Consumer-Product Skill Matching: The Effects of Difficulty on Relative Self-Assessment and Choice

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Consumers infer their best product choice from comparative information about themselves and products (Prelec, Wernerfelt, and Zettelmeyer 1997). Though common, this “matching” process leads to unstable preferences when perceived product ranks change due to product array manipulations. This article proposes that another variable, task difficulty, also leads to inconsistent choices through the matching process. Accuracy resulting from matching is also assessed by exploring domains where comparative standing is based on measurable, objective skill. The present studies show that people rely heavily on their relative self-assessments in product choice, but these estimates are often inaccurate and thus lead to unintended and inconsistent choices.
It is a truism in marketing that consumers evaluate products not just on their inherent properties, but on where those products stand relative to other products. More recently, there is increasing evidence that consumers also evaluate products as a function of where they themselves stand relative to other consumers. For example, Moorman et al. (2004) showed that consumers rely on their perceived product expertise relative to other consumers as a guide for shopping behavior by searching and behaving in a way consistent with that level of expertise. Similar results have been shown regarding perceptions of relative susceptibility to disease (Menon, Block, and Ramanathan 2002) and relative success in future product experiences (Menon and Johar 1997).

In one of the first articles to explore relative preferences, Prelec et al. (1997) showed that consumers choose products that they believe are in line with their own relative preferences (see also Wernerfelt 1995). Moreover, the authors demonstrated that consumption choices can be shifted by changing the relative standing of products. For instance, a consumer who believes that her preferences for binoculars put her in the 30th percentile compared to other consumers will also prefer binoculars that she believes are in the 30th percentile compared to other binoculars. And, the pair of binoculars that she believes are in the 30th percentile will depend on the skew of the sample of binoculars provided to her. This choice process will henceforth be referred to as a “matching” strategy.

This article seeks to extend research on the matching strategy in several ways. First, it examines the matching strategy in domains in which consumers rely on perceptions of skill, not just preference. These experiments demonstrate that consumers match their product choices to their perceived relative ability even when objective ability measures are available. Second, this article examines how these relative perceptions may be distorted, leading to biased choices. Drawing on recent research on task difficulty effects on perceptions of relative ability (Burson, Larrick, and Klayman 2006; Kruger 1999), the article shows that
consumers’ perceptions of their relative ability are highly but systematically malleable. In contrast to Prelec et al.’s emphasis on biases that arise from arbitrary changes in choice arrays, the present work focuses on biases that emerge from systematic—but unwarranted—changes in relative self-perception. When self-perceptions are unstable (as they have been shown to be in skill-based domains), a strategy that aligns products with these self-perceptions (matching) leads to biases in product choice. Finally, this article shows that perceptions of relative standing—in particular, one’s skill level compared to relevant others—are an important intermediate step in product choice, and thereby an important determinant of choice in its own right.

SKILL-BASED PRODUCTS

Although many product choices are driven solely by needs and desires, others depend on an additional consideration: How much skill is required to use the product? Common examples of products that require such consideration are technological devices and sports-related goods. For skill-based products, consumers must determine which item is appropriate for their skill level. Logic suggests that good choices require that consumers evaluate their own abilities within a relevant consumption domain and choose a product that is neither too advanced to use nor so introductory as to be ineffectual. For example, in order to choose which skis to purchase, a consumer needs to first evaluate his skiing ability and then look for skis that match his ability. Though it would be convenient to tally the number of times he falls or perhaps the speed at which he descends a slope, absolute information such as this is not particularly useful in product choice and is often unavailable. Instead, the consumer is typically required to estimate some comparative skill level (beginner, intermediate, advanced) and then choose a product that is similarly categorized. Thus, assessments of comparative
standing of one’s own skills and available products are sometimes an essential part of product choice (Simonson 1993; Ratneshwar, Shocker, and Stewart 1987).

Skill-based assessments merit direct examination because they differ from other perceptions that have been used to study the matching strategy, such as preferences (Prelec et al. 1997). For example, for most skills, it is more desirable to be better than others than worse. Furthermore, because preferences are subjective (there’s no accounting for taste), it is hard to evaluate whether relative preferences are being estimated accurately or whether they lead to appropriate choices through matching. However, to the extent that abilities can be measured more objectively, they permit more reliable assessments of relative standing that should guide appropriate product choices. Finally, skill assessments will often be orthogonal to preference assessments. We all know someone who prefers to buy the best equipment but whose abilities do not justify the acquisition. One may simply prefer the “professional” cookware regardless of whether one knows the difference between mincing and dicing.

**SKILL MATCHING**

“Matching” describes the process of choosing a product by aligning its rank among products with the consumer’s rank in preference. For example, people who think they are an average height buy the “middle” rain poncho in an array (Prelec et al. 1997). The following research proposes that for skill-based products, the same rules of matching should apply: Consumers who believe they hold a particular rank will choose a product that they believe is appropriate for their relative standing. Given that accuracy is important with regard to skills (the fancier digital camera can be frustrating for the novice photographer), research about skill-matching is important. Inaccurately positive self-perceptions may lead to poor choices, but so might overly pessimistic assessments. A current Walgreen’s spot shows a customer
stating, “Technology works for some people. I’m not one of them” while backing away from an electric toothbrush.

In the case of skill-based products, matching is often a sensible strategy and may lead to reasonable choices if it utilizes accurate information about consumer and product standing. However, the consequences of skill matching are less favorable if consumers estimate their comparative skill-level incorrectly. At the very least, they may choose a different level product than they intended. The following section considers how self-assessment is malleable and can lead to incorrect estimates of one’s relative skill level, and how this, in turn, may result in systematic biases in choice.

**DIFFICULTY AND SELF-ASSESSMENTS**

People are notoriously poor judges of their relative skill (see Alba and Hutchinson 2000 for a review). Exaggerated perceptions of mastery are characteristics of normal human thought (Taylor and Brown 1988; Taylor 1989) and mispredictions of comparative ability have been shown to occur among consumers of all skill levels (Burson et al. 2006). A direct consequence of poor relative skill assessment is that related product decisions may be prone to important and systematic biases.

Recent research has shown that most people are systematically inaccurate judges of their own standing, assessing themselves as too low when a task feels difficult and too high when a task feels easy (Kruger 1999). However, research has not yet demonstrated the consequences of these biases in relative self-assessments on product choice. The current research predicts that perceptions of difficulty will change comparative estimates and therefore impact choices determined via matching. For instance, the short putting green in the sporting goods store might make most people feel like better-than-average golfers, but a
challenging climbing wall might make most people feel like worse-than-average climbers. Indeed, anecdotal evidence illustrates the unfortunate consequences of erroneous assessments of comparative abilities on choices. In 1999, most of the 50,000 students taking a college entrance exam in Beijing pessimistically applied to low-tier colleges. In this case, the national college entrance examination was quite difficult and most of the test-takers underestimated their relative performance. Since the choice of which college to apply was based on students’ post-exam, pre-feedback estimates of comparative performance on the exam, many students applied to lower-ranked colleges than they actually needed to. “A student who is dying for entering [sic] China’s prestigious Qinghua University applied for an ordinary college due to his wrong assessment of his performance” (China Daily 1999).

The present research will show empirically that consumers choose higher-end products when product usage seems easy and thus they perceive their ability to be relatively high, and that consumers choose lower-end products when usage seems difficult and thus they perceive their comparative ability to be low. As the previous example suggests, difficulty effects on assessments of relative standing can impact choices when people try to match their skill level to a product’s intended skill level. The following two studies examine the effect of usage difficulty on product choice. More specifically, this research shows that consumers’ assessments of their abilities relative to others are influenced by perceived difficulty associated with their own performance. Thus manipulations of difficulty result in reliable shifts in self-assessments that ultimately lead to inconsistent product choices.

This research not only documents skill-matching, but also shows that it is the estimate of comparative skill rather than actual, absolute skill that drives choice. Because matching is tested in domains where consumers’ skill levels can be objectively measured, these studies are able to show that the strategy can lead to unintended product choices by consumers as a result of inaccurate assessments of their own ability compared to others.
STUDY 1

This experiment was designed to document skill matching and illustrate that, because of difficulty effects, perceptions of domain difficulty change participants’ perceptions of comparative skill and ultimately influence product choice. Difficulty of a putting exercise was manipulated in order to influence participants’ perceptions of their relative golf ability. It was predicted that a longer putting distance would lead to lower self-assessments (even if it was difficult for everyone) than would an easier putt. Then, because of the matching process, those in the harder condition would choose lower-skill/lower-priced golf balls than would those in the easier condition. Thus, a relationship between participants’ self assessments and their choices was predicted. Furthermore, manipulating consumers’ perceptions of their own skill level should cause product choices to vary, leading to inconsistent product choices.

Procedure

Forty male and 15 female MBA students (median age 28) from a Midwestern university were recruited and randomly assigned to either an easy or hard task condition. First, all participants were allowed to putt golf balls 10 times in a row on an indoor putting green. They used a personally-selected putter from a collection of putters of different lengths and styles. Half of the participants putted from a distance of three feet (easy condition) while the other half of participants putted from 10 feet (hard condition). Next, all participants examined six levels of golf balls described on two dimensions—in terms of price ($9.95 per dozen – $34.95 per dozen) and intended skill level (“1st timer” – “professional”). This array description parallels that used by Prelec et al. (1997) who described products along a linear
frontier of price and quality and it also describes the environment within which consumers often evaluate products. (Retailers often display products identified primarily by price and intended skill level (e.g. skis or kitchen equipment). In fact, websites tend to facilitate search using these features in particular.) Participants indicated which of these 12-packs they would purchase for their own use. Then, on the next page, they estimated their relative golfing ability compared to other golf ball consumers. Participants provided their age, gender, the effect that higher-end balls would have on performance (worsen, no effect, improve), and their current mood on one to seven scales (sad-happy, bad mood-good mood, irritable-pleased, and depressed-cheerful) to ensure that any condition effects were not due to mood differences resulting from the golf experience. One participant did not complete the questionnaire and was excluded from the sample. At the end of the 30-minute session, participants were paid $10 and debriefed.

Results

Overall, participants estimated they were in the 26th percentile at golfing compared to their peers and chose 12-packs of golf balls ranked second from the bottom of the array. As predicted, the correlation between participants’ own comparative estimates and the rank of their chosen golf balls was significant, $r(54) = .72, p < .001$. Even controlling for difficulty condition (which might inflate the correlation), a regression of product choice on participants’ own estimates showed that participants’ own percentile predicted the rank of their product choice, $B = .04, SE = .01, t(53) = 6.93, p < .001$.

Next, a MANOVA explored the effect of difficulty on putting score, percentile estimates of own standing, rank of chosen product, and average mood. As anticipated, those putting farther got fewer points than those putting a short distance, ($M_{\text{hard}} = 2.65$ vs. $M_{\text{easy}} =$
8.19 out of 10, $F(1, 52) = 140.50, p < .001$). In turn, participants’ estimates of relative golf skill were significantly different by condition, $F(1, 52) = 12.07, p = .001$, showing that the difficulty manipulation worked. Those putting 10 feet thought they were in the 15th percentile, and those putting three feet thought they were in the 35th percentile. Finally, the MANOVA supported the prediction that shifts in self assessments result in shifts in product choice. In the harder condition, participants chose a set of golf balls ranked nearly second from the bottom but participants in the easier condition chose a set ranked nearly third from the bottom. This difference was significant, $F(1, 52) = 4.28, p = .044$. There was no effect of condition on mood ($F = .01$).

Discussion

The results support the hypothesis that perceived relative skill influences product choice to such a degree that manipulations of perceived comparative skill change product choices. Notably, this experiment achieved matching for skills (rather than preferences) and with six options for participants to choose among (rather than two or three as in Prelec et al. 1997) illustrating the generalizability and robustness of the matching effect. Another noteworthy result is that, although participants chose different products in the two conditions, they did not choose particular products in order to improve their performance. A chi-square test on participants’ reports of whether better golf balls would hurt, have no effect on, or help their performance showed that the vast majority of participants (70%) believed better golf balls would have no effect on their performance ($\chi^2(2) = 36.11, p < .001$). Once again, these same participants still chose a less advanced product when they putted from farther away and a more advanced product when they putted from three feet. This is further evidence that choice is not driven by a goal to improve skill but rather to match it.
However, a limitation to the present experiment is that matching was demonstrated through a correlation between participants’ percentiles and product ranks rather than actual deviation between product and consumer standing. Though the difficulty manipulation was successful in shifting product choice, it is not clear that participants were actually matching: A strategy of always choosing a product one rank below one’s ideal matching product could also produce a strong correlation. The next study seeks to resolve this issue by allowing consumers to provide their own perceptions of product percentile standing. If participants here choose a product that shares their own self-assessed percentile, then they are engaging in true skill-matching. Study 2 will also use another product domain (photography) in which participants are likely to have more experience and hence higher self-assessments than they did for golf. This should increase the probability of finding difficulty effects on product choice because self-assessments and product choices will not be constrained by a floor. A third improvement in study 2 is a larger choice set which is more representative of an actual choice context. Finally, the next study includes a “no choice” alternative so that participants (for instance those who think they are very unskilled) are not forced to express ambivalence as a preference for low-skill products.

**STUDY 2**

This experiment used digital cameras and photography as the product and skill domain. It was once again predicted that perceptions of domain difficulty would change participants’ perceptions of comparative photography skill and ultimately influence their product choice through matching. Difficulty of a photography quiz was manipulated in order to shift participants’ perceptions of their relative photography ability. The quiz was intended to simulate an experience consumers might encounter in a consumption context—a
discussing with a salesperson about their skills, for instance. It was hypothesized that the difficult quiz would lead to lower self-assessments than the easier quiz. Then, because of the matching process, those in the harder condition would choose less advanced cameras than would those in the easier condition despite the fact that shifts in assessments are unwarranted.

Procedure

In this experiment, 46 students from a Midwestern university each took an eight-item, multiple-choice quiz about photography. Difficulty was manipulated in two ways: number of multiple choice options and difficulty of the questions. In the easy condition, the quiz asked easy questions about photography and participants needed only to identify which of two possible answers was correct (e.g. “Red eye’ is more likely if: a) the flash is used or b) the flash is not used”). In the hard condition, the questions were more difficult and participants were required to choose from among three options (e.g. “What are the two basic types of digital images? a) vector and roster, b) vector and rester, or c) vector and raster”).

After completing the quiz, all participants estimated their percentile at taking pictures compared to their peers. Then they were asked to choose one of 10 digital cameras they were told were available at a well-known chain and which were described in terms of intended skill level (“first-timer” – “professional”) and price ($75 – $525). They were also given the option not to pick a camera. One participant chose this option and was eliminated from the analysis. Then, participants estimated the relative standing of each camera by estimating the percent of consumers that needed a more advanced option than each of the 10 alternatives (“What percent of consumers need a higher-priced/higher-skill camera than [camera X]?”). At the conclusion of the 10-minute experiment, participants were paid $2 and debriefed.

\[1\text{ The answer for the easy question is “a”. The answer for the hard question is “c”.
}]}
Results

First, product percentiles were calculated by subtracting each participants’ estimates of the percent of people that would prefer a higher-price/higher-skill camera from 100. Thus, if a participant reported that 37% of people would prefer a higher-price/higher-skill alternative than the target camera in the array, this option was coded as a 63\textsuperscript{rd} percentile alternative. Then, each participant’s matching camera was determined using his or her own estimate and the estimation of the camera’s comparative standing. For instance, if a particular participant reported that he was in the 63\textsuperscript{rd} percentile at photography, then his matching product was the camera in the array which he described as closest to the 63\textsuperscript{rd} percentile. The difference between the rank of the chosen product and the rank of the matching product was then calculated. Participants who matched received a 0.

Thirty-eight percent of participants matched their chosen camera to their own percentile standing (see figure 1). Furthermore, the predicted correlation between participants’ own percentile estimates and the percentile estimate for their chosen camera was significant, $r(45) = .53, p < .001$. A regression of product choice on participants’ own estimates and difficulty condition showed that only participants’ own self-assessments predicted the standing of their product choice, $B = .47, SE = .12, t(45) = 4.06, p < .001$. The observed proportion of matching occurred significantly more than could be predicted by chance ($\chi^2(1) = 38.58, p < .001$) despite the fact that, with 10 options to choose from, there were nine ways for each participant to not match. Testing matching more rigorously showed that matching also occurred more often than could be predicted by base rates, $\chi^2(1) = 27.58, p < .001$. 
Next, a MANOVA tested the difficulty effect on quiz scores, percentile estimates of own standing, and percentile of chosen product. As anticipated, participants taking the harder quiz got fewer questions correct than those taking the easy quiz ($M_{\text{hard}} = 3.46$ vs. $M_{\text{easy}} = 7.17$ out of eight, $F(1, 43) = 103.29$, $p < .001$). In turn, participants’ estimates of photographic skill compared to other consumers were significantly different by condition ($M_{\text{hard}} = 38^{\text{th}}$ percentile vs. $M_{\text{easy}} = 58^{\text{th}}$ percentile, $F(1, 43) = 7.09$, $p = .011$), showing that the difficulty manipulation worked. The primary goal of this analysis was to confirm that, when consumers’ own percentile estimates shifted due to task difficulty, matching would cause their product choices to shift as well. The MANOVA supported this prediction. In the harder condition, participants chose a camera in the $48^{\text{th}}$ percentile but participants in the easier condition chose a camera in the $62^{\text{nd}}$ percentile. This difference was significant, $F(1, 43) = 4.52$, $p = .039$.

Discussion

In this experiment, matching was strictly shown by allowing participants to both generate their own percentiles and the percentiles of the product they would choose. Note that this design made the possibility of demand effects remote. Participants needed to recall their own standing, the product they chose, then invert the scale used to assign percentiles to products, and assign the correct inverted number to their chosen product. Nevertheless, as predicted, consumers relied on beliefs about their own percentile standing as a cue to what product they should buy. Furthermore, their perceptions of their own standing were influenced by task difficulty leading to unstable product choices: When the task was easy, they preferred more advanced products than those preferred when the task was difficult.
GENERAL DISCUSSION

Two studies have shown that consumers tend to match their choices to their own skills, but more importantly, that skill matching persists as consumer standing changes. Therefore, differences in perceived usage difficulty can lead to differences in product choice, implying unstable purchase decisions over time. Combined with Prelec et al.’s (1997) finding regarding array effects in preference matching, this research shows that biased inputs from both the consumer and the product sides of matching can lead to biased choice. Importantly, choice instability suggests choice inaccuracy: Though she may intend to purchase a product that matches her skills, a consumer’s intentions are contaminated by difficulty effects and she therefore sometimes chooses products above or below her ability. These results paint an interesting picture of consumer behavior. For instance, consumers faced with challenging queries from a salesperson may underestimate their relative ability in the product domain and inaccurately select a less advanced product than they would have if left to their own devices or if faced with simple questions from a salesperson.

These results make several important contributions. First, the current research focuses on skills rather than preferences. And, because skills are measurable, actual relative estimates can also be assessed. Marketers can watch a consumer putt on an indoor putting green or probe a consumer’s photography knowledge in order to accurately assess the true standing of and product intended for that customer. Does actual relative ability play any role in product choice? Previous research has shown a poor correlation between estimated and actual ability (Burson et al. 2006; Krueger and Mueller 2002), suggesting that it may not. In fact, these two experiments permit measurement of the extent that true relative ability influences product choice. To explore this possibility, the actual percentile standing of each participant was
calculated from each participant’s actual golf or camera quiz score (within difficulty condition). If actual skill in a product domain influenced choice, there would be a main effect of actual percentile on level of chosen product. When actual percentile was included as a covariate in the original MANOVAs, actual percentile performance did not predict product choice in either study \((F_s < 1.40)\) and all of the original results held. Actual relative performance is not a significant predictor of product choice.

Fortunately, though it is difficult to measure or change preferences, it is possible to both measure and alter the accuracy of consumers’ self-perceptions and product choices, as was shown in this article. Thus, a marketer who determines a consumer’s true ability can also change that consumer’s perception of relative ability to match an appropriate good. It is a unique characteristic of skill-based domains that a consumer who overstates his photography ability can be identified through a few diagnostic questions, and the appropriateness of his product preferences can be assessed and potentially corrected.

Finally, the fact that the current research uses skills rather than preferences to test matching also enables a test of whether people rely on comparative self-assessments over absolute assessments about themselves to choose products. Might consumers with low putting scores simply prefer less advanced products than those who score better, with no need to appeal to comparative assessments? Data from both experiments suggests that this is not the case. In the first experiment, partial correlations show that estimates of relative standing correlate with product choice. The correlation between chosen product and self-assessment, controlling for actual putting score, is \(r(51) = .70, p < .001\). However, when participants’ self-assessments are partialled out of a correlation between actual score and chosen product rank, the relationship disappears \((r(51) = .00, p = .99)\). Similarly, in study 2, the correlation between percentile of chosen product and own self-assessment, controlling for actual score, is \(r(42) = .49, p < .001\). However, partialling out self-assessments eliminates the relationship
It is clear that the relationship between absolute performance and product choice is mediated by comparative assessments. Thus, it is indeed particularly important to understand consumers’ relative beliefs if one wants to predict their choices.

Future Directions

Though the focus of these studies has been on how shifts in usage difficulty affect self-assessments, other factors are likely to bias consumers’ estimates of their relative ability. Perceptions of difficulty inferred from subjective feelings of cognitive effort (Schwarz et al. 1991) and comparative ignorance (Fox and Tversky 1992) would likely lead to similar results as those found here. Furthermore, misperceptions about differences among different subpopulations to which one is being compared or self-enhancement motivations could both drive of self-perception and ultimately influence product choice. Future research can explore the extent to which these influences on self-assessments will also produce shifts in choice.

Researchers may also explore moderators of the skill-matching process. One possible moderator of the effect is actual skill level. Perhaps, for instance, professional photographers do not prefer “professional” cameras because their added expertise brings with it added knowledge about low correlations between the price and the skill level of the product. These consumers might know, hypothetically, that a $300 camera is meant for better photographers than a $500 camera. Or, professional photographers may believe more than other photographers that they need to buy products above their current standing so as to grow into the product. These are just a few interesting possibilities that warrant further study.²

Finally, future research might assess the extent to which unintended purchases resulting from matching lead to dissatisfaction. This paper argued that matching can lead to

² We thank two anonymous reviewers for these insights.
unfortunate consequences as it did for the college applicants in Beijing. However, this is surely not always the case. The next step for marketers may be to determine when matching helps and when it hurts consumers.

Conclusions

Previous research shows that consumers use comparative information about themselves and products in order to infer their best product choice. The current studies have shown that a variable internal to the consumer can bias choices. Specifically, inferences about one's relative skill level drawn from usage difficulty produce inconsistent product choices. Because skill level is objective and measurable, this article was also able to show that self assessments and choice are often unrelated to actual relative ability. Nevertheless, consumers rely heavily on their relative self-assessments to choose products and therefore that they unintentionally choose products that do not match their actual skill.
REFERENCES


FIGURE 1

DISTRIBUTION OF MATCHING ACROSS ALL PARTICIPANTS IN STUDY 2
FIGURE 1

DISTRIBUTION OF MATCHING ACROSS ALL PARTICIPANTS IN STUDY 2
1) SKILL-BASED PRODUCTS
1) SKILL MATCHING
1) DIFFICULTY AND SELF-ASSESSMENTS
1) STUDY 1
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