Constructing Stable Preferences: A Look into Dimensions of Experience and their Impact on Preference Stability

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Abstract

There are two polar schools of thought regarding the existence of preferences. The "economics" tradition is based on the assumption of existing preferences. The emerging "constructive" processing approach assumes preferences are constructed based on the task and context factors present during choice or preference elicitation. Most researchers believe in a middle ground where consumers construct their preferences when they are new to a category and eventually develop more stable preferences with experience in a domain. This research is designed to bridge the gap between these two schools of thought by understanding the process by which preferences are learned and developed over time. Specifically, we investigated the impact of several dimensions of experience (effort, choice, and experience) on preference stability. Results revealed that the type of experience and its corresponding effort had a large impact on the process of preference development. Study 1 demonstrated that by exposing subjects to the tradeoffs in their environment, their preferences developed and stabilized most rapidly. In addition, the act of making a choice (Study 2) and repeated choices (Study 3) both led to increased preference stability, as indicated by measures of objective and subjective preference stability.

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Consider the decision process of a soon-to-be-parent who is in the market for a dazzling array of products that he has never considered before. He decides that his first purchase is going to be a baby stroller. As he evaluates strollers he notices that some of the strollers are quite heavy while others are rather light. Thus, he learns that the weight of the stroller is one differentiating attribute. He could infer that a heavier stroller is more stable and thus favor the heavy strollers. Instead, he might infer that a lighter stroller will be more easily maneuvered and thus prefer the lighter stroller. Although he is not sure whether to get a light or heavy stroller, he decides to look at all of them and then decide based on weight and many other attributes (e.g., appearance, ease of folding, price etc.). Our consumer, therefore, will have a large consideration set and will be fairly uncertain about how much importance to place on various attributes when making his purchase decision.

Now compare this decision process with the decision process of an experienced parent. She previously owned a heavy stroller and is certain that a lightweight stroller is the way to go. Not only is she certain that less weight is better than heavy, she feels that weight is the most important attribute. She evaluates only lightweight strollers and as a consequence has a much narrower consideration set. In addition, while making the purchase decision she consistently places a great deal of importance on the weight attribute.

There are two key points when contrasting the decision processes described above. First, a consumer with less experience in a product category should consider a wider range of products than a more experienced consumer. Second, a consumer with more experience in a product category should understand the product domain better. This understanding should lead to better identification of the attributes that are important for the decision; a better identification of the direction of the correlation or relationship between the attributes and overall satisfaction with the product; and finally, a better identification of the importance to place on the attribute when making the purchase decision (see Brown & West 1997; West, Brown, & Hoch 1996).

In the baby stroller example, the new consumer identifies weight as an important attribute, tries to estimate the direction of the relationship between weight and happiness with the stroller and grapples with how important weight is in relation to the other attributes associated with the stroller. On the other hand, the experienced consumer has consolidated their preferences to the point where there is less variance around the range of acceptable alternatives. The goal of this research is to examine the consolidation process. It is clear that often preferences do consolidate over time; in fact, it is this process of preference consolidation over time that is the main focus of the current work.

The Nature of Preferences

One of the key simplifying assumptions in economics is that preferences exist (but see Plott 1996 for a view of "discovered" preferences). Specifically, economic theory is built on the assumption that consumers' choices indicate their underlying needs and wants, because it is these underlying preferences which are tapped when consumers make choices. In addition, the trading off of one good versus another (e.g., guns and butter) until consumers are indifferent implies the existence of basic values for these products. Furthermore, in marketing, one of the implied assumptions of conjoint analysis is that respondents know what they like and are able to make choices among options based on these underlying preferences. The emerging literature on constructive preferences calls many of these beliefs into question.

The notion that preferences are constructed by the decision maker within the task and the context of the decision task is an emerging generalization in the behavioral decision theory literature (Payne, Bettman, & Johnson, 1993; Slovic, Griffin, & Tversky, 1990). The constructive preference perspective argues that often times people construct their preferences in a given situation based on information available at the time of preference elicitation. The groundwork for the acceptance of the constructed preference perspective has been laid with a variety of demonstrations of the lability of preferences in the face of task and context changes. These demonstrations include preference reversals (Lichtenstein & Slovic, 1971; Lichtenstein & Slovic, 1973; Tversky, Sattath, & Slovic, 1988; Fischer & Hawkins, 1993), contingent valuations (Kahneman, Ritov, Jacowitz, & Grant, 1993; Schkade & Payne, 1994), the endowment effect (Camerer, 1992; Loewenstein & Issacharoff, 1994; Medvec, Madey, & Gilovich, 1995), the winner's curse (Thaler, 1988), the asymmetric dominance effect (Huber, Payne, & Puto, 1982; Simonson & Tversky, 1992; Ariely & Wallsten, 1995), and many others. Such findings in the constructive processing literature raise serious concerns for measuring consumer preferences.

In our view marketing is moving away from the "economics" perspective and towards the constructive approach. It is clear that consumer preferences often depend on the decision making environment, i.e., that environments shape how preferences develop. Yet, even as the demonstrations of constructive processing accumulate, we do not completely believe that consumers construct their preferences for every decision. Consumers do not go into every situation with a "tabula rasa," or blank slate. In fact, it would be maladaptive for consumers to ignore their previous experiences and go through the extensive effort of constructing their preferences for each and every decision they make.

Instead, we believe consumers learn from past decisions and adapt their consumption behavior over time to reflect both their own learning and changes in the environment (see also West, Brown, & Hoch, 1996). Initially, when encountering a new domain, consumers are more likely to be constructing their preferences. Eventually, as consumers gain experience in a domain, stable preferences can developed (see West, 1996; Hammond, McClelland & Mumpower, 1980; Hammond, Stewart, Brehmer & Steinmann, 1975). Thus, the "constructive" approach provides a good approximation of what consumers are doing as they enter a new category and the "economic" perspective provides a good approximation of experienced consumers (see Fischhoff, 1991).

In our mind, it is clear that neither the "economic" perspective nor the "constructive" approach provides a complete account of the preference formation process. Consumers clearly have some form of preferences (a favored combination of attributes) and with increased experience these preferences can change and stabilize over time. Therefore, we believe consumer experiences are the foundation of their preference structures, and the processes associated with such experiences lead to preferences which stabilize over time. In summary, the ideas we express here suggest that both camps are right, some of the time. That is, when consumers first enter a category, they will probably need to construct their choices, due to lack of experience in the domain. However, as experience is gained in a domain, preferences will stabilize. It is this *process* of preference stabilization or consumer learning that is investigated in the current research. We consider this preference stabilization process to have both objective and subjective aspects and in the studies that follow we use both objective measures (based on revealed preferences) and subjective measures (based on self reports of attribute importance and strength of preference) to evaluate the preference development process.

The goal of this paper is to explore the dimensions of experience and their differential impact on the structure of preference as experience is gained. In essence we are trying to uncover what it is consumers take away from the processes associated with different types of common consumer experiences (Effort, Choice, and Experience). We begin by identifying the important dimensions or components of experience. The primary focus of the first study is to examine how different

dimensions of experience impact preference development and stability. Studies 2 and 3 focus more directly on the mechanisms and a specific type of preference stability over time.

STUDY 1: Choice and Experience

In order to represent a realistic picture of the preference stabilization process, the procedure used in Study 1 incorporated repeated choices, where after each choice subjects experienced the outcome of their choice. In addition to investigating the impact of real choices and experiencing their outcome, the current study attempts to examine different types (dimensions) of experience. In order to provide an intuitive illustration of the different types of experiences we are investigating, consider the following examples: Imagine three consumers who are in the process of making a decision to purchase a gas barbecue grill.

The first consumer looks through a Sears catalog for information about gas grills (referred to as the **Information** condition). This consumer does not get to actually experience any of the gas grills and instead will infer benefit levels from the communicated description. Intuitively we expect that even repeated encounters with listed information about the product category should have only a minor impact on the consumer's preference structure. In fact, this type of learning may be simple category meta-learning about the relative price range of gas grills carried by Sears (see Hoch and Ha, 1986).

The second consumer, although not having purchased a grill in the past, has used them several times at neighborhood cookouts (referred to as the **Trial** condition). While not knowing a great deal about specific manufacturers or models, this consumer has a good feel for the attributes that are important to him in a gas grill. For instance, in all his experiences he has never used the side burner and questions what uses he may have for this feature. In addition, while using different grills he noticed that grills smaller than 30,000 BTUs had trouble cooking large quantities. This consumer has a general idea of what he wants in a grill (specific attribute values), but at the same time does not know the specific tradeoffs he would like to make to best satisfy his needs.

The third consumer goes to a cookout demonstration at a store that specializes in outdoor grills and has a variety of brand names and models from which to choose. She has the ability to examine many different grills and can learn about the tradeoffs associated with the attributes of the gas grills (referred to as the **Hard-Choice** condition). For example, by examining one grill with a familiar brand name versus a similar grill without the brand name, the "cost" of the known brand can be estimated. Likewise, by examining a model with a side burner versus a similar model without a side burner, the "cost" of a side burner can be learned. In encountering all this information and comparing the different grills, she spends a fair amount of effort evaluating the gas grills before purchasing one. Therefore, in addition to a generic knowledge about the attribute importance, this consumer has a good idea of the costs associated with specific attributes, a more accurate view of the tradeoffs in the environment, and a better idea about the tradeoffs she prefers.

We believe the key to understanding the impact of each type of experience may be in understanding the specific dimensions of experience. The three key dimensions we will examine here are **Effort**, **Choice** and **Experience**. The Effort dimension is simply the amount of mental energy that consumers invest in making up their minds (Alba and Hutchinson, 1987). The Choice dimension is conceptualized as a process by which preferences are consolidated in order to arrive at a resolution for a choice task (Montgomery, 1983; Beach, 1993). Finally, Experience captures the idea that it is important to experience the outcome of the choice one makes (feedback). Indeed, marketers have believed for a long time in the power of getting the consumer to test or try their products (offering trial sizes, distributing free samples, and offering incentives to test drive cars). We believe that all three of the dimensions mentioned above (Effort, Choice, and Experience) can

potentially play a role in the development of stable preferences. Expending more effort, making choices, and gaining actual experience should all help to stabilize preferences. In this work we examine the relative role these three dimensions play in the process of stabilizing preferences during the initial encounters in a novel domain. We evaluate these general mechanisms by looking at both objective and subjective measures of preference stability, which are discussed in detail below.

In this study we created conditions that map onto the different types of experiences mentioned in the gas grill example: Information, Trial, and Hard-Choice. In addition, we added a condition which included the act of making a choice without its associated effort (Easy-Choice). This was done in order to tease apart the impact of effort and making a choice as the underlying processes that drive preference consolidation over time (by comparing Easy-Choice and Hard-Choice). This design also allowed us to compare the Trial condition versus the Easy-Choice condition to isolate the impact of choice. Finally, the Trial condition can also be compared to the Information condition to isolate the impact of the actual experience in the stabilization of preferences (see Table 1). Note that the boxed comparisons in Table 1 attempt to hold all other dimensions constant while isolating the impact of effort, choice, and experience.

••• Table 1 •••

In terms of comparing the performance in each of these conditions our goal was to capture both the objective and subjective aspects of the preference stability process. It is clear that objective measures are important because they capture consumers' actual preference stability. In addition, we also wanted to measure the subjective aspects of this process in order to capture the subjective feeling consumers have about their own knowledge (see Hoch and Deighton, 1989; Brucks, 1985). In the current study we used the actual choices and experiences subjects had as representative of the objective aspects of the preference stabilization process. The subjective aspects of the process were represented by subjects' strength of preference associated with their choices.

Method

Subjects. The subjects were 84 undergraduate students at a large southeastern university who responded to an advertisement in the university newspaper. Each subject was paid $10 for participating in the study.

Stimuli. The stimuli selected for Study 1 had to satisfy three key criteria to allow us to fully investigate the impact of the dimensions of experience on new preference formation. First, we hoped to eliminate any prior knowledge effects by selecting a domain where subjects had no prior experience. Second, in order to understand the processes associated with choice and experience, we selected a domain where subjects actually experienced their choices. Third, we selected an environment with the goal of minimizing potential satiation effects of repeated trial. The domain we selected to satisfy all these requirements was aversive noise. The aversive sounds we used were created by a white noise band with sawtooth pink noise added to it. This created a sound that somewhat resembled the emergency broadcast alert.

Each stimulus was composed of three attributes: intensity, duration and points. Intensity indicated the loudness of the sound, duration was presented in seconds, and points represented the number of points gained for listening to the sound. The basic correlation structure among the three dimensions of the stimuli for all stimuli sets was -0.75 for intensity and duration, -0.4 for duration and points, and 0.9 for points and intensity. Subjects were told that the larger part of their compensation would be based on the number of points accumulated during the study.

Procedure & Design. At the start of the study each subject listened to a sample of sounds that spanned the entire range used in the study. Subjects were then asked if the sounds were too harsh and were given the opportunity to stop the study. All subjects indicated that the sounds were annoying, yet within an acceptable range, and proceeded with the session. The study itself was composed of three stages: 1) **initial exposure, 2) experience, and 3) preference measurement**. Stage 1 was manipulated on four levels between subjects and directly corresponded to the four types of experiences mentioned earlier (see Table 1). Stages 2 and 3 were the same for all subjects and the dependent measures were based on these two stages.

Stage 1 of the study was the only between subject factor (type of initial exposure), and it was manipulated on four levels. The first three levels of the exposure factor correspond to the three scenarios discussed above (Information, Trial, and Hard-Choice) and the forth level was the control for choice (Easy-Choice). For all conditions, ten base sounds were presented one at a time in a random order and this was repeated twice for a total of twenty exposures to the stimuli (see Base-Sounds in Table 2). What was different between the four conditions was the type of information that was provided during these 20 initial trials. Subjects in the Information condition were presented with a written description of the stimuli, presented one a time. Similar to the Information condition, subjects in the Trial condition read the description of the base sounds; in addition, these subjects also experienced the corresponding sound for each of the twenty options. Subjects in the other two conditions (Hard-Choice and Easy-Choice), were presented with 20 pairs of stimuli. Subjects in the two choice conditions were presented with the same base sounds as subjects in the Information and Trial condition. The base sounds were paired with an additional sound description (see easy and hard choice sounds in Table 1). After being presented with the description of the stimulus pair, these subjects were asked to select one sound to be experienced; after doing so, they experienced the outcome of their selection. Subjects in the Hard-Choice condition were presented with twenty pairs of the stimuli constructed so that for each choice they faced real tradeoffs between the alternatives. Similar to the subjects in the Hard-Choice condition, subjects in the Easy-Choice condition also saw alternatives and made choices, but without facing tradeoffs or going through the same amount of effort as subjects in the Hard-Choice condition. Elimination of tradeoffs was achieved by adding a dominated alternative (see Table 2). The dominated alternative was created by presenting subjects in the Easy-Choice condition with one of the ten base stimuli and an additional stimulus that was equal to the base stimuli on two attributes (duration and intensity) and inferior on the third (points). This procedure presented subjects with stimuli pairs where a dominating option existed so that very little effort had to be given to the task itself. All other aspects of the Easy-Choice condition were identical to the Hard-Choice condition.

••• Table 2 •••

During stage 2 of the study all subjects received all pairwise comparisons (45) of ten new base sounds in random order (see Table 3). These ten new base stimuli were constructed such that they kept the same attribute correlation as the warm-up stimuli but with different combinations of levels on their three attributes (compare Tables 2 and 3). Stage 2 of the study used a graded choice task to combine choice and strength of preference into one measure. This was done by anchoring the scale with "100% sure I want option A" on the left, and "100% sure I want option B" on the right. Descriptions of the two items were shown with the preference scale below and the starting point of the probe was at the midpoint between the two options. Subjects were then told to move the probe toward the preferred option to indicate the degree to which they were confident in their preference for the option. Because indifference between the two options was not allowed, subjects were forced to move the probe towards one of the options to indicate their choice. Thus, the choice was made by moving the probe toward the preferred option. Strength of preference was measured by the distance the probe was moved toward an option. After indicating a preference, each subject experienced the option they had selected. This process was repeated for all pairs of stimuli (45 times). In stage 3 all subjects rated the ten sounds used in the pairwise selection task

(stage 2). This cardinal rating task was such that the subjects were asked to allocate 100 points among all ten of the options to indicate their relative preference.

••• Table 3 •••

To summarize, stage 1 of the study contained four between subject conditions, and stages 2 and 3 were the same for all subjects. In stage 2 (which was similar to the Hard-Choice condition), subjects performed all 45 pairwise comparisons among the new base stimuli (see Table 3) and experienced the sound chosen before finishing with the cardinal rating task in stage 3.

Results

The four experimental conditions used in the current study were aimed at isolating three different aspects of experience that may have a role in stabilizing preferences over time (Effort, Choice, and Experience). The goal of this study was to test the stabilization process that occurs during the initial exposure (stage 1) and to test how the three different components of experiences impact the stability of preferences. Next we examine both the objective and subjective indicators of preference stability. For objective indicators of preference stability we use the relationship between the choices made in stage 2 of the study and the ratings made in stage 3 of the study (Violations). Another measure we used as an objective indicator is the time needed to make choices in stage 2 of the study (Response-Time). For the subjective indicators of preference stability we used subjects' strength of preference (Preference Strength). For each of these indicators of preference stability (Violations, Response-Time, and Preference Strength), we first examine the main effects and then proceed to examine how each condition impacted the way preference developed over time.

Violations: First, we created a measure we called Violations to indicate the number of times subjects violated their final preference order (stage 3) during the forty-five choice tasks (stage 2). For this measure we compared ratings subjects gave to the ten stimuli in stage 3 with the actual choices they made during stage 2. To compute this measure, all forty-five choices made in stage 2 were reevaluated based on the option that would have been chosen if subjects were consistent with their final preference ordering (indicated by stage 3). A Violation occurred when item chosen from a pair was later given a lower rating than the other option in the pair. Our expectation for this measure was that it would reflect the extent to which the initial experience (stage 1) advanced subjects along their preference stabilization process.

One issue with the Violation measure is the fact that it compares two different elicitation modes (choice and ratings). Indeed, preference reversals are a common context effect which are manifested in different preference orderings for the same person based on the method used to elicit preferences. The fact that people's choices don't match their ratings in a similar task has been well established in the preference reversal literature (Lichtenstein & Slovic, 1971; Lichtenstein & Slovic, 1973; Tversky, Sattath, & Slovic, 1988). The important notion in this study is not the discrepancy between choices and ratings, but rather the size of the discrepancy as decision makers' get experience in a domain. A smaller discrepancy between final ratings and choices over time indicates a more consistent and stable preference structure.

First, we examined the total number of Violations subjects made with regard to the three comparisons suggested in Table 1. The results indicated that none of the specific two-way comparisons suggested in Table 1 were significant. Since stage 2 consisted of 45 trials (which was longer than the initial stage 1experience) the main effect of Violations (average over 45 trials) might not be very sensitive. Therefore, we also examined the Violations created during the first 20% of stage 2 (the first 9 trials). For the first 9 trials, the Hard-Choice condition had fewer Violations than the Easy-Choice condition [$F_{(1,80)} = 2.37$, $p < 0.010$]. In addition, the Trial condition had fewer Violations than the Information condition [$F_{(1,80)} = 2.02$, $p < 0.024$]. Finally,

the difference between the Easy-Choice and Trial conditions was not significant [$F_{(1,80)} = 0.639$, $p = 0.427$]. These results indicate that Choice had no stabilizing effect on preferences but that both Effort and Experience increased preference stability. The same analysis can also be performed on the Violations created during the first 40% of stage 2 (first 18 trials). For the first 18 trials, the only comparison from Table 1 that was significant was the difference between the Hard-Choice and Easy-Choice conditions. Subjects in the Hard-Choice condition had fewer Violations [$F_{(1,80)} = 2.17$, $p < 0.016$], indicating that Effort might have had the most profound and long lasting impact on preference stabilization.

Aside from examining the total numbers of Violations subjects committed in stage 2, it is also important to remember that stage 2 itself provided subjects with experience and feedback. Therefore, it might be important to examine changes in tendency to commit violations within these 45 pairwise comparisons. For this purpose we grouped the 45 choices into five blocks of nine consecutive decisions in order to give a clearer representation of the changes in preference structures over time. As can be seen in Figure 1, the Hard-Choice condition, hypothesized to be the most stable, had a remarkably consistent level of Violations ranging from .24 to .18 with no clear trend over time (F-value < 1). The trends for the other three conditions all showed a reduction in the proportion of Violations over time. The Information condition started with the highest level of Violations, (.49) and ended with .28. The Easy-Choice condition started with .41 Violations and ended with .18. The Trial condition started with .35 Violations in the first block and had .21 in the last block again, a substantial reduction. When testing for linear trends, all (except for the Hard-Choice condition) were statistically significant at the 0.01 level.

••• Figure 1 •••

Response-Time. We used the Response-Time measures as a proxy for the amount of effort required to make a choice. An examination of the three pairwise comparisons proposed in Table 1 showed that the only difference that was significant was the difference between the Information and Trial conditions [$F_{(1,80)} = 3.01$, $p = 0.0036$]. This significant main effect supports the idea that experiencing the actual sounds during stage 1 impacted the amount of effort subjects invested in stage 2 of the experience. It might not be surprising that subjects who were in the Information condition, who did not hear the sounds initially, took the longest time to make their choices. But given the Violation results, it is interesting to note that the level of Effort invested in stage 1 did not impact Response-Time during stage 2. In addition, it is also interesting to note that Response-Time for all conditions decreased over time, although this reduction was obviously higher for the Information condition (see Figure 2).

••• Figure 2 •••

Preference Strength. As indicated earlier, it was also important to capture some of the subjective aspects of preference development and stability. The idea was that such measures would not directly capture the level of preference stability but rather the level of beliefs subjects have in their ability. The indicator used for subjective preference stability was the strength of preference subjects displayed in their choices. A high level of preference strength indicates a subjective perception of stable or known preferences, at least in the specific choice situation where preference strength is measured. Regarding the three pairwise comparisons suggested in Table 1, the only significant difference was between the Easy-Choice and Hard-Choice conditions [$F_{(1,80)} = 3.79$, $p < 0.001$]. However, the direction of this effect was in the opposite direction from what was expected: subjects in the Easy-Choice condition had greater preference strength than subjects in the Hard-Choice condition (see Figure 3). We will return to these results in the discussion section.

A final point of interest is the interaction between the Information and Trial conditions. As can be seen in Figure 3, preference strength for the Trial condition decreased over time while, the preference strength for the Information condition increased over time [$F_{(1,80)} = 2.33$, $p = 0.032$]. Note that this comparison isolates the impact of experiencing the stimuli on preference development (Experience). The Information condition started with a low level of preference strength because they had not even heard the sounds yet. Then as they obtain experience in the task, their preference strength slowly and steadily rises. The Trial condition, on the other hand, starts out with high preference strength, which decreases over the course of the study. Their initial high belief in their knowledge level decreased as they were forced to face the difficult tradeoffs in the environment.

••• Figure 3 •••

Discussion

The key component or dimension of experience implied by the results of Study 1 is Effort. By comparing the Easy-Choice and Hard-Choice conditions, Effort was shown to play a role in both the objective and subjective indicators of preference stability (Violations and Preference Strength respectively). Subjects in the Hard-Choice condition had fewer Violations and less preference strength than subjects in the Easy-Choice condition. Thus, the higher level of Effort associated with the Hard-Choice condition led to more stable preferences and less preference strength (subjective perceptions) in those more stable preferences.

In addition to these two findings, the most fascinating results of Study 1 were the deleterious effects of Preference Strength in one's choices on the true stabilization of preferences. Why were subjects in the Easy-Choice condition the most sure of their preferences, while subjects in the Hard-Choice condition were the least sure of their preferences? Recall that this comparison isolated the impact of effort on preference structure development. One way to make sense of this discrepancy is to assess the differences between real or objective knowledge and subjective knowledge. Objective knowledge is obtained when we learn about our preferences for the underlying dimensions in an environment, thus furthering our ability to make consistent tradeoffs. Although subjective knowledge and objective knowledge should be positively correlated (Brucks, 1985), some environments will impact objective and subjective knowledge differently. We would postulate that our task was one such environment. In the Easy-Choice condition, subjects may have had a high level of preference strength (subjective knowledge) without the associated increase in objective knowledge, because they built up an unrealistic belief about the inherent simplicity of the tradeoffs in the environment. In the Hard-Choice condition, while subjects learned something about tradeoffs in the environment (objective knowledge), they also learned something about the difficulty of those tradeoffs, perhaps lowering their subjective knowledge. Specifically, one could characterize the subjects in the Easy-Choice condition as feeling the most capable, while actually showing less consistency of preferences across the two methods of preference elicitation.

We speculate that subjects in the Easy-Choice condition had such a high level of Preference Strength is due to the large impact of the initial experience with a novel environment. After experiencing the ease of making choices during the initial stage of their preference development (stage 1), these subjects may have felt that they knew their environment and preferences. Conversely, subjects in the Hard-Choice condition had their initial preference development in a difficult environment. Therefore these subjects knew that the environment was a difficult one and had a lower level of preference strength. These results indicate that the role of choice in preference stabilization is perhaps more complex than initially hypothesized. Choices that increase objective knowledge in an environment should lead to preference stabilization, while choices that increase subjective knowledge, without increasing objective knowledge at the same time, may lead to an unrealistic increase in preference strength, but not in preference stabilization. For marketers it is

interesting to understand this disassociation and realize that certain types of experiences that consumers encounter might have a differential impact on objective and subjective knowledge. Which one of these aspects is more important may depend on the specific application.

STUDY 2: The Single Choice Study

The main result of Study 1 was that encountering and making choices in environments characterized by difficult tradeoffs stabilizes consumers' preferences. Study 1 used different measures of preference stability to support this idea (Violations, Response-Time, and Preference Strength), but these measures were all outcome measures that do not bear directly on the mechanism for the preference stabilizing process. The goal of Study 2 therefore is to explore a specific aspect of preference that stabilizes when difficult tradeoffs are encountered and made. Our main hypothesis in this study is that during the stabilizing process consumers learn to apply a more consistent weighting function to the domain. Specifically, we believe that by encountering tradeoffs among attributes, consumers learn what importance (weight) to place on the different attributes. A similar type of weight shift has been used to explain preference reversals (Tversky, Sattath, & Slovic, 1998; Fischer & Hawkins, 1993; Hawkins, 1994). By learning the importance of these different attributes and using them consistently, consumers develop stable preferences. In the next two studies (studies 2 and 3) we begin to investigate this idea by examining the role of confidence in attribute importance weights in the development of stable preferences.

One indicator of the stability with which preferences are held is the confidence consumers have in the importance of specific attributes in a given environment. Note that confidence in attribute importance weights (named here **Preference-Stability**) is independent of the importance of the specific attribute itself. For example, different consumers can have the same importance associated with a specific attribute (bitterness) of beer. A more experienced consumer (Steve) likes bitter beers and uses this attribute consistently over time in selecting beers. On the other hand, a less experienced consumer (Dan) will use the bitterness cue less consistently because of his limited knowledge structure. Therefore, we view confidence in attribute importance weights (Preference-Stability) as a "feeling of knowing" about the importance of an attribute. Such Preference-Stability may be diagnostic in the same way that subjective knowledge (Brucks, 1985) may be more important than objective knowledge because of its influence on future behavior. Thus, the certainty with which consumers hold the importance of specific attributes should aid them in the selection process by consistently focusing their attention on certain attributes. Lastly, a more confident consumer may be more likely to perform a top down or strategy driven search, while a less confident consumer may be forced to be data driven and use a more constructive process (see Broniarczyk & Alba, 1994).

Method

Procedure. 182 subjects from a large southeastern university were recruited for this study and received course credit for their participation. Subjects were involved in a computer simulated choice study (see Table 4). In the first stage of the study all subjects saw two products. During their initial encounter (task 1), half of the subjects made a choice between the two products (the Choice condition) while the other half simply read the information about the two products without making a choice between them (the No-Choice condition). Note that the Choice condition in Study 2 is similar to the Hard Choice condition in Study 1 because subjects are forced to make tradeoffs between attributes. The two products were then erased from the computer screen, and subjects were asked to indicate how important each of the three attributes was in making a choice between the two displayed options (task 2). After indicating the point estimate for the attributes' importance, subjects were asked for a confidence interval around this estimate (task 3). This estimate, which we call Preference-Stability was explained to the subjects as expressing the range of acceptable values around their attributes' importance point estimates. This measure was

collected by having subjects create an interval that was initially centered on their point estimate. We allowed the subjects to increase the length of the interval both above and below their point estimate independently. In stage two of the study, a third option was added to the choice set, and subjects were again asked to indicate the importance of the three attributes (task 4) and their confidence about this estimate (task 5). The third alternative served to increase the difficulty of the tradeoffs in the choice task. During these last two tasks, attributes' importance and Preference-Stability were measured for the new choice set (including the third option).

••• Table 4 •••

Task. Five product categories familiar to a student population were used: microwaves, running shoes, computers, TVs, and bicycles (see Table 5). All five products were described by three relevant attributes, and each subject responded for all five product categories in either the Choice or No-Choice conditions (as described in Table 4).

••• Table 5 •••

For the attribute importance ratings and the confidence intervals around the importance ratings (Preference-Stability), subjects were instructed to give their estimates based on the current set of options they were facing. In addition, subjects were asked to make these estimates in a way that reflected the importance weighting of the average student. This was done for two reasons: First, we hoped to diffuse any income effects and the resulting impact on true preference development. For instance, subjects faced with a choice between a $400 and a $180 bicycle could make the decision trivial by simply stating that they don't have $400 for a bike and selecting the cheaper alternative by default. Second, we did not want subjects to simply dismiss an attribute as not being important to them and thus avoid the tradeoff inherent in the choice task. For example, in the choice of a computer, one way of accomplishing the decision is to simply select the computer with the fastest speed. By forcing subjects to weigh attribute importance with the entire student population in mind, we hoped to have them engage in more systematic processing of the alternatives (see Ariely and Wallsten, 1995).

Results

Preference-Stability. The confidence in attribute importance variable was transformed by subtracting 100 from each value, such that larger intervals reflected lower Preference-Stability. An ANOVA was performed on these measures using the confidence in attribute importance (Preference-Stability) as the dependent variable, condition (Choice or No-choice) as a between subject factor, and Product, Attribute, and Stage as within subject factors. Since the study was not focused on differences between products or attributes, and since there were no differences across the different products and attributes, we collapsed across both variables for the remainder of the analysis.

The results show a significant interaction between the choice condition and the stage ($F_{1,180}$ = 2.78, $p < .05$). When looking at this interaction further, Preference-Stability seems to increase from the first to the second stage ($F_{1,180}$ = 8.28, $p = .002$). In addition, the difference between the two choice conditions was marginally significant ($F_{1,180}$ = 2.54, $p = .055$). As can be seen in Figure 4, the increase in Preference-Stability from stage 1 to stage 2 is driven by the increase in the No-Choice condition. There are two important aspects of these results. First, Preference-Stability in the Choice condition was higher than Preference-Stability in the No-Choice condition. Second, the difference between Preference-Stability in stage 1 and stage 2 was evident in the No-Choice condition but not in the Choice condition. These data suggest that by expanding effort to resolve tradeoffs in the environment, subjects' weighting function for the different attributes becomes more precise and stable.

••• Figure 4 •••

Discussion

The measure of Preference-Stability showed an increase in the stabilization of preference structures after subjects made a choice. First, subjects in the Choice condition had greater Preference-Stability compared with subjects in the No-choice condition. This indicates the stabilizing impact of the initial choice on preferences. In addition, both conditions showed an increase in Preference-Stability between the first and second stages, suggesting the potential impact of simply acquiring more information about an environment. We speculate that the increase in Preference-Stability was not statistically significant for the Choice condition because subjects had consolidated their preferences when making their initial decisions. On the other hand we conjecture that subjects in the No-choice condition became more confident after the second exposure because they had not consolidated their preferences with the first exposure to product information.

Because Study 2 involved only a single choice, it required a very limited amount of effort and entailed a very limited opportunity for learning. However, in most domains consumers make multiple purchases and have a variety of experiences with products. Therefore, in Study 3 we attempted to expand our understanding of preference stabilization by examining it in a scenario involving multiple choices.

STUDY 3: Repeated Choice

Study 3 had two main goals. The first was to extend the findings of Study 2 to repeated decisions and the second was to supplement the subjective measure of preference stability used in Study 2 (Preference-Stability) with the same objective measure of preference stability (Violations) used in Study 1. In addition, while the use of an agent task has its benefits, we also wanted to test our ideas with regard to one's own preferences. Therefore, in Study 3 we asked subjects to provide us with their own attribute importance, confidence intervals (Preference-Stability), and preferences. As in Study 2, Study 3 used confidence in attribute importance weights as the subjective measure of preference stability (Preference-Stability). The additional objective measure of preference stability that was added in this study was based on the Violation measure used in Study 1. Similar to Study 1, subjects in the current study made a series of repeated choices followed by a rating task of all the alternatives. The ratings given at the end of the study were used as a standard against which we measured the number of implied violations they made (Violations). The general hypothesis is that preference structures, both objective and subjective, become more stable over repeated choices.

Method

Subjects. Subjects were 39 undergraduate students at a large southeastern university who responded to an advertisement and received $10 for participating in the study. During the study all subjects made a series of twelve choices (stage 1), followed by a desirability rating for each of the options in the choice sets (stage 2).

Task. We created 6 sample microwave ovens with three attribute levels based on the *1996 Consumer Reports Buying Guide.* To create the stimuli we selected the highest and lowest values for price, capacity, and power to create a high and low price/quality item. We then created four additional microwaves that were equally spaced between the highest priced microwave and the lowest priced microwave. Finally we added five percent random noise to every value to mask the equal spacing (Table 6 includes a complete list of the stimuli).

••• Table 6 •••

Procedure: During the first stage of the study, subjects were faced with twelve sets of three options randomly selected from the stimuli set (see table 6). In each of the twelve trials, subjects were first asked to select a microwave oven. After making their selection, subjects were asked for attribute importance weights and the Preference-Stability for those weights (same measures as in Study 2). At the end of these twelve choices, subjects were asked to individually rate each of the six microwaves which appeared in the study. By comparing the choices subjects made in the first stage to the implied choices calculated from the second stage, we created a measure of the number of times subjects violated their final preference order during the twelve choice tasks (Violations).

In addition, the amount of effort required in a decision task should be another indicator of the degree to which preferences are stable. When consumers have stable preferences the amount of effort required in a decision task should be reduced because consumers will be comparing alternatives to previous choices, internal decision rules, or stored tradeoff values. In other words, when consumers have less stable preferences, a hypothesized lengthy constructive process may be needed to "solve" the decision task (Response-Time).

Results

Preference-Stability. As in the Single Choice study (Study 2), the key indicator of the subjective preference structure was Preference-Stability (with higher numbers reflecting smaller intervals and higher Preference-Stability). When examining this measure in a single factor repeated measure ANOVA design, all three attributes showed an increase in Preference-Stability over the 12 trials when looked at [Price($): $F_{11,418} = 6.42$, $p < .0001$; Capacity(ft^3): $F_{11,418} = 4.97$, $p < .0001$; Power(watts): $F_{11,418} = 5.30$, $p < .0001$)]. Figure 5 shows the dramatic increase in Preference-Stability over the twelve trials, which indicates subjects' increased "feeling of knowing" regarding their preferences as the experience unfolded. Again, as in the Single Choice study, we see a change in subjects' subjective estimate of their own preference stability associated with choice. Note, however, that this stabilization appears much more dramatically in Study 3 than in Study 2, as subjects made repeated decisions in the same domain.

••• Figure 5 •••

Response-Time & Preference-Consistency. As in Study 1, we used two objective measures of the preference stabilization process. The Response-Time measure relates to the time taken to make the choice in stage 1 of the study and the Violations measure relates to the consistency between stages 1 and 2 of the study. As can be seen in Figure 6, the amount of time taken to make a choice decreases over the 12 trials when looked at in a single factor repeated measure ANOVA design ($F_{(11,418)} = 6.49$, $p < .0001$). Thus, we believe that in the first trials participants were learning the tradeoffs for the attributes in the domain, and as they gained experience they were relying on their past choices to aid in the selection process. When examining Violations, we are interested in the change in Violations over time and not the total number of Violations. A Violation of preference structure consistency occurs when a subject selects an option which was later given a lower overall rating than another option in the specific choice set. Note that for some trials more than one option may have been given the same rating in the rating task. In such cases, (41 of the 468) the selection of either option was not considered a Violation. Comparing the proportion of Violations over the first half of the study to the proportion of Violations in the second half of the study shows that Violations decreased from the first half (0.60) to the second (0.49), a statistically significant difference ($t_{196} = 2.55$, $p < 0.01$). Thus, subjects had fewer Violations as they gained experience in the domain. Subjects' increased consistency is

even more compelling given the reduction in effort subjects expended across the twelve trials. That is, subjects became faster and more consistent over the course of the study (Response-Time).

••• Figure 6 •••

Discussion

The three key findings in Study 3 fully support the general hypothesis that choice in an environment when subjects are forced to encounter tradeoffs plays a key role in stabilizing preferences. The subjective measures of the stabilizing process are based on the confidence subjects had in the attribute importance weights. This measure showed that participants' Preference-Stability increased as they gained experience in a domain. The objective measures of the stabilizing process were based on the Violations of the preference ordering and the amount of effort invested in making the choices (Response-Time). Both the Violation measure and the Response-Time measure indicated an increase in preference consistency over time. In summary, all three preference structure measures converge to indicate that choices increase the stability of preferences, by either reducing the necessity to construct preferences or increasing the consistency with which preferences are constructed

GENERAL DISCUSSION

Over the course of the three studies an intriguing picture of the preference stabilization process emerged. First, the type of environment in which the initial experience took place was shown to impact the type of knowledge learned by consumers and the consistency with which this knowledge was applied (Study 1). By comparing the hard and easy environments we conclude that objective and subjective knowledge can be disassociated. Subjective knowledge was gained after making choices in an easy environment while objective knowledge was gained after making choices in a difficult environment. Studies 2 and 3 expanded on these findings by examining a possible mechanism for preference stabilization. The results showed that the consistency with which subjects relied on the different attributes increased when making a single choice (Study 2) or repeated choices (Study 3). Across all three studies we employed different objective and subjective measures of preference stability. We used preference strength, confidence in attribute importance weights (Preference-Stability), time required to make a decision, and we created a measure called Violations (consistency over time). We do not believe that any one of our measures is the only "true" or "correct" measure of preference stability. Rather, we think that the set of measures provides insights into such stability.

The most complete picture of the preference development process is found in Study 1. In this study, subjects made a series of choices and actually experienced the outcomes associated with their choices. The most important results of this study concern the differential impact of the initial experience on objective and subjective knowledge. Subjects who were in the easiest choice environment had very unstable preferences, but these subjects also believed that their knowledge level was high. Subjects who were in the most difficult choice environment had very stable preferences, but these subjects believed that their knowledge level was low. What were these subjects learning during their initial experience? Perhaps environments which presented subjects with easy choices lulled consumers into a false sense of security regarding the stability of their own preferences. Possibly these subjects were misplacing the locus of the ease with which they made choices as a reflection of their own abilities and stable preferences, and not as a factor characterizing the environment. Conversely, environments which forced subjects to confront difficult tradeoffs may have led subjects to believe that the environment was indeed a difficult one and therefore they did not gain the same level of subjective knowledge.

In the domain of attitude judgments Tybout and Scott (1993) showed that weak evaluations can be influenced by subtle, constructive, self-perception processes, whereas strongly held

evaluations that are based on immediate sensory data or experience are influenced by information-aggregation . This is similar to the notion that consumers are more likely to construct a stable preference if the construction is based on rigorous experience in a domain. When the experience lacks rigor, consumers will be more susceptible to outside influences when constructing their preferences. The main difference between the Tybout and Scott (1983) studies and studies reported in this paper is that they focused on attitudinal judgments (evaluations of a single alternative) while we focused on preference judgments (relative evaluation of multiple alternatives).

Another potential explanation for the differences between the Hard-Choice and Easy-Choice conditions is related to the difficulty of the choice task. Perhaps subjects in the Hard-Choice condition faced such a difficult decision that instead of making a choice they would have preferred to delay the decision or not make the decision at all (Baron and Spranca, 1997). Of course, since we were dealing with aversive noise as the stimuli we did not want to give subjects this no choice option. In the absence of the no-choice option, Hard-Choice subjects may have formed weak, tentative preferences. Further research into the specific processes and types of preferences developed during initial expose do a novel domain is warranted.

In addition, it is very interesting to note the differential impact of the initial experience on objective and subjective preference stability. The objective measures of preference stability showed that regardless of the initial experience all subjects improved their objective knowledge when they made difficult tradeoffs (during stage 2). Remarkably, the subjective measures of preference stability were highly resistant to change after they were established during the initial experience. This resistance of subjective knowledge to updating is critical since in many consumer domains objective knowledge is hard to come by and consumers are forced to rely on their subjective knowledge.

The goal of studies 2 and 3 was to examine the consistency with which subjects used different attributes in their evaluations as a possible mechanism for preference stabilization. These studies replicated the results of Study 1 while providing insight into the stabilization process itself. The main measure used for this purpose was subjects' Preference-Stability (confidence in attribute importance weights). The results indicated that subjects used attributes more consistently after making a single choice (Study 2) and also after making repeated choices (Study 3). This validates the notion that consistency in usage of attribute importance is a component in the preference stabilization process.

To summarize, our goal was to understand the process by which preferences change from malleable to stable. The results show that making difficult tradeoffs helps consumers stabilize or consolidate their preferences. The implied challenge to marketers, therefore, is to find ways to help consumers think deeply about the tradeoffs in their product domain so that they understand better their own preferences and purchase products that better fit their needs. In addition, understanding consumers' experience level (and knowledge structure) can help marketers to create messages that are best suited for their consumers' needs. Consumers with little knowledge in the domain should get information that helps them understand the domain and the tradeoffs within it, while consumers with higher knowledge need mostly product information. Finally, how a preference is constructed should have serious implications for those who are trying to measure preferences. One would expect the accuracy of forecasts to vary greatly based on whether consumers were retrieving or constructing their preferences during the measurement exercise. Perhaps measurement analysts will want to estimate in some way the degree of preference construction in the measurement process. Currently all preferences are evaluated equally in many popular preference measurement techniques (e.g., conjoint analysis, logit modeling). One would expect that preferences based on knowledge of tradeoffs should be better predictors of sales than preferences that are more constructive.

Future Directions

Acquiring Taste: The type of preference development we investigated in this research was preference consolidation. Essentially, preference structures stabilize due to improved powers of discrimination associated with the reduction of variance around attribute importance estimates. There is another type of preference development that is different in nature. Think back to your first sip of beer. For most people the first taste of beer is mystifying, because we wonder how anyone could drink such a foul concoction. Many people recall drinking sweeter and lighter beers initially and progressing to heavier and more bitter beers. Analogously, white zinfandel can be thought of as a training wine, as many newcomers to wine start with white zinfandel and then move into less sweet varieties. One expression used to describe this progression is people "acquire a taste" over time.

One simple answer to the question of how preferences are developed is to say that consumers have inherent preferences and through trial and error learn what they like. Yet in the beer example above, most people claim to like the lighter and sweeter beers when they first start drinking beer, while people with more experience tend to prefer the heavier, more bitter beers. During the process of acquiring tastes consumers are not simply homing in on the specific tradeoff relationship between attributes. Instead they are changing the attributes tradeoffs which they consider optimal (e.g., the importance of bitterness in beer.

Thus, we believe that there are two types of processes for learning preferences. In one, preferences converge over time toward "ideal" tradeoffs among the attributes (as in our studies). In the second, preferences change over time as taste matures, such that the "ideal" tradeoffs among the attributes change over time. Understanding these two processes and their implications for consumer learning seems to be a very promising next step.

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Authors' Notes

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TABLE 1: The Dimensions of Each Condition in Study 1, and their Comparisons

	Dimensions		
Condition	Choice	Experience	Effort
Information	No-Choice	No	Low
Trial	No-Choice	Yes	Low
Easy-Choice	Choice	Yes	Low
Hard-Choice	Choice	Yes	High

TABLE 2
Stimuli Used in Stage 1 of Study 1

	Base Sounds			Easy-Choice Sounds			Hard-Choice Sounds		
Condition	Information & Trial Conditions			Easy-Choice Condition			Hard-Choice Condition		
Sound #	Points	Duration	Intensity	Points	Duration	Intensity	Points	Duration	Intensity
1	.15	6	6	.13	6	6	.40	6	7
2	.25	7.5	6	.22	7.5	6	.55	4.5	8
3	.20	3	7	.17	3	7	.60	1.5	9
4	.30	4.5	7	.26	4.5	7	.15	6	6
5	.40	6	7	.34	6	7	.25	7.5	6
6	.45	3	8	.39	3	8	.70	3	9
7	.55	4.5	8	.47	4.5	8	.20	3	7
8	.65	6	8	.56	6	8	.70	3	9
9	.60	1.5	9	.52	1.5	9	.30	4.5	7
10	.70	3	9	.60	3	9	.40	6	7

TABLE 3
Stimuli Used in Stages 2 and 3 of Study 1

Trial	Points	Duration	Intensity
1	.15	6.5	7
2	.25	8	7
3	.20	3.5	8
4	.30	5	8
5	.40	6.5	8
6	.45	3.5	9
7	.55	5	9
8	.65	6.5	9
9	.60	2	10
10	.70	3.5	10

TABLE 4
Description of the Procedure for Study 2

	Stage 1 (2 alternatives)			Stage 2 (3 alternatives)	
Condition	Task 1	Task 2	Task 3	Task 4	Task 5
Choice	Choice	Rating Attribute Importance	Confidence Intervals	Rating Attribute Importance	Confidence Intervals
No-Choice	No-Choice	Rating Attribute Importance	Confidence Intervals	Rating Attribute Importance	Confidence Intervals

TABLE 5
Descriptions of Items Used in Study 2

Products	Attributes	Product A	Product B	Additional Product
Microwaves	- Price ($)	380	209	294
	- Capacity (ft)	1.8	1.2	1.5
	- Power (W)	1000	700	850
Running Shoes	- Comfort	8.5	5.5	7
	- Durability	6.8	4.4	5.6
	- Price ($)	90	58.5	74.3
Computers	- Speed (Hz)	33	21.5	27.2
	- Memory (Mb)	8	4.4	6.2
	- Price ($)	1,900	1,235	1567
TVs	- Screen Size (in)	20	14	17
	- Price ($)	650	357	504
	- Power (W)	25	15	20
Bicycles	- Price ($)	400	180	290
	- Weight (lbs)	15	23	18.8
	- Wheel Base (in)	22	36	29

TABLE 6
Description of All Items Used in Study 3

Microwaves	Item A	Item B	Item C	Item D	Item E	Item F
Price ($)	100	152	199	253	295	354
Capacity (ft3)	0.6	0.84	1.06	1.3	1.58	1.84
Power (watts)	590	680	760	850	930	1010

Note: the structure of the stimuli was such that the higher letter (i.e. F) represents the highest price and quality while the lower letters (i.e. A) represent the lowest price and quality.

Figure captions:

FIGURE 1
Violations of Final Ratings During Choice by Condition and Trial

FIGURE 2
Decision Making Time for the Choice Tasks, Across Conditions and Trials

FIGURE 3
Preference Strength Across Conditions and Trials.

FIGURE 4
Average Size of Preference-Stability by Condition and Stage. Error Bars are Based on Standard Errors

FIGURE 5
Average Preference-Stability in Study 3 Over 12 Trials for all 3 Dimensions

FIGURE 6
Average Decision Time in Study 3 for the 12 Trials. Error Bars are Based on Standard Errors

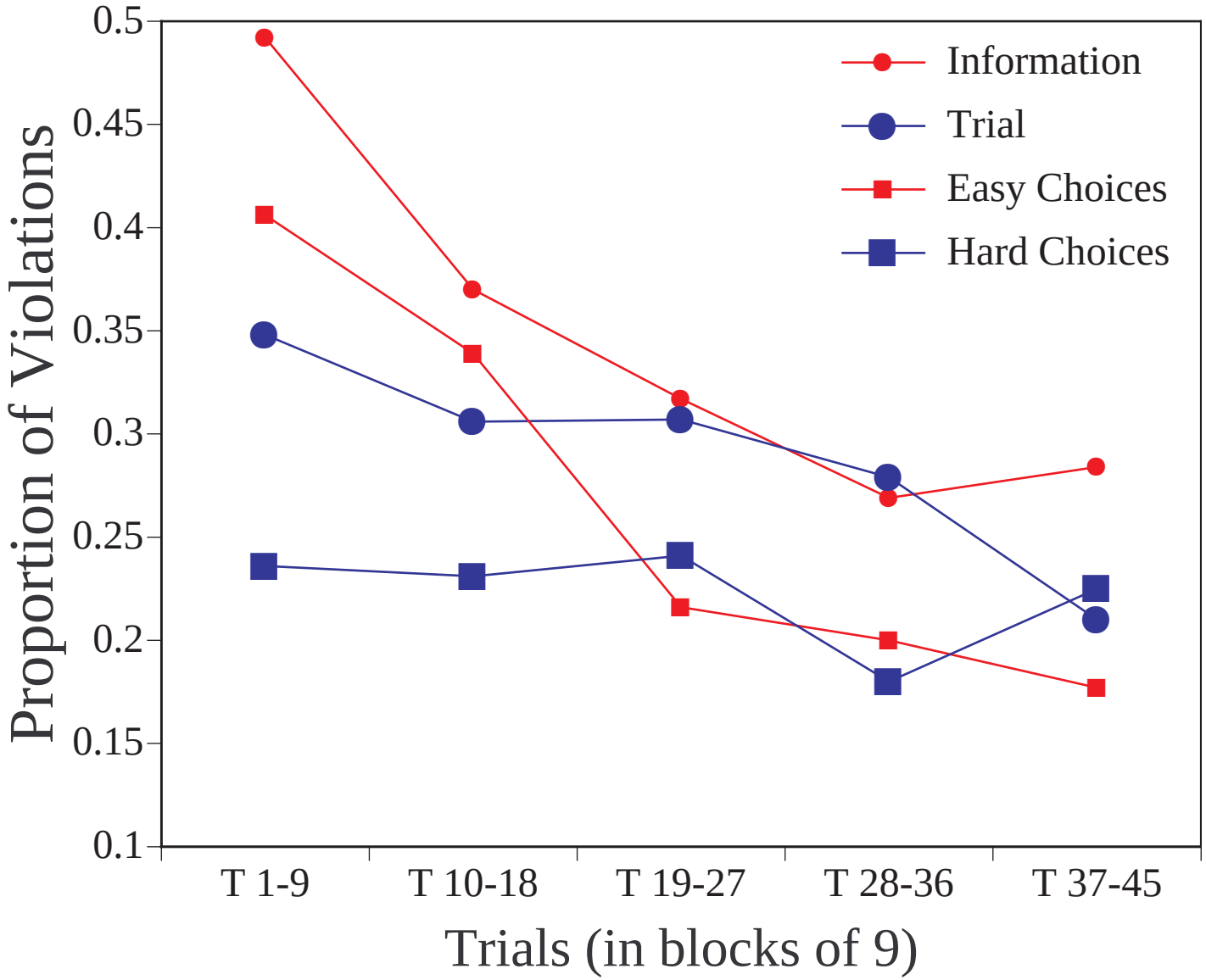
Proportion of Violations
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
T 1-9
T 10-18
T 19-27
T 28-36
T 37-45
Trials (in blocks of 9)
Information
Trial
Easy Choices
Hard Choices

Figure 1

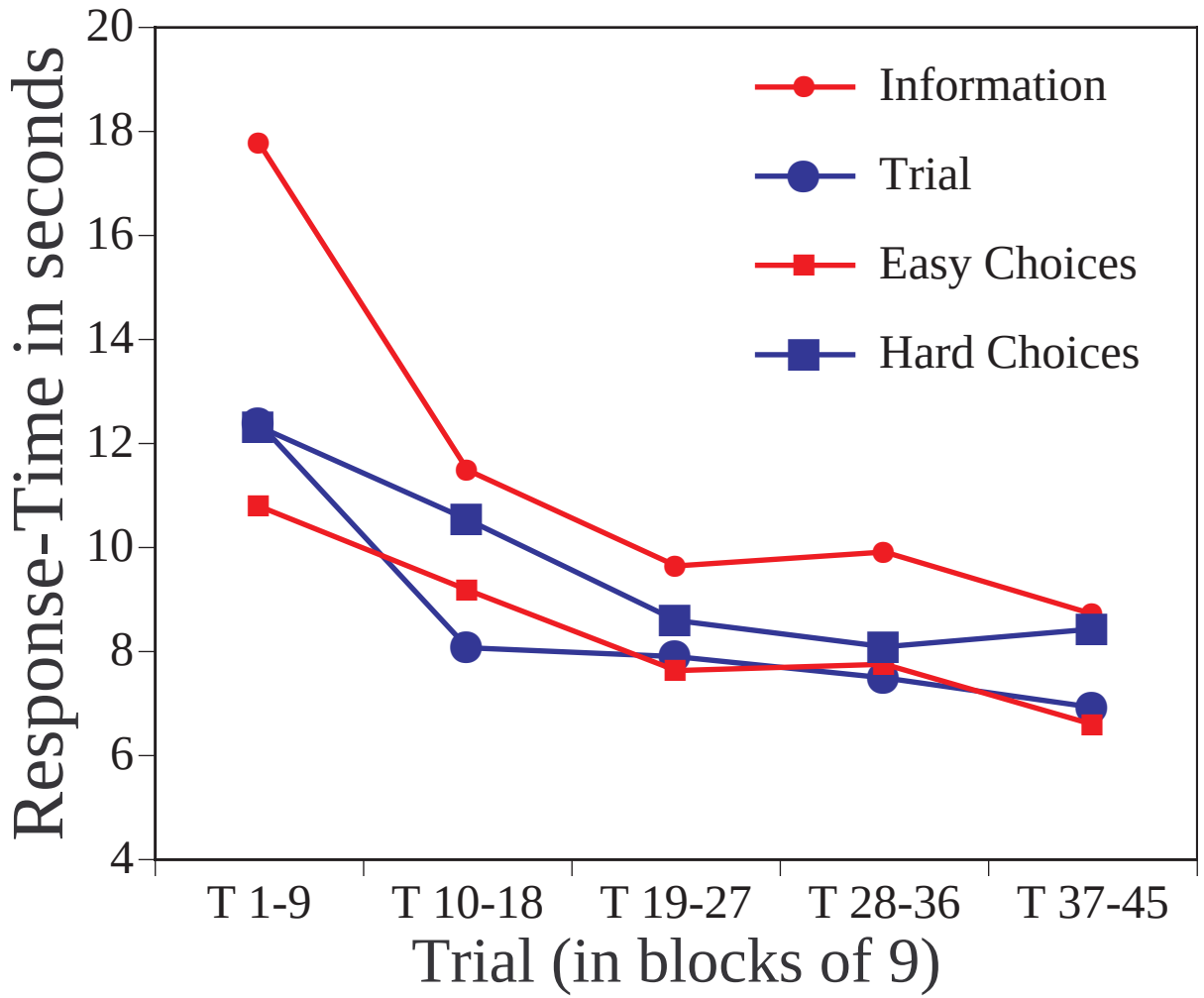
Response-Time in seconds
20
18
16
14
12
10
8
6
4
Information
Trial
Easy Choices
Hard Choices
T 1-9
T 10-18
T 19-27
T 28-36
T 37-45
Trial (in blocks of 9)

Figure 2

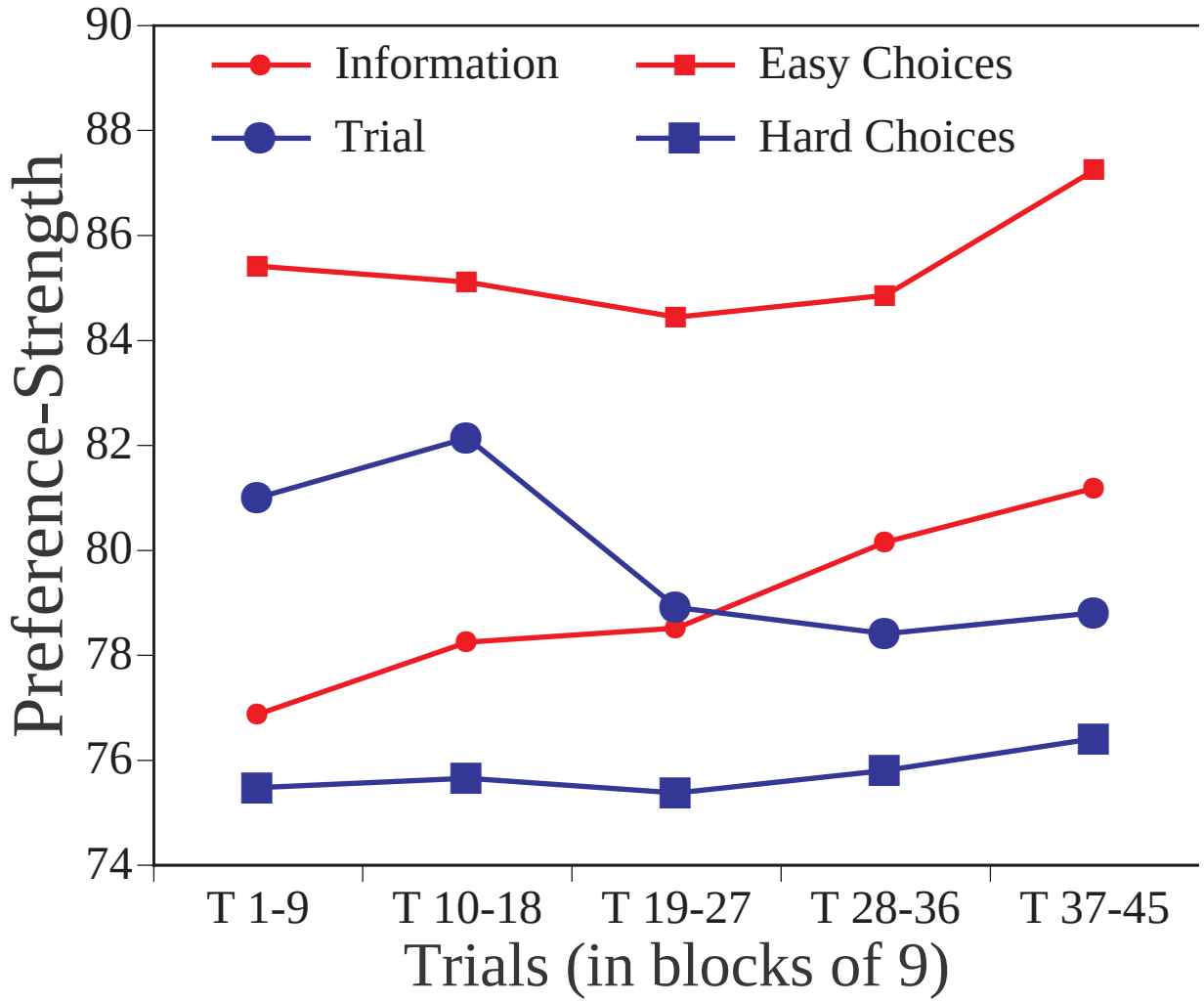
Information
Easy Choices
Trial
Hard Choices
Preference-Strength
90
88
86
84
82
80
78
76
74
T 1-9
T 10-18
T 19-27
T 28-36
T 37-45
Trials (in blocks of 9)

Figure 3

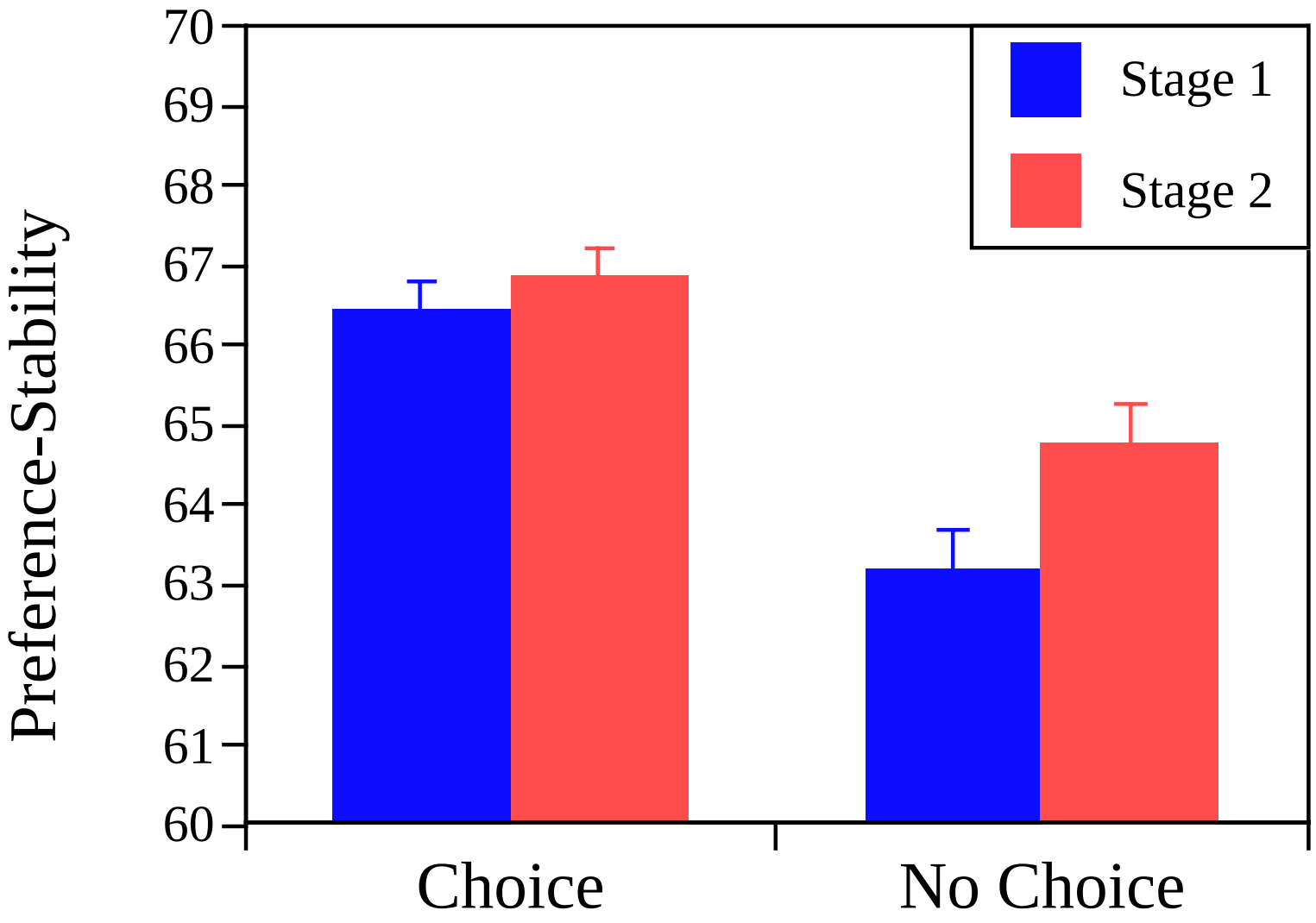
Preference-Stability
70
69
68
67
66
65
64
63
62
61
60
Stage 1
Stage 2
Choice
No Choice

Figure 4

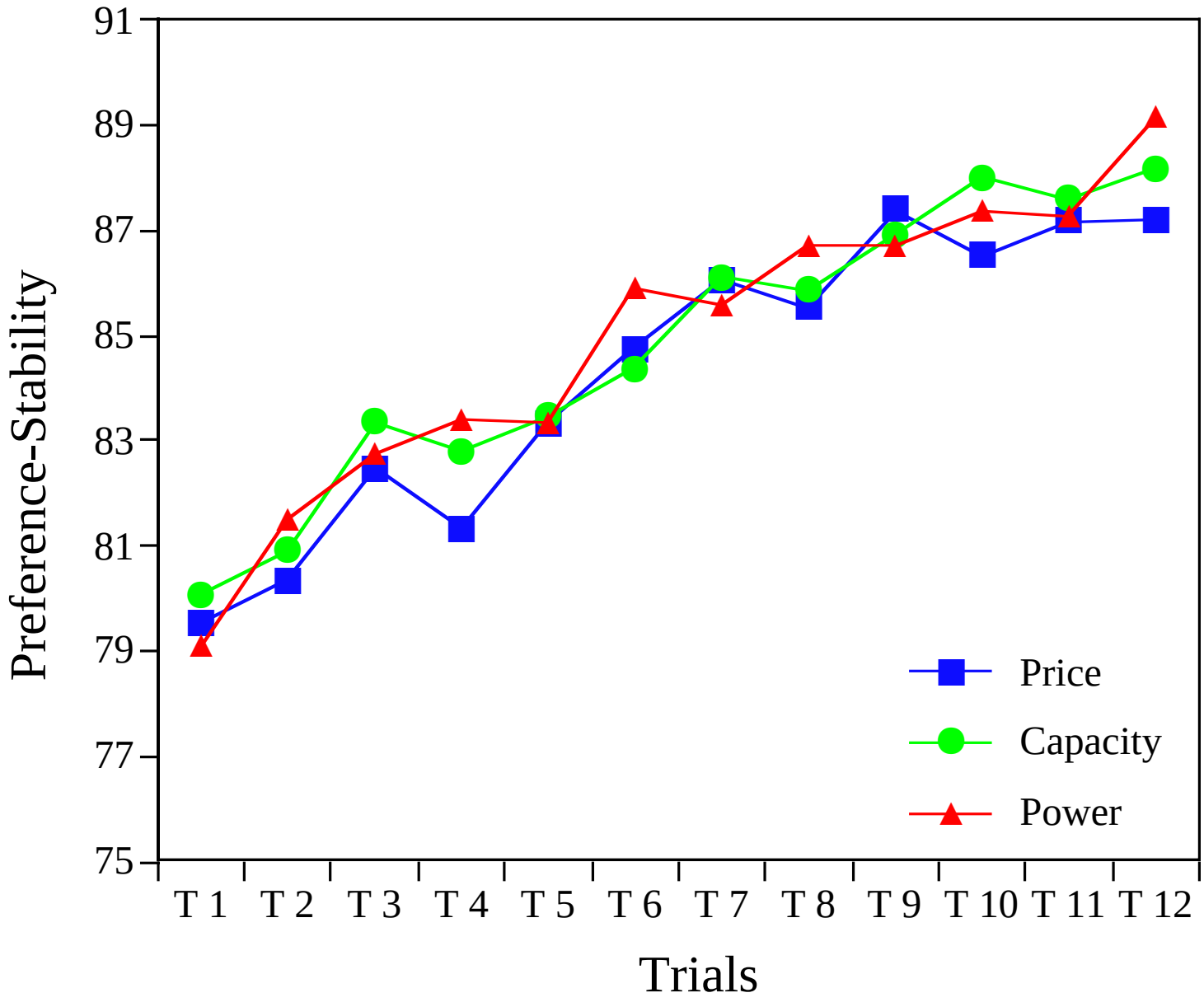
91
89
87
85
83
81
79
77
75
Preference-Stability
T 1
T 2
T 3
T 4
T 5
T 6
T 7
T 8
T 9
T 10
T 11
T 12
Trials
Price
Capacity
Power

Figure 5

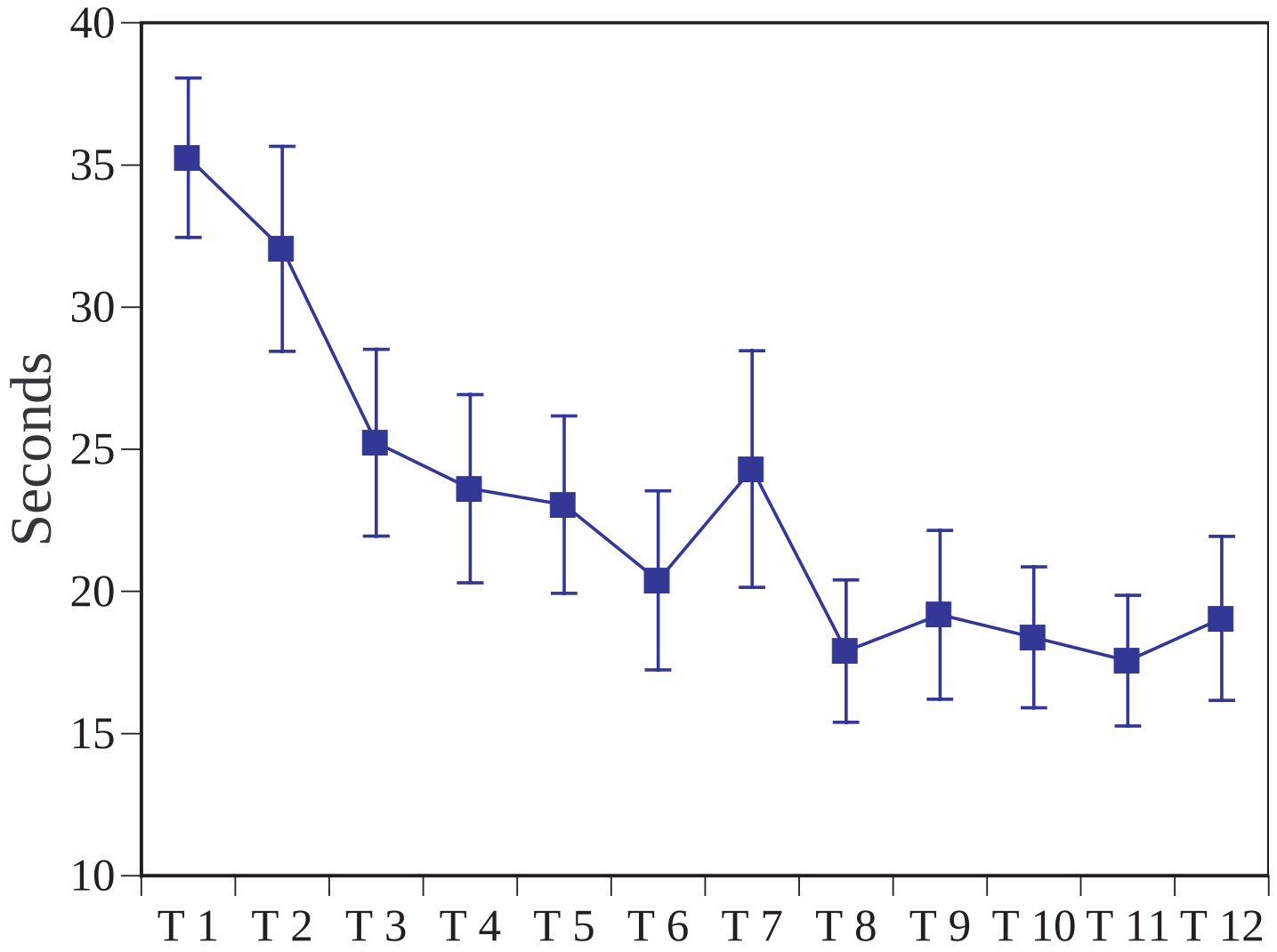

Figure 6