CHAPTER SIX

Fluency shapes evaluations: Feelings, interpretations, expectations, and goals

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Abstract

Evaluations, including social evaluations, are shaped by multiple mechanisms. Much research shows that one factor influencing evaluations is the ease of processing (fluency). In this contribution, we discuss how this influence results from the intricate interplay of fluency with expectations and beliefs about fluency, as well as epistemic goals—both general preferences for knowledge acquisition and goals related to specific belief content. This discussion leads to several insights. First, evaluations typically increase with fluency, reflecting a preference for efficiency and the positive affect associated with low effort. Fluency can also enhance evaluation via beliefs that connect it with value and by supporting the broader epistemic goal of knowledge acquisition. However, evaluations can also increase with disfluency. This may result from beliefs that connect disfluency with value or from epistemic goals that prioritize avoiding knowledge, making

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disfluency a desirable state. Additionally, the value of stimuli depends on perceivers' directional epistemic goals—their preferred belief state. If fluency facilitates preferred beliefs, it will increase evaluation, but if it facilitates undesirable beliefs, it will decrease evaluation. We review supporting evidence and introduce novel predictions. By integrating insights from the fluency framework and the epistemic motivation framework, we can better understand the mechanisms underlying evaluations, including key social judgments such as attractiveness and trust.

1. Introduction

How do people form evaluations? Following a long tradition, we define evaluations as internal assessments of a stimulus along broad dimensions of "goodness-badness" (Osgood, Suci, & Tannenbaum, 1957). These assessments—often called "preferences"—could be cognitive and deliberative in nature, or they could reflect affective and motivational states (Slovic, 1995; Zajonc, 1980). In practice, however, when psychologists study evaluations, they often focus on more specific questions: How do people determine whether a face is attractive, a person is trustworthy, a car is worth a high price, a dining experience is valuable, a painting is beautiful, or a politician or party is worth supporting?

The question of what makes things valued in people's minds is vast and has been explored across disciplines, including anthropology, biology, economics, neuroscience, history, political science, philosophy, and sociology (e.g., Berridge, 2004; Rokeach, 1973; Schwartz & Bilsky, 1987; Tooby, Cosmides, Sell, Lieberman, & Sznycer, 2008; for an interdisciplinary overview, see Brosch & Sander, 2015). However, this contribution focuses on a narrower yet crucial subset of internal psychological determinants of evaluation—processing fluency, or the ease or difficulty of processing a stimulus.

The concept of fluency is broad. As we will elaborate shortly, it encompasses the ease of perceiving, categorizing, comprehending, recalling, imagining, and deciding. It can also extend to the efficiency of motor movements and physical effort. For now, we emphasize that fluency's influence on evaluation is intriguing because it highlights that evaluative judgments are not solely about the *what*—the actual features of a stimulus (e.g., attractive facial features or negative message content)—but also about the *how*—the effort required to process those features.

The goal of this contribution is to illustrate the diverse ways in which fluency influences evaluations. We begin by outlining some straightforward

ways fluency impacts evaluative judgments, primarily through its positive hedonic tone. Then, we introduce complexities by discussing how fluency effects are shaped by various inferential and interpretational processes. Furthermore, we examine the role of two types of epistemic motivation. One type refers to non-directional epistemic goals—perceivers' general desire for certainty (understanding) or, conversely, their preference for uncertainty. These non-directional epistemic goals shape whether perceivers generally think of fluency as a good or a bad thing. The other type of motivation refers to directional epistemic goals—perceivers' goals related to the specific content of their beliefs. These goals shape evaluations on their own, as happens when people value content that matches their goals. In addition, these epistemic goals shape whether perceivers think that fluency of a specific content is a desirable or undesirable thing. This discussion allows us to explore the interplay between fluency and epistemic goals in the context of evaluation. Our approach offers a broader perspective on the relationship between fluency, beliefs, and motivation than our recent work on fluency in the specific domain of art (Yoo, Jasko, & Winkielman, 2024). Thus, beyond expanding the scope of inquiry, this contribution reviews new empirical evidence and introduces additional theoretical considerations.

The core argument of this contribution is as follows. First, stimuli may be processed with varying levels of fluency. A billboard message, a painting, or a politician's face may be fluent—"easy on the eyes"—meaning it is quick and effortless to process due to its simplicity, coherence, symmetry, prototypicality, familiarity, or other factors. This ease generally leads to more positive evaluations. Second, we discuss how fluency's impact on evaluation depends on people's expectations about both the stimulus and fluency itself. After all, what is perceived as easy is often relative to expectations. Third, we examine how fluency experience is interpreted and how people's "naïve theories"—their intuitive, informal, folk beliefs about how the mind works—link fluency to an object's value. As an example, a reader may interpret an experience of ease as evidence that the author is a skilled writer—or a simpleton. We also discuss how evaluations are driven by people's analysis of costs and benefits of effort (mental and physical). Fourth, we explore the role of non-directional and directional epistemic goals. At times, perceivers seek rapid and comprehensive understanding—for example, they may appreciate a politician who delivers clear messages and decisive solutions, regardless of content. Other times, people tolerate or even prefer ambiguity and surprises. Additionally, the content of beliefs and its relation to epistemic goals plays a crucial role. A clear political message may be

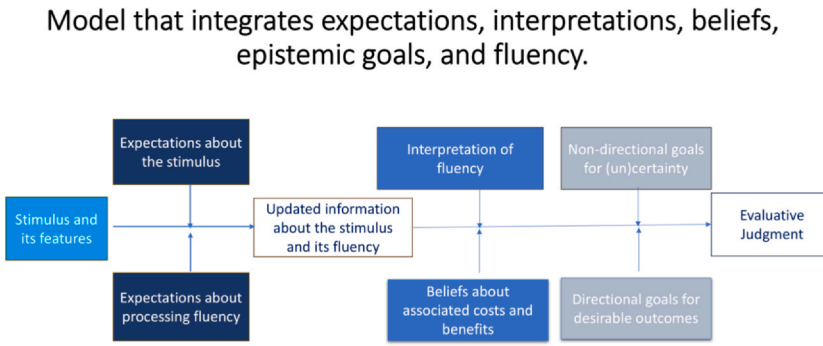

Fig. 1 Model that integrates expectations, interpretations, beliefs, epistemic goals, and fluency.

negatively evaluated if it contradicts the perceiver's views. Directional epistemic goals can also influence fluency itself—agreeable political messages tend to be processed more fluently. Moreover, epistemic goals can affect the evaluation of fluency, as perceivers may react negatively when opposing messages are too easy to process.

All these factors—the nature of experience, expectations, bridging inferences, interpretations, and epistemic motivation—collectively shape how fluency influences social evaluations. Our model of this interplay is presented in a simplified form in Fig. 1 and will be elaborated on throughout the main text. But, as the reader probably already expects, our contribution will conclude with a suggestion that the effects of fluency on evaluation are rarely straightforward, as they reflect the richness of our mental life.

2. Formative features: content matters in how we form evaluations

There is no doubt that people pay attention to the content of a stimulus—its features and meaning. People do so even when making quick, spontaneous evaluations. Take, for example, the growing body of research on spontaneous impressions of trustworthiness from faces. People make such evaluations based on facial cues, including those related to emotion (e.g., smile-like features), youthfulness (e.g., face roundness), dominance (e.g., eyebrow shape), or facial height-to-width ratio (Todorov & Oh, 2021). Importantly, evaluations made based on such cues have consequences,

ranging from the domain of politics (e.g., Lin, Adolphs, & Alvarez, 2018) to judgments of guilt or innocence (e.g., Wilson & Rule, 2015). This focus on features is a dominant approach in the psychology of first impressions, with computational tools allowing for a more sophisticated identification of cues, including complex cue combinations and multimodal cues (e.g., Lin & Thornton, 2024).

The literature on more deliberative judgments also emphasizes the importance of features, albeit on a higher behavioral level. For example, consider judgments of trust. Research suggests that to determine trust, people focus on behaviors that reveal a person's competence, benevolence, predictability, and integrity (Mayer, Davis, & Schoorman, 1995; Winkielman & Nowak, 2022). Interestingly, researchers have shown that during repeated interactions (e.g., playing multiple rounds of economic games), initial judgments of trustworthiness based on facial features are gradually integrated with information based on actual personal experience with a partner's decisions (e.g., Rezlescu, Duchaine, Olivola, & Chater, 2012). People are also able to override their initial impressions from faces, especially when provided with strong diagnostic information (Shen, Mann, & Ferguson, 2020). This is consistent with the prevailing assumption in psychology that evaluations reflect a continuous, dynamic process of updating impressions with new information (Fiske, Lin, & Neuberg, 1999; Freeman & Ambady, 2011).

3. Easy peasy lemon squeezy: the role of processing dynamics in evaluations

However, it has long been recognized that judgments and evaluations reflect not only *what* is being processed but also *how*—the quality of mental processing. One general distinction used to capture the difference between *what* and *how* is that some mental states are all about semantic content (e.g., a thought: *"I live in California"*)—they have *propositional*, sentence-like content. In contrast, some mental states are more like sensations or feelings (e.g., a sensation: *"I feel tired"*)—these have *non-propositional*, non-conceptual content (Block, 2023). To use related terminology from social cognition, evaluations are based not only on declarative but also on non-declarative input (e.g., Schwarz & Clore, 2007). A classic example of non-declarative input in evaluation is the experience of mood. In fact, people sometimes simplify complex evaluative decisions by asking themselves, *"How do I feel about it?"*

and are more likely to endorse an option when they are in a positive mood (Schwarz & Clore, 2007). What makes mood unique as a mental state is that it is a feeling—an experience—and thus more like a sensation than a sentence-like thought.

Although fluency often comes with a hedonic tone, it is not primarily an affective experience but rather a type of *cognitive experience*. More than a century ago, William James noted that the notion of experience is not limited to affect but also applies to cognitive feelings such as mental effort, familiarity, rightness, tip-of-the-tongue, coherence, or strangeness (James, 1890). Because these feelings are about one's own information processing (memory retrieval, understanding, etc.), they are commonly referred to as *metacognitive feelings* (Fernández Velasco & Love, 2024). Following this tradition, in its simplest form, processing fluency refers to the subjective experience of ease (or difficulty) associated with mental processing, including perceiving, categorizing, recalling, imagining, and deciding (Unkelbach & Greifeneder, 2013). As we will explain shortly, fluency can influence evaluations either through inferences about its meaning or through the positive hedonic tone typically associated with processing ease.

4. The varieties of fluency

The literature on fluency is extensive and encompasses research in social and cognitive psychology, neuroscience, computational modeling, consumer behavior, empirical aesthetics, biology, and many other fields. Unsurprisingly, the definitions and operationalizations of fluency vary widely (Alter & Oppenheimer, 2009). Although many researchers identify (and measure) fluency simply as an *"experience of ease,"* it is useful to make some distinctions.

One distinction is between *perceptual fluency*, which reflects the dynamics of early processes of stimulus recognition, versus conceptual fluency (e.g., Whittlesea, 1993). *Conceptual fluency* is usually associated with semantic elaboration processes, memory retrieval processes, and complex mental simulation processes (e.g., Unkelbach, 2006; von Hecker, Hanel, Jin, & Winkielman, 2023). It is worth highlighting that more intense and enduring cognitive effort is more likely to be subjectively noticed and thus more likely to undergo interpretational processes, as we will discuss shortly.

Many researchers also investigate *motor fluency*, which is typically defined as the ease of executing a movement. This type of fluency has been shown to produce hedonic benefits (Brouillet, Ferrier, Grosselin, & Brouillet, 2011;

Cannon, Hayes, & Tipper, 2010; Hayes, Paul, Beuger, & Tipper, 2008). Motor fluency is closely related to the subjective experience of physical effort. Unsurprisingly, many principles that govern the psychology of mental effort also apply to experiences of physical effort, as we will explore later (Marcowski, Białaszek, & Winkielman, in press).

Perhaps the trickiest distinction is between *felt fluency* (i.e., subjectively experienced as ease) and *unfelt fluency*—processing effort that is not represented in phenomenology as a feeling (Reber, Wurtz, & Zimmermann, 2004). For example, deciphering a blurry image or a poorly worded cooking recipe in a hard-to-read font may be slow and truly feel effortful. However, recognizing a familiar face may be objectively fast but may not elicit a conscious feeling of ease. Importantly, unfelt fluency can still influence evaluative judgments. One way it can do so is by changing the appearance of an object. This idea is supported by recent research on the evaluative effects of repeated face exposure, or the classic mere exposure effect (Zajonc, 1968). Studies have shown that repeated (fluent) faces actually appear perceptually happier than novel (disfluent) faces, as indicated by perceptual judgments (Carr, Brady, & Winkielman, 2017). Another way unfelt fluency can influence evaluative judgments is by biasing motor dispositions, such as approach-avoidance movements (Carr, Rotteveel, & Winkielman, 2016).

The concept of unfelt fluency may be perplexing —after all, we have just discussed fluency as a subjective experience. Still, it makes sense if one considers that the organism can monitor the quality of its own processing without conscious awareness (Brouillet & Friston, 2023). Note also the similarities with the idea of *"unconscious emotion"* or *"unfelt affect"*—the observation that basic assessments of goodness/badness and basic physiological reactions do not require the emergence of conscious experience (Winkielman & Berridge, 2004). Similarly, the distinction between felt and unfelt fluency allows for cases in which monitoring of mental effort (smoothness, speed, efficiency) occurs unconsciously, generates no feeling, but still biases an object's appearance or dispositions to respond. We will return to this possibility when discussing computational models of fluency.

5. The cognitive origins of fluency research

Before we delve deeper into why fluency may be linked to evaluation, we should highlight that much of the pioneering empirical work on

fluency originated in the field of cognitive psychology. As mentioned, early speculations about fluency date back to William James (James, 1890), but systematic research on fluency began in the psychology of memory (Jacoby, 1983; Koriat, 1993). Researchers in this field have long known that variables such as priming, contrast, repetition, clarity, duration, intensity, prototypicality, and symmetry all lead to faster and easier responding (Haber & Hershenson, 1965). A key observation was that these different variables can also contribute to *illusions of familiarity*, *illusions of fame*, *judgments of learning*, and the *feeling of knowing*, all of which are based on the experience of processing ease (Jacoby, Kelley, & Dywan, 1989). This convergence of influences gave rise to the idea of a unified experience of fluency (Jacoby et al., 1989; Schwarz & Clore, 2007; Winkielman, Ziembowicz, & Nowak, 2015). The concept of *fluency experience* underpins a large body of cognitive research, demonstrating fluency's influence on judgments of truth (Hansen, Dechêne, & Wänke, 2008; Reber & Schwarz, 1999), coherence (Topolinski & Strack, 2009), risk (Song & Schwarz, 2009), and various other dimensions (Schwarz, Jalbert, Noah, & Zhang, 2021). In fact, much of what is known about fluency has been discovered by psychologists interested in non-evaluative "cold", cognitive judgments. However, in this contribution, we will focus on the evaluative consequences of fluency and the possibility that fluency has both direct and indirect influences on judgments of value.

6. It is good to be easy on the mind: the idea of hedonic fluency

The *Hedonic Marking of Fluency* account extends the original cognitive fluency theory to evaluative judgments (Winkielman, Schwarz, Fazendeiro, & Reber, 2003). Specifically, it proposes that fluency carries a positive hedonic marking (tinge), which likely arises because fluency signals favorable internal states (low energy expenditure, computational efficiency, goal progress) and favorable states of the world (familiarity, symmetry, typicality, and predictability).

The original empirical support came from experiments using priming, signal-to-noise ratio, clarity, contrast, and duration to facilitate or impede the processing of simple picture stimuli and basic liking judgments (Reber, Winkielman, & Schwarz, 1998). Research then expanded to a variety of stimuli and methods. For example, names—including brand names and

stock tickers—that are easier to pronounce are more liked and more frequently purchased than disfluent names (Laham, Koval, & Alter, 2012; Lee & Labroo, 2004; Oppenheimer, 2008). It is not only the ease of pronunciation or simple rhymes that makes stimuli more fluent and liked, but also their conceptual consistency and coherence. Simple cognitive inconsistency can generate negative affect, as it increases processing effort (Levy, Harmon-Jones, & Harmon-Jones, 2018; Topolinski, Likowski, Weyers, & Strack, 2009). Even when controlling for message content, inconsistency decreases participants' judgments of trust (Nowak, Biesaga, Ziembowicz, Baran, & Winkielman, 2023).

People also prefer repeated stimuli, as demonstrated by the mere exposure effect across words, faces, brand names, and sounds (Baker, 1999; Carr et al., 2017; Cutting, 2003; Monahan, Murphy, & Zajonc, 2000; Tremblay, Inoue, McClannahan, & Ross, 2010; Zajonc, 1968). The prevailing explanation for why repetition increases liking is that repetition enhances fluency (for review, see Montoya, Horton, Vevea, Citkowicz, & Lauber, 2017). Evaluations, including attractiveness and trust, are also enhanced by prototypicality, as demonstrated by the *beauty-in-averageness* effect across faces, birds, watches, and consumer products (Halberstadt & Rhodes, 2003; Landwehr, Labroo, & Herrmann, 2011; Winkielman, Olszanowski, & Gola, 2015). Critically, fluency is a causal contributor to this preference (Vogel, Carr, Davis, & Winkielman, 2018; Vogel, Ingendahl, & Winkielman, 2021; Winkielman, Halberstadt, Fazendeiro, & Catty, 2006). It also explains shifts in preferences as participants' expertise grows and different stimuli become more fluent (Carr, Huber et al., 2017; Cox & Cox, 2002; Landwehr, Wentzel, & Herrmann, 2013).

Importantly, across these paradigms, hedonic fluency effects can be detected through spontaneous approach-avoidance responses (Carr et al., 2016) and physiological measures. For instance, fluent stimuli increase muscle activity over the *zygomaticus major*—or the *"smiling"* region (Cannon et al., 2010; Gerger & Leder, 2015; Topolinski et al., 2009; Winkielman & Cacioppo, 2001; Winkielman et al., 2015). There is also evidence that repetition (*mere exposure*) is associated with more efficient brain processing (Grill-Spector, Henson, & Martin, 2006) and greater activity in reward regions (e.g., Ballard, Hennigan, & McClure, 2017; Elliott & Dolan, 1998; Green, Bærentsen, Stødkilde-Jørgensen, Roepstorff, & Vuust, 2012). Similarly, pattern prototypicality is associated with more efficient neural processing and more favorable evaluation (Kaminska et al., 2020; Reber, Stark, & Squire, 1998).

Though hedonic fluency provides a parsimonious framework for explaining many evaluative effects, evaluations are often shaped by perceivers' expectations, theories, and—our novel emphasis here—goals. As we discuss next, these factors play a key role in determining what is fluent, how fluency is experienced and interpreted, and whether and how it is used in judgments.

7. I knew it was coming! The impact of stimulus expectations on fluency

The original version of the *Hedonic Fluency Theory* emphasized that the fluency of a stimulus depends either on its objective properties (e.g., symmetry, contrast, duration) or on the perceiver's history with the stimulus or related contextual stimuli (e.g., repetition, priming, consistency, prototypicality). It was proposed that these variables influence how easily (quickly and without errors) a stimulus is processed, either through standard associative mechanisms such as pre-activation in priming or repetition, or through the perceiver's ability to create a coherent mental model.

Early computational modeling of fluency linked it to unconscious monitoring of neural network properties, such as settling time or the number of network units changing state (Lewenstein & Nowak, 1989; Winkielman, Huber, Kavanagh, & Schwarz, 2012). In these models, fluency is essentially a function of a global match with learned patterns. Later computational modeling work on hedonic fluency of prototypes used either a global match memory model (Carr, Huber et al., 2017) or a statistical feature learning model (Ryali, Goffin, Winkielman, & Yu, 2020). These later models essentially compute the degree of overlap between stored information and incoming stimuli. Therefore, they can be understood as incorporating expectations (predictions) about the most likely stimulus parameters. Many researchers now conceptualize hedonic fluency effects in terms of predictive coding theories, where hedonic effects correspond to a form of reward for correct predictions or improvements in the internal mental model (for detailed discussion, see Brielmann & Dayan, 2022; Brouillet & Friston, 2023; Fernández Velasco & Love, 2024; Van de Cruys & Wagemans, 2011; Yoo et al., 2024).

One empirical implication of these conceptualizations is that stimulus fluency should dynamically change as a function of the perceiver's learning history as well as their current top-down expectations. A surprising,

unexpected (rare, unpredicted, deviant, irregular) stimulus is usually slower and harder to perceive and interpret than a predicted stimulus. This phenomenon can be easily explained by the influence of both bottom-up and top-down processes on processing efficiency (e.g., Pinto, van Gaal, de Lange, Lamme, & Seth, 2015).

Consistent with this idea, our research highlights that both fluency and evaluation of the same stimulus can change as a function of history and current top-down expectations. One demonstration of this is our research with faces of individuals and morphs (blends or composites) of those individuals (Carr, Huber et al., 2017; Halberstadt, Pecher, Zeelenberg, Wai, & Winkielman, 2013). When participants have only limited history (low familiarity) with individual faces, they generally prefer the morph, reflecting the fact that the morph is more fluent and familiar than the individual faces constituting the morph. This is known as the *beauty-in-averages* effect. After all, the morph is closer to the typical face, or in the language of expectations, it is the most predicted stimulus at the population level. However, when individuals have more knowledge (high familiarity) with specific faces, they prefer those individual faces over the morph. In the language of expectations, the morph is now less predicted than the individuals and is also less fluent. This is known as the *ugliness-in-averages* effect.

In addition to personal familiarity through repeated encounters, top-down manipulations can determine which specific stimulus becomes "expected" and thus fluent, and which becomes "unexpected" and thus disfluent. For example, consider an androgynous human face. It can serve as a prototype (average) of a broad category (human beings). However, it also as an atypical example of a narrower gender category (male vs. female). When participants' task is simply to detect the presence of faces, androgynous faces are fluent and liked. However, when participants must categorize faces as male or female, the same androgynous face becomes disfluent and disliked (Owen, Halberstadt, Carr, & Winkielman, 2016). Similar dynamic changes in fluency and preference for the same stimulus as a function of top-down manipulations have been demonstrated across other categories, such as living vs. non-living objects (Carr, Hofree, Sheldon, Saygin, & Winkielman, 2017), ethnic categories (Halberstadt & Winkielman, 2014), and specific emotion categories (Kaminska et al., 2020; Winkielman et al., 2015). In other words, top-down factors can flip the *beauty-in-averages* effect into the *ugliness-in-averages* effect. This dynamic dependence of stimulus fluency on task sets has been computationally modeled and accounts well for empirical findings on changes in fluency and

attractiveness of faces across various categories (Ryali et al., 2020). In short, whether the same object is fluent and benefits from fluency-based evaluative consequences depends on the perceiver's currently active and dynamically changing mental model of the world.

A broader speculation emerging from this research is that the impact of expectations on fluency may be one reason why social norms shape evaluations. Extensive empirical evidence suggests that individual preferences are influenced by the behavior and opinions of the majority or valued social groups (Cialdini & Goldstein, 2004). This has been demonstrated across various domains, including consumer products (Izuma & Adolphs, 2013), music (Berns, Capra, Moore, & Noussair, 2010), food preferences (Nook & Zaki, 2015), faces (Yoo & Winkielman, 2023), and even moral decisions (Jiang, Marcowski, Ryazanov, & Winkielman, 2023). Social influence can shape preferences even when a stimulus is already fluent and unambiguous (Yoo & Winkielman, 2023). However, its influence is even stronger when the stimulus is uncertain or ambiguous (Zhang et al., 2017). We propose that one reason for this effect is that social norms, beyond simply communicating value, create top-down expectations about the stimulus. This, in turn, enhances fluency, making certain stimuli easier to process and, consequently, more likable. For example, if a perceiver expects a musical piece to follow a particular style, the match between the piece and their expectation enhances fluency and liking (Huron, 2006). While we will refine this argument further, the key point remains—adjusting a stimulus to match expectations, or adjusting expectations to match the stimulus, is a way to enhance processing fluency and, ultimately, evaluations.

8. Wow, that was surprisingly easy! The role of expectations about fluency

Note that people can be surprised not only by the properties of a stimulus but also by its fluency. Across various domains, from science to art, we sometimes encounter works that initially seem undecipherable or intricate but turn out to be unexpectedly easy to comprehend. The original research on *unexpected fluency* comes from cognitive psychology. Specifically, Whittlesea and Williams (1998) demonstrated that it is the discrepancy (relative deviation) between expected and actual fluency, rather than the absolute level of fluency, that enhances familiarity illusions. In other words, a stimulus does not need to be objectively fluent to feel

familiar—it only must be more fluent than expected. This concept has been extended beyond the memory domain by studies showing that relative fluency also matters for judgments of truth and preference (Wänke & Hansen, 2015).

Does this mean that fluency feels good and is impactful only when it is surprising? No. According to the original *Hedonic Fluency Theory*, much of fluency's hedonic value and impact comes from simply being *easy on the mind*—its intrinsic positivity due to the reward value of smooth dynamics, resource economy, and coding efficiency (Reber, Schwarz, & Winkielman, 2004). Additionally, fluency serves as a heuristic cue that the environment is benign—typical, familiar, and predictable (Winkielman et al., 2015). This heuristic value does not need to be dependent on surprise (e.g., we like familiar but highly predictable foods). Our argument that fluency's positivity is at least partly *intrinsic* or *objective* is similar to the observation that while two push-ups feel easy and enjoyable, twenty push-ups feel hard and unpleasant, regardless of one's expectations.

It is also worth noting that from a *meta-cognitive* perspective, better-than-expected fluency is not always positive. If a stimulus is easier to process than anticipated, it signals to the perceiver that their mental model was inaccurate, triggering a prediction error signal about their own fluency. For instance, a reader may find a book too easy to read or a puzzle too easy to solve and, as a result, experience disappointment (Erle & Topolinski, 2018). This negative reaction may stem from various factors, but one possibility is that people feel upset by the misestimation of their own comprehension abilities. Future research could further explore this idea, particularly in relation to the broader question of which sensations are expectation-dependent, and which have more *intrinsic* properties. Both possibilities could be true. For example, a dental procedure, such as a root canal, that is less painful than expected could still feel distinctly unpleasant (*expectation-independence*). At the same time, the same root canal could feel more unpleasant if it was expected to be bearable (*expectation-dependence*).

9. What does it mean? "Naïve" theories about mental and physical effort

So far, we have argued that quick and efficient processing can generate an experience of ease, which carries a positive tinge. In other words, lower mental effort is typically perceived as pleasant. However, in

addition to its intrinsic qualities, perceivers may also engage in further interpretative processes regarding fluency experiences, much like they do with any experience. A classic example in psychology is the experience of arousal, which may carry a negative tinge but can be interpreted in different ways (e.g., nervous excitement, apprehension) and lead to a variety of judgments (Reisenzein, 2017). This idea also applies to fluency experiences—after all, the mere feeling of ease or difficulty does not inherently carry meaning on its own (Schwarz & Clore, 2007). This observation suggests that in some contexts, ease can lead to negative judgments, while difficulty can result in positive judgments.

To empirically test this idea, we manipulated the ease associated with the retrieval of neutral childhood memories. Specifically, we asked some participants to retrieve four events, which feels easy, while others were asked to retrieve twelve events, which feels hard (Winkielman & Schwarz, 2001). Additionally, we manipulated participants' *naïve theories* (folk beliefs) linking retrieval fluency to childhood happiness. The results showed that difficulty in retrieving neutral childhood memories (twelve events) could lead to more positive childhood evaluations than ease of retrieval (four events)—but only when participants were given a *bridging naïve theory* suggesting that difficulty in recalling childhood memories simply meant that nothing bad had happened. In contrast, the opposite result emerged when participants were provided with a naïve theory implying that difficulty in recalling memories indicated that something bad must have occurred. These findings are intriguing because they demonstrate that inferences drawn from processing difficulty can override any inherent negativity associated with the difficulty itself (see also Briñol, Petty, & Tormala, 2006). A similar effect has been observed with perceptual fluency. For instance, products advertised in easy-to-read fonts are sometimes perceived as less valuable, presumably because consumers interpret fluency as a sign of commonality (Pocheptsova, Labroo, & Dhar, 2010; see also Song & Schwarz, 2009).

We have just discussed how mental effort is subject to interpretation and inferences, which can shift its influence on evaluative judgments. These ideas align with recent research on the *paradox of effort*—the phenomenon that high effort can sometimes decrease but at other times increase the value of associated outcomes (Inzlicht, Shenhav, & Olivola, 2018). Both aspects of this paradox are well established. The classic *law of less work* or *principle of least effort* predicts that individuals should always value the less effortful option, as effort is generally perceived as an additional cost

(Hull, 1943; Zipf, 1949). Indeed, years of empirical research confirm that both mental and physical effort are usually perceived as costly and are avoided, unless necessary (Kool, McGuire, Rosen, & Botvinick, 2010; Shenhav et al., 2017). This is not surprising from the perspective resource-rationality – or the idea that organisms make decision that reflect the optimal use of limited resources (Bhui, Lai, & Gershman, 2021).

On the other hand, effort can sometimes enhance value, as demonstrated in phenomena such as the *IKEA effect* (Norton, Mochon, & Ariely, 2012) or the *martyrdom effect*, where greater effort leads to a higher evaluation of the cause (Olivola & Shafir, 2013). One explanation for these effects is that people sometimes interpret high effort as either increasing or decreasing the value of an outcome. This suggests that the *same* experience of high effort can have different implications for value.

For example, consider the effort required to climb stairs to the top of the Statue of Liberty or the Eiffel Tower. If the effort is interpreted as a sign of exclusivity or historical authenticity, it may enhance the value of the experience. Conversely, if the effort is interpreted as a sign of technological backwardness or inefficiency, it may detract from the experience's value.

Recently, we demonstrated the diversity of effort-value relationships in a paradigm where participants chose between an effortless option (money) and an item (a mug) associated with varying levels of physical effort, implemented as stair climbing (Marcowski et al., in press). The key finding was that participants exhibited highly diverse relationships between effort and item value. For some, greater effort increased the item's value, while for others, greater effort decreased it, leading them to prefer the effortless money option. More intriguingly, we observed *nonlinear* patterns, where small amounts of effort initially increased outcome value, but higher effort decreased it—or vice versa (initial decrease followed by an increase). These diverse effort profiles were best explained by a model that considered the *net effects* of effort on item value as a function of both *associated benefits* (positive inferences from high effort) and *associated costs* (negative inferences from high effort).

Admittedly, the research just described focused on *physical* effort, and there are many differences between physical and mental effort, as well as among different types of mental effort (Thomson & Oppenheimer, 2022). Still, the major conclusions seem applicable to fluency. After all, people need to interpret the meaning of effort and draw a variety of inferences from it, which ultimately shape their evaluations. This conclusion becomes even more compelling when considering that in effort-based decision-making

tasks, participants also factor in their personal epistemic and non-epistemic goals—a topic we will explore in the next section. Accordingly, the next section moves beyond the question of *what* inferences people draw from mental effort to *whether* fluency itself aligns with their goals.

10. What do I want? Fluency and the role of epistemic goals

Do people always value ease? Is low effort always desirable? A common challenge to the idea that fluency enhances evaluation is that people sometimes highly value stimuli that are unexpected, novel, complex, atypical, or ambiguous (Blijlevens, Carbon, Mugge, & Schoormans, 2012; Cox & Cox, 2002; Hekkert, Snelders, & Van Wieringen, 2003; Landwehr et al., 2013; Muth & Carbon, 2016; Nadal & Chatterjee, 2019). Another challenge is the observation that evaluations are strongly shaped by congruency with personal goals—what individuals seek in life. For example, rejection—whether in work or romance—is rarely perceived positively, as it typically frustrates personal or professional aspirations. Similarly, fluency itself may be influenced by an individual's broader values and goals. In short, a more comprehensive understanding of fluency's role in evaluation requires examining how people pursue their goals.

We propose that this challenge can be explained through the *Epistemic Motivation Model* (EMM) (Kruglanski et al., 2018; Kruglanski, 2013; Kruglanski, 2023). EMM posits that people construct new beliefs by updating prior ones based on new evidence (Kruglanski, Jasko, & Friston, 2020). According to EMM, belief updating reflects the *informational gain* (or *surprise*) induced by new evidence. This perspective aligns with our earlier discussion on how expectations shape fluency—expected events are processed more fluently (Pinto et al., 2015). However, in EMM, simply updating information or matching a stimulus to an expectation does not automatically lead to positive or negative evaluations. That is, EMM does not assume that fluency, or the alignment of a stimulus with expectations, is inherently good. Instead, evaluations depend on what the updated beliefs mean in relation to active epistemic goals. If new information aligns with one's goals, the experience feels positive; if it conflicts with one's goals, the experience feels negative. EMM further distinguishes between two general types of epistemic motivational influences—non-directional and directional—which we explore next.

11. I (don't) want to know: non-directional goals to seek vs. avoid certainty

Sometimes, people simply want to know—they seek a clear and confident conclusion, regardless of its content. For example, when traveling, we do not have a preference for a specific platform from which the train departs (2 or 6), we simply need to be sure of the platform number, so we know where to go. Similarly, someone motivated by a desire for certainty may not care whether the forecast predicts a sunny or rainy day—what matters is having a definitive answer, so they can dress appropriately. In both of these cases, certainty and predictability (i.e., fluency) are desirable.

However, there are times when people prefer not to know at all, or at least not yet. They may embrace uncertainty, finding value in surprise or ambiguity, either temporarily or indefinitely. Some people do not want to know the exact day they will die. Some people may choose not to know the results of a medical test, the details of a surprise party, or the ending of a book (D. Leavitt & Christenfeld, 2013; Leavitt & Christenfeld, 2011; Rosenbaum & Johnson, 2016). In all these cases, the unexpected, ambiguous, or surprising (i.e., disfluent) experiences are preferred.

Empirical evidence supports this distinction, showing that both situational factors and individual differences shape preferences for predictability versus ambiguity. For example, Hansen and Topolinski (2011) found that perceivers preferred atypical over typical patterns after being induced into an exploratory mindset, but this effect disappeared in a control condition. Similarly, positive mood, which promotes exploration, increases preferences for atypical over typical patterns (De Vries, Holland, Chenier, Starr, & Winkielman, 2010). The appreciation of uncommon objects also increases when individuals value uniqueness and novelty (Pocheptsova et al., 2010). Valsesia and Schwarz (2016) further demonstrated that consumers with strong uniqueness goals tend to prefer disfluency.

This revised fluency framework emphasizes that the value of fluency is not fixed but depends on an individual's goals. When the goal is to reduce uncertainty, the traditional hedonic fluency theory applies—higher fluency elicits positive affect. However, when the goal is to embrace uncertainty, a perceiver may prefer a disfluent stimulus or one that remains open to interpretation. In such cases, fluency's typical hedonic benefits may disappear. For example, if someone enjoys ambiguous films, the ease of comprehension may actually detract from the experience, leading to disappointment rather than pleasure. These paradoxes offer rich opportunities for further research.

Finally, individuals' prior expectations about fluency also play a crucial role (Hansen & Wänke, 2013). Someone with a strong preference for uncertainty may be disappointed if a stimulus is too easily understood (Erle & Topolinski, 2018). Next, we turn to the role of specific epistemic goals and how they shape evaluation, both independently and in combination with fluency.

12. I want it my way: directional goals to seek desirable outcomes

The second type of motivational influence is directional, shaped by the desirability or undesirability of specific outcomes that a person seeks to achieve or avoid. People generally strive to be healthy, successful, and knowledgeable, and their epistemic preferences reflect these goals. Beliefs that signal progress toward these outcomes evoke positive emotions, while information that suggests setbacks elicits negative reactions. Consequently, evaluations of stimuli are strongly influenced by their alignment with personal goals. For example, individuals are more likely to support a politician whose policies align with their values and oppose one whose actions contradict them.

Although this type of epistemic motivation is less frequently discussed in the context of fluency, it may still impact evaluations through meta-cognitive feelings. When a stimulus aligns with an important goal, it may be processed more fluently. Conversely, when information contradicts a goal, it might introduce cognitive friction, making it feel less fluent and potentially less favorable.

The influence of goals on fluency can be understood similarly to top-down expectations. Goals function as cognitive representations of desired end-states, acting as reference points that guide behavior (Kruglanski et al., 2002). As a result, they prioritize and facilitate the processing of goal-relevant content. In the field of attention, for instance, it is well established that having a goal to locate specific information can facilitate even low-level perceptual processes (Chapman & Störmer, 2024). From this perspective, content that supports a goal, as well as content that is incongruent or threatens it, should be processed more fluently than goal-irrelevant information. However, while goal-congruent content may benefit from fluency's positive effects, fluent processing goal-incongruent content might result in ambivalence due to its negative implications. These relationships between fluency, goals, and evaluation warrant further empirical investigation.

13. All together now: interplay between different epistemic goals and fluency

People often pursue multiple goals at once. Some of these are non-directional—they seek knowledge for its own sake or prefer to remain unaware. Others are directional—they aim for specific outcomes or beliefs. The final impact of fluency on evaluative judgment depends on how these two types of epistemic goals interact. In some cases, non-directional goals may be more influential, while in others, directional goals take precedence. As a result, people may favor fluency in certain contexts, prefer disfluency in others, or disregard fluency entirely in favor of goal alignment.

This dynamic is evident in findings that greater fluency in recognizing a prototypical pattern can lead to more negative evaluations if the pattern represents an undesirable category (Vogel et al., 2021). For example, a face that is prototypical and fluent for the category "criminal", will be evaluated more negatively than an atypical, disfluent face. In short, any positive hedonic value of greater fluency can be wiped out by the fluency serving as a cue to the negative category membership.

An intriguing but unexplored question is whether directional goals influence the experience of fluency itself. For instance, when encountering the same stimulus, does its meaning—whether it aligns with or contradicts a person's directional goals—affect both their overall evaluation and their subjective sense of fluency? Consider a scenario in which a politician's message either resonates with or opposes someone's deeply held values. Could this alignment or misalignment enhance or reduce the perceived ease of processing the message? While this hypothesis has yet to be tested empirically, it offers a promising direction for future research.

14. Conclusion

This contribution aimed to refine and expand the original fluency account of evaluation (Winkielman et al., 2003). We first outlined the fundamental reasons why fluency is often linked to positive evaluations. We then explored the complexity of inferences drawn from fluency, emphasizing how naïve theories, interpretations, and associated beliefs can shape the relationship between mental effort and value. Finally, we extended the traditional framework by incorporating insights from the epistemic motivation model (Kruglanski et al., 2018).

To fully understand fluency's impact on evaluation, we propose considering the following key factors, as summarized in Fig. 1: (i) the intrinsic value of ease, (ii) expectations about both the stimulus and fluency itself, (iii) interpretations of fluency and beliefs about its costs and benefits, (iv) non-directional epistemic goals—while fluency is often desirable, there are contexts where disfluency is appreciated—and (v) specific directional epistemic goals, which influence how individuals process and evaluate a stimulus. Importantly, people have preferences regarding knowledge acquisition, reaching particular conclusions, and even experiencing certain emotions (e.g., discomfort, inspiration). These goals shape how fluency contributes to evaluations.

Ultimately, this contribution highlights that fluency's effects are not straightforward but rather reflect an interplay of multiple psychological factors. Understanding this complexity opens up exciting avenues for future research. Furthermore, the principles explored here extend beyond mental and physical effort to a broader range of cognitive and affective experiences. All mental states, after all, exist within a rich network of goals and interpretations.

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