

Contrast and Assimilation Effects of Processing Fluency

HAO SHEN
YUWEI JIANG
RASHMI ADAVAL*

As processing difficulty associated with a product increases, information about a subsequently encountered product becomes easier to process, leading to more favorable evaluations of it (a contrast effect). If, however, the two products are categorized as part of the same overall experience, then the negative feelings elicited by increased processing difficulty of the first product transfer to the second product, leading to more unfavorable evaluations of it (an assimilation effect). Five studies identify the conditions in which the two processes occur and outline the various mechanisms that might underlie these effects.

Consumers often encounter sequential information that differs not only in content and form but also in temporal relatedness. For example, when browsing through a magazine, they might first encounter articles that are easy or difficult to read either because of content differences or because of other stylistic elements, such as the type of fonts used, the layout, figure-ground contrast, and so forth. These articles might be followed by ads for products that are either related to the article or not. How does the subjective experience of reading an article that is either easy or difficult to read influence readers' reactions to such product ads that are encountered subsequently?

Previous research has examined the effect of processing fluency (or ease of processing) on evaluations of the object described in the information being processed (for a review, see Winkielman et al. 2003). This research suggests that consumers often evaluate objects on the basis of the sub-

jective feelings of ease or difficulty that they experience at the time they read information about them (Schwarz 2004). For example, consumers are better able to process product information if its print font is easy to read (Novemsky et al. 2007), if it is presented in colors that are easy to read relative to the background (Reber and Schwarz 1999), or if they have been exposed to the same or related information previously (Labroo and Lee 2006; Lee and Labroo 2004). In all of these conditions, consumers evaluate the product more favorably than they might otherwise, suggesting that processing fluency has a positive effect on consumers' product evaluations.

Sometimes, however, the fluency experienced in processing information about one object might also influence evaluations of a different object that is viewed subsequently. Thus, in the example quoted earlier, the ease with which a magazine article is processed might influence the ease with which a subsequent ad is processed, leading to changes in the evaluations of the product described in it. The direction of this influence on evaluations is hard to predict. Some streams of research suggest that as processing difficulty associated with the first product increases, evaluations of the second product will become more unfavorable (an assimilation effect). For example, work by Winkielman and Cacioppo (2001; see also Schwarz 2004 and Winkielman et al. 2003) suggests that positive (negative) affect is elicited if there is high (low) processing fluency. If this is the case, then several theories about the role of affect in judgment would predict that the affect elicited by the first task might transfer to the second task, leading to assimilation effects (Fiske 1982; Gorn 1982; Schwarz and Clore 1983; Sujan 1985).

Other streams of research suggest that as the processing

*Hao Shen is assistant professor in the Department of Marketing, Chinese University of Hong Kong, Shatin, Hong Kong (shenhao@baf.mssmail.cuhk.edu.hk). Yuwei Jiang is assistant professor of marketing in the Department of Management and Marketing, Faculty of Business, Hong Kong Polytechnic University, Hung Hom, Hong Kong (msjiang@polyu.edu.hk). Rashmi Adaval is associate professor of marketing and James F. Towey Faculty Fellow in the Department of Business Administration, University of Illinois at Urbana-Champaign, Champaign, IL 61820 (mkadaval@ust.hk). Correspondence: Hao Shen. The authors thank the editor, associate editor, and reviewers for their helpful comments. The research for this project was supported by research grants HKUST6192/04H and HKUST6413/08H awarded to the last author by the Research Grants Council of Hong Kong and was conducted when the authors were at the Hong Kong University of Science and Technology.

John Deighton served as editor and Angela Lee served as associate editor for this article.

Electronically published August 20, 2009

difficulty of the first product increases, evaluations of the second product will become more favorable (a contrast effect). Such contrast effects could operate through a variety of mechanisms in which some criterion from the first experience is used as a standard of comparison in judging the second experience. The criterion that is used could vary. For example, work by Helson (1964) suggests a perceptual contrast whereby people adapt to the level of past stimuli and judge new stimuli in relation to an adaptation level. Thus, the experience of reading a difficult article could lead people to adapt to that low level of processing fluency. An ad that is encountered subsequently could be contrasted with this adaptation level. Other work (Adaval and Monroe 2002; Ostrom and Upshaw 1968) suggests that reading information about the first stimulus might create a perspective of how difficult or easy the material is to read and subsequent information might be evaluated in relation to this perspective. That is, the first task's difficulty might be used as a standard of comparison to judge the difficulty of the second task and, therefore, the second product. Or, as suggested by Lingle and Ostrom (1979), people might use their previously formed judgments (i.e., their fluency-based evaluation of the first product as good or bad) as a basis for later evaluations.

The present research distinguishes between the opposing effects implied by these different theoretical frameworks and determines when each is likely to predominate. In doing so, it makes two main contributions. First, previous studies have not examined the possibility that processing fluency experienced in one situation can influence the evaluation of objects that people view subsequently. The research reported in this article provides the first demonstration of this phenomenon. Second, it circumscribes the conditions under which processing fluency can lead to assimilation and contrast effects on subsequently evaluated objects and identifies the processes that might underlie these effects.

THEORETICAL BACKGROUND

Processing fluency is defined as the subjective feelings of ease or difficulty that individuals experience while processing information about an object (Novemsky et al. 2007). Previous research suggests that if consumers read product information fluently, the subjective ease of processing information might elicit a positive affective response toward the product (Winkielman and Cacioppo 2001; for a review, see Winkielman et al. 2003). Consequently, consumers' product evaluations might be influenced by subjective feelings of ease or difficulty that have little to do with the attributes of the product (for a review, see Schwarz 2004). For example, suppose consumers read attribute information about a DVD player. Feelings of ease are likely to be elicited if the information is presented in a font that is easy to read. Consumers might misattribute these positive feelings (caused by the experience of reading) to the DVD player and evaluate it more favorably. Correspondingly, low processing fluency caused by a difficult-to-read font can lead to poorer evaluations of the object.

Numerous studies have shown that variables that can af-

fect the speed or accuracy of identifying a stimulus, such as previous exposure (Zajonc 1968, 1980), figure-background contrast (Reber and Schwarz 1999), or print fonts (Novemsky et al. 2007), can influence processing fluency and lead to more favorable evaluations of the stimulus when this fluency increases (Labroo and Lee 2006; Lee and Labroo 2004; Winkielman et al. 2003). For example, Zajonc (1968) found that repeated exposures of an object increased people's liking of that object. Reber and his colleagues (Reber and Schwarz 1999; Reber, Winkielman, and Schwarz 1998) showed that participants liked a stimulus more when it was presented for a longer duration or printed in an easy-to-read color and therefore was easy to identify. In a consumer-related context, Lee and Labroo (2004) showed that, when a target came to mind more readily (either because it was presented in a predictive context or because it was primed by a related construct), participants developed more favorable attitudes toward it.

In all of the studies on processing fluency, participants were always asked to evaluate the object that elicits fluency. However, it is unclear if processing fluency experienced in one situation can have an influence on judgments of products that are viewed subsequently. More specifically, the processing fluency elicited by reading about one product could influence judgments of a second product either in the same direction as that of the first one (an assimilation effect) or in the opposite direction (a contrast effect). In principle, both of these effects could occur for reasons to be discussed.

Assimilation Effects of Processing Fluency

Several streams of research suggest that negative (positive) subjective experiences in one situation can lead to negative (positive) evaluations in a later situation (an assimilation effect). According to the affect-as-information theory (Schwarz and Clore 1983), negative feelings can be misattributed to other objects being judged. For example, Schwarz and Clore (1983) found that participants misattributed their mood, as a result of the weather, to life satisfaction. Consequently, they reported higher life satisfaction on good weather days than on bad weather days. Other affect transfer theories predict the same effect but postulate a different mechanism. For example, they predict that feelings can influence evaluations of an object via a conditioning mechanism where close proximity or overlap between a target and a stimulus that elicits feelings can lead to a transfer of evaluative feelings to the target (Gorn 1982).

Other work on priming also shows similar transfer of valence. For example, Murphy and Zajonc (1993) found that novel Chinese ideographs were evaluated more negatively if they were preceded by negative affective primes than positive affective primes. Similarly, work on the automatic evaluation effect (Bargh et al. 1992; Fazio et al. 1986) suggests that priming people with valenced object words (e.g., candy) facilitates their response to target words that are of similar valence (e.g., beautiful).

In general, the feelings elicited by reading information about one stimulus might be more likely to transfer to an-

other stimulus that is encountered subsequently if the two experiences are seen as related and are categorized together. Previous work by Lee and Labroo (2004) found that participants who were exposed to a bad product (lice-killing shampoo) in a previous situation evaluated a subsequent target product more negatively if it was related to the bad product they had seen than if it was not. Sujan (1985; see also Fiske 1982) similarly suggests that the attitude toward a product can be positively influenced if the superordinate category to which it belongs elicits positive affect. The conceptualization we propose and discuss presently incorporates elements of both and is based on how consumers think about the two experiences.

Contrast Effects of Processing Fluency

Other theories suggest a somewhat different possibility wherein negative (positive) subjective experiences elicited by processing information in one situation lead to positive (negative) evaluations in a later situation. For example, according to adaptation level theory (Helson 1964), new objects or experiences are judged in relation to an adaptation level that is formed from recent experiences. For example, water feels warmer after one has put one's hand in cold water than after one has put it in hot water (a perceptual contrast). In the present context, it is conceivable that people might adapt to a particular level of perceptual fluency. Thus, if the information is presented in a difficult-to-read font, people might adapt to this level of difficulty. Later, when they encounter an ad with product information in a font that is not difficult, they might find the subjective experience of reading it easier and more pleasant than usual, and this could lead to increased liking for the product described in the subsequent information.

Work by Adaval and Monroe (2002; see also Lynch, Chakravarti, and Mitra 1991; Ostrom and Upshaw 1968; Parducci 1965) suggests directionally similar judgmental contrast effects. According to this work, contrast effects typically occur because the initial context provides a perspective from which later objects are judged along a particular dimension. In the present context, when people read an article or ad that is difficult (easy), it creates a perspective of reading difficulty that is then used as a standard for judging the processing difficulty of subsequently encountered information. That is, any new information that is encountered is judged relative to this perspective and might seem easier (more difficult). According to this conceptualization, the standard of comparison typically comes to mind consciously and might be applied consciously.

A third, more obvious possibility is that contrast effects could be based on previously formed evaluations. According to research by Reber et al. (1998; see also Reber and Schwarz 1999), if people encounter information that is difficult to read, they form an unfavorable evaluation of the product described. This unfavorable evaluation of the first product could then be used as a standard of comparison to judge the target product (see Lingle and Ostrom 1979 for similar effects in the social judgment domain). Thus, in this

case, a negative evaluation of the first product drives the contrast effect independently of any changes in the perception of fluency. The conceptualization we propose not only identifies when a contrast effect is more likely to occur but also which of these alternative processes underlie it.

The Present Conceptualization: When Do Assimilation and Contrast Occur?

According to previous research in cognitive and social psychology, most experiences that people have are represented in memory as mental models (Johnson-Laird 1980, 1983; Wyer and Radvansky 1999; Zwaan and Radvansky 1998). When individuals encounter a series of experiences that are temporally and thematically related, they are likely to form a single model of the sequence of events as a whole and store it in memory as a single representational unit. When the events are unrelated, however, separate representations are formed (Wyer, Adaval, and Colcombe 2002; see Adaval, Isbell, and Wyer [2006] and Radvansky et al. [1997] for empirical evidence). According to this stream of research, if consumers read a magazine article and then encounter an ad that is thematically related to it, they will represent the two experiences in memory as a single representational unit if they see them as temporally and thematically related. On the other hand, if they see the ad as unrelated to the magazine article, the two experiences may be stored as two separate representations.

The nature of the representations formed has interesting implications for the issues of concern in this article. If two related experiences are represented in memory as a single unit, the feelings elicited by the two experiences are unlikely to be distinguishable from each other. Thus, for example, if the material in a magazine article is easy or difficult to read, the feelings that consumers experience in the course of comprehending the information are unlikely to be distinct from those that are elicited by a related ad that follows it. As a result, the feelings elicited by the first experience are likely to have a positive (assimilation) effect on evaluations of the ad and the product it describes.

However, suppose that the ad that follows is not thematically related to the article. The two experiences are then likely to be represented in memory independently of one another. In this case, consumers who have experienced feelings of ease or difficulty in comprehending the magazine article are likely to be sensitive to the change in feelings they experience when comprehending the ad that follows it and might interpret the latter feelings in relation to those they experienced earlier, while reading about the ostensibly unrelated and independent event. Consequently, as the difficulty of processing the magazine article increases, the processing of the ad that follows it will seem easier, leading to more favorable reactions to the ad and the product it describes (contrast effect). By the same token, if the processing of the magazine article becomes easier, then the high fluency experienced will make a subsequently encountered ad seem more difficult to read and will lead to more unfavorable

evaluations of it. The process underlying these effects should be distinguished from the one that suggests that the evaluation of the magazine article (as good or bad) is used as a basis for evaluating the subsequent product ad.

We also assume that this contrast effect occurs when people are unaware of the source of these feelings (Schwarz and Clore 1983). That is, consumers might be aware that the feelings they are experiencing are pleasant or unpleasant but they might not be conscious of the source of these feelings (i.e., where they come from). Thus, any factor that draws attention to the source of the feelings of fluency should eliminate such contrast effects. This distinguishes our conceptualization from other ones (Adaval and Monroe 2002; Lynch et al. 1991) that imply that participants might be aware of the ease or difficulty of reading the font of the magazine article and might consciously evaluate the font of the following ad relative to this prior experience.

We tested this conceptualization in five experiments that examined which type of effect (assimilation or contrast) is likely to predominate, the conditions in which it is expected to occur, and the cognitive mechanisms underlying it. Experiments 1 and 2 provided evidence that an assimilation effect is more likely to occur if the two experiences are seen as related, whereas a contrast effect is more likely when consumers perceive them as being unrelated. Experiment 3 provided further support for the assumption that the contrast effect is mediated by experienced changes in feelings of fluency. Experiments 3–4 also showed that participants discount the information value of processing fluency in evaluating the stimulus if they realize that this fluency is due to the font in which the information is presented or if they misattribute this fluency to other sources (e.g., room lighting). In these conditions, the contrast effect disappears. Experiment 5 suggested that the contrast effect also occurs when processing fluency increases and the subsequently encountered product information is difficult to read.

EXPERIMENT 1

The objective of this experiment was to demonstrate the conditions in which processing fluency experienced in one situation can lead to either a contrast or an assimilation effect in a subsequent situation. Participants were presented with a movie review using a Web page format as part of the first reading experience. The movie review was in either a difficult-to-read or an easy-to-read font. After they had examined it, they were presented with an ad for popcorn that used an easy-to-read font in all cases and were asked to evaluate the advertised product. However, in one condition, the relationship between the movie and the popcorn ad was made explicit. In the other condition, this relationship was not obvious. After reading the ad, participants were asked to evaluate the popcorn.

As noted earlier, an increase in the difficulty of the fonts used in the movie review Web page should decrease the fluency experienced by participants (Novemsky et al. 2007). When these participants later encounter an ad that is easy to read, the change in fluency experienced might be attrib-

uted to the product described in the ad and might lead participants to evaluate this product more favorably (a contrast effect), if the two experiences are seen as unrelated. If, however, the two experiences are seen as related, the feelings elicited by the movie review might be transferred to the advertised product, leading to lower evaluations (an assimilation effect).

Method

One hundred thirty-two undergraduate students participated in the experiment for extra course credit. Participants were randomly assigned to one of four conditions of a 2 (font of the movie review: difficult vs. easy) \times 2 (relationship between experiences: related vs. not related) between-subjects design.

Participants were told that this study was being done for an upcoming film festival and that the organizers were interested in how people form impressions based on movie reviews. All participants were then asked to read a review for a forthcoming film, *Fountain*. Participants were also forewarned that, in order to get more stable measures of their impressions, they would be asked to report their impression after it had time to settle and, in the interim, they would be given a product evaluation task. (Thus, the product evaluation task was presented as a filler task and given after participants had read the movie review but before they reported their impression of the review.)

Although the content of the movie review was the same, the movie review was presented in different fonts. In the difficult font condition, the review was presented in a difficult-to-read font (Script Mt Bold). In the easy font condition, participants read the same review presented in an easy-to-read font (Arial) of the same size. The choice of fonts was determined after a pretest. Twenty-eight undergraduates from the same subject pool evaluated different fonts along a scale from one (very easy to read) to 10 (very difficult to read). Results confirmed that the Script Mt Bold font was significantly more difficult to read ($M = 7.68$) than the Arial font ($M = 1.71$; $F(1, 27) = 401.60$, $p < .001$).

After participants had finished reading the movie review, they turned the page of the booklet and saw an ad for popcorn. The ad for the brand "Popcorn Universe" was taken from an existing ad for the brand available on the Web. It showed three pictures of popcorn and described the popcorn as easy to make, package, and eat. It also claimed that 160 flavors of popcorn were available. The verbal information about the ad was presented in an easy-to-read font (Arial). In the related condition, the pictures and descriptions of the popcorn were introduced with a headline that said "Enjoy Popcorn While Watching the Movie *Fountain*." In the unrelated condition, the headline said, "Popcorn: It's What's for Dinner." A pretest with 80 participants confirmed that participants who were exposed to one of the two ads and evaluated the relationship between popcorn and movies along a scale from zero (not at all related) to 10 (very related) rated popcorn as more related to movies in the former condition ($M = 3.95$) than in the latter ($M = 2.90$; $F(1, 78) =$

5.34, $p < .05$). Note, however, that the relationship between popcorn and movies was generally low (below the midpoint), suggesting that for this sample population, popcorn was not normally associated with movies.

After reading the ad, product evaluations were measured along four scales that ranged from -5 to $+5$ (dislike/like, bad/good, unfavorable/favorable, unattractive/attractive). Next, participants reported how much they liked the movie review on a scale from zero (not at all) to 10 (very much). Then, they evaluated the difficulty of reading the movie review on a scale from zero (not at all difficult) to 10 (very difficult). Finally, they indicated whether their evaluation of the product was affected by the movie review they saw earlier by circling "yes" or "no." Participants were then thanked, debriefed, and dismissed.

Results

Manipulation Checks. A manipulation check to assess if difficulty in reading was appropriately manipulated suggested that the movie review was more difficult to read when it was presented in a difficult font ($M = 8.09$) than when it was presented in an easy font ($M = 3.95$; $F(1, 128) = 118.60$, $p < .001$). Also, as expected, participants perceived the movie review as less favorable when it was presented in a difficult font ($M = 4.37$) than when it was presented in an easy font ($M = 5.60$; $F(1, 128) = 9.18$, $p < .01$).

Product Evaluations. We expected that an assimilation effect would occur when popcorn was perceived as related to movies, but a contrast effect would be dominant when the two stimuli were seen as unrelated. As shown in the top half of table 1, this was indeed the case. The 2×2 ANOVA on product evaluations confirmed that the interaction of font difficulty of the movie review and relatedness of the two experiences was significant ($F(1, 128) = 12.96$, $p < .001$). As expected, it showed that when the two stimuli were highly related, participants' evaluations of the popcorn became less favorable as font difficulty increased ($M = 2.62$ vs. 1.74 for easy and difficult fonts, respectively; $F(1, 128) = 4.50$, $p < .05$). In contrast, when the two stimuli were not related, participants' evaluations of the popcorn became more favorable as font difficulty increased ($M = 1.17$ vs. 2.35 for easy and difficult fonts, respectively; $F(1, 128) = 8.96$, $p < .01$).

Demand Check. Despite the above differences, participants reported little insight into the factors that gave rise to their evaluations. Ninety-one percent of participants indicated that their product evaluation was not affected by the movie review they saw earlier. This percentage did not differ with font difficulty ($p > .95$) or relatedness of the two stimuli ($p > .18$). This demand check ruled out a potential alternative explanation that participants in the related conditions deliberately consulted their judgment of the movie review when they reported their rating of popcorn. Furthermore, participants' liking of the movie review was not significantly correlated with their product evaluation ($r =$

TABLE 1
EVALUATIONS OF THE ADVERTISED PRODUCT AS A
FUNCTION OF RELATEDNESS AND FONT OF MOVIE
REVIEW—EXPERIMENTS 1 AND 2

Product evaluation	Unrelated	Related
Experiment 1:		
Easy font	1.17 (2.10)	2.62 (1.64)
Difficult font	2.35 (1.29)	1.74 (1.43)
M_{diff}	-1.18	.88
Experiment 2:		
Easy font	.41 (.91)	1.65 (1.44)
Difficult font	1.34 (1.46)	.08 (1.66)
M_{diff}	-.93	1.57

NOTE.—Standard deviations are in parentheses.

.17, $p > .19$ for the related condition and $r = .07$, $p > .50$ for the unrelated condition). The low correlation suggests that participants in both related and unrelated conditions did not use their evaluation of the movie review as a basis for evaluating the popcorn.

Discussion

The results of experiment 1 confirmed our expectation that assimilation effects occur when the two experiences are categorized together. Thus, when participants read that they could enjoy popcorn while watching the movie (related condition), they categorized the popcorn and the movie as part of the same experience. Consequently, evaluations of popcorn in this condition decreased as fonts of the movie review became relatively more difficult to read (an assimilation effect). In contrast, when the relatedness between the popcorn and the movie was not emphasized (unrelated condition), evaluations of popcorn increased as the font of the movie review became relatively more difficult to read (a contrast effect).

Although the results of this experiment provide preliminary support for our conceptualization, there is an alternative explanation for the results. It is conceivable that the contrast effect in the unrelated condition reflected a correction contrast, rather than the type of contrast that we have assumed. That is, participants might perceive popcorn to be naturally related to movies. Consequently, evaluations in both related and unrelated conditions might be assimilated in the direction of the movie review. However, the unusual use of popcorn suggested by the headline in the unrelated condition ("Popcorn: It's What's for Dinner") might then induce them to be aware that popcorn could conceivably be unrelated to movies and, therefore, lead them to correct their evaluations of popcorn to avoid the biasing influence of the movie review. This deliberative correction where popcorn is evaluated more favorably as processing difficulty of the movie review increases is different from the perceptual contrast that we proposed. In order to rule out this explanation, experiment 2 replicated our findings using a different method to manipulate relatedness.

EXPERIMENT 2

In experiment 2, participants were again asked to read a movie review that would be used as promotional material for an upcoming film festival. The review was presented in either difficult-to-read or easy-to-read fonts. After they had read the review, they were exposed to an ad for a brand of watches that was presented in an easy-to-read font. Relatedness was manipulated in a more subtle way. In one condition, the watch manufacturer was listed as the sponsor of the upcoming film festival. In the other condition, this relationship was not mentioned. After reading the ad, participants were asked to evaluate the watch brand. We expected that in the former conditions, participants would see the watch ad and movie review as part of the same experience. As a result, the feelings that they experienced at the time of reading the movie review would be similar to or indistinguishable from those elicited by the brand, resulting in an assimilation effect. However, a contrast effect would be more likely to occur if the brand was perceived to be unrelated to movies.

Method

Sixty-seven undergraduate students participated in the experiment for extra course credit. The experiment was a 2 (font of the movie review: difficult vs. easy) \times 2 (relationship between experiences: related vs. not related) between-subjects design.

Participants were given a cover story that was similar to the one in experiment 1 and under this pretext were asked to read a review about the movie *Fountain* that was presented either in a difficult-to-read font (Forte) or easy-to-read font (Arial). When participants had finished reading the movie review, they were exposed to an ad for Trudeaux watches. The ad showed two pictures of the watches along with a headline, "Trudeaux Watches: You'll Never Be Late Again." The text indicated that the watches brought performance and style together and emphasized the quality of these watches and their ability to keep accurate time. The verbal information about the ad was presented in an easy-to-read font (Arial). In the related condition, a line at the bottom of the ad described the brand (Trudeaux) as the proud sponsor the film festival. In addition, the Web page for the ad shared the same banner ("12th Annual Film Festival") as that used in the Web page of movie review. In the unrelated condition, the information about a sponsor was not mentioned, and there was no shared banner for the ad.

After reading the ad, participants evaluated the brand, Trudeaux, along the same four scales as those used in experiment 1. Next, participants reported the difficulty of reading the movie review on a scale from zero (not at all difficult) to 10 (very difficult) and rated how pleasant they felt when they read the movie review on a scale from -5 (very unpleasant) to $+5$ (very pleasant). They also indicated the extent to which the ad for the watches was related to the film festival on a zero (not at all related) to 10 (very related) scale.

Results

Manipulation Checks. Participants' assessments of how difficult the movie reviews were to read were analyzed using analysis of variance. As expected, the movie review was perceived as more difficult to read when it was presented in a difficult-to-read font ($M = 6.24$) than when it was presented in an easy-to-read font ($M = 2.97$; $F(1,63) = 30.91$, $p < .001$). Moreover, participants indicated that they felt significantly less pleasant when they were examining the difficult-to-read movie review ($M = -.36$) than the easy-to-read movie review ($M = .56$; $F(1,63) = 3.92$, $p < .05$). The data also showed that participants perceived the ad as more related to the film festival when the brand Trudeaux was described as a sponsor of the film festival ($M = 3.06$) than when such information was not provided ($M = 2.00$; $F(1,63) = 3.38$, $p = .07$).

Product Evaluations. Results of this experiment, summarized in the lower half of table 1, confirmed our expectations. When the Trudeaux brand was described as a sponsor of the film festival, participants evaluated the brand less favorably as font difficulty of the movie review increased ($M = 1.65$ vs. $.08$ for easy and difficult fonts, respectively; $F(1,63) = 10.71$, $p < .01$), thus replicating the assimilation effect observed in experiment 1. In contrast, the reverse was true when information about the sponsorship was not mentioned and the two stimuli were seen as unrelated ($M = .41$ vs. 1.34 for easy and difficult fonts, respectively; $F(1,63) = 3.65$, $p = .06$). This pattern was confirmed by a significant interaction involving font difficulty and relatedness of the two experiences, $F(1,63) = 13.42$, $p < .001$.

Discussion

Experiment 2 replicated the finding that increases in the relative reading difficulty of fonts pertaining to one stimulus decrease the evaluation of a subsequently encountered stimulus if the two stimuli are treated as part of the same experience but increase its evaluation if the two are perceived as unrelated. It is worth noting that the two experiences can be related either conceptually (e.g., if they belong to naturally related categories, such as sports and shoes), perceptually (e.g., through the use of cosmetic features, such as a common border) or experientially (e.g., when people try to form a narrative of the two experiences). Although experiment 2 does not distinguish between these processes, it is clear that (unlike experiment 1) the product category used (watches) is unlikely to be naturally related to movies unless the ad links them perceptually or conceptually as described above. Further, the current manipulation of relatedness is unlikely to lead to increased attention or elaboration. Consequently, the contrast effect observed in this experiment cannot be attributed to a correction contrast.

Supplementary Data

If the process underlying the assimilation effect is based on how people think about the experience, then even ads that are unrelated to the first reading experience might be assimilated with the help of an instructional manipulation. To assess this, we collected supplementary data and asked 75 participants to read the same movie review in either easy or difficult font. However, before they read the movie review, they were given different instructional sets. In control conditions, they received instructions that were identical to experiments 1 and 2. That is, they were told that the study was for an upcoming film festival and that the organizers were interested in how people formed impressions on the basis of movie reviews. They were given the movie review to read under this pretext. In narrative conditions, however, they were given an additional instruction before they were given the movie review to read. Specifically, they were told, "in forming your impressions of the movie review, try to imagine a sequence of steps where you encounter the movie review in a magazine, decide to attend the film festival, dress up for it, and reach the venue." That is, they were encouraged to create a narrative-type representation as they were processing the movie review (see Adaval et al. 2006 for a similar manipulation that results in the formation of a different type of mental representation). After participants read the movie review, they were presented with the watch ad that did not contain the sponsor information (i.e., the unrelated ad) and were asked to report their impressions of it along a scale from -5 (unfavorable) to $+5$ (favorable). After this, they reported the extent to which they thought that the ad for the watches was related to the film festival along a scale from zero (not at all) to 10 (very much). They also indicated how difficult it was to read the fonts of the movie review along a similar scale.

Note that participants were at no time told to include the watch as part of their imagined narrative but were merely asked to create a narrative of going to the film festival. Nevertheless, we expected that participants would incorporate the watch into the movie-going narrative, as the ad indicated that the watch could help people never be late for any occasion. If participants engage in this process and evaluate the two experiences as a whole, they should judge the watches less favorably as font difficulty of the movie review increases. In control conditions, however, these experiences should remain unlinked and should lead to the contrast effects obtained earlier for the unrelated ad. Results were consistent with expectations. Manipulation checks confirmed that participants saw the watch ad as more related to the movie review under narrative conditions ($M = 2.87$) than under control conditions ($M = 1.82$; $F(1, 71) = 6.39$, $p < .01$) and perceived the fonts of the movie review to be more difficult in difficult-to-read font conditions ($M = 6.97$) than in easy-to-read font conditions ($M = 2.92$; $F(1, 71) = 97.44$, $p < .001$).

More important, for participants in control conditions, evaluations of the watch paralleled those of the previous experiment and became more favorable as font difficulty

increased ($M = 1.11$ vs. 1.84) for easy versus difficult fonts, respectively ($M_{\text{diff}} = -0.73$). However, under narrative conditions, increases in font difficulty led to more unfavorable evaluations ($M = 1.84$ vs. $.58$) for easy versus difficult font conditions ($M_{\text{diff}} = 1.26$; $F(1, 71) = 5.92$, $p < .05$). These findings confirm the assumption that when the two experiences are represented in memory as part of the same experience, assimilation effects are more likely, while contrast effects occur when they are seen as separate experiences.

EXPERIMENT 3

Although the first two experiments demonstrated conditions in which assimilation and contrast effects are likely to occur, the process underlying the contrast effect is not clear. As noted earlier, the contrast effect could be the result of deliberative cognitive activity or could occur without participants' awareness. For example, participants might be aware of the ease or difficulty of reading the font of the movie review and might consciously evaluate the font of the ad relative to this prior experience. This deliberative comparison might lead to changes in the evaluation of the product (see Adaval and Monroe 2002; Lynch et al. 1991). Alternately, as our conceptualization suggests, participants might experience a change in fluency when reading the ad without being aware that the ease or difficulty that results is because of differences between the font of the movie review and that of the ad, and these changes in feelings of fluency might be misattributed to the advertised product. To provide further evidence to support this assumption, Experiment 3 examined only unrelated experiences that would yield contrast effects.

Participants in this experiment received different instructions prior to the presentation of the movie review Web page. Some participants were told to form an impression of the movie review, whereas others were asked to form an impression of the Web page on which it was presented. We assumed that if participants were asked to form an impression of the Web page, they would be more likely to evaluate design aspects of its layout (such as the font, white space, etc.) and pay less attention to the content of the movie review. This should increase attention to the font of the ad as well and increase the likelihood that the fonts of the movie review are compared to that of the ad that is presented subsequently. If this comparative process increases awareness that the font of the ad is easier to read when it is preceded by a difficult-to-read review than an easy-to-read review, participants should correctly attribute any enhanced ease of processing of the ad to the font and not misattribute this ease to the advertised product. As a result, no contrast effects should be evident in this condition. On the other hand, if participants focus on forming an impression of the movie review, they should focus on the content of the review and be less aware of the font in which it is presented. Decreased attention to the font should lead it to have the sort of contrast effect we proposed.

Method

Subjects and Design. Sixty-five students enrolled in introductory business classes were offered \$5 to participate in this experiment. The experiment was a 2 (font of movie review: difficult vs. easy) \times 2 (instructional set: Web page impression vs. movie review impression) between-subjects design.

Procedure. Participants were told that the study was about how people form impressions of movie reviews (Web pages). They were told that they would be asked to look at a movie review (Web page) that was designed for an upcoming film festival. The movie review was presented either in a difficult-to-read font (Script Mt Bold) or an easy-to-read font (Arial). In Web page impression conditions, participants were told to form an impression of the Web page. In movie review impression conditions, participants were asked to form an impression of the movie review. All participants were then given a questionnaire that contained a movie review Web page that had the review for a forthcoming film, *Fountain*. Thus, the information they received was identical except that their attention was either directed to the movie review or to the Web page. The efficacy of this manipulation was confirmed via a pretest involving 62 participants who were randomly assigned to one of four conditions of a 2 \times 2 design featuring font difficulty and instructional set. Participants confirmed that they paid more attention to the movie review in the movie review impression conditions ($M = 7.03$) than in the Web page impression conditions ($M = 6.28$; $F(1, 58) = 4.79$, $p < .05$).

When participants had finished examining the movie review (Web page), they were exposed to a print ad for sport shoes. The ad showed two pictures of sport shoes and also contained several verbal descriptions in an easy-to-read font (Verdana). After reading the ad, product evaluations were measured along the same four scales as those used in previous experiments. After participants had completed their evaluation of the product, they were asked to answer a few questions about the movie review Web page. As a manipulation check, they were first asked to report the difficulty of reading the review along a scale from zero (not at all difficult) to 10 (very difficult). They were then asked to report their feelings during the experiment. That is, participants recalled how pleasant they felt when they were examining the movie review Web page and the ad for the shoes along scales from -5 (very unpleasant) to $+5$ (very pleasant).

Finally, to assess if participants paid differential attention to the movie review in the two instructional conditions, participants were given an unexpected memory test about the movie review. In this test, they were given four brief descriptions of movie plots and were asked to select the one that described the movie on the Web page they had recently examined.

Results

Manipulation Checks. As expected, participants perceived the movie review as more difficult to read when it was presented in a difficult-to-read font ($M = 7.18$) than when it was presented in an easy-to-read font ($M = 4.28$; $F(1, 61) = 27.03$, $p < .001$), and this effect was independent of instructional set. The effectiveness of the different instructional sets (impression of movie review vs. Web page) was assessed indirectly by the memory test conducted at the end. Although none of the participants who had been asked to form impressions of the movie review made any mistake in the memory test, 14% of those who had been asked to form impressions of the Web page chose a wrong answer (Wald $\chi^2 = 5.95$, $p < .05$), suggesting decreased attention to the review.

Product Evaluations. We expected a contrast effect when participants were asked to form impressions of the movie review but not when they were asked to form an impression of the Web page. This was, in fact, the case. As the data in table 2 show, participants in the movie review impression conditions evaluated the product more favorably when the ad was preceded by a movie review in a difficult-to-read font ($M = 1.11$) than in an easy-to-read font ($M = -.32$; $F(1, 61) = 5.31$, $p < .05$). When participants were asked to form impressions of the Web page, the contrast effect disappeared (.55 vs. .85 for difficult and easy fonts, respectively; $F < 1$). The interaction of instructional set and font of the movie review was significant ($F(1, 61) = 4.39$, $p < .05$) and remained significant even when the data of participants who chose a wrong answer in a memory test were removed. This result suggests that the contrast effect does not occur when conditions focus attention on the font and allow a deliberative comparison of the font of the ad with that of the movie review.

Subjective Feelings. The font of the movie review influenced the feelings participants reported experiencing when they were reading the movie review and the ad. Specifically, although participants felt less pleasant when they were examining the difficult-to-read movie review ($M = .21$) than the easy-to-read movie review ($M = 1.25$; $F(1, 61) = 5.92$, $p < .05$), they felt more pleasant when they read

TABLE 2

EVALUATIONS OF THE ADVERTISED PRODUCT AS A FUNCTION OF INSTRUCTIONAL SET AND FONT OF MOVIE REVIEW—EXPERIMENT 3

Product evaluation	Movie review impression	Web page impression
Easy font	-.32 (1.70)	.85 (1.66)
Difficult font	1.11 (1.31)	.55 (1.79)
M_{diff}	-1.43	.30

NOTE.—Standard deviations are in parentheses.

the ad in the former condition ($M = .88$) than in the latter ($M = -.09$; $F(1, 61) = 3.86$, $p < .05$). This was true independent of the type of instruction participants received at the beginning of the experiment.

Mediation Analysis. We assumed that the contrast effect occurred because of perceived changes in fluency (i.e., the difference in feelings of fluency evoked by reading about the ad after the movie review). To test for mediation, we looked at the condition in which the contrast effect was expected (i.e., conditions in which participants formed an impression of the movie review). We first computed a difference score by subtracting the feelings participants had when they were examining the movie review from the feelings they had when they were examining the ad. This difference score provides a measure of the change in feelings elicited by the two fluency experiences (that of reading the movie review and that of reading the ad).

Tests for mediation were done using procedures outlined by Baron and Kenny (1986). Fonts of the review (easy vs. difficult) had a significant impact on product evaluation ($\beta = 1.43$, $t(26) = 2.49$, $p < .05$). Fonts of the review also had a significant impact on the computed difference score or the perceived change in feelings of fluency ($\beta = 3.14$, $t(26) = 3.27$, $p < .01$). The change in fluency had a significant impact on product evaluation, as well ($\beta = .42$, $t(26) = 5.77$, $p < .001$). Furthermore, including change in fluency in the analysis reduced the effect of fonts of the review on product evaluation to nonsignificance ($\beta = .16$, $t(25) = .31$, $p > .76$), while the effect of change in fluency remained significant ($\beta = .40$, $t(25) = 4.60$, $p < .001$). A subsequent Sobel test supported the mediation effect ($z = 2.87$, $p < .01$).

Discussion

In this study, the product being evaluated (sports shoes) was unrelated to movies in both impression conditions, and, consequently, no assimilation effects were evident. Instead, as difficulty in processing the movie review increased, it led to more favorable evaluations of the product judged subsequently (a contrast effect). The experiment provided evidence that perceived changes in subjective feelings of fluency mediated the effect of fonts on subsequent product judgments. Although the mediation analysis provides support for our conceptualization, participants could have been aware that reading the movie review was pleasant or unpleasant and the subsequent product ad might have been contrasted directly away from this affective experience through a deliberative comparison of the two fluency experiences. Our conceptualization, however, assumes that such a contrast occurs because the two fluency experiences are not compared in a deliberative manner or actively assessed. Rather, change in fluency is perceived much as one experiences the coolness of an air-conditioned room after a hot day in the sun.

Although the underlying process warrants further investigation, an important finding of experiment 3 is that the

contrast effect seems to occur without participants being aware of the source of the fluency experience. When participants were instructed to form impressions of the Web page only, their attention was drawn away from the movie review and directed toward design elements of the Web page, such as font, layout, and so forth. When they encountered the product ad subsequently, they might have deliberately compared the fonts of the ad with that of the movie review Web page and might have been aware that the enhanced ease of processing the ad was due to its font. Consequently, they might have discounted the information value of processing fluency when evaluating the advertised product. Support for this difference in attention is suggested by the fact that participants paid less attention to the movie review if they were instructed to form impressions of the Web page rather than that of the movie review. This was demonstrated in the pretest and also the memory test conducted at the end of the experiment.

In an additional experiment (not reported) we also found that when participants are given two sets of "movie review product ad" descriptions consecutively (as opposed to the one set used in this and in previous studies) and are asked to evaluate the fonts of the ad after the first product judgment is made, the contrast effect is obtained for the first product but not for the second. Apparently the increased attention to fonts after the first product judgment is made leads participants to discount the effect of font fluency on subsequent judgments. Thus, the apparent lack of awareness of the source of the fluency experience appears necessary for the occurrence of the contrast effect. Although this was tested indirectly in experiment 3 by directing participants' attention to design elements of the movie review Web page, a more stringent way of assessing whether participants are aware of the source of the fluency experience is through the use of a classic misattribution paradigm (Schwarz and Clore 1983). Experiment 4 provided such a test. In addition, it also provided some evidence that when two experiences are unrelated, perceived changes in fluency can have downstream consequences on participants' mood states.

EXPERIMENT 4

Participants in experiment 4 were asked to read a movie review that was presented in either an easy or difficult font. After they had finished reading the review, half of the participants were told that they would be asked to evaluate the lighting in the room in 5 minutes, ostensibly for a survey conducted by the university facilities management office. That is, their attention was drawn to the lighting, but they were not asked to evaluate it. After this, all participants were given an ad for shoes that was identical to the one used in experiment 3. In control conditions, this intervening instruction about lighting was not given, and participants proceeded to evaluate the ad for shoes directly.

Based on the results of experiments 1–3, participants in control conditions should evaluate the product more favorably as font difficulty of the movie review increases. However, we expected that when participants' attention was

drawn to the lighting, they might discount the information value of processing fluency if they misattribute the fluency to extraneous factors (Schwarz 2004). In the present context, participants whose attention is drawn to the lighting in the room should misattribute the subjective ease or difficulty they experience as a result of the fonts to the lighting and, therefore, should stop using these feelings as a relevant criterion for subsequent evaluations of the ad. Consequently, the contrast effect of processing fluency should disappear.

In addition, we also expected that if the contrast effect was the result of changes in subjective experience (as demonstrated in experiment 3), it should have downstream consequences on participants' moods (i.e., their general feeling states at the end of the experiment). Participants who read a movie review in a difficult-to-read font followed by an ad in an easy-to-read font should experience more relief (positive affect) relative to those who read both the movie review and ad in easy fonts. These feelings can be considered more of a by-product of the process and should be apparent in control conditions where participants' attention is not drawn to the lighting in the room. However, if participants have already misattributed the fluency experienced by the first task to the lighting, then this experienced relief should decrease.

Method

Seventy-four undergraduate business students participated in this experiment for extra course credit. The experiment was a 2 (font of movie review: difficult vs. easy) \times 2 (attribution: attention to lighting vs. control) between-subjects design.

Participants were given a review about the film *Fountain* and asked to form an impression of it. The movie review was presented in either easy-to-read or difficult-to-read fonts. The fonts used in this experiment were identical to those used in experiment 3. After they had finished reading the review, the experimenter told participants in the attention to lighting condition that the university facilities management office wanted to assess whether or not students were comfortable with the lighting in the room. They were told that they would be asked to evaluate the lighting in 5 minutes, after they had completed another task. They were then given the product evaluation task. In the control condition, this intervening instruction about lighting assessment was omitted, and participants proceeded to the product evaluation task immediately after reading the movie review.

Participants in both conditions were then exposed to an ad for shoes that was identical to the one used in experiment 3. The ad was presented in an easy-to-read font (Verdana). Participants evaluated the product along the same four scales as those used in previous experiments and also reported the difficulty of reading the movie review and the ad along a scale from zero (not at all difficult) to 10 (very difficult). Then, at the end of the experiment, all participants were given a different questionnaire that assessed their mood. They were asked to indicate how they felt at that moment (i.e., right now) along a scale from -5 (very negative) to $+5$ (very positive).

Results

Manipulation Checks. Participants perceived the movie review to be more difficult to read when it was presented in a difficult-to-read font ($M = 7.55$) than an easy-to-read font ($M = 3.69$; $F(1, 70) = 50.23$, $p < .001$). Participants also indicated that the product ad was less difficult to read in the former condition ($M = 2.42$) than in the latter ($M = 3.67$; $F(1, 70) = 4.59$, $p < .05$).

Product Evaluations. We expected that participants in control conditions would show the typical contrast effect observed in previous conditions. In contrast, participants who paid attention to the lighting would misattribute the processing fluency to the lighting and, therefore, would discount the information value of fluency when they evaluated the product. As shown in table 3, this was in fact the case. In control conditions, participants evaluated the product more favorably when the ad was preceded by a difficult-to-read movie review ($M = 1.05$) than an easy-to-read review ($M = -.27$; $F(1, 70) = 5.31$, $p < .05$). However, when participants' attention was called to the lighting, the contrast effect disappeared (.53 vs. 1.00, respectively; $F < 1$). This pattern of means was confirmed by a significant interaction featuring font difficulty of the movie review and attribution instructions ($F(1, 70) = 4.19$, $p < .05$).

Mood at the End of the Experiment. Feelings measured at the end of the experimental session showed that participants who had been exposed to difficult fonts prior to the easy-to-read ad were, on average, happier ($M = 1.74$) than those who had been exposed to easy-to-read fonts ($M = -.11$; $F(1, 70) = 15.71$, $p < .001$). This main effect was qualified by a marginally significant interaction involving font difficulty and attribution conditions ($F(1, 70) = 2.77$, $p < .10$), which suggested that the relief experienced was greater for participants in the control conditions ($M_{\text{diff}} = 2.45$) than for those in the attribution to lighting conditions ($M_{\text{diff}} = 1.00$).

Discussion

The results of experiment 4 provided further support for our conceptualization that when the information value of processing fluency is attributed to an extraneous source (e.g., lighting), it no longer serves as input in the evaluation of subsequently encountered products. Our results also showed

TABLE 3

EVALUATIONS OF THE ADVERTISED PRODUCT AS A FUNCTION OF ATTRIBUTION CONDITIONS AND FONT OF MOVIE REVIEW—EXPERIMENT 4

Product evaluation	Control condition	Attention to lighting
Easy font	-.27 (1.85)	1.00 (1.72)
Difficult font	1.05 (1.83)	.53 (2.00)
M_{diff}	-1.32	.47

NOTE.—Standard deviations are in parentheses.

that the experienced change in fluency could have downstream consequences on participants' mood. Mood measures taken at the end of the experiment showed that participants experienced more relief when they had been exposed to difficult-to-read fonts initially and later had evaluated a product ad in an easy-to-read font. So, not only was the product evaluated more favorably but it also had a positive effect on participants' feelings at the end. This effect on mood decreased when participants had attributed the fluency to the lighting.

As noted earlier, calling attention to the lighting decreased the effect of font difficulty from -1.32 to $.47$. However, this reduced effect of font difficulty in lighting conditions was driven not only by a decrease in evaluations of the product in difficult-to-read font conditions but also by an increase in evaluations of the product in easy-to-read font conditions. This reversal raises an interesting theoretical ambiguity about the nature of the contrast effect that was mitigated by the misattribution manipulation. More specifically, it is unclear if people adapted to low processing fluency (as the movie review became difficult to read) and rated the subsequent product more favorably because it was relatively easier to read or if they adapted to higher levels of fluency (as the movie review became easier to read) and rated the subsequent product more negatively because it was relatively more difficult to read. To assess this theoretical ambiguity, it is necessary to see if the contrast effect will also occur if processing fluency of the movie review improves and the product ad is difficult to process. (Note that in previous experiments the product ad was always presented in easy-to-read fonts.) Theoretically, the effects should be similar. Experiment 5 explored this possibility.

EXPERIMENT 5

Experiment 5 shed some light on the theoretical ambiguity noted earlier by varying the font difficulty of the movie review at three different levels (easy vs. moderately difficult vs. difficult to read). After reading it, all participants evaluated an ad for shoes that was presented in moderately difficult font. According to our assumption, the subsequent product ad should be perceived as easier to read when font difficulty of the movie review goes from moderately difficult to difficult (increases in processing difficulty). However, it should be perceived as more difficult to read when the font difficulty of the movie review goes from moderately difficult to easy (decreases in processing difficulty). The evaluation of the advertised product should differ accordingly.

Method

Sixty-nine participants were randomly assigned to one of the three conditions. Participants were asked to read a movie review that was presented in an easy-to-read font (Arial), moderately difficult-to-read font (Monotype Corsiva), or difficult-to-read font (Forte). After that, they were exposed to the same ad for shoes as in experiments 3 and 4. However, the font of the ad was changed to one that was moderately

difficult (Bradley Hand ITC). The level of font difficulty was confirmed in a pretest where 23 undergraduates from the same subject pool evaluated the different fonts along a scale from -5 (very easy to read) to $+5$ (very difficult to read). Results confirmed that of the fonts, Forte was the most difficult to read ($M = 1.83$), followed by Bradley Hand ITC ($M = 1.00$), Monotype Corsiva ($M = .26$), and Arial ($M = -3.04$).

After participants read the ad, they evaluated the product along the same four scales as those used in previous experiments and also reported the difficulty of reading the ad and the movie review along a scale from zero (not at all difficult) to 10 (very difficult).

Results

Manipulation Checks. As expected, the movie review was perceived as most difficult to read when it was presented in a difficult font ($M = 6.32$), followed by the condition in which it was presented in a moderately difficult font ($M = 3.92$), and finally by the condition in which it was presented in an easy font ($M = 2.50$; $F(2, 66) = 13.89$, $p < .001$). The perceived difficulty of reading the ad was consistent with the contrast effect. That is, the ad was perceived as least difficult to read in the first condition, followed by the second one, and finally by the third one (3.32 vs. 3.72 vs. 4.82 , $F(2, 66) = 2.74$, $p < .07$).

Product Evaluations. The overall influence of the font of the movie review on product evaluation was significant, $F(2, 66) = 3.78$, $p < .05$. A linear trend analysis (Keppel 1991) indicated that the evaluation of the ad was lowest if participants had previously read an easy review ($M = -.81$) and highest if they had read a difficult review ($M = .77$), with the condition in which participants had read a moderately difficult review falling in between these extremes ($M = .25$; $F(1, 66) = 7.26$, $p < .01$). The pattern of means confirms our assumption that as the initial information gets easier to process, it can also lead to a decrease in the evaluation of a subsequent product that is not easy to process.

GENERAL DISCUSSION

The impact of processing fluency on people's judgment and decision making is well recognized in both social psychology and consumer research (Lee and Labroo 2004; Reber et al. 1998; Schwarz 2004; Winkielman et al. 2003). Previous studies were concerned mainly with how processing fluency of an object is influenced by its own features (Novemsky et al. 2007; Reber and Schwarz 1999; Reber et al. 1998) or the accessibility of concepts that were used to evaluate it (Lee and Labroo 2004; Zajonc 1968, 1980). The present research provides new insights about how processing fluency associated with one experience influences subsequent experiences. Our experiments demonstrate that, as the font difficulty of information in a magazine article increases, it leads consumers to judge a subsequent easy-to-read prod-

uct ad as more attractive if (a) the product in the ad is perceived to be unrelated to the information participants read earlier (experiments 1–2) and (b) participants are unaware of the source of the fluency experience (experiments 3–4). Further, the effect is mediated by experienced changes in feelings of fluency (experiment 3). When the magazine article and the ad that follows are treated as part of the same experience, however, participants are more likely to judge the advertised product unfavorably as processing difficulty increases. Certain key aspects of our results are worth discussing.

First, we showed that the increase in processing difficulty of the first article can result in contrast effects only if that article and the subsequent ad are unrelated, whereas assimilation effects are more likely to occur if they are categorized together as part of the same experience. Experiments 1 and 2 showed that when a popcorn ad was related to the movie review, or a watch ad was described as a sponsor of the film festival, increases in processing difficulty associated with the movie review led to unfavorable evaluations of the product. In this context, it is worth noting that Barsalou (1983) distinguishes between natural categories and ad hoc categories. Ad hoc categories could be created for use in specialized contexts. For example, although a movie review and a watch might not be naturally related, participants might be more likely to see them as belonging to the same ad hoc category if they think about the watch brand as a sponsor of the film festival or if they imagine the use of the product as part of the overall film-going experience. Thus, how consumers think about the two reading experiences they encounter appears to drive the categorization process and the assimilation and contrast effects that result.

Second, our experiments also examined if the contrast effect of processing fluency on subsequently encountered products occurred through a spontaneous or deliberative mechanism. One possibility is that consumers deliberately compare the fonts of the product ad with that of the movie review and find that the fonts of the ad are better than those of the movie review. Our results in experiments 3 and 4, however, ruled out this possibility. In these experiments, the contrast effect of processing fluency disappeared when consumers' attention was drawn to the fonts or when an alternative source (e.g., room lighting) was made salient. Another possibility is that the processing difficulty of the movie review could have influenced evaluations of it, and this evaluation of the review could have been used as a basis for judging the subsequent product. However, experiment 1 showed that the correlation between the two evaluations was low, ruling out the possibility that the contrast effect was driven by the evaluation of the review.

Third, processing fluency did influence the feelings participants reported experiencing when they were reading the movie review and the ad (experiment 3) and also appeared to have some downstream consequences on participants' overall moods with participants in difficult font conditions experiencing more relief or positive affect at the end of the experiment (experiment 4). An obvious question surrounds

the impact that processing fluency has on mood. One might expect that participants should be unhappier if they encounter a difficult font that is taxing to read, and this might have an effect on subsequent judgments. However, in our studies, participants spent only 5 minutes reading the movie review. Because of the short duration of time spent, a negative response toward the difficult-to-read movie review might not be strong enough to have such a lasting impact on participants' moods. Rather, the change in feelings as participants went from reading the movie review in a difficult font to reading the ad in an easy font might have exerted more of an effect, and the relief experienced by the transition might have led to more positive moods at the end in the difficult-to-read font condition.

Two conceptual ambiguities remain. First, in our experiments, a difficult-to-read font was often less familiar than an easy-to-read font. In principle, it would be desirable to separate the effects of ease of processing the fonts from the effects of familiarity with the fonts. However, this is more difficult than it may appear. Whittlesea (1993; see also Whittlesea and Williams 2000) suggests that the fluency of processing a stimulus can be the determinant of feelings of familiarity rather than the consequence of these feelings. Thus, for example, processing a movie review in an easy-to-read font can increase feelings of fluency that can be misattributed to familiarity with the font. This raises a question about the direction of the effect: does fluency lead to familiarity, or does familiarity lead to fluency? The theoretical ambiguity surrounding fluency and familiarity makes it difficult, if not impossible, to distinguish between the effects of these variables.

Second, it is conceivable that the assimilation effect in related conditions was driven by conceptual fluency that typically results when the target is predicted by the context or is indirectly primed by it (Lee and Labroo 2004; Whittlesea 1993). Although this explanation cannot be completely discounted, it does not seem plausible, because if movies are naturally associated with popcorn in participants' minds, it should be equally predicted in both ad conditions of experiment 1 (both related and unrelated ads pertained to popcorn). Consequently, one would expect to see similar effects in both these conditions.

The processes that underlie the assimilation and contrast effects nevertheless merit further investigation. One avenue for future research is to assess if the assimilation effect disappears in the presence of distraction or cognitive load. If the assimilation effect is due to elaboration at the time of exposure to the two experiences (i.e., participants elaborate on the connection between movies and the product ad), then the effect should disappear when they are under cognitive load, and the product ad should be evaluated favorably as processing difficulty of the first experience increases. A second possibility is to examine the extent to which the temporal distance between the two experiences moderates the assimilation and contrast effects that we observed. For example, temporal contiguity between the two experiences can be varied (e.g., simultaneous presentation

vs. sequential presentation vs. delayed presentation) along with processing difficulty, and this might moderate the extent to which feelings of fluency transfer.

Finally, although instructions to construct a sequence of events facilitated the construction of a single mental representation leading to assimilation effects, it would be useful to understand the conditions under which this is more likely. For example, it is conceivable that instructions to construct a narrative led to more holistic processing (Adaval et al. 2006), and participants attempted to comprehend the two experiences as a whole rather than as two discrete experiences. Nevertheless, there may be conditions in which this is less likely to occur (e.g., if the second experience requires very different types of processing skills or because the content is very hard to integrate). Future research could shed additional light on this issue.

Our findings have important substantive implications, as well. Although we manipulated fluency using font difficulty, the contrast effect can occur with other manipulations. For example, consumers might read an article in a magazine and find its content difficult to understand. Or, they might expend considerable effort understanding a difficult topic on a television program. Our findings imply that the difficulty of understanding the meaning of information in these situations will have a positive influence on people's judgment of unrelated product ads they view subsequently rather than a carryover negative effect. The implications of our findings are noteworthy for advertising, since they suggest that it might be better to advertise unrelated products if consumers are likely to encounter difficulty in processing previous information.

REFERENCES

- Adaval, Rashmi, Linda M. Isbell, and Robert S. Wyer (2006), "The Impact of Pictures on Narrative- and List-Based Impression Formation: A Process Interference Model," *Journal of Experimental Social Psychology*, 43 (May), 352–64.
- Adaval, Rashmi and Kent B. Monroe (2002), "Automatic Construction and Use of Contextual Information for Product and Price Evaluations," *Journal of Consumer Research*, 28 (March), 572–88.
- Bargh, John A., Shelly Chaiken, Rajen Govender, and Felicia Pratto (1992), "The Generality of the Automatic Attitude Activation Effect," *Journal of Personality and Social Psychology*, 62 (6), 893–912.
- Baron, Reuben M. and David A. Kenny (1986), "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*, 51 (December), 1173–82.
- Barsalou, Lawrence W. (1983), "Ad Hoc Categories," *Memory and Cognition*, 11 (3), 211–27.
- Fazio, Russell H., David M. Sanbonmatsu, Martha C. Powell, and Frank R. Kardes (1986), "On the Automatic Activation of Attitudes," *Journal of Personality and Social Psychology*, 50 (February), 229–38.
- Fiske, Susan T. (1982), "Schema-Triggered Affect: Applications to Social Perception," in *Affect and Cognition: The 17th Annual Carnegie Symposium on Cognition*, ed. Margaret S. Clark and Susan T. Fiske, Hillsdale, NJ: Erlbaum, 55–78.
- Gorn, Gerald J. (1982), "The Effects of Music in Advertising on Choice Behavior: A Classical Conditioning Approach," *Journal of Marketing*, 46 (Winter), 94–101.
- Helson, Harry (1964), *Adaptation Level Theory*, New York: Harper & Row.
- Johnson-Laird, P. N. (1980), "Mental Models in Cognitive Science," *Cognitive Science*, 4, 71–115.
- (1983), *Mental Models: Towards a Cognitive Science of Language, Inference and Consciousness*, Cambridge, MA: Harvard University Press.
- Keppel, Geoffrey (1991), *Design and Analysis: A Researcher's Handbook*, Englewood Cliffs, NJ: Prentice-Hall.
- Labroo, Aparna A. and Angela Y. Lee (2006), "Between Two Brands: A Goal Fluency Account of Brand Evaluation," *Journal of Marketing Research*, 43 (August), 374–85.
- Lee, Angela Y. and Aparna A. Labroo (2004), "The Effect of Conceptual and Perceptual Fluency on Brand Evaluation," *Journal of Marketing Research*, 41 (May), 151–65.
- Lingle, J. H. and T. M. Ostrom (1979), "Retrieval Selectivity in Memory-Based Impression Judgments," *Journal of Personality and Social Psychology*, 37 (February), 180–94.
- Lynch, John G., Dipankar Chakravarti, and Anusree Mitra (1991), "Contrast Effects in Consumer Judgments: Changes in Mental Representations or in the Anchoring of Rating Scales?" *Journal of Consumer Research*, 18 (December), 284–97.
- Murphy, Sheila T. and Robert B. Zajonc (1993), "Affect, Cognition, and Awareness: Affective Priming with Suboptimal and Optimal Stimulus," *Journal of Personality and Social Psychology*, 64 (May), 723–39.
- Novemsky, Nathan, Ravi Dhar, Norbert Schwarz, and Itamar Simonson (2007), "Preference Fluency in Consumer Choice," *Journal of Marketing Research*, 44 (3), 347–56.
- Ostrom, Thomas M. and Harry S. Upshaw (1968), "Psychological Perspective and Attitude Change," in *Psychological Foundations of Attitudes*, ed. Anthony G. Greenwald, Timothy C. Brock, and Thomas M. Ostrom, New York: Academic Press, 217–42.
- Parducci, Allen (1965), "Category Judgment: A Range-Frequency Model," *Psychological Review*, 72 (November), 407–18.
- Radvansky, G. A., Robert S. Wyer, J. M. Curiel, and M. F. Lutz (1997), "Situation Models and Abstract Ownership Relations," *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 23 (5), 1233–46.
- Reber, Rolf and Norbert Schwarz (1999), "Effects of Perceptual Fluency on Judgments of Truth," *Consciousness and Cognition*, 8 (September), 338–42.
- Reber, Rolf, Piotr Winkielman, and Norbert Schwarz (1998), "Effects of Perceptual Fluency on Affective Judgments," *Psychological Science*, 9 (January), 45–48.
- Schwarz, Norbert (2004), "Meta-Cognitive Experiences in Consumer Judgment and Decision Making," *Journal of Consumer Psychology*, 14 (4), 332–48.
- Schwarz, Norbert and Gerald G. Clore (1983), "Mood, Misattribution, and Judgments of Well-Being: Informative and Directive Functions of Affective States," *Journal of Personality and Social Psychology*, 45 (September), 513–23.
- Sujan, Mita (1985), "Consumer Knowledge: Effects on Evaluation Strategies Mediating Consumer Judgments," *Journal of Consumer Research*, 12 (June), 31–46.
- Whittlesea, Bruce W. A. (1993), "Illusions of Familiarity," *Journal*

- of Experimental Psychology: Learning, Memory, and Cognition*, 19 (6), 1235–53.
- Whittlesea, Bruce W. A. and Lisa D. Williams (2000), “The Source of Feelings of Familiarity: The Discrepancy-Attribution Hypothesis,” *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 26 (3), 547–65.
- Winkielman, Piotr and John T. Cacioppo (2001), “Mind at Ease Puts a Smile on the Face: Psychophysiological Evidence That Processing Facilitation Elicits Positive Affect,” *Journal of Personality and Social Psychology*, 81 (December), 989–1013.
- Winkielman, Piotr, Norbert Schwarz, Tetra Fazendeiro, and Rolf Reber (2003), “The Hedonic Marking of Processing Fluency: Implications for Evaluative Judgment,” in *The Psychology of Evaluation: Affective Processes in Cognition and Emotion*, ed. Jochen Musch and Karl C. Klauer, Mahwah, NJ: Erlbaum, 189–217.
- Wyer, Robert S., Rashmi Adaval, and Stanley J. Colcombe (2002), “Narrative-Based Representations of Social Knowledge: Their Construction and Use in Comprehension, Memory, and Judgment,” *Advances in Experimental Social Psychology*, 34, 131–97.
- Wyer, Robert S. and G. A. Radvansky (1999), “The Comprehension and Validation of Social Information: The Role of Situation Models,” *Psychological Review*, 106, 89–118.
- Zajonc, Robert B. (1968), “Attitudinal Effects of Mere Exposure,” *Journal of Personality and Social Psychology: Monograph Supplement*, 9, 1–27.
- (1980), “Feeling and Thinking: Preferences Need No Inferences,” *American Psychologist*, 35 (2), 151–75.
- Zwaan, R. A. and G. A. Radvansky (1998), “Situation Models in Language Comprehension and Memory,” *Psychological Bulletin*, 123 (2), 162–85.