

# The Duration Heuristic

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The duration heuristic refers to the tendency to evaluate services based on their duration rather than on their content. We propose that consumers rely on the duration heuristic because it simplifies the evaluation process. In particular, the duration heuristic is most likely to be seen when the duration of the service experience is evaluable relative to other features and when duration is considered in relation to price. Across four experiments and a field study, we (a) provide demonstrations of the duration heuristic, (b) illustrate the biases that result as a consequence of its use, and (c) identify conditions under which consumers are more likely to use the heuristic.

Time is one salient medium through which service providers deliver their services and consumers consume these services. In many situations, consumers have to spend a longer time consuming the service if they want to get more out of it. For example, a consumer has to spend a longer time in a massage parlor if she wants to have a full-body massage than if she just wants to have her shoulder massaged. Similarly, a consumer who wants to tone her body through participation in a physical training program has to be in the program long enough for the exercise to take effect. Is it generally true that longer programs are more effective? This is far from the universal truth because the effectiveness of a training program is determined by several additional quality factors, such as the design of the program, the expertise of the physical trainer, and the equipment used. While a training program's effectiveness is condi-

tional on its duration, duration alone does not lead to—nor does it determine—effectiveness.

Although consumers may understand that the duration of the service in itself does not determine its value, they tend to believe in a positive correlation between the two. Because duration can be easily measured on an objective scale while value is often difficult to assess, consumers who believe in a positive correlation between value and duration may use duration as a heuristic cue to infer value. To this extent, they may believe that a longer service is more valuable than a shorter one. We refer to the tendency to evaluate services based on their duration rather than their content as the “duration heuristic.”

As with any other heuristics, consumers rely on the duration heuristic in service evaluations because it simplifies the evaluation process. An optimal strategy to evaluate a service often requires a careful assessment of each of its features and an integration of these assessments into an overall evaluation. When consumers lack the ability and/or motivation to go through this cognitively demanding process, they may simplify the process by using the nominal duration of the service as a basis for evaluating the service. Less obvious, however, is the fact that consumers may also have difficulty evaluating (distinct from measuring) duration. For example, while consumers may know that any training program that lasts for less than 30 minutes (per session) is ineffective and that any program that lasts for more than 180 minutes is unrealistically long, they may not be able to understand the value of a 60-minute program. Previous research on attribute evaluability shows that when consumers find an attribute difficult to evaluate, they do not base their evaluations on this attribute (see Hsee [2000] for a review). Thus, the difficulty in evaluating duration may hinder its use as a heuristic basis for service evaluations.

While duration may have minimal impact on service evaluations when it is difficult to evaluate, showing duration together with the price of the service may facilitate its in-

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fluence on service evaluations. Specifically, showing duration with price prompts consumers to evaluate the service's value for money. Previous research shows that the evaluation of an option's value for money is often made based on its economic value, independent of the amount of benefit one can derive from the consumption of the option itself (Hsee 1999; Thaler 1985). Therefore, even if consumers have no insights as to how much benefit they can obtain from a given service duration, they can still use duration as a basis for evaluating its value for money and, subsequently, for evaluating the service.

In this research, we provide empirical evidence for the above propositions. Specifically, we demonstrate how (low) duration evaluability moderates the effect of duration on service evaluations. Further, when duration evaluability is low and consumers are unlikely to use the duration heuristic, we demonstrate that price information facilitates the use of duration as a basis for evaluations. We also identify biases that may result as a consequence of the use of the heuristic.

The rest of this article is organized as follows. We first review the relevant research on heuristics and the underlying rationale behind these heuristics. We apply this rationale to the present research and derive the duration heuristic hypothesis. We then identify conditions under which consumers are likely to use the heuristic and develop predictions concerning the biases that result as a consequence of its use. Finally, we present four laboratory experiments and one field study that support these predictions.

## THE DURATION HEURISTIC

### The Duration Heuristic as an Inference Process

For many services (e.g., fitness programs, coaching, and physical therapy), duration is a carrier of value. In particular, a greater benefit can accrue when the service is consumed over a longer duration. However, consumers may also assume that they will end up getting more benefits from a service when the service lasts for a longer duration. To facilitate the illustration of this distinction, consider a fitness program as an example. While it is generally true that if one wants to "achieve a higher fitness goal" (event *X*), one has to "participate in a physical training program that lasts for a longer duration" (event *Y*), consumers also tend to believe that if one "participates in a physical training program that lasts for a longer duration" (event *Y*), s/he will be able to "achieve a higher fitness goal" (event *X*). This is a reflection of a more general disposition to treat conditional relations between events as biconditional and, therefore, to infer that if one event *X* implies another event *Y*, then *Y* also implies *X* as well (see Wyer and Srull 1989, chap. 9).

Other heuristics that exemplify the disposition to treat conditional relations between events as biconditional include the representativeness heuristic (Kahneman and Tversky 1972), the availability heuristic (Tversky and Kahneman 1973), and the simulation heuristic (Kahneman and Tversky 1982). The representativeness heuristic refers to the ten-

dency whereby when people believe members of a particular social category have certain attributes, they infer that people who have these attributes belong to that category. For example, when individuals believe that businessmen in general are sociable (that *X* is *Y*), they then infer that people who are sociable are likely to be businessmen (that *Y* is *X*) and that people who are not sociable are unlikely to be businessmen (that not-*Y* is not-*X*). The availability heuristic is another manifestation of this inference process. It refers to the tendency whereby people infer higher frequency and probability of occurrence when examples are easy rather than difficult to bring to mind. In other words, people assume a biconditional relation between the frequency of occurrence of an event and the ease of remembering this event. To elaborate, because people believe that if a stimulus occurs very frequently, it will be easy to remember (*X* implies *Y*), so they also infer that if a stimulus is easy to remember, it must be typical and has occurred very frequently (*Y* implies *X*), and that if a stimulus is difficult to remember, it cannot be typical (not-*Y* implies not-*X*).

As discussed earlier, although a service's value is conditional on its duration, duration alone does not lead to, nor does it determine, its value. However, if consumers treat the conditional relation between duration and value as biconditional, they may use duration as a basis to infer value and evaluate longer services more favorably than shorter ones. We refer to the tendency to evaluate services based on their duration rather than on their content as the "duration heuristic."

**H1:** When consumers use duration as a heuristic basis for service evaluation, service evaluation is biased in favor of longer duration.

### Duration as a Heuristic Cue: How Evaluable Is It?

Heuristic cues from which people draw their inferences are supposed to be easy to interpret and evaluate (Hogarth 1981). For example, the heuristic cue in the representativeness heuristic—the presence or absence of an attribute—is easy to evaluate because there are only two alternate values (i.e., present or absence) and people know the meaning of each value (see Hsee [2000] for a discussion of the concept of "evaluability" and factors that determine the evaluability of an attribute). Similarly, the heuristic cue in the availability heuristic—the experienced ease or difficulty of recall or thought generation—is a subjective experience of memory retrieval and is therefore interpretable in its own right. In this case, individuals can easily draw inferences based on the cue.

In order to assess how easily duration can be used as a cue, we draw on research on attribute evaluability (Hsee 2000; Hsee et al. 1999). An attribute is hard to evaluate if the decision maker does not have much knowledge about that attribute's effective range, neutral reference point, and value distribution. For most consumers, duration has exactly these characteristics. For instance, the duration of physical

training programs can vary from 30 to 180 minutes. Consumers may know that any duration less than 30 minutes will be ineffective and any duration more than 180 minutes will be unrealistic and that, within the effective range, a longer duration is better than a shorter duration. However, they may not know how to interpret the desirability of a particular value of duration within the range. Specifically, a consumer who evaluates a 60-minute program may not know how much she can achieve in the 60-minute duration and the effectiveness of such a program. If she has knowledge about the duration of other programs, or if she has participated in a physical training program before, she may be able to decide whether the 60-minute duration is relatively short, relatively long, or just right. Without this knowledge, however, it would be difficult to evaluate the 60-minute duration, and this difficulty may hinder her use of duration as a heuristic cue.

While the use of the duration heuristic is unlikely when one has difficulty evaluating a specific value of duration, showing duration together with price information may facilitate the use of duration as a basis for service evaluation. To illustrate, suppose that the consumer we considered earlier now finds out that the 60-minute program costs \$80. With the price information available, the consumer can compute a “duration-to-cost” ratio—the higher this ratio, the more minutes of service she can get for each dollar paid, and the better the economic value of the transaction. Whether a transaction has good value for money or not is a prevalent consideration in decision making. Previous research shows that consumers have a “value-seeking” tendency and tend to look for the option that has the best value for money, regardless of whether they actually enjoy consuming that option or not (Hsee 1999). Accordingly, we suggest that even if consumers have no insight as to how much benefit they can obtain from a specific duration of service, they may still evaluate how good it is as a “deal” based on its duration-to-cost ratio. Hence, duration will have an impact on service evaluation through the computation of its duration-to-cost ratio.

In principle, an objective evaluation of a duration-to-cost ratio requires consumers to contrast it to those of other physical training programs available in the market. However, in the domain of monetary values, research suggests that consumers assess the value for money of a product by framing the benefit per dollar in the context of other products that the same amount could buy (Gourville 1998). Similarly, our consumer may contrast the duration-to-cost ratio with that of other consumption opportunities that they consider to be relevant as a basis for comparison. For example, if with \$80, the consumer could take a 2-hour yoga class, enjoy a 2-hour massage, or go for a 3-hour high tea, then the 60-minute physical training program would appear unattractive, because with the same amount of money, she will get a lesser quantity of benefit from the training program than from the other services that she typically consumes. The result of this comparison would obviously depend on what consumers consider to be relevant as a basis for comparison, and this consideration

would, in turn, depend on their consumption pattern. Our objective in this research, however, is not to examine the specifics of how and with what these comparisons are made but to illustrate that consumers can evaluate a duration-to-cost ratio based on their own subjective perspective. More pertinently, while duration alone may have low evaluability, duration-to-cost ratio has high evaluability.

In contrast, consumers who do not know the price of the physical training program will not be prompted to consider the value for money of the program. As discussed earlier, their difficulty in interpreting the meaning of duration may hinder their use of duration as a basis of their evaluations. We thus hypothesize that:

- H2:** The duration heuristic is more likely to be used in service evaluation when consumers evaluate the duration of the service in relation to its price than when they evaluate the duration alone, independent of any price information. Hence, the effect of duration on service evaluation will be stronger in the former case than in the latter case.

### When Is Duration Not a Heuristic?

It is important to differentiate conceptually between consumers’ consideration of duration as a heuristic cue to infer service benefit and their consideration of duration as a benefit in itself. Consider a bank consumer in a teller queue who would evaluate the service negatively if her wait time were long. She would not be using duration as a heuristic cue, but for the intrinsic value she gets from (short) duration. By contrast, suppose that the consumer is evaluating a consultation provided by the bank manager. In this case, the duration of the consultation is not a benefit in itself but a carrier of benefit. Therefore, it can be used as a heuristic cue to infer benefit (e.g., the quality of the consultation). In this article, our domain of investigation of the duration heuristic is this latter type of evaluation.

What happens if consumers apply the duration heuristic to an inappropriate domain? In this case, the heuristic backfires. For example, locksmiths should open locks as quickly as possible to relieve the agony of those locked out of their homes. These consumers should evaluate a locksmith’s service more favorably if he takes a shorter time. However, consumers who rely on the duration heuristic may do the reverse—that is, they may evaluate the service more favorably when it takes a longer time than a shorter time. More generally, if consumers apply the duration heuristic in situations when a short duration itself is a benefit, their evaluations are likely to be biased. We next report the results of four experiments and a field study to test these hypotheses.

## EXPERIMENT 1

The objective of this experiment was to demonstrate the existence of the duration heuristic (hypothesis 1) and to test the prediction that the heuristic has a bigger effect on evaluations when consumers evaluate duration in relation to

price than when they evaluate the duration alone (hypothesis 2).

## Method

*Design and Participants.* We employed a 2 (duration of service episode: long vs. short)  $\times$  2 (price information: available vs. unavailable) between-participants factorial design. Participants were 97 undergraduates at the National University of Singapore who participated in exchange for course credit. We asked participants to evaluate a physical training program of which the nominal duration was framed as either longer (the “long duration” conditions) or shorter (the “short duration” conditions). The program’s content was pitted against the nominal duration of the program so that the shorter program had relatively more favorable content. Participants under the “price information available” conditions also received price information on the program, whereas those under the “price information unavailable” conditions did not receive any price information.

*Procedure.* Participants were told that the study was concerned with how consumers evaluate physical training programs. They read about a program that “starts with a one-to-one personal training session conducted by a certified personal trainer, who can tailor the program to meet each customer’s objective and develop a program based on his/her personal goals. This is followed by a self-practice session in which the customer can practice and exercise at his/her own pace.” Participants under the “long duration, price information available” condition continued to read that “each physical training program lasts for 2 hours and is priced at \$40,” whereas those under the “long duration, price information unavailable” condition read only that “each physical training program lasts for 2 hours.” All participants under the long duration condition then read the specific activities included in each session, listed in an itemized format as follows:

First 30 minutes: personal training session

Next 30 minutes: self-practice session

Next 60 minutes: you can cool down at the rest area and are entitled to use the steam and sauna facilities at our clubhouse. Please sign out when you leave the gymnasium.

The programs under the two “short duration” conditions were essentially the same, except that the 60-minute time constraint on the use of clubhouse facilities was relaxed and was listed separately from our calculation of the duration of the program. Hence, the nominal duration became 1 hour (i.e., 30 minutes personal training session plus 30 minutes self-practice session). More specifically, participants under the “short duration, price information available” condition read that “each physical training program lasts for 1 hour and is priced at \$40,” whereas those under the “short duration, price information unavailable” condition read about only the duration but not the price of the program. Participants then read about the specific activities as before, but

now the last item read: “Afterwards, you can cool down at the rest area, and are entitled to use the steam and sauna facilities at our clubhouse.”

In principle, the 1-hour program is better than the 2-hour program because the 1-hour program allows an unrestricted usage of the clubhouse facilities, but the 2-hour program imposes a restriction on the usage. However, if participants rely on the duration heuristic in evaluating the two programs, they should prefer the 2-hour program to the 1-hour program.

*Dependent Measures.* We asked participants under the “price information available” conditions to evaluate the attractiveness of the price and asked all participants to evaluate the attractiveness of the program, both on a scale from 1 (not at all) to 9 (very attractive). As a manipulation check, we asked them to evaluate the duration of the physical training program on a scale from 1 (short) to 9 (long).

## Results

*Manipulation Check.* Participants evaluated the duration of the program as longer when it was framed as a 2-hour program than when it was framed as a 1-hour program ( $M_L = 5.54$  vs.  $M_S = 3.43$ ;  $F(1, 93) = 48.87$ ;  $p < .001$ ).<sup>1</sup> This difference did not depend on whether or not the participants knew the price of the program ( $p > .50$ ). Hence, the manipulation of duration was successful.

*Service Evaluation and Price Evaluation.* We predict that participants would be more likely to evaluate the program based on its duration if they could consider duration in relation to price than if they had to consider duration independent of any price information. An overall analysis yielded a significant interaction of duration and price information availability ( $F(1, 93) = 19.28$ ;  $p < .01$ ). Consistent with our prediction, we found that duration influenced evaluation of the program when participants knew the price of the program ( $M_L = 6.44$  vs.  $M_S = 4.73$ ;  $F(1, 93) = 19.13$ ;  $p < .01$ ). By contrast, when they did not know the price of the program, duration did not influence their evaluation of the program. Instead of using duration as a heuristic device to evaluate the program, these participants appeared to base their evaluations on the actual content of the program and evaluated the 2-hour program relatively less favorably ( $M_L = 5.08$  vs.  $M_S = 5.76$ ;  $F(1, 93) = 3.22$ ;  $p < .05$ , directional).

Only participants who received price information were asked to evaluate the price of the program. These participants evaluated the price as more attractive when the program lasted for 2 hours ( $M = 5.86$ ) than when it lasted for 1 hour ( $M = 4.95$ ;  $F(1, 45) = 6.78$ ;  $p = .01$ ). This was consistent with the findings on the evaluation of the program.

<sup>1</sup>For subscripts, L = long and S = short.

## Discussion

This experiment demonstrated consumers' use of the duration heuristic in service evaluation. More specifically, the influence of duration on service evaluation was more apparent when participants knew both the duration and the price of the service but was moderated in the absence of price information. However, two issues remained unclear. First, when price information was absent, why did duration not have an impact on evaluation? We propose that the underlying reason relates to the evaluability of duration. If this is the case, when duration is made evaluable, we should see a stronger heuristic role for duration even when price information is absent. We test this prediction in experiment 2. The second issue was the question that when price information was shown, what was the mechanism through which the moderating effect of price occurred? We believe that the role of price as a moderator comes from the evaluability of the duration-to-cost ratio. We test this in experiment 3.

## EXPERIMENT 2

The first objective of this experiment was to test the moderating role of evaluability. To do so, we examined the way in which the effect of duration on evaluation changes as a function of duration evaluability. We again employed a physical training program as the service context, but this time we measured participants' experience of working out. Presumably, participants who had never worked out before would find duration difficult to evaluate, because they would not know how much they could achieve in a particular duration of physical training. We expected the low evaluability of duration to moderate the effect of duration on evaluation. By contrast, participants who worked out regularly should find duration easy to evaluate because they had some experience-based knowledge of physical training. In this case, the effect of duration should reappear.

The second objective of this experiment was to show that duration, when used, serves as a heuristic cue to simplify evaluations rather than as a diagnostic informational input for evaluation. Previous research on heuristics suggests that heuristics are generally used as a mental shortcut to simplify evaluations when individuals are not motivated to process information (see Liberman [2001] for a review). We therefore manipulated participants' motivation to process information about the content of the physical training programs. If duration was considered as a heuristic cue to simplify evaluations, only low-motivation participants would use it as a basis for evaluation. As motivation increases, we expect it to play a smaller role in evaluation.

These two points together suggest an interaction effect among motivation, experience, and duration on service evaluation. Specifically, experienced participants with low motivation to make an accurate evaluation would be most likely to use the duration heuristic in evaluations.

## Design and Participants

This experiment has a 2 (duration: long vs. short)  $\times$  2 (motivation: high motivation vs. low motivation)  $\times$  2 (experience: high vs. low) between-participants factorial design. One hundred and ninety-three undergraduates at the National University of Singapore participated in the experiment in exchange for course credits. They were randomly assigned to one of the eight experimental conditions.

## Independent Measures and Manipulations

*Experience.* We asked participants to indicate whether they (a) exercise in a gymnasium on a regular basis, (b) used to exercise in a gymnasium on a regular basis but no longer do so, or (c) had never exercised regularly. We also included a self-elicited measure of experience in the questionnaire, which asked participants to indicate how well they know physical training programs on a scale from 1 (not at all) to 9 (very well).

*Manipulation of Motivation.* Participants in the "low-motivation" conditions were told that a fitness club would soon open its branches in a number of [listed] cities. These cities did not include the city in which the participants lived. We expected these participants to find this task irrelevant and, consequently, to be less careful in evaluating the program's content. By contrast, participants in the "high-motivation" conditions lived in one of the target cities and were told that by participating, they had a chance to win a package of physical training programs. We expected that this would make the evaluation of physical training programs self-relevant and increase motivation (see Celsi and Olson [1988] for a similar manipulation).

*Manipulation of Duration.* The same two physical training programs used in experiment 1 were used here. To reiterate, a physical training program was framed either as a 1-hour or a 2-hour program, and the favorableness of the program's content was pitted against the duration of the program so that the shorter program had a relatively more favorable content.

*Dependent Measures and Manipulation Checks.* After reading the information on the program, participants evaluated it on a nine-point scale ranging from 1 (not good at all) to 9 (very good). On the next page, they evaluated the duration of the program on a scale from 1 (short) to 9 (long). They also indicated how well they know physical training programs, on a scale from 1 (not at all) to 9 (very well). Finally, they responded to a motivation measure by indicating the extent to which they have considered the information on the physical training program very carefully, on a scale from 1 (not at all) to 9 (very much).

## Results

*Experience.* Among the 193 participants, 86 either exercised regularly in the present ( $n = 29$ ) or in the recent

**TABLE 1**  
SERVICE EVALUATION AS A FUNCTION OF DURATION, EXPERIENCE, AND MOTIVATION: EXPERIMENT 2

	High experience		Low experience	
	High motivation	Low motivation	High motivation	Low motivation
Long duration	6.30	7.16	6.00	6.86
Short duration	7.09	5.86	6.56	6.63

past ( $n = 57$ ); while 107 never exercised in a gym regularly. The self-elicited measure of experience showed that the first set of participants did not differ in terms of their reported knowledge of physical training programs ( $M_E = 5.38$  and  $M_{UTE} = 5.12$ ).<sup>2</sup> An analysis of the evaluation data also showed that their evaluations of the program did not differ from each other ( $M_E = 6.76$  and  $M_{UTE} = 6.51$ ;  $p > .50$ ). Therefore, the two groups were pooled together for subsequent analyses and will be referred to as “high-experience” participants. These participants perceived themselves as more knowledgeable about physical training programs ( $M = 5.21$ ) than the low-experience participants ( $M = 3.57$ ;  $F(1, 185) = 39.29$ ;  $p < .001$ ). This difference did not depend on any other experimental factors ( $F$ 's  $< 1$ ).

**Manipulation Checks.** Participants perceived the duration of the program as longer when it was framed as a 2-hour program than when it was framed as a 1-hour program ( $M_L = 4.76$  vs.  $M_S = 3.47$ ;  $F(1, 185) = 30.74$ ;  $p < .001$ ; none of the interactions with other factors were statistically significant). High-motivation participants indicated that they were relatively more careful in evaluating the information on the training program ( $M_{HM} = 6.17$  vs.  $M_{LM} = 5.35$ ;  $F(1, 185) = 9.03$ ;  $p < .01$ ; none of the interactions with other factors were significant).<sup>3</sup> Hence, manipulations of duration and motivation were both successful.

**Service Evaluation.** We analyzed the evaluation data as a function of duration, experience, and motivation (see table 1). Although the three-way interaction was not significant ( $F(1, 185) = 2.03$ ;  $p = .16$ ), planned contrasts provided support for our predictions. To reiterate, we predicted that only high-experience participants would be able to use the duration heuristic, but they would use it as a basis for evaluation only when they were not motivated to form an accurate evaluation. Consistent with this prediction, high-experience participants with low motivation had a more favorable evaluation of the program when it was longer ( $M = 7.16$ ) than when it was shorter ( $M = 5.86$ ;  $F(1, 185) = 6.84$ ;  $p = .01$ ). However, under high motivation, they evaluated the shorter (more attractive) program more favorably than the longer (less attractive) program ( $M_S = 7.09$  vs.  $M_L = 6.30$ ;  $F(1, 185) = 2.86$ ;  $p < .05$ , directional).

By contrast, we expected low-experience participants to find duration difficult to evaluate. Therefore, they were un-

likely to use it as a basis for evaluation even when they were unmotivated to make an accurate evaluation. Consistent with this prediction, low-experience participants' evaluations did not differ as a function of the program's nominal duration ( $M_L = 6.43$  and  $M_S = 6.60$ ;  $F < 1$ ). This was the case for both high-motivation ( $M_L = 6.00$  and  $M_S = 6.56$ ;  $F(1, 185) = 1.56$ ;  $p > .20$ ) and low-motivation participants ( $M_L = 6.86$  and  $M_S = 6.63$ ;  $F < 1$ ).

## Discussion

In experiment 1, we found that when the price information of the physical training program was absent, the impact of duration on service evaluation was minimal. We attributed the null effect of duration on evaluation to the low evaluability of duration; that is, because participants in experiment 1 found duration difficult to evaluate, they were unable to use it as a basis for evaluations. We replicated this finding in experiment 2 with low-experience participants, for whom duration was truly low in evaluability. However, when participants had some experience-based knowledge of physical training, the heuristic role of duration reappeared. Therefore, findings of this experiment provided support to our proposition that the use of the duration heuristic in evaluation is moderated by the evaluability of duration.

Further, the effect of motivation on the duration heuristic provided evidence that these participants had used duration as a heuristic cue to simplify their evaluations rather than as a piece of diagnostic information in their evaluations. That is, if they had used duration as a piece of diagnostic information, they should have used it when they were motivated to form an optimal evaluation. However, our finding showed that duration was used as a basis for evaluation only when participants were low in motivation.

## EXPERIMENT 3

In experiment 1, we showed that price facilitates the use of duration as a basis for service evaluations. The purpose of this experiment was to verify that the facilitative effect came from the evaluability of duration-to-cost ratio. In experiment 1, we manipulated the possibility of evaluating duration in relation to price by making the price information either available or unavailable to participants. In the present experiment, we kept the availability of price information constant across experimental conditions but blurred the ratio

<sup>2</sup>For subscripts, E = exercise and UTE = used to exercise.

<sup>3</sup>For subscripts, HM = high motivation and LM = low motivation.

calculation by making the one-to-one relationship between price and duration ambiguous.

We again employed physical training as the service context. The one-to-one relationship between the price and duration of a physical training program was made ambiguous by bundling four programs together as a package and pricing the package as a whole. Previous research on price bundling suggests that, when multiple products are sold together at a bundled price, consumers perceive a greater ambiguity as to the cost of each particular product (Soman and Gourville 2001). In Soman and Gourville's paper, participants considered purchasing four ski tickets, each at a price of \$40, versus four tickets as a bundle in the format of a 4-day pass at a price of \$160. They found that when the tickets were sold individually, participants could unambiguously identify a one-to-one relationship between the cost (\$40) and the benefit (a day of skiing) of each ticket. In this case, they were very sensitive to what they have paid for each ticket and felt pain to forgo any of the tickets. However, when the tickets were sold in a bundle, the association between the cost and the benefit of each ticket became more ambiguous and the cost for each ticket was open to interpretation. These authors showed that although the actual cost of skiing on any given day was \$40 in both cases, the perceived cost of skiing on any given day was more ambiguous when the tickets were sold as a bundle than when they were sold individually.

Although Soman and Gourville's (2001) research addresses the influence of price bundling on the decision to consume what consumers have paid for, their findings on the mechanism of price bundling have implications to our experiment. We applied price bundling as a mechanism to manipulate the ambiguity of the one-to-one relationship between price and duration. Specifically, we asked some participants to consider buying a monthly pass costing \$160 that would entitle them to participate in four training programs (ambiguous price), whereas others were asked to consider buying four programs individually, each at \$40 (unambiguous price). If participants use duration as a basis for evaluation without relating it to price, the influence of duration on evaluations should not depend on whether the programs are priced as a bundle or individually. By contrast, if evaluation of duration is made in relation to price, the ability to attach an unambiguous price tag should be a prerequisite for this evaluation. Hence, we expect the influence of duration on evaluation to be more apparent when the programs are sold individually than when they are sold as a bundle.

*Design and Participants.* This study employed a 2 (duration: long vs. short)  $\times$  2 (bundling: bundled vs. unbundled) between-participants factorial design. Participants were 100 undergraduates at the University of Toronto who were randomly assigned to one of the four experimental conditions.

*Stimulus Materials.* We presented participants with a physical training program scenario similar to that employed

in experiment 1. That is, the program was either framed as a 1-hour program (under the "short-duration" conditions) or a 2-hour program (under the "long-duration" conditions). Participants considered a case in which a consumer has to purchase a minimum of four programs each time, as opposed to one program at a time in experiment 1. We framed the four programs as either an unbundled purchase or a bundled purchase. More specifically, we told participants under the "unbundled" conditions that, "for the sake of ticketing efficiency, customers have to buy a minimum of four tickets each time (one ticket for one program), and a price of \$40 is charged for each ticket (i.e., a total of \$160 for four tickets). Each ticket is valid for one month after the date of issuance." By contrast, we told participants under the "bundled" conditions that they "have to buy a 1-month pass to join the program" and that "each pass enables the pass holder to participate in up to four physical training programs. Each monthly pass is valid for 1 month after the date of issuance, and a price of \$160 is charged."

After participants had gone through the scenarios, we asked them to evaluate the attractiveness of the program's price (referred to as "price evaluation" hereafter) and then the attractiveness of the program (referred to as "service evaluation" hereafter), each on a scale from 1 (not at all) to 9 (very much). To check our manipulation of duration, we also asked them to evaluate the time duration of the program on a scale from 1 (short) to 9 (long).

## Results

*Manipulation Check.* Participants evaluated the duration of a program as longer when it was framed as a 2-hour program ( $M = 6.04$ ) than when it was framed as a 1-hour program ( $M = 3.61$ ;  $F(1, 96) = 151.89$ ;  $p < .01$ ). This difference did not depend on whether the programs were priced individually ( $M_L = 6.07$  vs.  $M_S = 3.58$ ) or as a bundle ( $M_L = 6.00$  vs.  $M_S = 3.63$ ;  $F < 1$ ;  $p > .50$ ).

*Price Evaluation and Service Evaluation.* We predicted that duration would have a stronger impact on evaluation when the programs were priced individually than when they were priced as a bundle in the form of a monthly pass. Our findings were consistent with this prediction. An analysis of service evaluation data yielded a significant interaction of duration and price bundling ( $F(1, 96) = 6.03$ ;  $p < .05$ ), and an analysis of price evaluation data also yielded a significant interaction of duration and price bundling ( $F(1, 96) = 3.85$ ;  $p = .05$ ). The means for service evaluation and price evaluation are shown in table 2. When the programs were priced individually, participants evaluated the programs as more attractive when the duration was framed as longer ( $M = 6.74$ ) than when it was framed as shorter ( $M = 4.88$ ; difference = 1.86;  $F(1, 96) = 28.54$ ;  $p < .01$ ). However, the effect of duration on evaluations became weaker when the programs were priced as a bundle ( $M_L = 5.60$  and  $M_S = 4.96$ ; difference = 0.64;  $F(1, 96) = 3.25$ ;  $p = .07$ ). The difference between the two

**TABLE 2**  
SERVICE EVALUATION AND PRICE EVALUATION AS A  
FUNCTION OF DURATION AND PRICE BUNDLING:  
EXPERIMENT 3

	Service evaluation		Price evaluation	
	Bundled	Unbundled	Bundled	Unbundled
Long duration	5.60	6.74	5.40	6.22
Short duration	4.96	4.88	4.96	4.71
Difference	.64	1.86	.44	1.51

contrasts was statistically significant (interaction contrast:  $F(1, 96) = 6.03$ ;  $p = .02$ ).

Findings on price evaluation showed the same pattern. When the programs were priced individually, participants evaluated the price more favorably when the duration was framed as longer ( $M = 6.22$ ) than when it was framed as shorter ( $M = 4.71$ ;  $F(1, 96) = 15.65$ ;  $p < .01$ ). However, when the programs were charged a bundled price, price evaluations did not differ as a function of duration ( $M_L = 5.40$  and  $M_S = 4.96$ ;  $F(1, 96) = 1.28$ ;  $p = .26$ ). The difference between these two contrasts was statistically significant (interaction contrast:  $F(1, 96) = 3.85$ ;  $p = .05$ ). These findings suggested that the tendency to use duration as a basis for evaluation was stronger when duration was considered in relation to price than when it was not.

## Discussion

The results of experiment 3, together with those of experiment 1, suggest that price information can facilitate the use of duration in service evaluations and that the facilitative effect comes from the evaluability of the duration-to-price ratio of a service. Note that when participants evaluated duration in relation to price, duration influenced their evaluation of not only the price but also their evaluation of the training program's attractiveness. This implies that participants took the program's price into account when they evaluated the program's attractiveness. However, it was unclear whether they did so automatically or only when they were prompted to report their price evaluation before they evaluated the program's overall attractiveness. To distinguish between these possibilities, we conducted a follow-up study with only the "price unbundled" conditions, asking participants to evaluate the attractiveness of the program before they evaluated the price of the program. An effect of duration was still found on program evaluation ( $M_L = 6.54$  vs.  $M_S = 5.13$ ) and price evaluation (6.34 vs. 4.95), replicating the findings of the main study. This suggests that when participants received both price and duration information of a service, they automatically paired up the two quantities and used them in the evaluations.

For most physical training programs, such as the ones we employed as stimuli in experiments 1–3, there is a positive relationship between the duration and the effectiveness of a program. That is, if consumers participate in a program

that lasts for a longer time, they generally will end up achieving more. The duration heuristic is a reasonably functional cue (Hogarth 1981) for inferring the value of a service when there is a positive relationship between duration and value. However, as discussed earlier, there are services in which a short duration is valuable in itself. If consumers apply the duration heuristic to evaluate these services, the heuristic will backfire. Experiment 4 examined such a case.

## EXPERIMENT 4

### Overview

We employed a locksmith scenario in this experiment. In general, consumers who want a lock to be opened should presumably evaluate a lock-picking service more favorably if it is efficient (lasts for a short duration) than if it is inefficient (lasts for a long duration). However, if consumers rely on the duration heuristic in evaluating the service, they may judge an inefficient service more favorably than an efficient service. If they later use these judgments as a basis for evaluating the price of the service, they may evaluate a given price more favorably when the service is inefficient than when it is efficient.

To test our prediction, we manipulated the duration of the service (long vs. short) and asked participants to evaluate the service's price and efficiency. Half of the participants were asked to evaluate its efficiency first, followed by its price. They were basically prompted to consider efficiency as a criterion for evaluation. Thus, we expected them to judge the price more favorably when the duration was shorter rather than longer. By contrast, other participants were asked to evaluate the service's price first, followed by its efficiency. Because they were not prompted to consider efficiency as a criterion for evaluation, we expected them to be more likely to base their price evaluations on duration. As such, they would evaluate the price more favorably when the service lasts for a longer duration (vs. a shorter duration, i.e., when the service was inefficient rather than efficient).

*Design and Participants.* Participants were 100 students at the University of Toronto who participated in a series of studies and were compensated with cash. They were randomly assigned to one condition in a 2 (duration: long vs. short)  $\times$  2 (evaluation order: price-efficiency order vs. efficiency-price order) between-participants factorial design.

*Stimulus Materials.* Participants under the short-duration conditions were asked to imagine that they had locked themselves out of their apartment. "You call up a locksmith to unlock the door for you. It takes 5 minutes for the locksmith to get the job done, and he charges you \$25." The scenario participants read under the long-duration conditions was exactly the same, except that it took 20 minutes for the locksmith to open the lock.

After participants had gone through the scenario, we asked them to evaluate the service. Those under the "price-efficiency" conditions first evaluated the reasonableness of

the price charged for the service (1 = not at all; 9 = very reasonable), followed by the efficiency of the service (1 = not at all; 9 = very efficient). By contrast, participants under the “efficiency-price” conditions evaluated the service’s efficiency first, followed by the service’s price. All participants then judged “the duration of the time it took for the locksmith to unlock the door” (1 = short; 9 = long) and “how difficult is it for the locksmith to unlock the door” (1 = not difficult; 9 = very difficult).

## Results

*Manipulation Check.* Participants judged the duration of the service as shorter when it lasted for 5 minutes ( $M_s = 3.64$ ) than when it lasted for 20 minutes ( $M_L = 6.12$ ;  $F(1,96) = 107.15$ ;  $p < .01$ ). They also evaluated the service as more efficient in the former case than in the latter case ( $M_s = 5.98$  vs.  $M_L = 4.22$ ;  $F(1,96) = 54.86$ ;  $p < .01$ ). These differences did not depend on whether efficiency was judged before or after price. In either case, the two-way interaction of duration and evaluation order was not significant ( $F < 1$ ;  $p > .50$ ).

*Price Evaluation.* An overall analysis of the price evaluation data yielded an interaction of duration and evaluation order ( $F(1,96) = 10.40$ ;  $p < .01$ ). When participants judged efficiency before price, they judged the price as more reasonable when the service was more efficient (i.e., lasted for a shorter duration;  $M_s = 5.60$ ) than when it was less efficient (i.e., lasted for a longer duration;  $M_L = 4.88$ ;  $F(1,96) = 2.92$ ;  $p < .05$ , directional). When price was judged first, however, participants did not seem to take efficiency into consideration in making their price evaluations. They evaluated the price as more reasonable when the service lasted for a longer duration ( $M = 5.88$ ) than when it lasted for a shorter duration ( $M = 4.68$ ;  $F(1,96) = 8.12$ ;  $p < .01$ ), replicating the findings of experiment 1 and 3. This finding is important in light of the fact that participants had always judged the service as more efficient when it lasted for a shorter duration (as shown in the manipulated check), but efficiency had relatively little impact on price evaluations when it was not explicitly called to participants’ attention.

However, we could explain the findings alternatively as follows. That is, under the “long-duration” conditions, participants might have attributed the long service time to the complexity of the lock rather than to the inefficiency of the service. By the same token, under the “short-duration” conditions, participants might have attributed the short service time to the simplicity of the lock rather than to the locksmith’s efficiency in opening the lock. If this is the case, it is reasonable to judge the price for the long (short) duration service as more (less) reasonable, because the lock was difficult (easy) to open. However, our data show that participants did not perceive the lock to be more or less difficult to open when the duration varied ( $M_L = 4.64$  and  $M_s = 4.74$ ; this difference did not depend on evaluation order). Therefore, this alternative explanation does not seem viable.

## FIELD STUDY

The design of the field study was the same as that of experiment 4. This study was conducted in a midsized town in the state of Illinois in collaboration with a hardware store. This store offered a locksmith service where consumers who had locked themselves out of their homes or offices called in. The store employed two locksmiths who were dedicated for these jobs. In the particular period of time in which the study was done, they had no capacity constraints and hence were willing to cooperate with us to generate lock-picking services of different durations in exchange for our help on other aspects of their business. The locksmiths kept track of how long it took them to get the job done and asked the customer to fill out a very short survey. The charge for opening a lock was \$35.

The locksmiths reported that unless they encountered any unusual problem due to the complexity of the lock, the time taken to open a lock ranged from 5 to 15 minutes. Locks could be opened in as little as 5 minutes when the locksmiths were prepared to start work as soon as they arrived and were intensely focused on the task. However, in some cases when they needed to sort out their tools upon arrival and were not under any time pressure, they took as much as 15 minutes. We asked them to provide their services as usual but to report to us situations in which the duration of the service was approximately either 5 minutes (short-duration condition) or approximately 15 minutes (long-duration condition). Given the fact that this was a field study, it was difficult to establish a tight control over how long the actual episode took, but time records show that the average durations were clustered around 5 minutes (range: 4–8 minutes) and 15 minutes (range: 14–18 minutes) for the two conditions, respectively. We only used data from actual service episodes in which the locksmith did not have any unusual problems due to the complexity of the lock.

At the end of the service, the locksmith collected the payment and requested customers to spend a minute answering a simple survey for the store. All customers in our data complied with the request. One version of the survey (“price” condition) asked customers only one question: to evaluate how reasonable the price charged for the service was (1 = not at all; 9 = very reasonable). In a second version, customers in “efficiency-price” conditions evaluated the service’s efficiency first (1 = not at all; 9 = very efficient), followed by the service’s price.

The hardware store provided us with 64 responses. The findings replicate those from the lab experiment. That is, for consumers who had evaluated efficiency before they evaluated price, they rated the price as more reasonable when the service took a shorter time ( $M = 6.13$ ) than when it took a longer time ( $M = 3.43$ ;  $F(1,60) = 18.03$ ;  $p < .01$ ). Thus, they appeared to use efficiency as a criterion for evaluations. However, those who evaluated only the price of the service apparently did not take efficiency into consideration and made their evaluations based on the duration heuristic. They evaluated the price as more reasonable when the service took a longer time ( $M = 5.81$ ) than when it took

a shorter time ( $M = 4.17$ ;  $F(1, 60) = 5.23$ ;  $p < .05$ ). The interaction between duration and question order was significant ( $F(1, 60) = 20.50$ ;  $p < .05$ ).

## GENERAL DISCUSSION

Across four experiments and a field study, we find support for a tendency to evaluate services based on their durations, and we label this as the duration heuristic. In experiment 1, we show that evaluations based on the duration heuristic deviate from content-based evaluations and that the impact of duration on evaluations is more apparent when duration is considered in relation to price than when it is evaluated alone. In experiment 2, we demonstrate that (low) duration evaluability moderates the effect of duration on service evaluations. In experiment 3, we suggest that price information can facilitate the use of duration in service evaluations by prompting consumers to evaluate the service's duration-to-price ratio. Then, in experiment 4, we document a situation in which the use of the duration heuristic backfires and leads to judgments that do not just deviate from, but are opposite of, an optimal judgment. Finally, the field study provides external validity for the duration heuristic by demonstrating its impact in a real-world consumer setting. Together, these experiments (a) provide demonstrations of the duration heuristic, (b) illustrate the biases that result as a consequence of its use, and (c) outline conditions under which consumers are likely to use the heuristic.

Is the use of the duration heuristic irrational? Our position is that, in general, the use of heuristics should not be regarded as irrational. In fact, Hogarth (1981) and others point out that human beings use heuristics because they are smart—they come up with shortcuts to simplify decisions that are less important so that they can spend more resources on decisions that are more important. Our point was to document and map the usage of the heuristic. We, of course, agree that the duration heuristic (like other heuristics) can lead to reasonably accurate evaluations in many cases.

Our findings are consistent with work on the accessibility-diagnostics framework (Higgins 1996; Lynch, Marmorstein, and Weigold 1988). For example, the findings of experiment 4 and the field study show that consumers use duration as a basis for evaluation, and they refrain from using it only when they are prompted to base their evaluations on other criteria (e.g., efficiency, as in the experiments). These findings suggest that duration is a highly accessible cue that consumers typically use in service evaluations. The findings of experiment 2 also suggest that consumers' use of the duration heuristic depends on how evaluable duration is, and hence how diagnostic it is, as a basis for evaluation. Because the duration heuristic is, to a certain extent, akin to the accessibility-diagnostics framework, the framework could provide a theoretical basis for the understanding of consumers' use of the duration heuristic in service evaluations. However, it is also important to note that the accessibility-diagnostics framework alone does not provide insights pertaining specifically to the duration heuristic. To attain the specificity, we draw theories from dif-

ferent literatures and apply them to understanding the duration heuristic. For example, theories on the inference process explain the logic behind the heuristic, the conceptualization of evaluability (Hsee 1996) helps to shed light on when consumers are likely or unlikely to use the heuristic, and, finally, the theory on transaction evaluation (Gourville 1998) explains the moderating role of price in the use of the duration heuristic.

## Limitations and Future Research

While our research presents evidence for the duration heuristic, it was not without limitations. One limitation is that we measured only price evaluation, but not service evaluation, in experiment 4 and the field study (unlike in the first three experiments, where we measured both price and service evaluations). As discussed earlier, we assumed that when both the price and the duration of a service are known to consumers, they serve as a basis for evaluating the service's economic value (see earlier discussion on consumers' evaluations of an option's economic value; Hsee 1999). Following this logic, we believe that price evaluation is more sensitive than service evaluation in detecting the influence of duration on the evaluation of economic value. Thus, we chose price evaluation as the key dependent variable in these experiments. However, we acknowledge that measuring service evaluation in these last two experiments would have resulted in a more compelling demonstration of our proposed effects (in line with the first three experiments).

Second, while we observe from the first experiment that participants tended to evaluate a service based on its content when they did not know the price of the service, it is inappropriate to conclude that consumers always use a service's content instead of its duration as a basis for evaluation when they do not know its price. More generally, which aspect of a service—content or duration—will be used as a basis for evaluation will depend on their relative diagnosticity and relative ease of use. In our experiment, the content of the program was used because it was interpretable and easy to understand. There could be other cases in which a service's content is too technical to understand and when duration is the only information about the service that consumers can understand. In this case, duration may still be used as a basis for evaluation. This is a calibration issue that we did not look into in the present research and is worthy of further investigation.

Another worthwhile research direction is to investigate the duration heuristic in relation to the placebo effect (Shiv, Carmon, and Ariely 2005). This research shows that marketing actions (e.g., pricing) can alter the efficacy of a marketed product. For example, participants who consumed an energy drink purported to increase mental acuity that they purchased at a discounted price subsequently performed worse on a puzzle-solving task than did equivalent participants who purchased the same drink at its regular price. Shiv et al. further show that the placebo effect is mediated by participants' expectations of the drink's performance—that is, when participants bought the drink at a discounted

(regular) price, they expected the drink to be less effective (more effective); consequently, they performed worse (better). We suspect that the duration of a service could also create a placebo effect on consumption experience. That is, when the service consumers consume (e.g., physical training program) has a longer duration, they may expect it to be more effective. This expectation then leads to a placebo effect—they may actually work out to make the service more effective. Further research could examine such a possibility and explore the scope of the effect.

### Managerial Implication

The current research has important implications for managing efficiency enhancement programs. To the extent that consumers evaluate services with a shorter duration less favorably than those with a longer duration, and that they do not always consider efficiency as a criterion for service evaluations, an organization's effort on efficiency enhancement may have an adverse impact on consumers' evaluations of the service. One of our acquaintances provided us with a real example that demonstrates how efficiency enhancement programs may have adverse effects. This person runs an organization in an Asian country that provides consultations to students who want to study abroad. They assist clients in a variety of ways, including searching for institutions that suit their needs, applying for student visas, and making accommodation arrangements, airport pickups, and course selections. Before this organization implemented an efficiency-enhancing program, clients had to go to the office in person, fill out and hand in a form with their needs and preferences, and then wait for the consultations. Clients typically had to wait for an hour or so for a consultation, and the consultation itself typically lasted 20 minutes. The company charged a standard rate for each consultation, and most clients found this price reasonable. Recently, they changed the procedure to a more efficient one in which clients filled out the personal particulars form online a day before they physically visited the office. The consultants, therefore, could gather the relevant information and prepare for the consultation without having the clients wait at the office. The price charged for the service remained unchanged. Presumably, consumers should appreciate this arrangement because it significantly reduced the duration. Most customers, however, now think that the price is unreasonable and that the company should reduce the price.

We suspect that these clients fell prey to a duration heuristic bias. We therefore advised this organization to make it explicit to its clients that this arrangement can actually improve the efficiency of their services and hence save the clients' time. Asking clients to focus on efficiency improved their evaluation. Marketers who plan to improve the efficiency of their services should, therefore, make it very explicit to their customers that the shorter duration of their services is an effort to improve the efficiency of their services.

While we suggest that our findings have implications for managerial decisions, we acknowledge that much remains

to be done to attain the generalizability of our findings, because so far we have only tested our hypotheses in two types of scenarios—a physical training program and a locksmith service. We seek to generalize our findings across different domains in future research. For example, we can examine whether consumers infer the quality of professional consultation (e.g., investment consultation, doctor consultation, or even dental treatment) from its duration. Presumably, professional practitioners should be valued for their skillfulness, and the more skilful they are, the less time they need to disentangle and solve problems. However, if consumers infer service quality from duration, they would value a longer consultation more, and contradictions arise. As another example, we can examine whether consumers infer the effectiveness of a new technology from the time it takes to develop this technology. For example, suppose that company A claims that their research team has taken 10 years to develop a new technology, while company B's team claims that they have taken 3 years of research time to develop theirs. Consumers who use the duration heuristic in their evaluations may infer that company A's technology is more effective than company B's.

### REFERENCES

- Celsi, Richard L. and Jerry C. Olson (1988), "The Role of Involvement in Attention and Comprehension Processes," *Journal of Consumer Research*, 15 (September), 210–24.
- Gourville, John T. (1998), "Pennies-a-Day: The Effect of Temporal Re-framing on Transaction Evaluation," *Journal of Consumer Research*, 24 (March), 395–408.
- Higgins, Tory (1996), "Knowledge Activation: Accessibility, Applicability and Salience," in *Social Psychology: Handbook of Basic Principles*, ed. Tory Higgins and Arie Kruglanski, New York: Guilford, 133–67.
- Hogarth, Robin M. (1981), "Beyond Discrete Biases: Functional and Dysfunctional Aspects of Judgmental Heuristics," *Psychological Bulletin*, 90 (September), 197–217.
- Hsee, Christopher K. (1996), "The Evaluability Hypothesis: An Explanation of Preference Reversals between Joint and Separate Evaluations of Alternatives," *Organizational Behavior and Human Decision Processes*, 67 (September), 247–57.
- (1999), "Value Seeking and Prediction-Decision Inconsistency: Why Don't People Take What They Predict They'll Like the Most?" *Psychonomic Bulletin and Review*, 6 (4), 555–61.
- (2000), "Attribute Evaluability: Its Implications for Joint-Separate Evaluation Reversals and Beyond," in *Choices, Values, and Frames*, ed. Daniel Kahneman and Amos Tversky, Cambridge: Cambridge University Press, 543–63.
- Hsee, Christopher K., George F. Loewenstein, Sally Blount, and Max H. Bazerman (1999), "Preference Reversals between Joint and Separate Evaluations of Options: A Review and Theoretical Analysis," *Psychological Bulletin*, 125 (5), 576–90.
- Kahneman, Daniel and Amos Tversky (1972), "Subjective Probability: A Judgment of Representativeness," *Cognitive Psychology*, 3 (July), 430–54.
- (1982), "The Simulation Heuristic," in *Judgments under Uncertainty: Heuristics and Biases*, ed. Daniel Kahneman,

- Paul Slovic, and Amos Tversky, Cambridge: Cambridge University Press, 201–8.
- Liberman, Akiva M. (2001), "Exploring the Boundaries of Rationality: A Functional Perspective on Dual Models in Social Psychology," in *Cognitive Social Psychology: The Princeton Symposium on the Legacy and Future of Social Cognition*, ed. Gordon B. Moskowitz, Mahwah, NJ: Erlbaum, 291–304.
- Lynch, John G., Howard Marmorstein, and Michael F. Weigold (1988), "Choices from Sets including Remembered Brands: Use of Recalled Attributes and Prior Overall Evaluations," *Journal of Consumer Research*, 15 (September), 169–84.
- Shiv, Baba, Ziv Carmon, and Dan Ariely (2005), "Placebo Effects of Marketing Actions: Consumers May Get What They Pay For," *Journal of Marketing Research*, 42 (November), 383–93.
- Soman, Dilip and John T. Gourville (2001), "Transaction Decoupling: How Price Bundling Affects the Decision to Consume," *Journal of Marketing Research*, 38 (February), 30–44.
- Thaler, Richard H. (1985), "Mental Accounting and Consumer Choice," *Marketing Science*, 4 (3), 199–214.
- Tversky, Amos and Daniel Kahneman (1973), "Availability: A Heuristic for Judging Frequency and Probability," *Cognitive Psychology*, 5 (2), 207–32.
- Wyer, Robert S., Jr. and Thomas K. Srull (1989), *Memory and Cognition in Its Social Context*, Hillsdale, NJ: Erlbaum.