

Research Report

If It's Difficult to Pronounce, It Must Be Risky

Fluency, Familiarity, and Risk Perception

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ABSTRACT—*Low processing fluency fosters the impression that a stimulus is unfamiliar, which in turn results in perceptions of higher risk, independent of whether the risk is desirable or undesirable. In Studies 1 and 2, ostensible food additives were rated as more harmful when their names were difficult to pronounce than when their names were easy to pronounce; mediation analyses indicated that this effect was mediated by the perceived novelty of the substance. In Study 3, amusement-park rides were rated as more likely to make one sick (an undesirable risk) and also as more exciting and adventurous (a desirable risk) when their names were difficult to pronounce than when their names were easy to pronounce.*

Guided by expected-utility theory, researchers have often assumed that risk perception is an analytic procedure: people presumably assess the severity and likelihood of possible outcomes and integrate this information through an expectation-based calculus (for a review, see Harless & Camerer, 1994). However, the observation that subjective perceptions of risk are insensitive to changes in probability (e.g., Kahneman & Ritov, 1994; Kahneman, Ritov, & Schkade, 1999) challenged this assumption. Accordingly, recent research conceptualized lay risk judgment as an intuitive rather than an analytic process and emphasized the role of feelings—like worry, fear, dread, and anxiety—in risk perception (for reviews, see Loewenstein, Weber, Hsee, & Welch, 2001; Slovic, Finucane, Peters, & MacGregor, 2004). The present research contributes to this “risk as feeling” approach (Loewenstein et al., 2001) by exploring the role of a previously neglected experiential variable, namely, the fluency with which a stimulus can be processed. As

reviewed below, fluently processed stimuli are judged as more familiar and elicit a more positive affective response than disfluently processed stimuli (for a review, see Schwarz, 2004). Both familiarity and affect are assumed to be involved in intuitive judgments of risk.

In an influential series of studies, Zajonc (1968) observed that liking for a neutral stimulus increases with the frequency of exposure. He suggested that people prefer previously seen, familiar stimuli over novel ones because novel stimuli are associated with uncertainty, whereas familiar stimuli are considered safe, at least in the absence of negative memories (Zajonc, 1980, 1998). Consistent with the hypothesized familiarity-safety association, the perceived risks of technologies (e.g., Richardson, Sorenson, & Soderstrom, 1987), investments (e.g., Weber, Siebenmorgen, & Weber, 2005), and leisure activities (e.g., Zuckerman, 1979) have been found to decrease as their familiarity increases. Unfortunately, the role of familiarity, per se, is difficult to isolate in such studies, and the observed effects may instead reflect differences in knowledge and previous experience or desensitization to the threat. To avoid these ambiguities, the present studies presented only novel stimuli and manipulated their perceived familiarity through manipulations of processing fluency.

Because familiar material is easier to process than novel material, people (erroneously) infer familiarity from ease of processing, even when fluent processing is merely due to presentation variables like exposure duration, high figure-ground contrast, or an easy-to-read print font (for reviews, see Alter & Oppenheimer, 2008; Reber, Schwarz, & Winkielman, 2004). In cognitive research, this fluency-familiarity link gives rise to erroneous recognition judgments for perceptually easy-to-process stimuli (e.g., Whittlesea, Jacoby, & Girard, 1990) and to strong feelings of knowing (e.g., Koriart & Levy-Sadot, 2001). In social psychological research, fluent processing of a statement results in the impression that one has heard it before, suggesting that the opinion is popular (e.g., Weaver, Garcia, Schwarz, & Miller, 2007) and increasing the likelihood that the statement is accepted as true (e.g., Reber & Schwarz, 1999). If the

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apparent familiarity of a stimulus plays a prominent role in intuitive judgments of risk, novel stimuli should therefore be perceived as less risky when they are easy rather than difficult to process.

Numerous variables, from figure-ground contrast and the readability of print fonts to the ease with which a name can be pronounced, can influence processing fluency and have been found to exert comparable effects on a wide variety of judgments (for reviews, see Alter & Oppenheimer, 2008; Reber et al., 2004). The present studies used ease of pronunciation as a fluency manipulation. We found that ostensible food additives were rated as more harmful (Study 1) when their names were difficult rather than easy to pronounce and that this effect was mediated by the perceived familiarity of the stimuli (Study 2).

However, previous research also showed that high fluency is experienced as pleasant and elicits a low-level affective response, as indicated by increased activation of zygomaticus major, the muscle involved in smiling (Winkielman & Cacioppo, 2001). This positive affective response may further contribute to evaluations of fluently processed stimuli as less risky. We addressed this possibility by assessing the impact of processing fluency on evaluations of risks with a positive or negative connotation. As indicated by a large body of research, positive affect elicits more favorable evaluations than negative affect (see Schwarz & Clore, 2007, for a review). If fluency effects on intuitive judgments of risk are driven by the affect associated with fluent processing, low processing fluency should therefore result in more negative evaluations, and high processing fluency should result in more positive evaluations, independent of the positive or negative connotations of a given risk. We found no support for this prediction (Study 3); instead, stimuli with difficult-to-pronounce names were rated as more risky, independent of valence.

STUDIES 1 AND 2

Studies 1 and 2 provide a first test of the hypothesis that people perceive fluently processed stimuli as safer than disfluently processed ones. Specifically, we asked participants to rate the harm of ostensible food additives with easy-to-pronounce or difficult-to-pronounce names.

Method

Pretest

Pretest participants ($N = 15$) rated the ease with which the names of 16 ostensible food additives could be pronounced (1 = *very difficult*, 7 = *very easy*). All names were composed of 12 letters, and the 5 easiest (e.g., Magnalroxate; $\alpha = .7$, $M = 5.04$, $SD = 0.88$) and most difficult (e.g., Hnegripitrom; $\alpha = .71$, $M = 2.15$, $SD = 0.7$) names were selected as stimuli; the difference in ease of pronunciation was significant, $t(14) = 11.91$, $p < .001$, $p_{\text{rep}} = 1$, $d = 4.4$.

Participants and Procedure

Study 1. Twenty students participated for course credit. They were instructed to imagine that they were reading food labels

and asked to judge the hazard posed by different food additives (1 = *very safe*, 7 = *very harmful*). Five easy-to-pronounce and five difficult-to-pronounce names were presented in two random orders. Presentation order did not affect the results (all $ps > .13$) and was dropped from analysis.

Study 2. Fifteen students participated for course credit. The procedure was identical to Study 1 except that participants rated the novelty (1 = *very old*, 7 = *very new*) as well as hazardousness (1 = *very safe*, 7 = *very harmful*) of each substance, in counterbalanced order. The order in which substances were presented did not affect the results (all $ps > .13$) and was dropped from analysis.

Results

Perceived Hazard

As predicted, participants in Study 1 rated substances with hard-to-pronounce names ($M = 4.12$, $SD = 0.78$) as more harmful than substances with easy-to-pronounce names ($M = 3.7$, $SD = 0.74$), $t(19) = 2.41$, $p < .03$, $p_{\text{rep}} = .92$, $d = 0.75$. Study 2 replicated this finding with mean hazardousness ratings of 4.76 ($SD = 0.64$) for hard-to-pronounce and 3.68 ($SD = 0.65$) for easy-to-pronounce substances, $t(14) = 5.46$, $p < .001$, $p_{\text{rep}} = 1$, $d = 2$. The order of the hazardousness and novelty ratings did not affect these results (all $ps > .3$).

Perceived Novelty

Participants in Study 2 further rated the substances as more novel when their names were difficult ($M = 4.72$) rather than easy to pronounce ($M = 3.69$), $F(1, 13) = 28.21$, $p < .001$, $p_{\text{rep}} = 1$, $\eta_p^2 = .685$. Fluency had a significant main effect for both question orders, but a greater effect when the novelty questions preceded the hazardousness questions ($M_s = 5.14$ vs. 3.51 , $SD_s = 0.38$ and 0.89), $t(6) = 4.72$, $p < .01$, $p_{\text{rep}} = .97$, $d = 2.77$, than when hazardousness questions preceded novelty questions ($M_s = 4.35$ vs. 3.85 , $SD_s = 1.17$ and 0.89), $t(7) = 2.24$, $p = .06$, $p_{\text{rep}} = .86$, $d = 1.21$. The interaction of question order and pronunciation difficulty was significant, $F(1, 13) = 7.93$, $p < .02$, $p_{\text{rep}} = .94$, $\eta_p^2 = .379$.

Mediation

To assess whether the influence of fluency on risk judgments is mediated by perceived familiarity, we conducted a test of moderated mediation (Muller, Judd, & Yzerbyt, 2005) that takes the observed interaction of question order and pronunciation difficulty on novelty ratings in Study 2 into account. Two criteria need to be met to warrant a test of moderated mediation. First, there should be a significant effect of the treatment on the outcome variable, which does not depend on the moderator. As shown in the results of Study 2, fluency had a significant effect on hazardousness ratings that was not moderated by question order, meeting the first criterion. Second, the effect of the treatment on

the mediator, the partial effect of the mediator on the outcome variable, or both should depend on the moderator. As shown in the results of Study 2, fluency had a significant effect on novelty ratings and this effect was moderated by question order, meeting the second criterion. When the treatment effect on the mediator is moderated, mediation is established if there is a significant partial effect of the mediator on the dependent variable, controlling for the moderator. To test this possibility, the hazard-ousness ratings were regressed on fluency, novelty, question order, and the fluency-order and novelty-order interactions. This analysis revealed a significant direct effect of novelty on harm ratings, $\beta = .4$, $F(1, 24) = 6.76$, $p = .016$, meeting the requirements of mediation. In addition, the residual direct effect of fluency on harm ratings remained significant in this regression, $\beta = -.29$, $F(1, 18.06) = 4.8$, $p = .042$, which indicates that the effect of fluency on harm ratings was partially mediated by novelty. No other terms related to question order were significant predictors of harm ratings, all F s < 1 .

Discussion

In sum, these findings indicate that disfluently processed stimuli are perceived as more novel and more hazardous than fluently processed stimuli. Moreover, the impact of fluency on perceived risk is partially mediated by perceived novelty. Although these findings indicate that processing fluency can influence judgments of risk through their impact on perceived stimulus familiarity, the partial mediation leaves room for a possible contribution of fluency-elicited affect. Previous research has shown that high processing fluency is experienced as positive (Reber et al., 2004) and gives rise to spontaneous positive affective reactions that can be captured with electromyography (Winkielman & Cacioppo, 2001). Positive affect consistently results in more positive evaluations (for a review, see Schwarz & Clore, 2007). Accordingly, it should attenuate judgments of undesirable risks but increase judgments of desirable risks. Study 3 tested this possibility.

STUDY 3

Amusement-park rides offer a desirable sense of adventure and excitement but are also associated with the undesirable possibility of making one feel sick. Taking advantage of this ambiguity, we presented participants with easy- or difficult-to-pronounce names of amusement-park rides, asking some of them to identify rides that are adventurous and exciting and others to identify rides that are too risky, and hence likely to make them feel sick. If fluency-elicited affect is a major contributor to risk perception, it should result in differential effects on judgments of desirable and undesirable risks. No such differential effects should be observed if fluency effects on risk perception are primarily driven by perceived familiarity.

Method

Pretest

Based on pretest ratings ($N = 15$) of 20 Native American names, we selected 3 easy-to-pronounce names (Chunta, Ohanzee, and Tihkoosue) and 3 hard-to-pronounce names (Vaiveahtoishi, Tsiischili, and Heammawihio). The easy names ($\alpha = .6$, $M = 4.91$; 1 = *very difficult*, 7 = *very easy*) were significantly easier to pronounce than the hard names ($\alpha = .8$, $M = 3.13$), $t(14) = 3.04$, $p < .01$, $p_{\text{rep}} = .95$, $d = 1.4$. In addition, the easy names ($\alpha = .61$, $M = 4.45$; 1 = *very unpleasant*, 7 = *very pleasant*) were rated as more pleasant than hard names ($\alpha = .80$, $M = 3.67$), $t(13) = 3.03$, $p < .01$, $p_{\text{rep}} = .95$, $d = 1.17$, consistent with the usually observed positive effect of fluency on liking (Reber et al., 2004).

Participants and Procedure

Thirty-five students participated for course credit and were randomly assigned to the conditions of a 2 (easy- vs. difficult-to-pronounce names) $\times$ 2 (desirable vs. undesirable risk) factorial design.

All participants were asked to imagine that they were visiting an amusement park and were handed a brochure with the names of the rides offered. Participants assigned to the desirable-risk condition further imagined that they wanted to identify “very exciting and adventurous rides” on the basis of the brochure so they would not “waste time on dull ones.” Next, they were asked to report their “impression of how adventurous each ride would be” (1 = *very dull*, 7 = *very adventurous*). In contrast, participants assigned to the undesirable-risk condition were asked to imagine that their amusement-park visit fell on “a day when you are not feeling very well” and that they wanted to avoid the rides that “are too risky and adventurous” and guess which ones “are the most risky and hence most likely to make you sick.” Next, they rated the risk associated with each ride (1 = *very safe*, 7 = *very risky*).

In both conditions, the three easy-to-pronounce and three difficult-to-pronounce names were presented in two random orders. Order of presentation did not affect the results (all F s < 1) and was dropped from analysis.

Results and Discussion

Consistent with the participants in Studies 1 and 2, participants assigned to the undesirable-risk condition perceived rides with difficult-to-pronounce names as riskier ($M = 4.35$) than rides with easy-to-pronounce names ($M = 3.02$), $t(18) = 4.36$, $p < .001$, $p_{\text{rep}} = .99$, $d = 1.48$. Similarly, participants assigned to the desirable-risk condition perceived rides with difficult-to-pronounce names as less dull and more adventurous ($M = 4.04$) than rides with easy-to-pronounce names ($M = 3.06$), $t(15) = 2.94$, $p = .01$, $p_{\text{rep}} = .95$, $d = 1.08$. These parallel effects of processing fluency on perceptions of desirable and undesirable risk were reflected in a main effect of ease of pronunciation, $F(1, 33) = 26.18$, $p < .001$, $p_{\text{rep}} = 1$, $\eta_p^2 = .442$, that was not qualified by an interaction

TABLE 1
Mean Perceived Level of Desirable and Undesirable Risks Associated With Easy- and Difficult-to-Pronounce Amusement-Park Ride Names (Study 3)

Difficulty of name	Risk	
	Desirable (excitement and adventure)	Undesirable (sickness)
Easy to pronounce	3.06 (1.02)	3.02 (0.98)
Hard to pronounce	4.04 (1.47)	4.35 (1.46)

Note. Standard deviations are given in parentheses.

with the desirability of the rated risk, $F(1, 33) = .61, p = .44, p_{\text{rep}} = .42, \eta_p^2 = .018$. The results are presented in Table 1.

In sum, low processing fluency increased perceptions of desirable as well as undesirable risks. This pattern is compatible with the assumption that fluency influences risk perception through its effects on the perceived novelty of the stimuli (Study 2) and is difficult to reconcile with the assumption that fluency-elicited affect plays a major role in the observed results.

GENERAL DISCUSSION

The present results consistently show that people perceive disfluently processed stimuli as riskier than fluently processed stimuli. This observation holds for undesirable risks, like the hazards imposed by food additives (Studies 1 and 2) or the risk of getting sick on an amusement-park ride (Study 3), as well as desirable risks, like the ride's adventurousness. Throughout, the observed effects are consistent with the assumption that the perceived familiarity or novelty of a stimulus can serve as a heuristic cue in intuitive judgments of risk, as indicated by mediation analyses (Study 2).

Although it has long been assumed that the frequently observed preference for fluent and familiar stimuli over disfluent and unfamiliar ones reflects that familiarity indicates safety (e.g., Zajonc, 1980, 1998), direct support for this assumption has been lacking. The present studies fill this gap, using domains in which risk perception plays an important role in everyday life, namely, the safety of food additives and the adventurousness of entertainment activities. Our findings further suggest that risk perception is likely to be affected by any of the numerous variables known to influence processing fluency, from visual presentation characteristics to conceptually related semantic primes (for reviews, see Alter & Oppenheimer, 2008; Reber et al., 2004). From an applied perspective, our findings suggest that fluency manipulations may offer a promising avenue for the management of perceived risk. For example, disfluent product names may alert consumers to the risks posed by potentially hazardous products, possibly motivating them to pay closer attention to warnings and instructions.

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(RECEIVED 11/5/07; REVISION ACCEPTED 7/29/08)