal-dot condition, it was 2,900/2,090, or 1.39.

Participants were also asked to assume that they would never enlarge a photo to a size larger than the sample photos (10 inches) or crop a portion of a photo and enlarge it and that the quality of the sample photos was representative of the quality of the photos they would expect from these cameras. They were then asked to decide whether to purchase model A or model B.

Results and Discussion

The results are summarized in figure 1. Consistent with hypothesis 1a, the provision of specifications could indeed affect choice: the choice share for model A was significantly higher in the total-dot specification condition than in the no

FIGURE 1

EXPERIMENT 1 RESULTS

NOTE.—Choice share for camera A (the higher-resolution model) is higher when resolution is specified in total dots than when unspecified and is lower when resolution is specified in diagonal dots than when specified in total dots.

specification condition ($\chi^2(1) = 18.17$, $p < .0001$). Consistent with hypothesis 1b, different specifications could also influence choice: the choice share for model A was significantly higher in the total-dot specification condition than in the diagonal-dot condition, even though the two conditions were objectively equivalent ($\chi^2(1) = 4.65$, $p < .03$).

According to our theory, the underlying reason for the above finding was that the s_A/s_B ratio in the total-dot condition was greater than both the raw e_A/e_B ratio in the no specification condition and the s_A/s_B ratio in the diagonal-dot condition. To test for this underlying reason, we needed to know the s_A/s_B in the two specification conditions and the e_A/e_B in the no specification condition. The s_A/s_B ratio in the two specification conditions was given: 4.037/2.097, or 1.93, in the total-dot specification condition, and 2,900/2,090, or 1.39, in the diagonal-dot specification condition. Thus, it is clear that the s_A/s_B ratio was higher in the total-dot condition than in the diagonal-dot condition. To estimate e_A/e_B in the no specification condition, we recruited another group of participants similar to those in our study ($n = 20$) and gave them the same instructions and same sample photos as in the no specification condition. But instead of asking them to make a choice, we asked them, "How much sharper do you think the photo by camera A is relative to the photo by camera B?" We deliberately refrained from telling them what we meant by sharpness, so that their responses would reflect their own intuitions, that is, would reflect their raw e's. On average, these participants considered the photo by camera A to be 14% sharper than the photo by camera B, yielding an e_A/e_B ratio of 1.14. As expected, the raw e_A/e_B ratio in the no specification condition was significantly smaller than the s_A/s_B ratio in the total-dot specification condition (1.93; $t(19) = 10.76$, $p < .001$).

In short, the s_A/s_B ratio in the total-dot condition (1.93) was higher than both the e_A/e_B ratio in the no specification

condition (1.14) and the s_A/s_B ratio in the diagonal-dot condition (1.39). As predicted, these ratio data were indeed in line with the choice results reported earlier, namely, that the choice share for the higher-resolution camera was higher in the total-dot condition than in both the no specification condition and the diagonal-dot condition.

The result of study 1 is indicative of what happens to digital camera buyers in real life. The first thing many digital camera buyers consider is megapixels. In reality, beyond a certain threshold (around 2 megapixels), the resolution (sharpness) of a digital camera, for most amateur consumers, matters little to their experiences, and other features, such as portability and image vividness, become relatively more important. Yet the presence of specifications such as the megapixel ratings leads consumers to pursue megapixels by spending extra money or by sacrificing other features.

This phenomenon is reflected in study 1. By their raw experience, participants perceived model A's photo (which is analogous to photos taken by a 4-megapixel camera) only slightly (14%) sharper than model B's photo (which is analogous to photos taken by a 2-megapixel camera). And in the no specification condition, indeed only 26% of the respondents opted for the higher-resolution camera (model A) instead of the camera that produced more vivid pictures (model B). But in the total-dot specification condition (which mimicked the megapixel ratings in the real world), as many as 75% of the respondents opted for the higher-resolution camera. To summarize, study 1 supported our first hypothesis that whether specifications are presented and how specifications are presented can both influence consumer choice.

STUDY 2: TOWELS

In study 1, we merely assumed that our participants could not map the sharpness specifications to their viewing experience, and therefore the specifications carried no predictive information beyond what the respondents could already know by viewing the photos. Yet it was possible that our assumption was wrong.

In study 2, we went a step further: instead of providing them with specifications, we asked respondents themselves to generate specifications on the basis of their experiences; hence, by design, these specifications carried no additional information above and beyond what the experience conveyed. Like study 1, study 2 also tested hypothesis 1 (hypotheses 1a and 1b) and was composed of three conditions, one no specification condition and two specification conditions.

Method

Participants (91 college students recruited from a large public university in China) were asked to assume that they were shopping for a towel and had narrowed their choices to two identical towels (A and B), except that towel A was softer, and towel B was better looking. Towel A was dark brown, and towel B was light blue. In a pretest ($n = 25$),

84% of the respondents preferred towel B's color. Participants were handed the two towels and asked to touch and inspect them for as long as they wished. Softness was the key attribute on which specifications were manipulated. Color was merely a trade-off attribute to avoid a ceiling effect, just as vividness was in study 1.

The study consisted of three softness specification conditions: no specification, area specification, and diameter specification. In all the conditions, participants were instructed to draw two circles to express their impressions of the softness of the two towels. They were told, "The softer a towel feels to you, the larger a circle you should draw." We intentionally left the participants to interpret what we meant by large.

In the no specification condition, participants received no additional instructions. In the area condition, participants were asked to estimate the areas of the two circles they had just drawn and to write down their estimates. In the diameter condition, participants were asked to estimate the diameters of the two circles they had just drawn and to write down their estimates. Finally, in all the conditions, participants were asked to decide which towel they would choose.
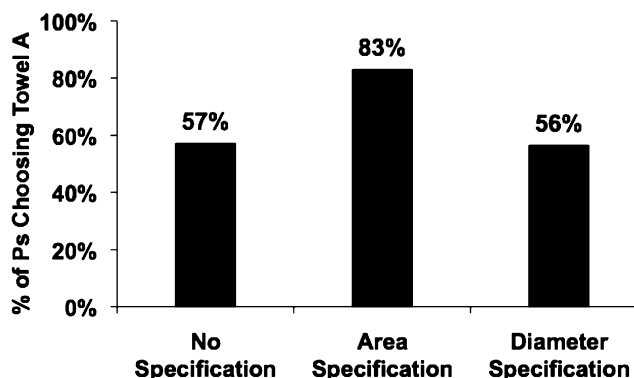
Note that for the same two circles, diameter specification and area specification yield different size ratios because area is a function of diameter squared. For instance, if two circles are 3 and 2 centimeters, respectively, in diameter, yielding a ratio of 1.5, they will be 7.07 and 3.14 square centimeters, respectively, in area, yielding a ratio of 2.25.

Results and Discussion

The results are summarized in figure 2. In support of hypothesis 1a, the presence of specifications could indeed alter choice: the choice share for the softer towel (A) was significantly higher in the area condition than in the no specification condition ($\chi^2(1) = 7.062, p < .01$). In support of hypothesis 1b, different specifications could also influ-

FIGURE 2

EXPERIMENT 2 RESULTS

NOTE.—Choice share for towel A (the softer towel) is higher when softness is specified in areas than when unspecified and is lower when softness is specified in diameters than when specified in areas.

ence choice: the choice share for the softer towel (A) was also significantly higher in the area condition than in the diameter condition ($\chi^2(1) = 4.985$, $p < .05$).

According to our theory, the underlying reason for the above finding is that the s_A/s_B ratio in the area condition was greater than both the raw e_A/e_B ratio in the no specification condition and the s_A/s_B ratio in the diameter condition. To verify this underlying reason, we needed to find the s_A/s_B ratios in the two specification conditions as well as the raw e_A/e_B ratio in the no specification condition. The s_A/s_B ratio in a given specification condition was the mean ratio of the specifications that participants in that condition assigned to towel A versus towel B. As mentioned earlier, although area and diameter specifications were equivalent, they resulted in different s_A/s_B ratios, as area is a function of diameter squared. Indeed, the mean s_A/s_B ratio in the diameter condition was only 1.60, whereas the mean s_A/s_B ratio in the area condition was 4.55. Thus, it is clear that the mean s_A/s_B ratio was higher in the area condition than in the diameter condition. One may wonder why mean s_A/s_B in the area condition is not mean s_A/s_B squared in the diameter condition. Mathematically the two are not the same; that is, $a_1^2/b_1^2 + a_2^2/b_2^2 + \dots$ is not the same as $(a_1/b_1 + a_2/b_2 + \dots)^2$.

To estimate the raw e_A/e_B ratio, we recruited another group of participants similar to those in our study ($n = 23$) and gave them the same instructions and same towels as in the no specification condition. Instead of asking them to make a choice, we asked them, "How much softer do you feel towel A is relative to towel B?" On average, the participants considered towel A to be 41% softer than towel B, yielding an e_A/e_B ratio of 1.41. As expected, this ratio was significantly lower than the s_A/s_B ratio in the area condition ($t(22) = 71.44$, $p < .001$).

The s_A/s_B ratio in the area condition (4.55) was greater than both the e_A/e_B ratio in the no specification condition (1.41) and the s_A/s_B ratio in the diameter condition (1.60). As theorized, these ratio data were fully consistent with the choice data reported earlier. To recapitulate, the choice share for the softer towel was higher in the area condition, in which respondents were asked to specify the areas of their self-generated circles, than in both the no specification condition, in which respondents were not asked to specify the circles, and the diameter condition, in which respondents were asked to specify the diameters of the circles. Study 2 replicated the finding of study 1 in a different product domain and demonstrated that even self-generated specious specifications could still exert a profound influence on consumer choices.

STUDY 3: SESAME OIL

Study 3 extended the first two studies in two directions. First, it used another method to ensure that the specifications provided no additional predictive information. In study 1, we merely assumed that the specifications carried no such information. In study 2, it was by design that the specifications carried no such information. In study 3, we directly elicited participants' beliefs about whether the specifications

carried any useful information, focused only on those respondents who said no, and showed that even these respondents were still influenced by the specifications.

Study 3 also differed from the first two studies in its specification effect. In the first two studies, the presence of specifications either increased the choice share for option A (the option superior on the specified dimension) or kept it at about the same level as in the no specification condition. In study 3, we showed that if s_A/s_B was small enough, the presence of specifications could also decrease the choice share of option A.

Method

Participants (194 college students recruited from a large public university in China) were asked to imagine that they were shopping for a bottle of sesame oil and had narrowed their options to two brands, A and B. The two brands were identical except that brand A was more concentrated and hence more aromatic than brand B. Participants were given the two brands of sesame oil, each contained in a 250-milliliter bottle, and asked to smell and compare them for as long as they wished.

The study was composed of three specification conditions: no specification, large ratio specification, and small ratio specification. In all the conditions (including the no specification condition), participants were told that brand A was more concentrated and more aromatic than brand B, brand A was RMB 20 per bottle (250 milliliters), and brand B was RMB 9 per bottle (also 250 milliliters).

In the no specification condition, participants were given no other information. In the two specification conditions, participants were informed that the aroma of sesame oil could be measured by a special index called the Xiangdu index. In the large ratio specification condition, they were told that the Xiangdu index was 9 for brand A and 2 for brand B. In the small ratio specification condition, they were told that the Xiangdu index was 107 for brand A and 100 for brand B. In both specification conditions, participants were told that the Xiangdu indexes only meant the rank order of aromas, that a higher index indicated a stronger aroma, and that they should not infer anything from the ratio or the difference of the indexes. Participants were given an example: "If one brand's Xiangdu index is twice as high as the other brand's Xiangdu index, it does not mean that the first brand is twice as aromatic as the second brand." The reason we used such an arcane index for aroma was to simulate real life. In real life, the meanings of many specifications are beyond the comprehension of the average consumer. For example, although most consumers know that lotions with higher sun protection factor (SPF) ratings offer better protection against sunburns than lotions with lower SPF ratings, few understand how SPF is created or whether an SPF 30 lotion is twice as effective as an SPF 15 lotion.

Because in all the conditions (including the no specification condition) participants were told about the rank order of the two brands (that brand A was more aromatic than brand B) and in the two specification conditions participants

were told that the specifications conveyed no other information than rank order, the three conditions were normatively equivalent. In other words, the specifications had no additional predictive power. In all the conditions, participants were then asked to decide which brand they would purchase.

To check whether participants in the two specification conditions understood our instructions that the specifications conveyed no other information than rank order, we asked them, after they had indicated their purchase intention, which of the following was true: (*a*) a higher Xiangdu index did not mean more aromatic; (*b*) a higher Xiangdu index meant more aromatic, but a Xiangdu index of 2 did not mean twice as aromatic as a Xiangdu index of 1; and (*c*) a higher Xiangdu index meant more aromatic, and a Xiangdu index of 2 meant twice as aromatic as a Xiangdu index of 1. The correct answer was *b*.
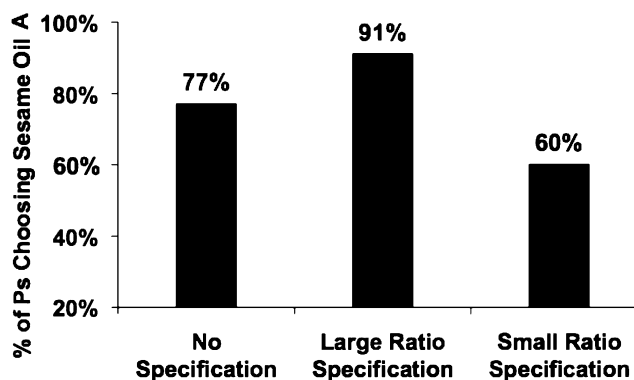
Results and Discussion

Most (81%) of the respondents in the specification conditions chose the correct answer, *b*, to the question about whether specifications conveyed other information than rank order, and 19% chose either *a* or *c*. In the rest of the analysis, we only consider the results of those 81% of the respondents who chose the correct answer. However, inclusion of the remaining 19% of the respondents would not change the pattern of our findings.

The results are summarized in figure 3. Supporting hypothesis 1a and replicating the findings of studies 1 and 2, the presence of specifications indeed altered choice: the choice share for brand A in the large ratio specification condition was significantly higher than that in the no specification condition ($\chi^2(1) = 3.581$, $p = .058$). Supporting hypothesis 1b, different specifications also led to different choices: the choice share for brand A in the small ratio specification condition was significantly smaller than that in the large ratio specification condition ($\chi^2(1) = 13.449$, $p < .000$). Furthermore, the choice share for brand A in the small ratio specification condition was even smaller than that in the no specification condition ($\chi^2(1) = 4.152$, $p < .05$). This was our first time to show that the presence of specifications could decrease the choice share of the superior brand.

To further test our theory, we compared the s_A/s_B ratio in the large ratio and small ratio specification conditions with the raw e_A/e_B ratio in the no specification condition. If our theory is correct, the s_A/s_B ratio in the large ratio specification condition should be greater than the e_A/e_B ratio in the no specification condition, and the s_A/s_B ratio in the small ratio specification condition should be smaller than the e_A/e_B ratio in the no specification condition. The s_A/s_B ratio in the two specification conditions was given: it was 9/2, or 4.50, in the large ratio specification condition and 107/100, or 1.07, in the small ratio specification condition. To estimate for e_A/e_B, we asked the participants in the no specification condition ($n = 62$) to rate their perceived aroma of brand A and the aroma of brand B on a 0–100

FIGURE 3

EXPERIMENT 3 RESULTS

NOTE.—Choice share of brand A (the more aromatic brand) is higher when aroma is specified in a large ratio than when unspecified and is lower when aroma is specified in a small ratio than when specified in large ratio or unspecified.

scale, with 0 denoting "not aromatic at all" and 100 denoting "very aromatic." To ensure the robustness of our findings, in this study we obtained *e*'s in a different way than in the other studies. Recall that in the other studies, we obtained *e*'s by asking respondents how much better one product was relative to the other. Here, we obtained *e*'s by directly asking respondents to rate the two products. The mean e_A/e_B ratio was 2.84.

These results supported our prediction. The s_A/s_B ratio in the large ratio specification condition (4.05) was indeed greater than the e_A/e_B ratio in the no specification condition (2.84; $t(59) = 5.04$, $p < .000$), and the s_A/s_B ratio in the small ratio specification condition (1.07) was indeed smaller than the e_A/e_B ratio in the no specification condition ($t(59) = 5.385$, $p < .000$). These ratio data paralleled the choice data reported earlier.

In summary, study 3 replicated studies 1 and 2 in yet another context. Extending studies 1 and 2, study 3 demonstrated that specifications could influence the decisions of even consumers who consider the specifications uninformative and that the presence of specifications could not only increase but also decrease the choice share of the option that is superior on the specified attribute.

STUDY 4: CELLULAR PHONES

Study 4 tested hypothesis 1a in yet another product category: cellular phones. More important, study 4 also tested hypothesis 2, that specifications had a lesser effect on liking than on choice.

Method

Participants (78 college students recruited from a large public university in China) were instructed to assume that they were in the market for a cellular phone and that there

were only two viable options, model A and model B. The two models were identical in all aspects, including price, except for the vividness and the size of their screens. The participants were then shown two high-quality pictures of the two models. In the pictures, the screen of model A was slightly but distinctively more vivid, and the screen of model B was slightly but distinctively larger. Participants were told that the size and the vividness of the actual phone screens were identical to those on the photos. Thus, by viewing the photos, they could directly experience these variables.

In this study, vividness was the attribute on which specifications were manipulated. Size was merely a trade-off attribute to counterbalance vividness and prevent a ceiling effect, like vividness in study 1.

Participants were randomly assigned to one of four conditions that constituted a 2 (vividness specifications: absent vs. present) $\times$ 2 (type of preference: choice vs. liking) factorial design. In all the conditions, participants were told that phone A's screen was more vivid than phone B's screen. In the no specification condition, no additional information was provided about the vividness of the two models. In the specification condition, participants were given an unfamiliar specification, as in study 3. They were told that vividness could be measured by a special index called SVI, with a higher SVI value indicating greater vividness. They were further told that the SVI value was not linearly related to vividness and that a greater SVI value did not mean proportionally greater vividness. Participants were then informed that phone A had an SVI of 1,800 and that phone B had an SVI of 600.
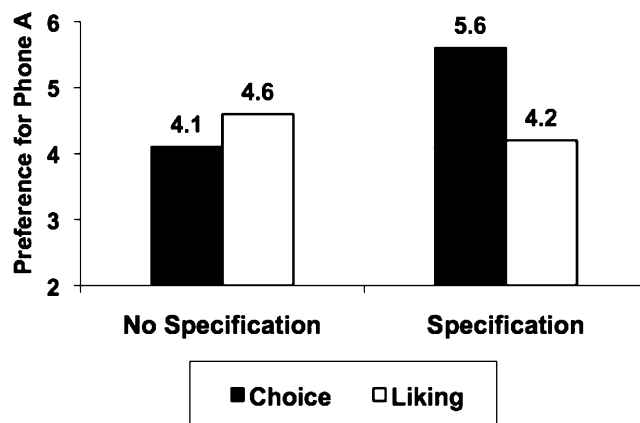
After receiving information about screen size and vividness and inspecting the sample photos, participants answered either a choice or a liking question. In the choice condition, they were asked which model they would purchase. In the liking condition, they were asked which model they would like more when using it. In both cases the respondents were asked to circle a number on a 7-point scale with 1 indicating "definitely B" and 7 indicating "definitely A."

Results and Discussion

The results are summarized in figure 4. We examine the choice data and test for hypothesis 1a first. As predicted, the presence of specifications changed choice: the choice tendency for phone A over phone B was significantly higher in the specification condition than in the no specification condition ($t(39) = 2.81$, $p < .01$).

According to our theory, the above difference occurred because the s_A/s_B ratio in the specification condition was greater than the raw e_A/e_B ratio in the no specification condition. This was indeed the case. The s_A/s_B ratio in the specification condition was given: 1,800/600, or 3.0. The e_A/e_B in the no specification condition, as estimated using the same method as in studies 1 and 2 with an independent group of respondents ($n = 23$), was 1.3. As expected, the s_A/s_B ratio in the specification condition (3.0) was indeed

NOTE.—Vividness specification increases preference for phone A (the more vivid model) when preference is likelihood of choice but not when it is degree of liking. Both likelihood of choice and degree of liking are rated on 1–7 scales.

greater than the e_A/e_B in the no specification condition (1.3; $t(22) = 7.05$, $p < .000$).

We now turn to hypothesis 2. According to this hypothesis, the presence or absence of specifications would have a smaller effect on liking than on choice. To test this hypothesis, we subjected our data to a 2 (type of preference) $\times$ 2 (presence or absence of specifications) ANOVA. A significant interaction effect emerged from the analysis ($F(1, 74) = 5.34$, $p < .05$). As expected, compared with choice, liking was less affected by specifications.

The finding on choice versus liking is particularly noteworthy. The presence of specifications can lead revealed preference to deviate from hedonic preference. Most products on the market have specifications, s's, and chances are that the s's do not match the e's. According to our theory and the finding of study 4, consumers' action will chase the s's, but their heart will still follow the e's, hence creating a discrepancy between choice and happiness. For example, in the no specification condition of study 4, the choice result was quite close to the liking result, but in the specification condition, the choice result deviated dramatically from the liking result.

The reader might wonder whether the effect of specifications on choice was through their effect on predicted consumption experience, that is, whether the specifications altered the choosers' predicted consumption experience with the alternative target products. Study 4 ruled out this possibility. Had the effect of specifications on choice been through their influence on predicted consumption experience, the specifications would have had as great (if not greater) an effect on liking as on choice. The fact that liking was more stable than choice supported our proposition that choosers do not just base their decisions on predicted consumption experiences but also pursue specious numbers.

STUDY 5: POTATO CHIPS

Study 5 was a replication of study 4 using potato chips and involving real choice and real consumption. Like study 4, it tested hypotheses 1a and 2.

Method

Participants (138 college students recruited from a large public university in China) were told that the experiment was about consumer preference for different types of potato chips. The stimuli were two types of potato chips. They were of the same flavor (original flavor), except that one type (type A) was in thick slices (thickness equal to about 1.5 millimeters), and the other (type B) was in thin slices (thickness equal to about 0.8 millimeters).

Participants were randomly assigned to one of four conditions, constituting a 2 (specifications: present vs. absent) × 2 (type of preference: choice vs. liking) factorial design. In all the conditions, participants were told that type A chips were a newer product and were thicker than type B chips. We mentioned "newer" to imply that the thicker version was superior. We inserted this implication because if the respondents had no preference between the thick and thin versions then we could not predict the direction of the effect of specifications. This mentioning of "newer" probably increased the absolute preference for the thicker version. We were not interested in the absolute preference rate; we were interested in whether preferences varied across different conditions.

Respondents in the no specification condition received no additional information about the thickness of the chips. Respondents in the specification condition were told about the exact thickness of the two types of chips—1.5 millimeters for type A and 0.8 millimeters for type B.

Regardless of their conditions, participants were asked to sample a few pieces of each type so that they had direct experiences with their options. In the choice condition, participants were presented with two buckets of chips, one containing 45 grams of the thick version (type A) and the other containing 45 grams of the thin version (type B). They were told they could eat a total of 45 grams of chips (i.e., half of the chips in the two buckets combined) and could choose from either bucket. However, they had to decide in advance how much to eat from each bucket. In the liking condition, participants were presented with the same two buckets of chips and were not asked to decide in advance how much to eat from each bucket. Instead, they could pick from either bucket as they were eating. Later on, we measured how much each participant consumed by checking how much was left in each bucket.

Strictly speaking, in both the choice and the liking conditions, participants "chose," but in the choice condition, participants were explicitly asked to make a choice; it was explicit and deliberate. In the liking condition, participants were not explicitly asked to make a choice; they simply spontaneously picked chips from one bucket or the other as they ate. Therefore, it could be considered as a behavioral

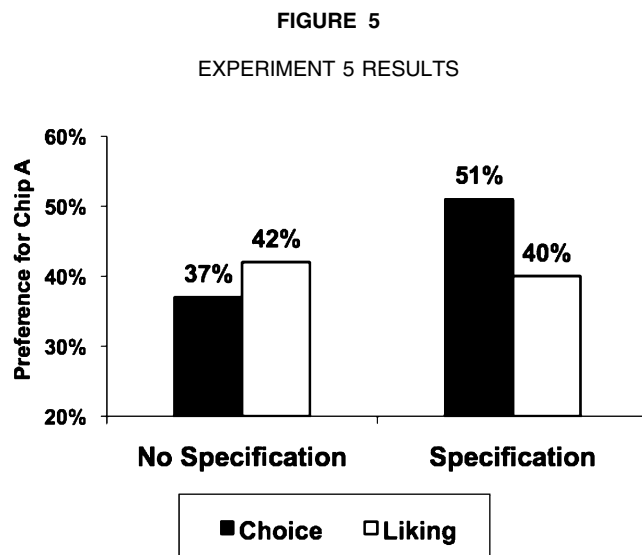manifestation of how much the participants liked one type of chips versus the other.

The difference between our choice and liking conditions was analogous to the simultaneous choice and sequential choice conditions in studies on variety-seeking literature (e.g., Simonson 1990), and our assumption that sequential choice reflected liking was corroborated by the finding in the variety-seeking literature that participants' liking was more in line with sequential choice than with simultaneous choice (Simonson 1990).

Results and Discussion

Figure 5 summarizes the mean proportion of type A over type B potato chips that participants chose in the choice condition or consumed in the liking condition.

Let's first examine the choice data and test for hypothesis 1a. As expected, the presence of specifications changed choice: the mean choice share for type A chips was significantly higher in the specification condition than in the no specification condition ($t(69) = 2.70$, $p < .01$). According to our theory, this effect occurred because the s_A/s_B ratio in the specification condition was greater than the e_A/e_B ratio in the no specification condition. The s_A/s_B ratio in the specification condition was given: 1.5/0.8, or 1.88. The e_A/e_B ratio in the no specification condition, as we found using the same method as in study 4 with an independent group of respondents ($n = 23$), was 1.35. As expected, the s_A/s_B ratio in the specification condition was indeed significantly greater than the e_A/e_B ratio in the no specification condition ($t(22) = 11.01$, $p < .001$).

We now turn to hypothesis 2. According to this hypothesis, liking (actual consumption) would be less affected by specifications. To test this hypothesis, we subjected the data to

FIGURE 5

EXPERIMENT 5 RESULTS

NOTE.—Thickness specification increases preference for type A chips (the thicker version) when preference is choice (premade decision) but not when it is liking (real consumption).

a 2 (choice vs. consumption) × 2 (presence or absence of specifications) ANOVA. The analysis yielded a significant interaction effect in the expected direction ($F(1, 131) = 4.41$, $p < .05$). As hypothesis 2 predicted, specifications had a lesser effect on liking (true consumption) than on choice.

Study 5 replicated the finding of study 4 in yet another product category and with real consumption. Together, the two studies offered robust evidence that liking is more stable and less susceptible to specifications than choice, regardless of whether liking is measured by directly asking people which option they enjoy more or by unobtrusively observing how much people consume each option.

GENERAL DISCUSSION

This research has a number of noteworthy aspects. First, it addresses a topic highly relevant to marketing—product specifications. Virtually all products carry specifications, but their effect on consumer preferences is under studied. Second, we offer a simple model (eq. 1) that not only predicts the existence of a specification effect but specifies when the effect is strong and when it is weak, and we provide empirical evidence for the predictions. Third, our studies tap a wide range of domains and involve not only externally given specifications but also self-generated and clearly specious specifications. Finally, we compare choice with liking and show that while choice chases specifications, liking stays put, suggesting that what we choose may end up being different from what we like.

In the remainder of this section, we explore the implications of this research for marketers and consumers. An obvious implication for marketers is that they can take advantage of consumers' quest for better specifications and reap more profits. In most situations, marketers are already doing this. In other situations, there is still room for marketers to improve. For example, in situations in which there is not yet a popularly known quantitative specification, marketers can invent one and popularize it. For instance, makers of crispy biscuits could create and popularize a "crispness index," use it to compare their products against their competitors' products, and feature the comparisons prominently on their Web site and on their products.

Even in product categories in which there is already a well-known quantitative specification, marketers can still find room to improve. For example, the size of a television (or any monitors) is conventionally measured by its diagonal length. Marketers could convert the specifications to areas. As we explained earlier, the s ratio of a large screen over a smaller screen would be greater if the s's are expressed in area rather than in diagonal length. Even better, marketers could invent an esoteric size index such that it is the cubic of a linear measure. Using such an index, the s ratio of a large screen over a smaller screen would be even greater.

Authors of many marketing articles end with a discussion of how to apply their findings to help marketers take advantage of consumers. In the preceding paragraphs, we have also done that. It is now time for us to consider the effects of specifications on consumer welfare.

As demonstrated in our studies, seeking specifications can lead buyers to overlook experiential dimensions of the choice options or to pay too much for the option with the best specification. However, seeking specifications also entails benefits. We highlight two benefits here. First, as we mentioned in the introduction, specifications can provide useful information if direct experience is unavailable or unreliable, and consumers know how to map specifications to consumption experience (e.g., McCabe and Nowlis 2003). What we have sought to show in this research is that consumers may mindlessly follow specifications even in situations in which specifications are superfluous.

A second benefit of choosing options with better numbers is that the numbers often carry a bragging utility. Although a 2-karat diamond may not look much better than a 1-karat diamond, the fact that one owns a 2-karat diamond is a source of admiration from others and happiness within oneself. By the same token, if a person has a choice between a 2-karat diamond that is imperfect in design and does not look beautiful and a 1-karat diamond that is perfect in design and looks beautiful, it may still be "rational" for the person to go with the 2-karat diamond if she cares about bragging utility. After all, it is easier to solicit admiration from others when you tell them, "I have a 2-karat diamond," than when you tell them, "I have a good-looking diamond." Moreover, if you eventually want to sell your diamond, you could probably collect more proceeds by selling an ugly-looking 2-karat diamond than by selling a good-looking 1-karat diamond, as buyers may also be specification seeking.

However, the pursuit of numbers also entails its costs and can lower overall consumer welfare. To pursue numbers, consumers may spend too much money or otherwise sacrifice other benefits. To illustrate, let us again take the purchase of a digital camera. Whereas most digital cameras are cheap compared with the income of most individuals in the United States, they are not cheap compared with the income of individuals in developing countries.

Several years ago, we conducted a study among a group of white-collar workers in China. Their mean monthly income was about 4,000 yuan, or $500 at that time. The study consisted of two phases—choice and experience. During the choice phase, the participants were asked to assume that they did not yet have a digital camera and to indicate whether they would buy a 500-yuan 1-megapixel camera or a 3,000-yuan 5-megapixel camera, with everything else between the two models identical. During the experience phase, some of the respondents were shown a large photo taken by a 1-megapixel camera, and some respondents were shown a photo (of the same size and same scene) taken by a 5-megapixel camera. Each group rated the sharpness of the photo they saw.

The results revealed a remarkable choice-experience inconsistency: during the choice phase, 69% of the respondents said that they would buy the 3,000-yuan 5-megapixel model instead of the 500-yuan 1-megapixel model. Yet during the experience phase, those who viewed the 1-megapixel photo rated it just as sharp as those who viewed the 5-

megapixel photo. Recall that in study 1 participants could tell the difference between a 2-megapixel picture and a 4-megapixel picture, but here participants could not even tell the difference between a 1-megapixel picture and a 5-megapixel picture. This apparent contradiction occurred because in study 1 the two pictures were juxtaposed, but here they were evaluated separately. Remember that most of the respondents were willing to pay an extra 2,500 yuan—a lion's share of their monthly income—for the 5-megapixel model instead of the 1-megapixel model, yet the consumption consequences of the two models were indistinguishable for them. This, in our view, is an example of loss in consumer welfare.

There were two key differences between the choice and the experience conditions. First, in the choice phase, the megapixel specifications were salient; in the experience phase, they were not. Second, in the choice phase, information about both models was juxtaposed and the participants could easily compare (a situation that is called JE); in the experience phase, each group of participants saw only the photo of one resolution level and did not get to compare it with the other resolution level (a situation that is called SE).

These two factors are the topics of two separate streams of research: The first—presence or absence of specifications—is the topic of the present research. The second—JE versus SE—is the topic of another line of research (Hsee and Zhang 2004). In the experiment described above, the two factors both led the choosers to the higher megapixel model option. One factor exacerbated the effect of the other.

The above example reflects reality. In real life, most purchase situations and most consumption situations vary on these two factors: during purchase, we can easily compare multiple options (JE), and we are flooded with numbers (specifications). During consumption, we encounter only the option we chose (SE), and the memory of the numbers has faded away (no specifications). For example, when shopping for a television (typically in a store or online), we compare multiple models and see numerous numbers. When we use a television (typically at home), we experience the chosen TV alone and rarely think about its specifications. Some readers may say that the consumption mode of a camera is joint because people often view multiple photos. Indeed, people may view multiple photos, but these photos are typically of different scenes yet from the same camera. Thus, as far as camera or resolution is concerned, the consumption mode is still single.

In short, the situation we find ourselves in when we decide what to purchase often differs significantly from the situation we will find ourselves in when we eventually consume the good we purchase. One of the differences is the prevalence of specifications. The other is JE. Yet both propel us to seek numbers.

How could consumers become unbiased? In making purchase decisions, consumers should at least do two things. First, they should seek experience, not just numbers. Second, they should avoid direct comparison and stimulate SE.

Again, take the purchase of a digital camera for example. We recommend the following. First, the buyers should ignore megapixel ratings. Instead, they should try to acquire some representative photos from the cameras they are considering buying and "experience" these photos. Second, when experiencing these photos, the buyers should refrain from comparing them side by side. Instead, they should look at the set of photos taken by one camera and form an overall impression. Then, take a break and view the set of photos taken by another camera and form an overall impression. The buyer should then buy the camera that leaves the better overall impression.

Was Shakespeare wrong when he wrote, "That which we call a rose / By any other name would smell as sweet"? According to our research, the answer depends on what he meant by "as sweet." If he meant that people will be equally inclined to buy roses if roses are called something else, then he seemed to be wrong. Our research suggests that decisions are susceptible to the influence of external descriptions. However, if he meant that people will equally enjoy roses if roses are called something else, which we suppose is indeed what he meant, then he was probably correct. Our research indicates that liking is more impervious to the influence of external descriptions. After all, it is hard to outsmart Shakespeare.

REFERENCES

Amir, On and Dan Ariely (2007), "Decisions by Rules: The Case of Unwillingness to Pay for Beneficial Delays," *Journal of Marketing Research*, 44 (1), 145–52.

Ariely, Dan, George Loewenstein, and Drazen Prelec (2006), "Tom Sawyer and the Construction of Value," *Journal of Economic Behavior and Organization*, 60 (1), 1–10.

Arkes, Hal R. and Peter Ayton (1999), "The Sunk Cost and Concorde Effects: Are Humans Less Rational than Lower Animals," *Psychological Bulletin*, 125 (5), 591–600.

Bettman, James R., Mary Frances Luce, and John W. Payne (1998), "Constructive Consumer Choice Processes," *Journal of Consumer Research*, 25 (3), 187–217.

Chinander, Karen R. and Maurice E. Schweitzer (2003), "The Input Bias: The Misuse of Input Information in Judgments of Outcomes," *Organizational Behavior and Human Decision Processes*, 91 (2), 243–53.

Deighton, John (1984), "The Interaction of Advertising and Evidence," *Journal of Consumer Research*, 11 (3), 763.

Diener, Ed and Robert Biswas-Diener (2002), "Will Money Increase Subjective Well-Being?" *Social Indicators Research*, 57 (2), 119–69.

Fehr, Ernst and Jean-Robert Tyran (2001), "Does Money Illusion Matter?" *American Economic Review*, 91 (5), 1239–62.

Fischer, Gregory W., Nirmala Damodaran, Kathryn B. Laskey, and David Lincoln (1987), "Preferences for Proxy Attributes," *Management Science*, 33 (2), 198–214.

Hamilton, Rebecca W. and Debora Viana Thompson (2007), "Is There a Substitute for Direct Experience? Comparing Consumers' Preferences after Direct and Indirect Product Experiences," *Journal of Consumer Research*, 34 (4), 546–55.

Hoch, Stephen J. and Young-Won Ha (1986), "Consumer Learning:

Advertising and the Ambiguity of Product Experience," *Journal of Consumer Research*, 13 (2), 221–33.

Hsee, Christopher K. (1996), "The Evaluability Hypothesis: An Explanation for Preference Reversals between Joint and Separate Evaluations of Alternatives," *Organizational Behavior and Human Decision Processes*, 67 (3), 247–57.

——— (1999), "Value Seeking and Prediction-Decision Inconsistency: Why Don't People Take What They Predict They'll Like the Most?" *Psychonomic Bulletin and Review*, 6 (4), 555–61.

Hsee, Christopher K., George Loewenstein, Sally Blount, and Max Bazerman (1999), "Preference Reversals between Joint and Separate Evaluation of Options: A Review and Theoretical Analysis," *Psychological Bulletin*, 125 (5), 576–90.

Hsee, Christopher K., Yang Yang, Naihe Li, and Luxi Shen (forthcoming), "Wealth, Warmth, and Well-Being: Whether Happiness Is Relative or Absolute Depends on Whether It Is about Money, Acquisition, or Consumption," *Journal of Marketing Research*.

Hsee, Christopher K., Fang Yu, Jiao Zhang, and Yan Zhang (2003), "Medium Maximization," *Journal of Consumer Research*, 30 (1), 1–14.

Hsee, Christopher K. and Jiao Zhang (2004), "Distinction Bias: Misprediction and Mischoice Due to Joint Evaluation," *Journal of Personality and Social Psychology*, 86 (5), 680–95.

Hsee, Christopher K., Jiao Zhang, Fang Yu, and Yiheng Xi (2003), "Lay Rationalism and Inconsistency between Predicted Experience and Decision," *Journal of Behavioral Decision Making*, 16 (4), 257–72.

Huber, Joel, John W. Payne, and Christopher Puto (1982), "Adding Asymmetrically Dominated Alternatives: Violations of Regularity and the Similarity Hypothesis," *Journal of Consumer Research*, 9 (1), 90–98.

Keeney, Ralph L. (1994), "Creativity in Decision Making with Value-Focused Thinking," *Sloan Management Review*, 35 (4), 33–41.

Keeney, Ralph L. and Howard Raiffa (1976), *Decisions with Multiple Objectives: Preferences and Value Trade-Offs*, New York: Wiley.

Kempf, Deanna S. and Robert E. Smith (1998), "Consumer Processing of Product Trial and the Influence of Prior Advertising: A Structural Modeling Approach," *Journal of Marketing Research*, 35 (3), 325–38.

Kivetz, Ran and Itamar Simonson (2003), "The Idiosyncratic Fit Heuristic: Effort Advantage as a Determinant of Consumer Response to Loyalty Programs," *Journal of Marketing Research*, 40 (4), 454–67.

Krider, Robert E., Priya Raghubir, and Aradhna Krishna (2001), "Pizzas: π or Square? Psychophysical Biases in Area Comparisons," *Marketing Science*, 20 (4), 405–25.

Kwong, Jessica Y. Y. and Kin Fai Ellick Wong (2006), "The Role of Ratio Differences in the Framing of Numerical Information," *International Journal of Research in Marketing*, 23 (4), 385–94.

Lee, Leonard, Shane Frederick, and Dan Ariely (2006), "Try It, You'll Like It: The Influence of Expectation, Consumption, and Revelation on Preferences for Beer," *Psychological Science*, 17 (12), 1054–58.

Luce, Mary Frances, John W. Payne, and James R. Bettman (2000), "Coping with Unfavorable Attribute Values in Choice," *Organizational Behavior and Human Decision Processes*, 81 (2), 274–99.

Markman, Arthur and Debora Gentner (1993), "Structural Alignment during Similarity Comparisons," *Cognitive Psychology*, 25 (4), 431–67.

Markman, Arthur and Douglas Medin (1995), "Similarity and Alignment in Choice," *Organizational Behavior and Human Decision Processes*, 63 (2), 117–30.

McCabe, Deborah Brown and Stephen Nowlis (2003), "The Effect of Examining Actual Products or Product Descriptions on Consumer Preference," *Journal of Consumer Psychology*, 13 (4), 431–39.

Morewedge, Carey K., Daniel T. Gilbert, Kristian O. R. Myrseth, and Timothy D. Wilson (2007), "Consuming Experiences: Shifting Standards in Affective Forecasting," working paper, Department of Social and Decision Sciences, Carnegie Mellon University.

Raghubir, Priya and Joydeep Srivastava (2002), "Effect of Face Value on Product Valuation in Foreign Currencies," *Journal of Consumer Research*, 29 (3), 335–47.

Shafir, Eldar B., Peter Diamond, and Amos Tversky (1997), "Money Illusion," *Quarterly Journal of Economics*, 112 (2), 341–74.

Shafir, Eldar B., Daniel N. Osherson, and Edward E. Smith (1993), "The Advantage Model: A Comparative Theory of Evaluation and Choice under Risk," *Organizational Behavior and Human Decision Processes*, 55 (3), 325–78.

Shafir, Eldar B., Itamar Simonson, and Amos Tversky (1993), "Reason-Based Choice," *Cognition*, 49 (1–2), 11–36.

Silvera, David H., Robert A. Josephs, and R. Brian Giesler (2001), "The Proportion Heuristic: Problem Set Size as a Basis for Performance Judgments," *Journal of Behavioral Decision Making*, 14 (3), 207–21.

Simonson, Itamar (1989), "Choice Based on Reasons: The Case of Attraction and Compromise Effects," *Journal of Consumer Research*, 16 (2), 158–74.

——— (1990), "The Effect of Purchase Quantity and Timing on Variety-Seeking Behavior," *Journal of Marketing Research*, 27 (2), 150–62.

——— (2008), "Will I Like a 'Medium' Pillow? Another Look at Constructed and Inherent Preference," *Journal of Consumer Psychology*, 18 (3), 155–69.

Simonson, Itamar and Amos Tversky (1992), "Choice in Context: Tradeoff Contrast and Extremeness Aversion," *Journal of Marketing Research*, 29 (3), 281–95.

Slovic, Paul (1995), "The Construction of Preference," *American Psychologist*, 50 (5), 364–71.

Slovic, Paul and Sarah Lichtenstein (1983), "Preference Reversals: A Broader Perspective," *American Economic Review*, 73 (4), 596–605.

Soman, Dilip and John Gourville (2001), "Transaction Decoupling: How Price Bundling Affects the Decision to Consume," *Journal of Marketing Research*, 18 (1), 30–44.

Stigler, George J. and Gary S. Becker (1977), "De Gustibus Non Est Disputandum," *American Economic Review*, 67 (2), 76–90.

Thompson, Debora Viana, Rebecca W. Hamilton, and Roland T. Rust (2005), "Feature Fatigue: When Product Capabilities Become Too Much of a Good Thing," *Journal of Marketing Research*, 42 (4), 431–42.

Van Osselaer, Stijn M. J., Joseph W. Alba, and Puneet Manchanda (2004), "Irrelevant Information and Mediated Intertemporal Choice," *Journal of Consumer Psychology*, 14 (3), 257–70.

Veenhoven, Ruut (1991), "Is Happiness Relative?" *Social Indicators Research*, 24 (1), 1–34.

Wertenbroch, Klaus, Dilip Soman, and Amitava Chattopadhyay

(2007), "On the Perceived Value of Money: The Reference Dependence of Currency Numerosity Effects," *Journal of Consumer Research*, 34 (1), 1.

Wright, Alice A. and John G. Lynch Jr. (1995), "Communication Effects of Advertising versus Direct Experience When Both Search and Experience Attributes Are Present," *Journal of Consumer Research*, 21 (4), 708–18.

Yeung, Catherine and Dilip Soman (2005), "Attribute Evaluability and the Range Effect," *Journal of Consumer Research*, 32 (3), 363–69.