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It feels fluent, but not right: The interactive effect of expected and experienced processing fluency on evaluative judgment☆

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HIGHLIGHTS

- Both expected and experienced processing fluency influence evaluative judgment.
- Evaluation is higher when experienced fluency conformed to their expectation.
- This effect is mediated by a sense of assurance.
- This effect disappears when people are under cognitive load.

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ABSTRACT

In this research, we examined the malleability of processing fluency from the angle of people's *a priori expectation* of how fluently stimuli will be processed. Results from three studies suggest that the value of the fluency experience is contingent on how easy or difficult people *expect* the incoming information would be processed. Specifically, participants had higher evaluations of the target when their experienced processing fluency conformed (vs. did not conform) to their expected processing fluency. We also found that the interactive effect between expected fluency and experienced fluency was mediated by a sense of assurance when people's subjective fluency experience conformed to their expectations. Moreover, we showed that a positive effect of processing fluency occurred when people are under cognitive load (affective route); and interpreting the fluency experience in terms of one's expected fluency occurs when people had enough cognitive capacity (interpretive route).

Introduction

Over the past twenty years, much research has been done to document the influence of processing fluency (i.e., the subjective experience of ease with which information is processed) on judgment (see Schwarz, 2010 for a review). Much of the existing literature has documented a positive effect of processing fluency on evaluative judgment. That is, stimuli that are easy to process are more likable (e.g., Lee & Labroo, 2004; Reber, Winkielman, & Schwarz, 1998; Winkielman, Schwarz, Fazendeiro, & Reber, 2003). However, recent research has shown that processing fluency can also have a negative effect on evaluative judgment (e.g., Briñol, Petty, & Tormala, 2006; Labroo & Kim, 2009). Schwarz (2010) reconciles these findings by proposing that processing fluency can influence evaluative judgment through two pathways. One is through the spontaneous positive affective reaction elicited by processing fluency, much like the influence of moods or emotions (we refer to this as the *affective pathway*). In the second pathway, the value of processing fluency is largely dependent on how people interpret the fluency experience. Therefore, processing fluency can lead to more positive or more negative judgments depending on people's subjective interpretation of the fluency experience (we refer to this as the *interpretive pathway*).

The current research intends to achieve two objectives. First, we aim to provide further evidence for the malleability of the value of processing fluency by examining the effect of expected fluency on evaluative judgment. The role of expected fluency has been discussed in the seminal work on feelings of familiarity (e.g., Whittlesea, 1993; Whittlesea & Williams, 1998, 2000). In this line of work, the discrepancy between expected fluency and actual processing fluency leads to the feeling of familiarity. Interestingly, however, the effect of people's expected fluency of incoming stimuli on evaluative judgment has not been examined. Yet, as Schwarz (2004) suggested, people often have a priori expectations for how easy or difficult it would be to process the stimulus information and such expectations are likely to have an impact on evaluative judgment. Thus, in this research we examine how people's expected fluency of the incoming stimuli affects their interpretation of experienced

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processing fluency and in turn their evaluations of the stimuli. Another important question is—when does the affective pathway versus the interpretive pathway come into play? We seek to address this question in the context of the effect of expected fluency on evaluative judgment.

Building on the idea that the value of processing fluency is malleable, we propose that people's a priori expectation of how fluently stimuli will be processed is an important factor in determining their interpretation of the value of the fluency experience. Expectation is a generic term referring to beliefs about the future (Roese & Sherman, 2007). In the context of information processing, people's expectations of processing fluency can be based on either their past exposure to the stimulus (Whittlesea & Williams, 1998) or their expertise in the domain (Schwarz, 2004). For example, people who have little knowledge or experience with the stimuli in a particular domain would expect to have more difficulty processing information in that domain than would people who have a lot of knowledge or experience. Once an expectation is formed, the cognitive and behavioral consequences of the information hinge critically on whether incoming information confirms or disconfirms the expectation (Roese & Sherman, 2007). A confirmed expectation usually means that the current situation is normal and represents no potential problem or danger; in contrast, a disconfirmed expectation tends to signal a potential problem or threat in the environment (Roese & Sherman, 2007). Thus, we propose that when people's experienced fluency in processing a message conforms to their a priori expectation, the signaling of "situation normal" (Roese & Sherman, 2007, p. 100) elicits a sense of assurance, which would in turn leads to more positive evaluations of the target. In contrast, when experienced fluency does not conform to expected fluency, the signaling of a potentially problematic situation would elicit a sense of doubt and a feeling that something is not right, which in turn leads to more negative evaluations. Furthermore, since comparing one's expected fluency with his or her actual processing fluency involves a monitoring process (Whittlesea & Williams, 2000) that requires cognitive resources (Gross, 2002), we propose that the interactive effect between people's expected fluency and actual processing fluency would only occur when they have enough cognitive resources (interpretive pathway). However, when people are under cognitive load, they do not have the capacity to monitor the coherence between expected fluency and actual fluency; thus, the interactive effect between expected fluency and experienced fluency on judgment would be replaced by a positive effect of experienced fluency (affective pathway).

We tested these hypotheses in three experiments. In Experiment 1, we demonstrated the basic interactive effect of expected and actual processing fluency by manipulating expected fluency through product category and experienced fluency through the brand name in a print advertisement. In Experiment 2, we replicated this basic finding using a different manipulation of experienced processing fluency. More importantly, we showed that the effect of expected fluency disappeared when people were put under cognitive load, and only a positive effect of experienced fluency on judgment was observed. Finally, in Experiment 3, we replicated the effect of expected fluency in the domain of public policy. Furthermore, we showed that the interactive effect between expected fluency and experienced fluency was mediated by a sense of assurance when people's subjective fluency experience conformed to their expectations.

Experiment 1

In Experiment 1, we sought to provide initial evidence for the interactive effect of expected and experienced processing fluency on evaluative judgment. We manipulated participants' expected fluency by varying the type of product described in a print advertisement and manipulated experienced processing fluency by varying the ease of pronouncing the brand name of the product. We predicted that people would evaluate the product more favorably when their experienced processing fluency of the message conformed (vs. did not conform) to their expected fluency.

Method

Participants

Seventy-four undergraduate students participated in the study for course credit. They were randomly assigned to a 2 (expected fluency: high vs. low) × 2 (experienced fluency: high vs. low) between-subjects factorial design.

Procedure

Participants were told that they were taking part in a study to evaluate advertisements. On this pretense, they were told that they would see a print advertisement for a new brand of medicine. To manipulate participants' expected fluency, we used two different categories of medicine. In *high-expected-fluency* conditions, participants were told that they would see an advertisement for a new brand of cold remedy. Because most participants are familiar with cold remedies in general and often see advertisements for these products in daily life, they should expect a high level of fluency in processing product information about cold remedies. In *low-expected-fluency* conditions, however, participants were told that they would see an advertisement for a new brand of anticoagulant medicine (for use in treating blood clots). This type of medicine was unfamiliar to our participants—young adults with little experience with vascular diseases who rarely encountered advertisements for anticoagulant medicines. These assumptions were confirmed in a pretest with 30 undergraduate students from the same subject pool. Half of the participants were asked the extent to which they expected to know about brands of cold medicine and to be familiar with information about these medicines on two nine-point scales (1 = *not at all*; 9 = *very much*). The other half of the participants were asked the same two questions about medicines for vascular diseases. A one-way ANOVA on the average of participants' ratings on these two items ($r = .78$) showed that participants indeed expected that they would be more familiar with product information about cold remedies ($M = 5.68$, SD = 2.29) than with product information about medicines for vascular diseases ($M = 3.75$, SD = 1.78; $F_{(1,28)} = 6.72$, $p < .05$).

Participants in the main experiment were then shown an advertisement for each of the two types of medicine. The advertisements were similar in structure and length. The only difference was in the description of the disease and the symptoms the medicine relieves. To manipulate participants' experienced processing fluency, we used a subtle manipulation by only varying how difficult or easy it was to pronounce the fictitious brand name of the medicine (see Song & Schwarz, 2009, for a similar manipulation of processing fluency). In *high-experienced-fluency* conditions, the brand name for the medicine, *Vik*, was easy to pronounce, whereas in *low-experienced-fluency* conditions, the brand name, *Vrkptiei*, was unpronounceable. Both brand names are fictitious.[2] A pretest with 40 undergraduate students from the same subject pool indicated that none of the participants had heard of either of these fictitious brands or similar brands. Moreover, results from the pretest confirmed that the brand name of *Vik* was perceived as easier to process ($M = 1.18$, SD = .67; 1 = *very easy to pronounce/understand*; 9 = *very difficult to pronounce/understand*; $r = .92$) than *Vrkptiei* ($M = 8.40$, SD = .53; $F_{(1,38)} = 1423.23$, $p < .001$).

After reading the advertisement, participants were asked to evaluate the medicine on two nine-point scales (1 = *bad/ineffective*; 9 = *good/effective*; $r = .68$). Finally, participants were debriefed and thanked.

Results and discussion

A 2 (expected fluency) × 2 (experienced fluency) ANOVA on the product evaluation index yielded only a significant interaction ($F_{(1,70)} = 8.83$,

[2] The fictitious brand used here *Vik* could be potentially confused with an actual brand of cold medicine *Vicks*, which can be a potential confound. However, the fact that Vicks is not available in the Hong Kong market, where the experiment was conducted, can help ameliorate this concern.

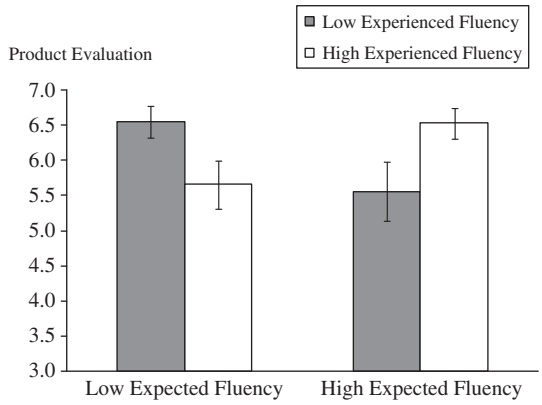

Fig. 1. Product evaluation as a function of expected fluency and experienced fluency (Experiment 1).

$p < .01$, $\eta_p^2 = .11$, see Fig. 1). As predicted, planned comparisons showed that when participants expected the message to be easy to process, they evaluated the medicine more favorably when its brand name was easy to pronounce ($M = 6.53$, SD = .91) than when it was difficult to pronounce ($M = 5.56$, SD = 1.77; $F_{(1,70)} = 4.57$, $p < .05$, $\eta_p^2 = .06$). However, when participants expected the message to be difficult to process, they evaluated the medicine more favorably when the brand name was difficult to pronounce ($M = 6.55$, SD = 1.04) than when it was easy to pronounce ($M = 5.66$, SD = 1.49; $F_{(1,70)} = 4.27$, $p < .05$, $\eta_p^2 = .06$). Neither the main effect of expected fluency nor that of experienced fluency was significant (Fs < 1). These results provide support for our hypothesis that whether the fluency experience signals a positive or negative value is subject to people's interpretation of the fluency experience in terms of their a priori expectation of how fluently the incoming information would be processed.

Experiment 2

Experiment 2 was designed to achieve two objectives: First, we aimed to replicate the findings from Experiment 1 using a different manipulation of experienced processing fluency. More importantly, we wanted to address the question of when each of the two pathways would come into play, and in the context of the current research—when the interactive effect between expected fluency and experienced fluency on judgment would be replaced by merely a positive effect of experienced fluency. We hypothesized that interpreting the fluency experience in terms of one's expected fluency is a more deliberate process, which requires cognitive resources. When people are under cognitive load, they may not have enough resources to interpret the fluency experience; thus, the effect of expected fluency would be overridden by the effect of experienced fluency. That is, we should observe that regardless of their expected fluency, easy-to-process stimuli are evaluated more favorably when participants are under cognitive load.

Method

Participants

One hundred and eighty-seven undergraduate students participated in the study for monetary compensation. They were randomly assigned to a 2 (expected fluency: high vs. low) × 2 (experienced fluency: high vs. low) × 2 (cognitive load: high load vs. no load) between-subjects factorial design.

Procedure

To manipulate cognitive load, we adopted a task commonly used in prior research (e.g., Gilbert & Osborne, 1989). Specifically, half of the participants were asked to memorize a 13-digit number and were told that they would need to recall the number at the end of the experiment session. The other half of the participants were not asked to perform this memory task. Afterwards, all participants were told that they would read a print advertisement for a fictitious brand of medicine, *Lipiter*. A pretest with 20 undergraduate students from the same subject pool suggested that none of the participants had heard of this brand name or similar brands. As in Experiment 1, expected fluency was manipulated by varying the product category. In *high-expected-fluency* conditions, participants were told that they would see an advertisement for a new brand of cold remedy. In *low-expected-fluency* conditions, participants were told that they would see an advertisement for a new brand of anticoagulant medicine. To manipulate experienced processing fluency, we varied the fonts used in the advertisements for product descriptions. In *high-experienced-fluency* conditions, we used the standard Times New Roman font in the advertisement (i.e., Times New Roman); whereas in *low-experienced-fluency* conditions, we used the Script MT Bold font (i.e., *Script MT Bold*), which has been used in previous research to induce difficulty in processing (e.g. Shen, Jiang, & Adaval, 2010). After seeing the advertisement, participants indicated their evaluation of the medicine on the same two scales as the ones used in Experiment 1 (1 = *bad/ineffective*; 9 = *good/effective*; $r = .67$). Finally, participants were debriefed and thanked.

Results and discussion

A 2 (expected fluency) × 2 (experienced fluency) × 2 (cognitive load) ANOVA on the evaluation index yielded a significant three-way interaction ($F_{(1,179)} = 9.23$, $p < .01$, $\eta_p^2 = .05$; see Fig. 2). Further analyses showed that for participants who were not under cognitive load, replicating the results from Experiment 1, there was a significant expected fluency × experienced fluency interaction ($F_{(1,179)} = 14.66$, $p < .001$, $\eta_p^2 = .08$). Specifically, when participants expected the message to be easy to process, they evaluated the medicine more favorably when the message was easy to process ($M = 6.28$, SD = .81) than when it was difficult to process ($M = 5.26$, SD = 1.18; $F_{(1,179)} = 11.30$, $p < .001$, $\eta_p^2 = .06$). Conversely, when participants expected the message to be difficult to process, the reverse was true ($M_{\text{easy-to-process}} = 5.56$, SD = 1.18 vs. $M_{\text{difficult-to-process}} = 6.24$, SD = .75; $F_{(1,179)} = 4.40$, $p < .05$, $\eta_p^2 = .02$). Neither the main effect of expected fluency nor that of experienced fluency was significant (Fs < 1).

Interestingly, however, for participants who were under cognitive load, there was only a significant main effect of experienced processing fluency such that participants evaluated the medicine more favorably when the message was easy to process ($M = 6.32$, SD = 1.43) than when it was difficult to process ($M = 5.69$, SD = 1.22; $F_{(1,179)} = 5.71$, $p < .05$, $\eta_p^2 = .03$). Neither the main effect of expected fluency nor the interaction was significant (Fs < 1). Consistent with our hypothesis, these results suggest that interpreting experienced fluency in terms of one's expected fluency requires cognitive resources. When people are under cognitive load, the effect of expected fluency is replaced by the effect of experienced fluency.

Experiment 3

The first two studies provided convergent support for our basic hypothesis. In Experiment 3, we examined the underpinnings of the observed effect. Roese and Sherman (2007) suggest that "the experience of expectancy confirmation may be seen as the cognitive equivalent of seafaring condition of 'situation normal'" (p. 100). In the present context, we propose that people may feel assured when their ease or difficulty of processing a message is consistent with their expectations. And this sense of assurance or a feeling-of-right may in turn have a positive impact on their evaluations (e.g., Cesario, Higgins, & Scholer, 2007; Cesario & Higgins, 2008). Experiment 3 thus examined the mediating role of this sense of assurance in the interactive effect between expected and experienced fluency observed in our earlier studies. To show robustness of the effect, we also introduced two changes in this experiment: First, we used a message related to a social policy as the

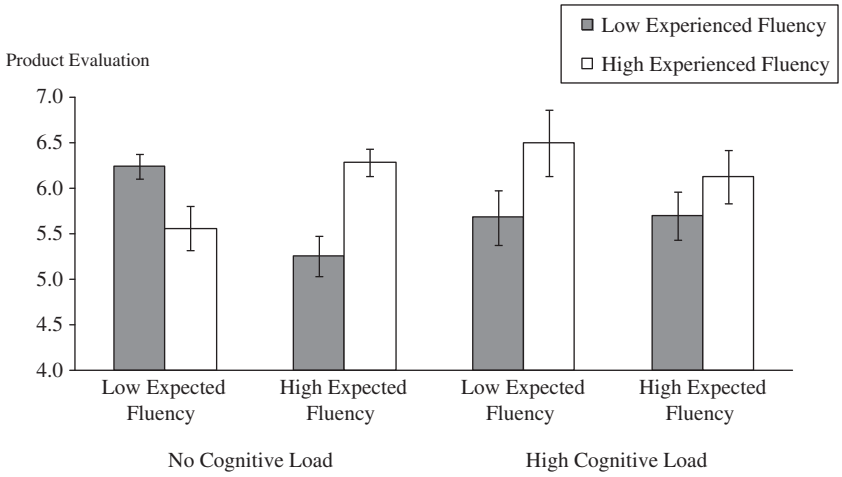

Fig. 2. Product evaluation as a function of expected fluency, experienced fluency, and cognitive load (Experiment 2).

stimulus information rather than an advertisement. Second, instead of manipulating expected processing fluency by varying product category, we measured participants' expectations of how easy or difficult it would be to process the message.

Method

Participants

Fifty-nine undergraduate students participated in the study for course credit. They were randomly assigned to one of the high or low experienced-fluency conditions.

Procedure

Participants were told that the study was on young citizens' opinions on various social policies. They were then shown a land development proposal for a remote area ostensibly proposed by the land planning office of the local government. As in Experiment 2, we manipulated experienced fluency of the message by varying the fonts in which the message was conveyed, using Times New Roman in high-fluency and *Script MT Bold* in low-fluency conditions.

After reading the land development proposal, participants were asked to evaluate it on four nine-point scales (1 = *not good/useful/beneficial/effective*; 9 = *very good/useful/beneficial/effective*). Responses along these scales ($\alpha = .93$) were averaged to provide a single index of policy evaluations. We then measured participants' sense of assurance while reading the proposal on two nine-point scales (1 = *not comfortable at all/did not feel right*; 9 = *very comfortable/felt right*), which was adopted from past research (Appelt & Higgins, 2010; Cesario & Higgins, 2008). Responses to these two items were averaged to form a sense-of-assurance index ($r = .86$). Finally, as a measure of expected processing fluency, participants were asked to recall how difficult they had expected the proposal to be prior to reading the proposal (1 = *difficult to read/understand*; 9 = *easy to read/understand*). Participants' answers to these questions ($r = .94$) were averaged to form an index of expected processing fluency.

Results and discussion

A regression analysis on participants' evaluations of the proposed policy as a function of experienced fluency, the continuous measure of expected fluency, and their interaction term yielded a significant interaction effect ($\beta = 0.30$, SE = .10, $t = 3.08$, $p < .01$). To interpret this interaction effect, we conducted a spotlight analysis at ± 1 SD from the mean of expected fluency (Preacher, Curran, & Bauer, 2006). The analysis showed that experienced fluency had a positive effect on policy evaluations when participants expected the proposal to be easy to process ($\beta = 0.56$, SE = .02, $t = 2.52$, $p < .05$); however, experienced fluency had a negative effect on evaluations when participants expected to have difficulty processing the message ($\beta = -0.60$, SE = .03, $t = -2.28$, $p < .05$). Again, consistent with our predictions, participants evaluated the policy more favorably when the experienced processing fluency conformed to their expected fluency in processing the information.

A regression analysis of participants' sense-of-assurance index as a function of expected fluency, experienced fluency, and their interaction revealed a similar interaction ($\beta = 0.48$, SE = .11, $t = 4.28$, $p < .001$). Moreover, a mediated moderation analysis (Muller, Judd, & Yzerbyt, 2005) revealed that when the sense-of-assurance index was introduced into the model as an additional predictor of policy evaluations, the interaction of expected fluency and experienced fluency was no longer significant ($\beta = 0.11$, SE = .10, $t = 1.08$, $p > .28$), while the effect of sense-of-assurance index was significant ($\beta = 0.39$, SE = .10, $t = 3.77$, $p < .001$). Bootstrapping analyses further confirmed the mediating role of sense-of-assurance in this mediated moderation. We constructed a 95% confidence interval (CI) for the indirect effect of sense-of-assurance using bootstrapping procedures (Preacher, Rucker, & Hayes, 2007). Zero fell outside this interval (95% CI: [0.0194, 0.1034]), which indicates that the indirect effect of sense-of-assurance was significant.

General discussion

In this research, we proposed that people's a priori expectations of how fluently incoming information will be processed play a key role in guiding the interpretation of the value of their subjective fluency experience. In three studies, we showed that when people's experienced processing fluency conformed (vs. did not conform) to their expected fluency, they evaluated the target more favorably, regardless of the level of actual processing fluency experienced (Experiments 1–3). Moreover, we showed that this effect of expected fluency only occurred when people had enough cognitive resources. When people were under cognitive load, however, the interactive effect between expected fluency and experienced fluency was replaced by only a positive effect of experienced fluency (Experiment 2). Finally, the interactive effect between expected fluency and experienced fluency was mediated by a sense of assurance when people's subjective fluency experience conformed to their expectations (Experiment 3).

Much of the past fluency research has documented a positive effect of fluency on evaluative judgment (e.g., Lee & Labroo, 2004). These

findings are interpreted in terms of an affective pathway such that the fluency experience spontaneously elicits positive affective reactions, which serve as the basis of judgment (Schwarz, 2010). It is possible that expected fluency also plays a role in some of these studies. As Schwarz (2004) suggested, people often have expectations regarding the ease or difficulty with which incoming stimulus will be processed. And expectations are sometimes held without any conscious awareness of their existence (Roese & Sherman, 2007). It seems likely that people in general expect incoming information to be processed rather fluently in familiar contexts. Therefore, difficult-to-process information may deviate from these a priori expectations and thus have a detrimental effect on evaluative judgments. Moreover, from the standpoint that the hedonic impact of fluency on evaluative judgment may present powerful biasing effects (Topolinski & Strack, 2010), past research has identified several strategies to prevent this unwanted influence, such as undermining the informational value of the fluency experience (Oppenheimer, 2005) or blocking stimulus-specific sensorimotor simulations which give rise to the fluency experience (Topolinski & Strack, 2010). Although interpreting the fluency experience in terms of one's expected fluency may itself be a bias, to the extent that people's a priori expectations of how fluently incoming information will be processed may have some ecological validity, our research suggests that highlighting people's expected fluency may be a potential alternative way of debiasing the hedonic impact of processing fluency on evaluative judgments.

Our findings are consistent with those of recent studies documenting that the value of the fluency experience is subject to people's interpretation of the nature of the experience (e.g., Briñol et al., 2006; Labroo & Kim, 2009). These studies have mostly examined how different naïve theories of information processing brought to mind by contextual cues guide people's interpretation of their fluency experience. Our research, however, focuses on examining the effect of people's a priori expectations about information processing. Although we only operationalized expected fluency through domain familiarity, the construct of expected fluency is more general and can potentially accommodate some of the past findings on the malleability of the value of processing fluency. For example, in pursuing an important goal, people usually expect to put in a lot of effort. Therefore, their a priori expectations of the goal pursuit process should be a disfluent experience rather than a fluent one. Indeed, Labroo and Kim (2009) found that objects associated with low processing fluency during a goal pursuit are more desirable.

Our research also adds to past work on expected fluency. Past research has made a distinction between two different types of expected fluency in the extant literature (Dechêne, Stahl, Hansen, & Wänke, 2010). One type of expected fluency is context-based expected fluency, that is, fluency expectation generated on the fly from external stimuli. In this type of expected fluency, expectancy is established through the level of fluency experience from the preceding stimuli. Past research has examined the impact of this context-based expected fluency (e.g., Hansen, Dechêne, & Wänke, 2008; Labroo & Kim, 2009; Hansen & Wänke, 2013; Shen et al., 2010; Whittlesea, 1993; Whittlesea & Williams, 1998, 2000). For example, research on truth judgment has shown that a statement is judged as more probably true when it is processed fluently (e.g., shown on the computer screen with a high color contrast). However, this truth effect happened only when the perceptual fluency of this statement deviated from people's expected fluency formed based on the fluency level of the recently encountered stimuli (i.e., when the statement is preceded by a less fluent statement, Hansen et al., 2008). Another type of expected fluency, however, is generated internally. For example, fluency expectancy may be formed based on one's knowledge or expertise in a particular domain. Despite the increasing understanding of how context-based expected fluency influences judgment, relatively less is known about the latter type of expectancy. The current research filled this gap by examining the impact of people's *a priori expectation* based on their familiarity or expertise in a domain.

Finally, our research contributes to the dual-pathway model of the influence of processing fluency on judgment (Schwarz, 2010) by being one of the first to examine the relationship between the two pathways. Processing fluency can exert its influence on judgment through two pathways: One is through the spontaneous positive affective reaction elicited by the fluency experience, and the other is through more malleable contextual interpretation of the fluency experience. Yet it remains unclear when each pathway comes into play. Our research provides an initial answer to this question by showing that the effect of expected fluency disappeared and only a positive effect of experienced processing fluency on judgment was observed when people were under cognitive load. This finding seems to suggest that the second pathway is a more deliberate process and requires cognitive resources, whereas the first pathway is more automatic. More systematic examination of the relationship between these two pathways awaits future research.

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