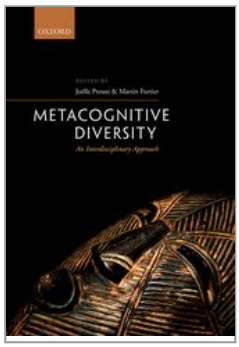

Metacognitive Diversity: An Interdisciplinary Approach
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Print publication date: 2018
Print ISBN-13: 9780198789710
Published to Oxford Scholarship Online: May 2018
DOI: 10.1093/oso/9780198789710.001.0001

Of fluency, beauty, and truth

Inferences from metacognitive experiences

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DOI:10.1093/oso/9780198789710.003.0002

Abstract and Keywords

To evaluate whether a claim is likely to be true, people attend to whether it is compatible with other things they know, internally consistent and plausible, supported by evidence, accepted by others, and offered by a credible source. Each criterion can be evaluated by drawing on relevant details (an effortful analytic strategy) or by attending to the ease with which the claim can be processed (a less effortful intuitive strategy). Easy processing favors acceptance under all criteria—when thoughts flow smoothly, people nod along. Ease of processing is also central to aesthetic appeal, and easily processed materials are evaluated as prettier. This sheds new light on why beauty and truth are often seen as related, by poets and scientists alike. Because people are more sensitive to their feelings than to where these feelings come from, numerous incidental variables can influence perceived beauty and truth by influencing the perceiver's processing experience.

Keywords: beauty, truth, fluency, accessibility, metacognitive experience, mere exposure, feelings as information

Introduction

Poets and scientists alike often assume that beauty and truth are two sides of the same coin. From John Keats's (1820) assertion that "beauty is truth, truth beauty" to Richard Feynman's (1981) belief that "you can recognize truth by its beauty and simplicity," beauty has often been offered as a heuristic for assessing truth. Although history abounds with beautiful lies and elegant theories that

nevertheless turned out to be wrong, the intuition holds considerable appeal. This appeal most likely reflects the fact that judgments of beauty and judgments of truth share a common characteristic: people make them, in part, by attending to the dynamics of their own information processing. When an object is easy to perceive, people evaluate it as more beautiful than when it is difficult to perceive; similarly, when a statement is easy to process, people are more likely to accept it as true than when it is difficult to process. Psychologists refer to the ease or difficulty of information processing as "processing fluency." Its shared role in judgments of beauty and truth renders it likely that we find the same stimulus beautiful as well as true, even when the processing experience is solely due to incidental influences.

Using beauty and truth as examples, I address in this chapter the role of metacognitive experiences in human judgment. The first section introduces the concept of processing fluency and discusses the conditions under which people do, or do not, rely on their metacognitive experiences as a source of information. The second section reviews key findings pertaining to judgments of truth, and the third section does so for beauty. In both domains, experimental research has identified processing fluency as the shared experience underlying the influence of a diverse set of variables and identified moderators that attenuate or enhance its impact. I conclude with a summary of the key lessons learned and their implications for the relationship between judgments of beauty and judgments of truth.

Metacognitive experiences: the feeling of thinking

Thinking is accompanied by a variety of subjective experiences, from incidental bodily sensations to affective responses to thought content. Other experiences arise from the **(p.26)** operation of mental procedures. An object may be easy or difficult to see or to recognize; the logical flow of a message may be easy or difficult to follow; and information about some target may easily "pop into mind" or may only be retrieved after an effortful search. At the most basic level, such metacognitive experiences convey that what one does is easy or difficult. This information is often useful and provides an experiential proxy for more demanding analyses. As any learner knows, familiar material is indeed easier to process than novel material, which makes ease of processing a potentially useful input for a large number of tasks, from deciding whether one has seen the object before (Whittlesea, 2002) to estimating the frequency of an event (Tversky & Kahneman, 1973) or the popularity of an opinion (Weaver, Garcia, Schwarz & Miller, 2007). Similarly, material that is internally coherent (Johnson-Laird, 2012) and compatible with one's beliefs (Winkielman et al., 2012) is easier to process than material that is internally contradictory or at odds with other things one knows, making ease of processing a potentially useful input for evaluating aspects of argument quality.

In addition, easy processing is experienced as more pleasant than difficult processing and elicits a spontaneous positive affective response that is reflected in self-reported momentary feelings (Monahan, Murphy & Zajonc, 2000) and increased zygomaticus activity (Winkielman & Cacioppo, 2001; for a review, see Winkielman, Schwarz, Fazendeiro & Reber, 2003). Both the metacognitive experience of easy or difficult processing and the accompanying affective response provide experiential information that people can draw on in making a wide variety of judgments.

Sensitivity to the feeling but not to its source

Because thinking can be easy or difficult for many reasons, it is often unclear why a given metacognitive experience arises. For example, a text may be difficult to follow because the reader is tired and distracted, because the lighting is poor, or because the arguments are incoherent. Empirically, many studies show that people are very sensitive to their experience of ease or difficulty, but insensitive to its source. They infer, for example, that an exercise routine will be difficult and demanding when the print font of the instructions is difficult to read, but are happy to try the exercise when the print font is easy to read (Song & Schwarz, 2008a). Here, people mistake the difficulty of reading as indicative of the difficulty of doing. Empirically, many incidental variables can influence how easy or difficult a mental operation feels, with downstream consequences for related judgments and decisions (for reviews of relevant variables, see Alter & Oppenheimer, 2009; Reber, Schwarz & Winkielman, 2004).

Visual and auditory variables can influence the speed and accuracy of low-level processes concerned with the identification of the physical identity and form of a stimulus. Examples include figure–ground contrast (e.g., Reber & Schwarz, 1999); the readability of a print font (e.g., Song & Schwarz, 2008a,b) or handwriting (e.g., Greifeneder et al., 2010); the familiarity of a speaker’s accent (Levy-Ari & Keysar, 2010); or the duration of stimulus presentation (e.g., Whittlesea, Jacoby & Girard, 1990). The associated metacognitive experience is often referred to as perceptual fluency (Jacoby, Kelley & Dywan, 1989). Other variables influence **(p.27)** the speed and accuracy of high-level processes concerned with the identification of stimulus meaning and its relation to semantic knowledge structures. Examples include the complexity of a message (e.g., Lowrey, 1998), its consistency with its context (e.g., Masson & Caldwell, 1998), or the availability of knowledge that facilitates its processing (e.g., Reder, 1987). The associated metacognitive experience of ease or difficulty is often referred to as conceptual fluency (Whittlesea, 1993). How fluently a stimulus can be processed is also profoundly influenced by the perceiver’s personal exposure history. Consistent with principles of knowledge accessibility (Higgins, 1996), recent or frequent exposure to a stimulus facilitates perceptual as well as conceptual processing, as does exposure to related material.

While perceptual and conceptual fluency have received most attention, there are many other variables that can elicit the experience of ease or difficulty. Some words are harder to pronounce than others (e.g., Song & Schwarz, 2009), writing feels more difficult when using one's nondominant hand (Briñol & Petty, 2003), and tensing the corrugator during task performance makes anything seem harder, from recalling examples of one's own behavior (e.g., Stepper & Strack, 1993) to generating arguments (e.g., Sanna, Schwarz & Small, 2002) and recognizing names (e.g., Strack & Neumann, 2000). Throughout, these diverse manipulations have similar effects, which reflects the fact that different sources of (dis)fluency result in similar phenomenal experiences.

Finally, people are more sensitive to changes in sensory input than to stable states, as has been known since the early days of perception research (for a review, see Berelson & Steiner, 1964); they also consider changes more informative, consistent with the covariation principle of attribution research (Kelley, 1972). Accordingly, metacognitive experiences are more influential when people experience *changes* in fluency, for example, when one target is more fluently processed than another. This makes within-participant manipulations, where fluency changes from one stimulus to the next, more powerful than between-participant manipulations, where some participants are exposed to easy-to-process and others to difficult-to-process material (for a meta-analysis, see Dechêne, Stahl, Hansen & Wänke, 2010).

Making sense of the experience: the role of metacognitive knowledge

How people interpret a given metacognitive experience, and what they infer from it, depends on which of many potentially applicable lay theories of mental processes they apply. Psychologists refer to these lay theories as metacognitive knowledge. Consistent with the pragmatic (James, 1890) and situated (Smith & Semin, 2004) nature of cognition, an applicable lay theory is usually brought to mind by the task at hand and allows the person to arrive at an answer that seems "obvious" in context (Schwarz, 2004, 2010). Other potentially applicable theories receive little attention, consistent with the general observation that information search is truncated once a satisfying explanation has been generated (Einhorn & Hogarth, 1986; Wyer, 1974)—yet, one of those neglected lay theories might have driven the person's inferences had it come to mind first. This renders inferences from metacognitive experiences highly malleable, as some examples may illustrate.

(p.28) People correctly assume that familiar (previously seen) material is easier to process than novel material. Hence, they erroneously "recognize" a novel stimulus as one they have previously seen whenever the stimulus is easy to process, even when this ease results solely from other variables, such as the clarity or duration of the stimulus presentation (Whittlesea, Jacoby & Girard, 1990). Conversely, people also correctly assume that it is easier to perceive a stimulus that is shown with high rather than low clarity or for a long rather than

short time. Hence, they erroneously infer higher clarity or longer duration when the stimulus is easy to process due to previous exposure (e.g., Witherspoon & Allan, 1985; Whittlesea et al., 1990). Thus, fluency due to visual presentation variables can result in “illusions of memory,” just as fluency due to memory variables can result in “illusions of perception” (for a review, see Kelley & Rhodes, 2002). In both cases, an applicable lay theory of mental processes is brought to mind by the respective memory (Have you seen this before?) or perception (For how long has this been shown?) task and applied to the experience of the moment, with little sensitivity to the actual source of that experience.

This malleability of metacognitive inferences is at the heart of the pervasive influence of fluency experiences across many domains of judgment. It results from three characteristics. First, different manipulations of fluency induce similar subjective experiences that do not carry salient markers of their source. Second, people hold a wide range of lay theories about mental processes, which can provide a multitude of explanations for why a given operation may feel easy or difficult. Third, these theories are recruited in a context-sensitive manner, which privileges theories that are applicable to the task at hand. This allows the same subjective experience of ease or difficulty to inform a wide range of different judgments, with sometimes opposite implications (Schwarz, 2002).

Perceived informational value of feelings

How people use metacognitive experiences in forming judgments follows the logic of feelings-as-information theory (for a review, see Schwarz, 2012), which was initially developed to account for mood effects in evaluative judgment (Schwarz & Clore, 1983). The theory assumes that people attend to their feelings (including metacognitive experiences, moods, emotions, and bodily sensations) as a source of information, which they use like any other information. The impact of a given feeling increases with its perceived relevance to the task at hand and decreases with the accessibility and consideration of alternative diagnostic inputs, which is a function of processing motivation and capacity (for a review, see Greifeneder, Bless & Pham, 2011). What people conclude from a given feeling depends on the epistemic question on which they bring it to bear and the lay theory they apply.

Whenever a feeling is attributed to a source that is irrelevant to the task at hand, its informational value is undermined and the otherwise observed influence eliminated. For example, realizing that a text is difficult to process because the print font is hard to read (Novemsky, Dhar, Schwarz & Simonson, 2007) eliminates the influence of processing fluency on judgments of the target, just as attributing one’s bad mood to rainy weather **(p.29)** eliminates mood effects on unrelated judgments (Schwarz & Clore, 1983). Conversely, experiencing a feeling despite opposing influences increases its perceived informational value; for example, finding recall easy despite allegedly distracting

music enhances the impact of the accessibility experience (Schwarz, Bless, Strack, Klumpp, Rittenauer-Schatka & Simons, 1991). Thus, discounting as well as augmentation effects (Kelley, 1972) are obtained, as is the case for the use of any other information.

Next, I turn to the operation of these processes in judgments of truth and judgments of beauty. These judgment tasks draw attention to different components of the fluency experience. As noted, fluent processing feels good and elicits a positive affective response. This fluency–affect link is key to the experience of aesthetic pleasure. However, fluent processing also lends itself to many other inferences about the content of one's thoughts, and these loom large in judgments of truth. Nevertheless, both classes of judgment show very similar patterns, because both draw on the same experiential input—the phenomenal experience of fluent processing.

Fluency and truth

For millennia, demagogues of all stripes have known that apparent truth can be created through frequent repetition of a lie—in Hitler's words, "Propaganda must confine itself to a few points and repeat them over and over again" (cited in Toland, 1976, p. 221). Empirical research supports this insight. Studying wartime rumors, Allport and Lepkin (1945) observed that the best predictor of whether people believed a rumor was the number of times they were exposed to it. Taking this observation to the laboratory, Hasher and colleagues (1977) asked participants to rate their confidence that each of 60 statements was true or false. Some statements were factually correct (e.g., "Lithium is the lightest of all metals") and others were not (e.g., "The People's Republic of China was founded in 1947"). Participants provided their ratings on three occasions, each two weeks apart. Across these sessions, some statements were repeated once or twice, whereas others were not, resulting in one, two, or three exposures. As expected, participants were more confident that a given statement was true the more often they had seen it; this pattern held for factually true and factually false statements. Numerous follow-up studies confirmed these observations across different content domains, from trivia statements (e.g., Bacon, 1979) to marketing claims (e.g., Hawkins & Hoch, 1992) and political beliefs (e.g., Arkes, Hackett & Boehm, 1989), and with the time delay between exposures ranging from minutes (e.g., Begg & Armour, 1991) to months (Brown & Nix, 1996). As Hasher and colleagues (1977, p. 107) concluded, "frequency of occurrence is apparently a criterion used to establish the referential validity of plausible statements."

However, frequency per se may not be the crucial variable. From a broader perspective, the frequency with which a statement has been encountered in the past is just one of many variables that may facilitate fluent processing of the same or similar statements in the future. Indeed, Begg, Armour and Kerr (1985) reported that merely exposing participants to a topic (e.g., "A hen's body

temperature") increased endorsement of a later specific assertion **(p.30)** (e.g., "The temperature of a hen's body is about 104F"). Presumably, the earlier exposure to the obscure topic facilitated later processing of the specific claim. If so, any variable that increases the ease with which a statement can be processed should also increase the likelihood that the statement is accepted as true. To test this possibility, Reber and Schwarz (1999) manipulated the ease of reading through the color contrast of the print font. Depending on condition, some statements (e.g., "Orsono is a city in Chile") were easy to read due to high color contrast (e.g., dark blue print on a white background), whereas others were difficult to read due to low color contrast (e.g., light blue print on a white background). As predicted by a fluency account, the same statement was more likely to be judged true when it was easy rather than difficult to read. Other variables that make material easy or difficult to process have parallel effects. For example, substantively equivalent statements seem more true when they rhyme than when they don't (McGlone & Tofighbakhsh, 2000) and when the speaker's accent is easy rather than difficult to understand (Levy-Ari & Keysar, 2010).

Even a picture without any probative value can increase acceptance of a statement, provided that it makes it easier to imagine what the statement is about. For example, Newman and colleagues (2012) asked some participants whether it is true that Nick Cave, the singer of an Australian rock band, "is alive" and others whether it is true that he "is dead." Both statements were more likely to be endorsed as true when they were accompanied by the same portrait of Nick Cave, making it easier to understand who the statement was about. In short, fluent processing can facilitate acceptance of an assertion as well as acceptance of its opposite (if asserted).

Clearly, incidental variables like color contrast, print font, rhyme, or the presence of a picture that lacks probative value should not influence judgments of truth. Nevertheless, their influence is reliable and often sizeable. To understand the mental processes underlying these observations, we need to consider how people judge truth.

Analytic and intuitive assessments of truth

When people evaluate the likely truth value of some piece of information they attend to a limited set of criteria, usually a subset of what might be considered the "Big Five" of truth assessment (Schwarz, 2015). Each of these criteria can be evaluated analytically, by drawing on relevant declarative information, or intuitively, by drawing on applicable experiential information. Analytic processing, also referred to as "system 2" processing in a language introduced by Stanovich (1999) and popularized by Kahneman (2011), is slow and effortful and requires time and motivation. In contrast, intuitive or "system 1" processing is faster and less effortful; it is the likely processing style in the absence of cues that indicate a need to pay close attention. As will become apparent, when

thoughts flow smoothly, intuitive processing dominates and leads us to nod along under all criteria commonly applied to truth assessment.

Do others believe this?

One criterion is social consensus—if many people believe it, there's probably something to it (Festinger, 1954). Accordingly, people are more confident in their beliefs when they **(p.31)** are shared by others (e.g., Newcomb, 1943; Visser & Mirabile, 2004), are more likely to endorse a message when many others have done so before them (Cialdini, 2009), and trust their memories of an event more when others remember it in similar ways (e.g., Ross, Buehler & Karr, 1998). Conversely, perceiving dissent reliably undermines message acceptance, which makes reports of real or fabricated controversies an efficient strategy for swaying public opinion (Lewandowsky, Ecker, Seifert, Schwarz & Cook, 2012).

To assess the extent of consensus, people can draw on declarative information by consulting survey data or asking their friends, potentially weighting their friends' opinions by their expertise. Alternatively, they may simply rely on how "familiar" a claim feels. Because one is more frequently exposed to widely shared beliefs than to highly idiosyncratic ones, the apparent familiarity of a belief provides a (fallible) experiential indicator of its popularity. Accordingly, the mere repetition of a belief can increase perceived social consensus even when all repetitions come from the same single source. For example, Weaver, Garcia, Schwarz, and Miller (2007) had participants watch a video recording of a group discussion in which a given opinion was uttered once or thrice. Not surprisingly, participants assumed that more people share the opinion when they heard it three times from three different speakers (72%) than when they heard it only once (57%). However, hearing the opinion three times from the *same* single speaker was almost as influential, resulting in a consensus estimate of 67%—apparently, the single repetitive voice sounded like a chorus. Even reading an identical email three times rather than only once can increase later estimates of how many people would agree with its content (Weaver et al., 2007; for a conceptual replication, see Foster et al., 2012). If these differences in perceived consensus result from differences in processing fluency, they should increase with the ease with which the previously seen or heard opinion statement can be processed. Mediation analyses confirmed this prediction. Participants who heard the message several times showed higher accessibility of message content in a lexical decision task, and this measure of accessibility predicted their consensus estimate (Weaver et al., 2007).

Is it compatible with other things I know?

A second criterion is whether the claim is consistent with other things one believes. This can be assessed analytically by checking the information against other knowledge, which requires motivation and cognitive resources as observed in many persuasion studies (Petty, Ostrom & Brock, 1981). A less demanding indicator is again provided by one's metacognitive experiences and affective

responses. When information is inconsistent with other things we know, we stumble and slow down, resulting in less fluent processing (Winkielman, Huber, Kavanagh & Schwarz, 2012). Information that contradicts our beliefs also elicits negative feelings, as shown in research on cognitive consistency (Abelson et al., 1968; Festinger, 1957; Gawronski & Strack, 2012). Accordingly, declarative as well as experiential inputs can indicate whether a given proposition is compatible with other things one knows.

As an example, consider a simple question: “How many animals of each kind did Moses take on the Ark?” Most people quickly answer “two,” the minimum number needed for **(p.32)** procreation. They miss that the biblical actor was Noah, not Moses, even though most correctly recall Noah as the one associated with the Ark when explicitly asked. The error arises because Moses feels familiar in the context of a biblical question—no error would occur if Moses were replaced with Obama, for example. If so, the “Moses illusion” (which was discovered by Erickson & Mattson, 1981) should be greatly attenuated whenever an incidental variable makes the question more difficult to process, thus reducing the feeling of familiarity. To test this prediction, Song and Schwarz (2008b) presented the Moses question in an easy or difficult to read font (namely, Arial, 12 pitch, black versus Brush script, 12 pitch, gray). Participants were warned that they “may or may not encounter ill-formed questions which do not have correct answers if taken literally. For instance, you might see the question ‘Why was President Gerald Ford forced to resign his office?’ In fact, Gerald Ford was not forced to resign. Please, write ‘can’t say’ for this type of question” (Song & Schwarz, 2008b, p. 794). When the font was easy to read, 88% of the participants failed to notice the error and answered “two”; when the font was difficult to read, only 52% did so.

Is it internally coherent?

A given piece of information is also more likely to be accepted as true when it fits a broader framework that lends coherence to its individual elements, as observed in research on mental models (for a review, see Johnson-Laird, 2012) and extensive analyses of jury decision-making (Pennington & Hastie, 1992, 1993). Coherence can be determined through a systematic analysis of the relationships between different pieces of declarative information. Alternatively, it can again be assessed by attending to one’s processing experience: coherent stories are easier to process than stories with internal contradictions (Johnson-Laird, 2012), which makes ease of processing an (imperfect) indicator of coherence. Indeed, people draw on their fluency experience when they evaluate how well things “go together” (Topolinski, 2012), as observed in judgments of semantic coherence (Topolinski & Strack, 2008, 2009) and syllogistic reasoning (Morsanyi & Handley, 2012).

As an example, consider the words *night, eyes*, and *closed.* For most people they prompt the concept *sleep,* although it is not mentioned. This reflects that all three words are closely associated with *sleep* in semantic knowledge. For other words, the shared associate is more removed and less likely to come to mind. For example, the words *over, plant*, and *horse* share the associate *power*, but are less likely to bring that concept to mind. While the former word triad is high in semantic coherence and easy to process and learn, the latter is low in semantic coherence and harder to process and learn (Bowden & Jung-Beeman, 2003; Deese, 1959). Once again, people treat these relationships as if they were bidirectional and infer coherence from ease of processing, even when ease of processing is due to incidental variables. Hence, merely increasing the color contrast with which word triads are printed can increase their perceived semantic coherence (Topolinski & Strack, 2009).

Is there a lot of supporting evidence?

People's confidence in a belief increases with the amount of supporting evidence. The extent of support can be assessed by an external search, as in a scientific literature review, **(p.33)** or by recall of pertinent information from memory; in either case, a larger amount of supportive declarative information increases confidence. Alternatively, support can be gauged from how *easy* it is to find supportive evidence—the more evidence there is, the easier it should be to find some (either in memory or the literature). This lay theory is at the heart of Tversky and Kahneman's (1973) availability heuristic by which people estimate likelihood and frequency by the ease with which pertinent examples can be brought to mind.

Because it is easier to find or generate a few rather than many pieces of supporting information, reliance on declarative or experiential information can lead to opposite conclusions (for reviews, see Schwarz, 1998, 2004). As an example, consider people who try to generate arguments in support of their own opinion. When they are asked to generate just a few arguments, the task is easy and their confidence in their own opinion is high. But when they are asked to list many arguments, doing so becomes increasingly difficult, and their confidence in their own opinion declines. As a result, the latter participants are less confident that their opinion is right, despite having listed more supporting arguments (e.g., Haddock, Rothman, Reber & Schwarz, 1999; Wänke, Bless & Biller, 1996). This effect cannot be traced to differences in the quality of the arguments. People who merely read the arguments, and are hence deprived of the experiential information of ease or difficulty associated with generating them, are more convinced the more arguments they read (Wänke et al., 1996). Moreover, once the informational value of the experience is discredited, the influence reverses even for those who generated the arguments. Specifically, Haddock and colleagues (1999) induced some participants to attribute their experience of ease or difficulty to unusual music playing in the background. These participants ignored their fluency experience and reported higher

confidence the more arguments they had generated, thus reversing the otherwise observed pattern.

Is the source trustworthy?

Finally, the likelihood that a belief is accepted as true increases with the perceived credibility and expertise of its source (for reviews, see Eagly & Chaiken, 1993; Petty & Cacioppo, 1986). As decades of persuasion research illustrate, evaluations of source credibility can be based on declarative information that bears, for example, on the communicator's education, achievement, or institutional affiliation. Alternatively, credibility judgments can be based on experiential information. For example, repeated exposure to pictures of a face makes the face seem more familiar, resulting in judgments of greater honesty and sincerity (Brown, Brown & Zoccoli, 2002). Similarly, the mere repetition of a name can make an unknown name seem familiar, making its bearer "famous overnight" (Jacoby, Kelley, Brown, & Jasechko, 1989; Jacoby, Woloshyn & Kelley, 1989), which may also result in an increase in perceived expertise. Going beyond the influence of repeated exposure, Newman and colleagues (2014) found that the same claim was more likely to be judged true when the name of the person who made it was easy rather than difficult to pronounce. Strangers with easy to pronounce names also seem more trustworthy in commercial contexts; for example, online sellers on eBay enjoy a pronounced trust advantage **(p.34)** when their username or online handle is easy to pronounce (Silva, Chrobot, Newman, Schwarz & Topolinski, 2017).

Summary

As the reviewed findings illustrate, fluently processed information enjoys an advantage over disfluently processed information under all major criteria of truth assessment: it seems more widely accepted, more compatible with one's own beliefs, more internally coherent and plausible, backed-up by more supporting evidence, and more likely to come from a credible source. Each of these inferences is based on a, generally correct, lay theory of mental processes that links ease or difficulty of processing with the relevant attribute. Material that is familiar, compatible with one's knowledge, and internally coherent is indeed easier to process, and well-established sources of information are easier to recognize; similarly, thinking of supporting information is easier the more such information exists. What people miss is that processing can be easy or difficult for many other reasons, from the readability of the print font to the presence of distractions. In short, they are sensitive to the feeling, but insensitive to its source.

Moderators

As noted in the preceding discussion, several variables reliably moderate the impact of processing fluency. Their importance warrants reiteration. First, people are more sensitive to changes in their experience than to stable states. Accordingly, an easily processed statement is more likely to be judged true when

it follows more difficult to process material than when it is embedded in other material of similar fluency (for a review, see Dechêne et al., 2010). Second, people do not draw on their subjective experience when its informational value is discredited (for a review, see Schwarz, 2012). Drawing their attention to the print font (e.g., Novemsky et al., 2007) or to allegedly distracting music playing in the background (e.g., Haddock et al., 1999) is sufficient to eliminate the otherwise observed effect, consistent with feelings-as-information theory (Schwarz, 2012). Third, reliance on fluency experiences increases when a lack of motivation or time makes more effortful analytic strategies less appealing or less feasible (for a review, see Greifeneder & Schwarz, 2014).

Surprisingly, one variable that does not seem to moderate the impact of fluency on truth judgments is actual knowledge. One might plausibly assume that people only resort to the heuristic strategy of judging truth on the basis of fluency when they lack relevant knowledge for doing otherwise. In a provocative set of studies, Fazio, Brashier, Payne, and Marsh (2015) found that this may not be the case. Replicating earlier findings, their participants were more likely to judge a statement true the more often they had seen it in an earlier phase of the experiment. An independent knowledge test showed that this pattern held for statements that participants knew to be true as well as for statements that participants actually knew to be false. Detailed modeling further rejected the idea that participants resorted to their feelings when their knowledge failed them—on the contrary, they only consulted their knowledge when their feelings alerted them to a potential problem. **(p.35)** Apparently, disfluent processing signaled that something may be wrong, which in turn prompted greater reliance on their actual knowledge, bringing their truth judgments in line with what they knew before the experiment. This observation is consistent with many other findings on the role of feelings in reasoning. From persuasion to person perception and problem-solving, people are more likely to engage in careful analysis when their feelings provide an experiential problem signal but fail to invest the effort when all seems fine (for reviews, see Schwarz, 1990, 2002, 2012; Schwarz & Clore 2007). Put simply, unless something *feels* wrong, we are likely to nod along.

Implications for the acceptance and correction of misinformation

The dynamics of intuitive truth judgment have important implications for the acceptance and correction of false information in the real world. Beginning with the proliferation of cable TV and talk radio, citizens in democracies enjoyed ever more opportunities to selectively expose themselves to media that fit their worldview. Recently, this trend has been accelerated by social media, where the same message may be encountered over and over again as more and more friends “like” it and repost it (Johnson, Bichard & Zhang, 2009). The resulting echo chambers contribute to growing polarization in public opinion (Stroud, 2010); they are also likely to enhance the conviction with which polarized positions are held and to facilitate the spread of information that enjoys little

support beyond its apparent social validation (for an extended discussion, see Lewandowsky et al., 2012).

Once it has been accepted, misinformation is difficult to correct, as is observed in domains as diverse as public opinion, health, and eyewitness testimony (for a review, see Lewandowsky et al., 2012). To date, public information campaigns aimed at correcting erroneous beliefs have rarely paid attention to metacognitive processes. Instead, their rationale is primarily based on content-focused theories of message learning (McQuail, 2000; Rice & Atkin, 2001) that assume that the best way to counter misinformation is to confront the "myths" with "facts," allowing people to learn what is correct. This strategy necessarily repeats the "myths" (false information) that it wants to correct, thus further increasing their subsequent fluency (for a review, see Schwarz et al., 2007). Accordingly, the popular facts-and-myths strategy works when recipients of educational materials are tested immediately, while they still remember the facts presented to them. But next time they hear the false statements, the myths sound all the more familiar and are *more* likely to be accepted as true than they would have been without any correction attempt.

Such backfire effects are even observed when information is repeatedly identified as false. For example, Skurnik, Yoon, Park, and Schwarz (2005) exposed older and younger adults once or thrice to product statements like "Shark cartilage is good for your arthritis," and these statements were explicitly marked as "true" or "false." When tested immediately, all participants were less likely to accept a statement as true the more often they were told that it is false. But, after a three-day delay, repeated warnings backfired for older adults, who were now more likely to consider a statement "true" the more often they had been explicitly told that it was false. Because explicit memory declines more rapidly with age **(p.36)** than implicit memory (Park, 2000), older adults could not recall whether the statement was originally marked as true or false, but still experienced its content as highly familiar, leading them to accept it as true.

As time passes, people may even infer the credibility of the source from the confidence with which they hold the belief. For example, Fragale and Heath (2004) exposed participants two or five times to statements like, "The wax used to line Cup-o-Noodles cups has been shown to cause cancer in rats." Next, participants learned that some statements were taken from the *National Enquirer* (a low-credibility source) and some from *Consumer Reports* (a high credibility source) and had to assign the statements to their likely sources. As expected, the same statement was more likely to be attributed to *Consumer Reports* than to the *National Enquirer* the more often it had been presented. Thus, frequent exposure not only increases the acceptance of a statement as true, it also facilitates the attribution of the presumably true statement to a highly credible source. This source attribution, in turn, may increase the likelihood that recipients convey the information to others, who themselves are

more likely to accept (and spread) it, given its alleged credible source (Rosnow & Fine, 1976).

Such findings highlight the fact that attempts to correct misinformation are likely to backfire when they focus solely on message content at the expense of the metacognitive experiences that accompany message processing. To avoid backfire effects, it is not sufficient that the correct information is compelling and memorable. It also needs to be closely linked to the false statement to ensure that exposure to the "myth" prompts recall of the "fact." This is difficult to achieve, and it will usually be safer to refrain from any reiteration of false information and to focus solely on the facts. The more the facts become familiar and fluent, the more likely it is that they will be accepted as true and serve as the basis of people's judgments and decisions without awareness of a potentially biasing influence (for extended discussions, see Lewandowsky et al., 2012; Schwarz et al., 2007, 2016).

Fluency and beauty

In the 1960s, Robert Zajonc observed that the more often his participants saw unknown graphical stimuli, such as Chinese ideographs, the more appealing they found them. This observation challenged the dominant learning theories of the time because the increase of liking was observed in the absence of any reinforcement—"mere exposure" was enough (Zajonc, 1968). Just as repeated exposure to a statement can make it seem more true, as Hasher and colleagues (1977) observed a decade later, repeated exposure to an object can make it seem more positive and likeable (Zajonc, 1968).

Mere exposure effects have been obtained with a variety of stimuli (including ideographs, words, faces, melodies, and works of art) and a variety of measures (including judgments of preference, behavioral choices, and physiological responses); a meta-analysis by Bornstein (1989) summarizes much of the empirical work. Zajonc (1968) suggested that mere exposure effects emerge because familiar stimuli are preferred over novel ones. As he liked to put it in conversations, "if you've seen it before and it hasn't eaten you yet, **(p.37)** it can't be that bad." As Titchener (1910, p. 411), who described familiarity as a "pleasant feeling," suggested, familiar stimuli elicit more positive affect as reflected in self-reports of feelings and physiological responses (e.g., Garcia-Marques, Prada & Mackie, 2016; Harmon-Jones & Allen, 2001; Monahan, Murphy & Zajonc, 2000). Conversely, incidental experiences of positive affect make novel material seem more familiar (e.g., Garcia-Marques, Mackie, Claypool & Garcia-Marques, 2004; Monin, 2003).

However, while the mere exposure effect is defined in terms of repeated exposure, such exposure may not be needed. As discussed in the context of truth judgments, repetition is merely one of many variables that facilitate fluent processing, and fluent processing itself, independently of how it was elicited, is

sufficient to increase perceived familiarity and to elicit positive affect. If so, any variable that increases fluent processing of a stimulus should suffice to increase perceivers' liking and appreciation of the stimulus. Empirically, this is the case (for a review, see Reber, Schwarz & Winkielman, 2004). For example, Reber, Winkielman, and Schwarz (1998) showed participants simple line drawings of familiar objects (e.g., a bird or a desk). For some participants, the drawing was preceded by a single subliminal presentation of the outline of the same object, intended to facilitate its processing; for other participants, the drawing was preceded by a single subliminal presentation of the outline of a different object, intended to impair processing. Some participants were asked to identify the target as quickly as possible. As expected, they recognized the object sooner when it was preceded by a matching than by a mismatching outline, which confirms that the manipulation induced the intended differences in fluency. Other participants were asked how much they liked the drawing. As expected, they liked it more when processing was easy. Experiments using other manipulations of fluency led to the same conclusion: the easier a stimulus is to process, the more it is liked (for a review, see Reber et al., 2004).

Furthermore, the positive response to fluently processed stimuli is not limited to self-reports of liking and related judgments. It can also be captured with psychophysiological measures, such as increased activation of the zygomaticus ("smiling muscle"; e.g., Winkielman & Cacioppo, 2001). In short, fluent processing is sufficient to produce all characteristics of the mere exposure effect, from increased preference to more positive affective responses, without repeated exposure. As in the case of truth judgments, repeated exposure is just one of many variables that facilitate fluent processing.

Beauty is in the processing experience of the perceiver

This observation has important implications for theories of aesthetic judgment. Many theories assume that beauty resides in the object of appreciation. This perspective gave rise to numerous attempts to identify objective features responsible for visual appeal (Arnheim, 1974; Birkhoff, 1933; Fechner, 1876; Gombrich, 1984; Maritain, 1966; Solso, 1994). Among the more prominent of these features are simplicity, symmetry, balance, clarity, contrast, and certain proportions, such as the golden section. More recent research has proposed additional candidates, such as prototypicality or averageness of the form (e.g., Halberstadt & Rhodes, 2000; Langlois & Roggman, 1990; Martindale, 1984). Importantly, **(p.38)** all of these characteristics share one important feature: they are likely to facilitate processing of the stimulus (Reber et al., 2004). From this perspective, visual appeal does not reside in attributes of the object of appreciation, but rather in the processing experience of the perceiver: an object is appealing when it is fluently processed, which is a function of stimulus, perceiver, and context variables.

The *stimulus variables* include the object attributes familiar from aesthetics research, from symmetry to form. The *perceiver variables* include the perceiver's chronically or temporarily accessible knowledge related to the object and the perceiver's history of exposure to the object. As numerous studies have demonstrated, compared with novices, people with extensive art education prefer more complex stimuli (e.g., McWhinnie, 1968; Smith & Melara, 1990). From a fluency perspective, art education increases the fluency with which complex art stimuli can be processed, partly through repeated exposure to such stimuli and partly through increased knowledge that can be brought to bear on them. Each of these components alone is sufficient to increase appreciation. Consistent with the power of repeated exposure (Zajonc, 1968), new art forms are often initially despised, only to become popular as time passes and exposure increases. More surprisingly, merely making a related concept highly accessible in the mind is sufficient to increase the perceived beauty of an object. For example, Winkielman and Fazendeiro (reported in Winkielman et al., 2003) showed participants a series of unambiguous pictures of common objects and animals on a computer screen. Each picture was preceded by a short presentation of a letter string consisting either of a word or a nonword. Participants first indicated, as fast as possible, if the letter string was an actual English word. Subsequently, they reported their liking for the picture. The letter strings served as the fluency manipulation. Some pictures were preceded by matching words (e.g., word "dog"—picture of a dog), introducing a high level of fluency. Other pictures were preceded by associatively related words (e.g., word "key"—picture of a lock), introducing a medium level of fluency. Yet other pictures were preceded by an unrelated word (e.g., word "snow"—picture of a desk), introducing a low level of fluency. As predicted, participants liked the pictures more under high than under moderate-fluency conditions, and least under low-fluency conditions. Thus, merely being exposed to a word, say "key," can increase the later appreciation of a picture with semantically related content, say a picture of a door with a lock. Such cross-modal accessibility effects on aesthetic pleasure are uniquely predicted by a fluency account and cannot be derived from other approaches (for a more extended discussion, see Reber et al., 2004).

As the reviewed examples illustrate, any variable that facilitates processing of a target stimulus also enhances liking of that stimulus. However, this fluency-appreciation link is moderated by a number of *context variables* that also bear on the influence of metacognitive experiences in other domains.

Moderators

One of these context variables is whether an easy-to-process object is seen in the context of other easily processed objects or in the context of more difficult to process objects. **(p.39)** As a general rule, people are more sensitive to changes in subjective experience than to stable states and this also holds for fluency experiences. Hence, a familiar object is liked more when it is presented in the

context of unfamiliar ones rather than in the context of other familiar ones. Zajonc's (1968) classic mere exposure experiments unwittingly took advantage of this regularity by showing all participants some objects more frequently than others. Decades later, Dechêne, Stahl, Hansen, and Wänke (2009) tested the influence of this procedural choice. Following Zajonc, some participants evaluated a mixed set of objects, consisting of some that they had seen before and some that were new (thus varying exposure frequency "within" participant in the language of experimental design). For other participants, the same objects were presented in homogenous sets, so that all objects were familiar or all were new (thus varying exposure frequency "between" participants). A reliable mere exposure effect was only observed in the former case. The same is true for the influence of fluency on judgments of truth (Dechêne et al., 2010; Hansen, et al., 2008), as already noted. In either case, changes in processing fluency are more informative than steady signals, as is the case for other feelings (Schwarz, 2012). The implications of these findings for displaying artworks in a way that maximizes appreciation are obvious and await empirical exploration.

How fluently a given stimulus can be processed also depends on what the perceiver attempts to do with the stimulus. Suppose, for example, that the target object is a picture of a human face with an ambiguous emotional expression. When people are asked to distinguish between pictures that show a human face and pictures that do not, the ambiguity of the face's emotional expression will not interfere with the task; but when they are asked to distinguish between pictures that show a happy or a sad face, ambiguity of emotional expression will make the task more difficult. Accordingly, the ambiguity of facial expression should affect how much one likes the picture in the latter case, but not in the former. Winkielman, Olszanowski, and Gola (2015) found consistent support for this prediction. In their experiments, the same target seemed more attractive the more the categorization task allowed for fluent processing. Using pictures of human faces as targets, they also found that fluently categorized faces seemed more trustworthy, again highlighting the parallels between beauty-related and truth-related judgments.

Finally, numerous studies have shown that people are more likely to explore novel and unfamiliar things in contexts they consider safe and benign than in contexts they consider problematic (for a review, see Schwarz, 1990). Because benign contexts are usually associated with (mildly) positive feelings, whereas problematic contexts are usually associated with a shift to negative feelings, changes in feeling play a key role in informing people about the likely nature of their current situation (Schwarz, 1990, 2002). One may therefore expect that a preference for the familiar is particularly pronounced when negative feelings signal a problematic situation, but attenuated when positive feelings signal a benign situation. Empirically, this is the case. De Vries and her colleagues (2010) found that participants in an experimentally induced sad mood preferred easy-to-process prototypical objects over novel ones. However, this preference for the

familiar was not observed when participants were put into a happy mood. Future research may fruitfully **(p.40)** explore whether other markers of benign versus problematic situations can similarly shift the appreciation of familiar objects.

Conclusion

As the reviewed research indicates, there is more to thinking than *what* comes to mind. Thinking is accompanied by a variety of subjective experiences, from bodily sensations to moods, emotions, and metacognitive experiences. People are sensitive to these feelings and draw on them as a source of information in making a wide range of judgments (for a review, see Schwarz, 2012). Unfortunately, they are much less sensitive to where their feelings come from. Hence, feelings elicited by incidental factors that are irrelevant to the judgment at hand can exert a profound influence. As seen, mere repetition, rhyme, an easy to read print font or good figure–ground contrast are all sufficient to increase the apparent truth value of a claim (Schwarz, 2015). The same variables also increase aesthetic appeal when people are asked how much they like an object or how pretty it is (Reber et al., 2004). That intuitive judgments of truth and beauty draw on the same experiential inputs is presumably at the heart of the widely held belief that beauty and truth are two sides of the same coin, despite the many beautiful theories that have been sent to the graveyard of science for failing more diagnostic tests of truth.

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