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**Metacognitive processes and subjective experiences**

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Theories of judgment commonly assume that people give more weight to information that they consider reliable, diagnostic, and relevant to the task at hand than to information they consider unreliable, nondiagnostic or irrelevant. This empirically well-supported assumption implies that people evaluate the available information (object-level thoughts) with respect to its reliability, diagnosticity for the target, and relevance for the judgment (meta-level thoughts)—and that the outcome of such meta-level assessments can enhance, impair or reverse the impact of the object-level thoughts. How people form these meta-level assessments is the topic of theorizing and research in metacognition, which studies how people think about their own thinking. The present chapter reviews key lessons from metacognitive research with a focus on social judgment and discusses them in the context of dual process models (for reviews of metacognitive work in other domains, see (for overviews, see Dunlosky & Metcalfe, 2008; Koriat, 2007). It highlights that metacognitive assessments can be based on declarative as well as experiential information and can involve inference processes that vary widely in the cognitive and motivational resources they demand.

Early dual process models in social psychology (Chaiken, 1980; Petty & Cacioppo, 1986) emphasized that processing can be more or less resource intensive and related this distinction to a continuum from low-elaboration processing to high-elaboration processing, often referred to as heuristic vs. systematic or peripheral vs. central route processing (for recent reviews, see Chaiken & Ledgerwood, 2012; Petty & Briñol, 2012). More recent dual process models introduced additional distinctions, drawing on an increased understanding of the role of automaticity in information processing (Andersen, Moskowitz, Blair, & Nosek, 2007, and the contributions to this volume). The metacognitive research we review has not been designed to bear on different criteria of automaticity, and has mostly attended to variables that are affected by, or influence, processing opportunity, ability, and motivation. Other dual process models emphasize the distinction between associative and rule-based or propositional processing (e.g., Gawronski & Bodenhausen, 2006; Strack & Deutsch, 2004, 2012). As any other evaluation, metacognitive evaluations of one's own thoughts involve propositional reasoning and can hence occur, per definition, only in a propositional mode.

The declarative and experiential inputs on which they draw are the output of associative processes that determine the content that comes to mind and the feelings of ease or difficulty that accompany it. What the propositional evaluation looks like—for instance, how many propositions relevant to the assessment are taken into account—is again a function of elaboration or more generally processing intensity (e.g., Gawronski & Bodenhausen, 2006). From this perspective, the opportunity, ability, and motivation to engage in resource-intensive processing play a key role across different dual-process frameworks; it is this commonality that we focus on in what follows.

### **Preview**

The present chapter's first section introduces basic concepts of metacognition; it illustrates how metacognitive judgment can draw on declarative as well as experiential information and how each source of information can serve as input into low-intensity as well as high-intensity processing. We conceptualize the use of experiential information in terms of feelings-as-information theory (Schwarz, 2012; Schwarz & Clore, 1983, 2007) and focus on the role of “cognitive feelings” (Clore, 1992), here, metacognitive experiences of ease or difficulty that accompany the thought process.

Next, we ask whether cognitive feelings exert more influence under conditions of low-intensity or of high-intensity processing. While the majority of the available empirical evidence suggests that metacognitive experiences are more likely to be relied on in conditions of low-intensity processing, the picture is more complex, depending on the specific meta-level thoughts on which cognitive feelings are brought to bear.

Finally, we address the reverse causal pathway and ask whether different cognitive feelings are differentially likely to prompt low-intensity versus high-intensity processing. We close with some caveats and issues for future research.

### **Metacognition: Thinking about one's thoughts**

Metacognition research distinguishes primary, object-level thoughts about a target of judgment from secondary, meta-level thoughts about one's own primary thoughts. Some of these

meta-level thoughts pertain to one's cognitive performance; they include whether one understood some information correctly (judgments of comprehension), whether one is likely to remember it when needed (judgments of learning), whether one "really" knows something even though one cannot retrieve it at the moment (feelings of knowing), and many related issues (for extensive reviews, see Dunlosky & Metcalfe, 2008; Koriat, 2007). These assessments are central to the very idea of metacognition – thinking about one's own thinking. Other meta-level assessments pertain to attributes of the object-level information one considers, such as whether the information is internally consistent, likely to be true, or relevant to the task (for reviews, see Petty, Briñol, Tormala, & Wegener, 2007; Schwarz, in press). These assessments can pertain to self-generated information as well as information provided by others. While the latter case is less obviously an instance of thoughts about one's own thoughts than the former, the difference is only a matter of degree. To evaluate information from extraneous sources, it has to be mentally represented first, thus becoming part of one's own thinking. More important, assessments of external information rely heavily on assessments of one's own thoughts about the external information, including, for example, whether one can trust one's own interpretation of it, whether it is compatible with other things one believes, and so on. In what follows, we highlight this common component and treat assessments of reliability, diagnosticity, and relevance as metacognitive, independent of whether they pertain to self-generated thoughts or externally presented information. Both kinds of assessments can be made in a more or less resource demanding manner and on the basis of declarative or experiential inputs. We illustrate this with different strategies for assessing an attribute of particular interest to social psychologists, namely the likely truth of a belief.

### **Declarative and experiential information in truth perceptions**

Information that is considered valid and reliable exerts more influence on judgment and behavior, independent of whether the information is recalled from memory or received from someone else. In making these assessments, people attend to a limited set of criteria, usually a subset of what might be considered the "Big Five" of truth assessment. In what follows, we review

research suggesting that each of these “Big Five” can be formed based on either declarative or experiential inputs.

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 the beliefs 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 on 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” the belief 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. Hence, the mere repetition of a belief can increase perceived social consensus even when all repetitions come from the same single source, making a single repetitive voice sound like a chorus (Weaver, Garcia, Schwarz, & Miller, 2007).

A second criterion is whether the belief 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 studies in the tradition of cognitive response approaches to persuasion (Petty, Ostrom, & Brock, 1981). A less demanding indicator is again provided by one’s metacognitive experiences and affective responses. Information that is inconsistent with one’s beliefs is processed less fluently (Winkielman, Huber, Kavanagh, & Schwarz, 2012) and elicits negative feelings (Festinger, 1957), an assumption shared by many theories of cognitive consistency (Abelson et al., 1968; Gawronski & Strack, 2012). Accordingly, declarative as well as experiential inputs can indicate whether a given proposition is consistent with other things one believes.

Third, a given piece of information is also more likely to be accepted as true when it fits a broader story that lends *coherence* to its individual elements, as observed in basic 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 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).

Fourth, 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, 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). In turn, the easier it is, the more evidence is likely available. This lay theory is at the heart of Tversky and Kahneman's (1973) availability heuristic. Because it is easier to find or generate a few rather than many pieces of supporting information, the factual recall of information, and pertaining cognitive experiences, result in opposing inferences. On the one hand, reliance on declarative information results in higher confidence the more supporting evidence one retrieves; on the other hand, reliance on experiential information results in lower confidence because the difficulty associated with finding many pieces of supporting evidence suggests there aren't many (Schwarz et al., 1991; for reviews, see Schwarz, 1998; Schwarz, 2004). Accordingly, people have less confidence in their beliefs after attempting to generate many rather than few supporting arguments (Haddock, Rothman, Reber, & Schwarz, 1999; Tormala, Petty, & Briñol, 2002). Similarly, people perceive information provided by a job applicant as less credible after mustering many reasons for why this person has told the truth, but as more credible after mustering many

reasons for why this person was lying (Ask, Greifeneder, & Reinhard, 2012). In each case, because recalling many instances is difficult, people seem to conclude that the respective amount of supporting object-level thoughts is low, thus not supporting the account in question.

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 higher 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.

As the example of truth assessment illustrates, metacognitive judgments can be based on declarative as well as experiential information. Moreover, it can involve high-intensity and low-intensity processing, in that truth judgments can be formed either with effort or in a lean and fast fashion. The above review of findings may have created the impression that reliance on experiential information and low-intensity processing go together, while declarative information and high-intensity processing team up. Though appealing in its simplicity, the picture is more complex, because declarative pieces of information are also at the heart of many simple heuristics relied on when processing intensity is low (e.g., a babyfaced person is trusted, Zebrowitz & Montepare, 1992), and experiential information has also been shown to be critical when processing intensity is high (e.g., Wänke & Bless, 2000). Hence, source of information and type of processing are not to be equated (but may also not be orthogonal, as reflected in the research reviewed later).

In the case of truth judgments, fluently processed information enjoys an advantage over disfluently processed information: it seems to be more popular, backed-up by more extensive supporting evidence, more consistent with one's own beliefs, more coherent, and more likely to

come from a credible source. All these perceptions reflect underlying lay theories that link specific cognitive experiences with (subjective perceptions of) real world characteristics. For instance, because widely shared beliefs are encountered more often than highly idiosyncratic ones (real world characteristic), they are perceived as more familiar (cognitive experience)—in turn, apparent familiarity of a belief may provide an experiential indicator of its popularity. Note that such lay theories turn the factual link between real world characteristics and subjective experiences up-side down, drawing inferences from the consequent (e.g., familiarity) to the antecedent (e.g., popularity). Such proceeding is legitimate when the link between antecedent and consequent is bi-directionally true, but potentially misleading in all other cases. If these other cases constitute the majority, fluency will be a fallible cue for truth. Having said this, it is important to keep in mind that the same argument pertains to lay theories that build on declarative information. Though fallible, reliance on experiential information may therefore prove to be a reliable source of information in meta-level thought, likely as reliable as heuristic reliance on declarative information (see also Greifeneder, Bless, & Scholl, 2013; Herzog & Hertwig, 2013).

### **Cognitive feelings as a source of information**

The subjective experience of ease or difficulty arises from the dynamics of one's own information processing at the object level and is inherently metacognitive. At the most basic level the experience conveys that what one does is easy or difficult, which informs judgments of effort. People infer, for example, that preparing a lunch roll takes more time and skill when the recipe is printed in a difficult rather than an easy to read font (Song & Schwarz, 2008b), thus mistaking the difficulty of reading as indicative of the difficulty of doing. In addition, easy processing feels more pleasant than difficult processing as reflected in self-reports and physiological measures of affect (e.g., Winkielman & Cacioppo, 2001). This affective experience, in turn, informs judgments of preference, beauty, and related attributes (Reber, Winkielman, & Schwarz, 1998; for a review, see Reber, Schwarz, & Winkielman, 2004).

Going beyond these global effort and affect dimensions, people form more specific inferences from their metacognitive experiences by drawing on applicable lay theories of mental



processes. For instance, as noted in the preceding discussion of truth judgments, people infer that information is more familiar, more internally coherent, or more consistent with our beliefs, when information processing is easy. In the case of truth judgments, the application of different lay theories converges on the same conclusion: if it is easy to process, it is probably true, independent of the specific criterion considered. This is presumably why fluently processed messages are more persuasive and “sticky” than disfluent messages. In other cases, however, different lay theories lead to diverging conclusions from the same experience, depending on which of many potentially applicable theories is brought to mind by the task at hand. For example, people who find it difficult to remember many details of an event conclude that the event happened long ago when asked about its date, but that it was not particularly important to them when asked about how much attention they paid to it at the time—while either one of these factors can explain their poor memory, they have different downstream implications for related judgments (for a reviews, see Schwarz, 2010). Thus, the numerous variables that can influence ease of processing give rise to a broad range of lay theories that guide individuals’ inferences from metacognitive experiences, which renders these inferences highly malleable. Which lay theory is brought to bear is likely a function of the lay theory’s applicability and accessibility, and may in turn be guided by experiential information.

Fluency experiences may be caused by the judgmental target (and are therefore inherent), or due to sources unrelated to the judgmental target (and therefore incidental). Unfortunately, individuals are often more sensitive to the experience than to its source and frequently misread processing experiences that arise from incidental variables as bearing on attributes of what they are thinking about. Such incidental influences are well-documented in the literature. For instance, people infer product preferences from easy versus difficult to read print fonts (e.g., Novemsky, Dhar, Schwarz, & Simonson, 2007), essay quality from differentially legible handwriting (Greifeneder et al., 2010; Greifeneder, Zelt, Seele, Bottenberg, & Alt, 2012), truth from rhyming (e.g., McGlone & Tofiqbakhsh, 2000), truth from high or low figure-ground contrast (e.g., Reber & Schwarz, 1999), risk from ease of pronunciation (e.g., Song & Schwarz, 2009), or concept usability from ease or difficulty of sentence unscrambling (Greifeneder & Bless, 2010). Most variables that can facilitate or

impair perceptual and conceptual processing may constitute a source of incidental influence (for a review, see Alter & Oppenheimer, 2009), unless there is reason to discredit the source. Indeed, people do *not* rely on their metacognitive experiences as a source of information when their representativeness of the target, or relevance to the task at hand is called into question (for a review, see Greifeneder, Bless, & Pham, 2011). Accordingly, attributing difficulty of recall to the influence of allegedly distracting background music (Schwarz et al., 1991), or realizing that it may simply result from a difficult to read print font (Novemsky et al., 2007), eliminates the otherwise observed influence of processing fluency. 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 et al., 1991). In short, the use of metacognitive experiences as a source of information follows the principles of feelings-as-information theory, which was initially developed to account for the influence of moods and emotions (for an integrative review, see Schwarz, 2012).

### **Do cognitive feelings exert more influence under low-intensity or high-intensity processing?**

Many dual process theories of persuasion share the assumption that relatively effortful high-intensity processing requires motivation, ability, and opportunity (Chaiken & Ledgerwood, 2012; Eagly & Chaiken, 1993; Petty & Briñol, 2012; Petty & Cacioppo, 1986). Decades of research showed that recipients are more likely to elaborate on the content of a message when the issue is important, their cognitive ability is high, and their opportunity unconstrained by time pressure, fatigue and related variables; conversely, they are more likely to rely on heuristic cues when issue relevance, ability and/or opportunity are low. This work further showed that most inputs can influence judgment under low-intensity as well as high-intensity processing, although in differential ways. When an issue is of high personal relevance, for example, recipients process consensus information analytically, and pay attention to attributes like sample size, giving the information more weight when based on a larger sample; in contrast, when the issue is of low personal relevance, they think less about the inputs and use consensus information as a heuristic cue, making its impact

independent of sample size (see Eagly & Chaiken, 1993). Notably, it's the same input, but used differently depending on low-intensity or high-intensity processing. Similarly, the source of a message may serve as a heuristic cue when processing motivation or ability are low, or as an argument that is taken into consideration during message elaboration when processing motivation and ability are high, resulting in differential message representations and judgments (Petty & Cacioppo, 1986). The same regularities apply to the use of metacognitive experiences and other feelings as a source of information.

### **Pitting thought content against processing experience**

To date, researchers interested in the differential use of cognitive feelings under low-intensity versus high-intensity processing have primarily relied on an experimental paradigm introduced by Schwarz and colleagues (1991) that pits accessible thought content against metacognitive experiences. Participants are asked to recall either few or many instances of an event or behavior or to generate few or many arguments for or against a proposition. What constitutes "few" or "many" thoughts in this paradigm is determined in a pretest that asks participants to list as many instances or arguments as come to mind; the modal number of thoughts listed in the pretest minus (or plus) fifty percent is the number of thoughts requested in the "few" (or "many") condition. This creates a situation in which listing few thoughts is experienced as easy, whereas listing many thoughts is experienced as difficult, thus setting the stage for exploring the relative contribution of thought content (declarative information) and cognitive feelings (experiential information) that accompany its generation. At present, the vast majority of the available evidence indicates that low-intensity processing fosters reliance on cognitive feelings at the expense of accessible content, whereas high-intensity processing attenuates reliance on cognitive feelings (for a review, see Greifeneder, Bless, et al., 2011). However, some noteworthy exceptions highlight that declarative content as well as cognitive feelings can also serve as input in the respective "other" processing mode under specific conditions. We address both sets of findings in turn and identify the conditions under which each one is likely to hold.

### **Low-intensity processing increases reliance on cognitive feelings**

**Processing motivation.** Rothman and Schwarz (1998) asked men to retrieve few (easy) or many (difficulty) behaviors that can increase or decrease their risk of heart disease. To test the role of processing motivation they drew on the *personal relevance* of the topic by assessing participants' family history of heart disease and by framing the task either in terms of one's own personal risk or in terms of the risk for an average American. If high processing motivation fosters processing of thought content, participants with a family history of heart disease who think about their own behavior should elaborate on the behaviors they listed; they should therefore see themselves at higher risk after listing many rather than few risk increasing behaviors and at lower risk after listing many rather than few risk decreasing behaviors. In contrast, participants without a family history, or participants who were asked to think about others, should find the task less relevant. If low personal relevance fosters reliance on the ease with which the respective behaviors came to mind, the otherwise observed pattern should be observed. Because recalling many behaviors (of any kind) is difficult, they should infer that they rarely engage in them, resulting in lower judgments of risk after recalling many rather than few examples of their own risk increasing behaviors and higher judgments of risk after recalling many rather than few examples of their own risk decreasing behaviors. The results were consistent with these predictions. When the task pertained to their personal behaviors and own risk, men with a family history of heart disease relied on the content of recall, whereas men without a family history relied on experienced ease of recall; but when the task pertained to the behaviors and risk of an average person, all relied on ease of recall. Both effects presumably reflect that low personal relevance decreases processing intensity, giving an advantage to experiential information of high immediacy. Conceptual replications of these findings were reported by Broemer (2004), Grayson and Schwarz (1999), Greifeneder (2007), and Haddock (2002), among others.

Other manipulations of processing motivation converge with these findings. Aarts and Dijksterhuis (1999, Exp. 2) manipulated participants' *accuracy motivation* through instructions and found that only participants with low accuracy motivation relied on their ease-of-retrieval experiences in making frequency estimates (see also Greifeneder, 2007, Exp. 1). Greifeneder and

colleagues tested the role of *uncertainty* in individuals' use of ease versus content of retrieval as a basis of judgment. As predicted, they found that cognitive experiences influenced judgments and behaviors under conditions of certainty, which fosters low-intensity processing, but not under conditions of uncertainty, which usually motivates high-intensity processing (Greifeneder, Müller, Stahlberg, Van den Bos, & Bless, 2011a, 2011b; Müller, Greifeneder, Stahlberg, Van den Bos, & Bless, 2010; see also Janssen, Müller, & Greifeneder, 2011).

Complementing these findings, Florack and Zoabi (2003) assessed participants' need for cognition, an individual difference variable that distinguishes people who are differentially likely to spontaneously engage in high-intensity processing. They found that individuals low in need for cognition relied more on their cognitive feelings than individuals high in need for cognition, who relied on accessible content.

**Processing opportunity.** Further highlighting the link between low-intensity processing and reliance on cognitive feelings, Greifeneder and Bless (2007) manipulated participants' processing capacity through a secondary task. They consistently found that participants under high cognitive load relied on the ease with which they could bring behaviors or arguments to mind, whereas participants under low cognitive load drew on the thought content they had generated. Complementing these judgment effects, they also observed important differences in response time: high-load participants, who based their judgments on their cognitive feelings, were equally fast after generating few or many arguments; in contrast, low-load participants, who based their judgments on accessible content, took longer to arrive at a judgment after generating many rather than few arguments (see also Koriat & Levy-Sadot, 1999). This pattern reflects that high-intensity processing takes more time the more inputs are considered, which is not the case for the summary information provided by one's cognitive feelings, which serve as input under conditions of low-intensity processing.

Throughout, these studies indicate that reliance on the subjective experience of ease or difficulty of recall or thought generation increases with decreasing processing motivation, ability or opportunity, that is, in conditions of low-intensity processing.

### **High-intensity processing increases reliance on cognitive feelings**

In contrast, a second line of work suggests the opposite conclusion, namely that cognitive feelings are more likely to influence judgments under conditions of *high* processing motivation. A crucial difference between these lines of work is the judgment on which the feeling is brought to bear. In the above studies, target judgments are explicitly or implicitly presumed to be mediated by the inferred amount of existing information (e.g., Schwarz et al., 1991). However, the same cognitive experiences can also influence individuals' confidence in their own thoughts, as initially shown by Haddock and colleagues (Haddock, Rothman, & Schwarz, 1996; Haddock et al., 1999): generating many arguments in favor of one's opinion is difficult and undermines one's confidence in one's own thoughts. Not surprisingly, such shifts in confidence and related measures of attitude strength have downstream consequences for other judgments.

Most importantly, people give more weight to information they are confident about than to information they are less confident about, as noted in our discussion of metacognitive truth assessments. Research in the tradition of dual process models of persuasion showed that such assessments of information quality are more likely under conditions of high processing motivation, ability, and opportunity (Chen & Chaiken, 1999; Petty & Cacioppo, 1986). Likewise, other dual mode models such as the associative-propositional evaluation model (Gawronski & Bodenhausen, 2006) hold that more propositions are considered with increasing levels of processing intensity. This provides a pathway in which the initial metacognitive experience influences one's trust in one's own thoughts, which can subsequently feed into other judgments to which these thoughts are relevant.

Drawing initial attention to this possibility, Wänke and Bless (2000) observed that ease-of-retrieval experiences had more impact under conditions of high motivation than under conditions of low motivation, in contrast to what earlier work would have predicted. This was the case when motivation was operationalized via need for cognition or by instructing participants to report accurate (high motivation) versus spontaneous reactions (low motivation). Similarly, Tormala and colleagues (2002) found that ease-of-retrieval experiences influenced the evaluation of an exam policy in conditions of high but not low processing motivation, again operationalized through need

for cognition or an accountability manipulation. Relatedly, Hirt, Kardes, and Markman (2004) observed more reliance on cognitive feelings as information among participants with high rather than low need for structure (Webster & Kruglanski, 1994). These findings are compatible with the assumption that participants brought their metacognitive experiences to bear on their own thought, giving their own thoughts more weight when ease of recall or thought generation suggested that they could have confidence in what they were thinking. Such metacognitive evaluations of one's own thoughts have recently been integrated into dual process models of persuasion (Briñol & Petty, 2009), where they are assumed to serve different roles under different processing conditions, as is the case for any other source of information.

### **Summary**

The reviewed evidence reiterates a central theme of research into metacognitive experiences: their meaning is context sensitive and what people infer from a given experience depends on which of many potentially applicable lay theories is brought to mind (Schwarz, 2010). Finding it difficult to recall many behaviors that increase one's risk of heart disease may suggest, for example, that one's risk is low (a judgment consistent with Tversky and Kahneman's, 1973, availability heuristic) or that one lacks expertise in this domain (or else the task would not be that hard). In the former case, the experience is brought to bear on the frequency of the focal behavior itself, which is more likely under conditions of low-intensity processing; in the latter case, the experience is brought to bear on the diagnosticity of one's own thoughts, which figures more prominently under conditions of high-intensity processing. While this distinction organizes the reviewed findings, it is important to note that the influence of metacognitive experiences on one's thought confidence is itself very often an effect of low-intensity processing, as discussed earlier. If so, the increased impact of metacognitive experiences under high-intensity processing may merely be a downstream effect of initial low-intensity processing during the evaluation of one's own thoughts. Future research may fruitfully address these complexities, preferably by extending the range of fluency manipulations beyond the recall and thought generation tasks used in the great majority of the currently available work.

**Do cognitive feelings influence the likelihood of low-intensity  
versus high-intensity processing?**

Dual process models of persuasion generally share the assumption that people are more likely to engage in effortful content processing when their motivation, ability, and opportunity to do so are high. *Ceteris paribus*, processing motivation is higher when people encounter a potential problem that needs attention than when they cruise along in a benign context. Feelings-as-information theory holds that affective and cognitive feelings play an important role in this process by providing information about one's current situation, which guides the choice of subsequent processing strategy (Schwarz, 1990, 2012). Feelings that provide a problem signal foster vigilance and the adoption of a detail-oriented bottom-up processing style, which is usually adaptive. In contrast, feelings that characterize the situation as benign are not, by themselves, associated with particular processing requirements. They foster reliance on pre-existing knowledge structures and top-down processing, *unless* goals or task demands require otherwise (Bless & Schwarz, 1999). Studies bearing on the influence of moods and emotions on processing style are consistent with these assumptions (for a review, see Schwarz & Clore, 2007). Here, we focus on the role of metacognitive experiences.

As our review of metacognitive truth assessments illustrated, fluently processed information is more likely to be accepted at face value than disfluently processed information. Not surprisingly, such metacognitive truth assessments influence how much people scrutinize information—when disfluent processing suggests that something may be wrong, the details receive more attention and distortions are more likely to be noticed. For example, when asked, “How many animals of each kind did Moses take on the Ark?” most people answer “two” despite knowing that the biblical actor was Noah, not Moses. But as Song and Schwarz (2008a) observed, merely presenting the question in a difficult to read print font can reduce the error rate from 88% (when the question is printed in Arial) to 53% (when the question is printed in gray Brush Script). However, the same manipulation reduces correct answers to a question that asks which country is famous for cuckoo clocks and pocket knives (Switzerland). In both cases, disfluency due to the print font discourages reliance on the first thing



that comes to mind, which improves performance when the spontaneous association is misleading (Moses question), but impairs performance when the spontaneous association is correct (Switzerland question). Similarly, Alter, Oppenheimer, Epley, and Eyre (2007) reported that disfluency improved performance on a variety of tasks, including syllogistic reasoning and logical problem solving, by increasing the likelihood of more effortful processing. For the same reason, difficult to read material is also better remembered, presumably because it received more detailed attention at encoding (Diemand-Yauman, Oppenheimer, & Vaughan, 2011). Finally, Greifeneder and Bless (2010) reported that fluent prime activation led to assimilation, but disfluent prime activation to contrast in a standard Donald-paradigm, presumably because fluency tags the accessible prime with a go- or use-signal, whereas disfluency serves as a stop-signal.

As these examples illustrate, disfluency is likely to trigger high-intensity processing, presumably because it flags the material for closer scrutiny. This improves performance on tasks that benefit from closer scrutiny, but impairs performance on tasks that benefit from reliance on less effortful judgment strategies. We hasten to add, however, that the driving force is presumably not fluency or disfluency per se, but the meaning of the experience in context (Schwarz, 2010). In contexts in which people learn, for example, that fluently processed information is likely to be false (e.g., Unkelbach, 2007), the otherwise observed relationship should be reversed. In addition, fluent processing feels good and positive affect itself makes elaborative processing and high attention to detail less likely (Schwarz, 1990, 2002). Hence, both the informational value of (dis)fluency and the accompanying affect are likely to foster high-intensity processing under disfluency and future research may fruitfully attempt to determine their relative contributions.

### **Coda**

People think about their own thinking and evaluate their primary object-level thoughts on a variety of dimensions, including reliability, truth, diagnosticity for a specific target, or relevance for a specific judgment. Such meta-level assessments can be formed in a relatively lean and fast fashion (here referred to as low-intensity processing), or in a more capacity-demanding slower fashion (here

referred to as high-intensity processing). Moreover, these assessments can be based on declarative or experiential information. This chapter reviewed many links between the two kinds of processing and the two sources of information, sketching a complex picture in which cognitive feelings play a critical role. Importantly, the way cognitive feelings are used as information, or channel subsequent information processing, depends on the interpretation of the feeling in the respective context. One of the challenges lying ahead will be to further understand what guides interpretation, thereby adding additional complexity to metacognition.

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