

TARGET ARTICLE



## Cognitive Consistency Theory in Social Psychology: A Paradigm Reconsidered

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### ABSTRACT

From the 1950s onward, psychologists have generally assumed that people possess a general need for cognitive consistency, whose frustration by an inconsistency elicits negative affect. We offer a novel perspective on this issue by introducing the distinction between *epistemic* and *motivational* impact of consistent and inconsistent cognitions. The epistemic aspect is represented by the updated expectancy of the outcome addressed in such cognitions. The motivational aspect stems from value (desirability) of that outcome. We show that neither the outcome's value nor its updated expectancy is systematically related to cognitive consistency or inconsistency. Consequently, we question consistency's role in the driving of affective responses and the related presumption of a universal human need for cognitive consistency.

### KEYWORDS

Affective response;  
cognitive consistency;  
hypothesis validation;  
motivation

I admit that two times two is four is an excellent thing. but if we are to give everything its due, twice two makes five is sometimes a very charming thing too. — Fyodor Dostoevsky, 1864

### Bottom Line Up Front

Every now and then in the evolution of a science, a conceptual paradigm may become so entrenched and taken for granted that its basic assumptions go unchallenged (Kuhn, 1962). With time, however, evidence may accumulate that questions those fundamental premises. This often occasions a reexamination that ultimately foments a paradigm shift (Kuhn, 1962). In the present article, we initiate such a reexamination with respect to a major social psychological paradigm based on the principle of cognitive consistency. Contrary to the received view, we conclude that humans do not have a general need for cognitive consistency whose frustration occasions upset and attitude change. Rather, humans care about satisfaction of their cognitive goals: reaching desired conclusions, or forming assured knowledge on a topic where certainty is desired. Cognitive consistency/inconsistency does not uniquely bear on those objectives, hence it does not, as such, matter much to individuals.

Our present aims are to substantiate the foregoing assertions by (a) outlining a theoretical model that depicts the epistemic and motivational consequences of consistent or inconsistent cognitions and (b) examining extant empirical data relevant to the model's implications.

### The Cognitive Consistency Paradigm

The cognitive consistency paradigm has been hailed as a major conceptual framework in social psychology, the assumptions

and implications of which infiltrated almost every corner of the field and insinuated themselves into other domains of psychological science (e.g., cultural psychology, organizational psychology, neuroscience, animal research) and beyond (political science, economics, sociology, and philosophy, among others). The consistency paradigm spawned two major source-books (Abelson et al., 1968; Gawronski & Strack, 2004) and inspired social psychology's most influential theory, namely, Festinger's (1957) theory of cognitive dissonance. The concept of cognitive dissonance itself has entered the popular culture and become a ubiquitous “household term” comfortably used by many in lay discourse.

Obviously, impact of such magnitude is unlikely to have been achieved without substantial empirical support. Indeed, voluminous research in labs across the globe has been interpreted as offering a solid base of support for the cognitive consistency paradigm and its core hypothesis that humans possess a deep-seated need for cognitive consistency the frustration of which engenders distress. Despite its considerable volume, however, it turns out that most such work suffers from the same fundamental flaw: a confounding of cognitive inconsistency with (a) its epistemic effect of updated expectancy, and (b) “bad news,” representing beliefs contrary to one's desires. And, as we show, when these are uncoupled, extant evidence suggests that the latter two, rather than cognitive inconsistency, are responsible for the observed phenomena in this domain.

### Epistemic and Motivational Aspects of Cognitive Consistency

Our theory centers on the distinction between *epistemic* and *motivational* aspects of an encounter between different

cognitions (beliefs, attitudes) that are consistent or inconsistent with one another. The epistemic aspect relates to *expectancy*, or belief resulting from this encounter, that is, the subjective likelihood that a given state of affairs will materialize. Cognitions consistent with this proposition constitute positive evidence that augments one's confidence in it; they are thus expectancy enhancing. Inconsistent cognitions constitute negative evidence that is confidence undermining or expectancy reducing. The motivational aspect addresses the subjective *value* to an individual of the state of affairs portrayed in the cognitions: Does he or she even care, and wishes to form a confident opinion, about it? Is this state of affairs desired by that person? Is it undesired? How strongly so? Answers to these questions define the type and magnitude of motivation the person has with respect to the state of affairs at issue and hence to her or his affective reactions to expectancy that it will materialize or not.

Expectancy and value are largely independent of each other. It is possible to have a high or a low expectancy about a highly desirable outcome (e.g., succeeding at an important exam) but also a high or low expectancy about a negative outcome (e.g., failing an exam), or an outcome (e.g., the departure time of a train) that is devoid of value as such, yet about which the individual may still desire to form confident (i.e., subjectively certain) knowledge.

The term *cognitive outcome* refers here to the content of the proposition and/or to its subjective certainty. Some propositional contents (e.g., that one succeeded at an exam) may be desirable for an individual, others (e.g., that one failed) undesirable. Too, the *certainty* of some propositions may be desirable (e.g., concerning the location of the exam's site), whereas the certainty of other propositions (e.g., concerning the manner of one's death, or the gender of one's unborn child) may be undesirable for some individuals (Gigerenzer & Garcia-Retamero, 2017).

Affective reaction to information is a combined function of *expectancy* and *value* attached to the cognitive outcome. Psychologists have long assumed that motivation is a function of the value/desirability of an object or a state of affairs qualified by expectancy that this state of affairs will materialize (Lewin, Dembo, Festinger, & Sears, 1944; Tolman, 1955; Vroom, 1964; for reviews, see Feather, 1982; Mitchell, 1982). In turn, motivation determines individuals' affect in a situation (Frijda, 2004; Higgins, 1987), and in the present context the individual's affective reaction to new (consistent or inconsistent) information.

Specifically, the higher the expectancy of a desired cognitive outcome, or the lower the expectancy of an undesired outcome and the greater the respective desirability or undesirability, the more positive would be the individual's affective reaction. Likewise, the lower the expectancy of a desired outcome or the higher that of an undesirable outcome, and the greater the respective desirability or undesirability, the more negative the affective reaction.

Crucially for the present discussion, expectancy isn't determined uniquely by cognitive consistency or inconsistency. Namely, the same magnitude of expectancy may arise from information inconsistent with a strongly held

hypothesis (i.e., one whose initial expectancy was high) or information consistent with a weakly held hypothesis (one whose initial expectancy was low). It is the magnitude of expectancy, rather than its origination from consistent or inconsistent information, that in conjunction with value determines the affective reaction to new information (Frijda, 2004; Higgins, 1987).

In what follows, we discuss in greater detail the epistemic and motivational aspects of new (consistent or inconsistent) information.

## **The Epistemic Reaction: How Cognitive Encounters Affect Beliefs**

### **What Consistency/Inconsistency Is**

The cognitive consistency paradigm addresses the affective and cognitive impact of new information that is consistent or inconsistent with the individual's prior beliefs. Following Festinger (1962, p. 13), we assume that the terms consistency and inconsistency pertain to the degree to which for a given individual<sup>1</sup> one cognition implies the other. For instance, the cognition "it is raining" may imply to most of us the cognition "pavement getting wet," hence the latter cognition is consistent with the former. Similarly, given the premise "if raining, the pavement is getting wet," the cognitions "it is raining" and "the pavement remains dry" are inconsistent with each other. We are thus assuming that the terms cognitive consistency and inconsistency refer to relation among beliefs as they are mentally represented in a given person's mind.

### **What Consistency/Inconsistency Does**

Subjective relations among beliefs are addressed with mathematical precision in the Bayesian approach, often recognized as a reasonable analogue of human inference (cf. Cosmides & Tooby, 1996; Hoffrage, Krauss, Martignon, & Gigerenzer, 2015; Knill, Kersten, & Yuille, 1996; Tenenbaum, Griffiths, & Kemp, 2006).

*Consistency* of two cognitions  $x$  and  $y$  with each other could be expressed in terms of the conditional probability (subscribed to by an individual) that  $x$  will be the case if  $y$  was (i.e., "if  $y$  then  $x$ "), and *inconsistency* of  $x$  and  $y$  in terms of the conditional probability that  $x$  will *not* be the case if  $y$  was (i.e., if "y then not-x"). The present probabilistic perspective suggests that consistency versus inconsistency lie on a continuum (of degrees of conditional probability) rather than representing a dichotomy (thus responding to an early critique of cognitive consistency models voiced on this issue by Deutsch & Krauss, 1965, pp. 69–70). Generally speaking, the more a given information (e.g., that one did well on a math exam) is seen as consistent with the hypothesis (e.g., that one is good in math), the higher the expectancy that the hypothesis is true. Similarly, the more that

<sup>1</sup>Because members of a group subscribe to a shared reality (Hardin & Higgins, 1996), the mental representation of relations among concepts is likely to be common for members of a given culture or community.

given information is seen as inconsistent with a hypothesis, the lower the expectancy that the hypothesis is true.

Consistent with the present analysis, in prior work cognitive consistencies or inconsistencies were typically assumed to pertain to either the confirmation or the disconfirmation of expectancies (e.g., Aronson, 1968, 1992; Proulx & Inzlicht, 2012), to the *uncertainty* (i.e., expectancy around probability level of .5) that ensues where contradictory beliefs clash (Festinger, 1957, p. 14), or to the *certainty* (in this case, high expectancy) conferred by others' agreement with one's self-views (Swann, 2011).

For instance, in the forced-choice paradigm of dissonance theory (cf. Brehm, 1956), realizing the positive aspects of a rejected alternative is inconsistent with (and lowers the subjective probability of) the proposition that one has made the right choice. Because such proposition may be desirable to the individual, lowering the subjective likelihood in its validity is unpleasant and elicits negative affect (i.e., dissonance). According to the present theory such affect *does not* stem from an inconsistency (of new information with a prior belief) but rather with an updated expectancy concerning an event one cares about, for instance, a lower expectancy that one has made the right choice. Other examples from dissonance or other consistency research are amenable to a similar analysis.

To summarize then, cognitive consistency and inconsistency foster an expectancy update regarding an outcome, or state of affairs that they affirm (e.g., that the weather will be nice, that John will pass the exam, that one is responsible for an aversive outcome, or for a bad decision). Cognitive consistency/inconsistency as such do not drive a unique affective response. The latter stems from (a) the *value/desirability* of the depicted outcome as qualified by (b) the updated expectancy. But, as noted earlier, given different initial expectancies the *same* updated expectancy could result from an expectancy increment caused by consistency between *x* and *y* or an expectancy decrement caused by an inconsistency. It follows that consistency or inconsistency *as such* does not enter into the determination of affect, contrary to the ubiquitous presumption that it does.

We now turn to explore further the role of value/desirability assigned to cognitions and its grounding in individuals' epistemic motivations.

### **Affective Responses to Updated Expectancies: Motivated Reactions to Good and Bad News**

Value (desirability) of a cognitive outcome, and affect driven by such value, derives from the motivational investment the individual has in the topic at issue (Frijda, 2004; Higgins, 1987). Because consistent or inconsistent cognitions ultimately affect a *belief*, or expectancy concerning some desirable or undesirable outcome, it is appropriate here to discuss *epistemic* motivations, namely, motivations to have or to avoid beliefs of different kinds (Kruglanski, 1989). Two types of epistemic motivations pertain to the desirability of cognitive outcomes: (a) the motivation to confirm or disconfirm *specific* propositions, and (b) the motivation to have or avoid

*certainty* on a given topic. Elsewhere (Kruglanski, 1989), we referred to these as specific versus nonspecific needs to have (or avoid) cognitive closure. Both are briefly discussed in turn.

### **Approaching and Avoiding Specific Closure**

A need for specific closure denotes the individual's preference for particular *contents* of knowledge. A job candidate may strongly prefer to know that she was deemed suitable rather than unsuitable for a position, or a traveler may prefer that his train should depart in the morning rather than in the evening. One would similarly attach negative value to knowledge that a desired outcome failed to materialize. The knowledge that one is rejected by an attractive other, that one failed an important exam, or that one's child was hurt in a car accident represent instances of undesirable knowledge the validation of which one may dread. Consistency theorists prominently highlighted needs for specific closure—in particular, the self-enhancement motivation, that is, the motivation to believe that one possesses desirable qualities (e.g., is competent, moral, and attractive), has made the correct choice in some matter, and is free of responsibility for an undesirable outcome; this motivation was generally assumed to drive various dissonance phenomena (cf. Aronson, 1968; Brehm & Cohen, 1962; Cooper & Fazio, 1984; Festinger, 1957, 1962). We reiterate that needs for specific closure may refer to any desirable or undesirable outcome regardless of its motivational origin (e.g., stemming from hunger, thirst, the need for control, or any other need). Any motive when activated could make some outcomes desirable. For instance, hunger could make desirable the belief that food is forthcoming and the safety motive that one's alarm system is working.

### **Approaching or Avoiding Nonspecific Closure**

The *nonspecific* label suggests that the individual desires or eschews certainty (closure) on a topic irrespective of its particular contents: An interviewer may wish to know for sure whether a candidate is suitable for a job yet be quite impartial as to whether he or she is or is not, in fact. A traveler may wish to be certain about a train's schedule yet have nary a preference concerning its specifics. In other cases, individuals may avoid knowing something. For instance, a person may find knowledge about her or his genetic makeup (hence vulnerability) threatening and therefore avoid it, expectant parents may avoid knowing the gender of their forthcoming offspring, and a person intending to read a novel might avoid knowing how it ends (cf. Gigerenzer & Garcia-Retamero, 2017). Whereas cognitive consistency researchers did not explicitly refer to the distinction between nonspecific and specific epistemic motivations, they did so implicitly. Early on, Canon (1964) hinted at the importance of nonspecific knowledge in stating that

it [is] possible that dissonance arousing information may be, in some circumstances, intrinsically ... useful. If a person is committed to a course of action, *any information* that can

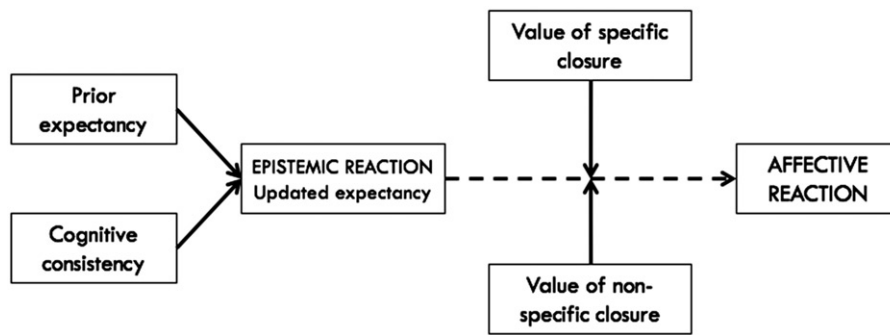


Figure 1. The expectancy-value model.

forewarn him of problems and difficulties is much more useful than information that tells him how easy and pleasant it will all be. (p. 84)

Pepitone (1968) similarly alluded to the need for nonspecific closure in asserting that “the tendency to seek and maintain valid cognitive structures [emphasis added] is one of the dynamics responsible for various effects attributed to inconsistency” (p. 323). More recently, meaning maintenance theorists invoked the motivation to maintain nonspecific closures in discussing “meaning,” defined as “the mental representations that allow us to understand our experiences” (Proulx & Inzlicht, 2012, p. 318), and hence “to understand, [our] world, and [our] relationship to the world” (Proulx & Major, 2013, p. 459). In general, individuals should experience positive affect to the extent that their (consistent or inconsistent) cognitions allowed them to reach or avoid nonspecific and/or specific closures that they desired or dreaded respectively.

In summary, desirability of beliefs on specific topics may be desirable or undesirable because of two of their aspects: (a) their contents’ correspondence to individuals’ needs for (or for avoidance of) specific closure and (b) their degree of certainty corresponding to individuals’ needs for (or for avoidance of) needs for nonspecific closure. Because under some conditions consistent cognitions may validate (increase the expectancy of), and inconsistent cognitions—invalidate (i.e., decrease the expectancy of) both desirable and undesirable beliefs, there seems little reason to posit a general need for cognitive consistency the frustration of which universally engenders negative affect. Instead, affective reactions to cognitive consistency or inconsistency should be determined by (a) the updated expectancy about a desirable or undesirable outcome plus (b) the desirability/undesirability of certainty on this topic. Our theory is graphically represented in Figure 1.

Consider a person who planned a hike with her friends and therefore wished for good weather over the next few days. Such person would be gratified (i.e., experience positive affect) if the weather forecast indicated a very low expectancy of rain. If that individual was also high in the need for closure, she might be additionally gratified by the certainty that the low probability affords. Consider now another person who wished to avoid going hiking with his friends (and study for an exam instead); such individual would be upset by the low probability of rain but, if also

high in the need for closure, he would at least appreciate the certainty that the forecast afforded and be somewhat mollified in consequence.

## The Empirical Base

To be compelling, a theory should explain extant data in a novel way. In the present case, the relevant data are voluminous. We review their gist next.

### Needs for Specific Closures

#### Reactions to “Bad” and “Good” News

According to our theory, cognitions inconsistent with a belief in a desired outcome should lower one’s expectancy that this outcome obtains; in plain speech, such an event constitutes “bad news,” eliciting negative affect in consequence. By the same token, cognitions inconsistent with an undesired outcome should constitute “good news,” and hence elicit positive affect. Of interest, a vast preponderance of studies in the dissonance tradition addressed the former case only. For instance, in classic forced compliance research, one’s desired self-concept as a reasonable person is presumably undermined by evidence that one committed a counterattitudinal act for insufficient inducement. This elicits negative affect, reducible via attitude change that restores one’s positive self-regard.

Other dissonance research suggests that for attitudinally inconsistent behavior to elicit negative affect, it must be performed under free choice (Linder, Cooper, & Jones, 1967), implying the individual’s personal responsibility for the behavior, hence impugning one’s desirable view of oneself. In a decision context, the positive qualities of the rejected alternative and the negative qualities of the selected alternative are inconsistent with the desired knowledge that one made a good choice, and hence is wise and judicious; this may breed negative affect, reduced via increasing one’s perceived attraction of the chosen alternative and downgrading the attraction of the rejected alternative as in the classic experiment by Brehm (1956). Extensive expenditure of effort is inconsistent with so doing for no good reason, again casting negative light on oneself and hence spawning negative affect. To prevent its arousal, individuals may justify their effort by elaborating the important reasons for putting in the effort (Aronson & Mills, 1959).



**The twin confounds of dissonance studies.** Results of dissonance experiments have been typically interpreted as attesting to the adverse effect of cognitive inconsistency on individuals' subjective well-being: One expects to act as someone intelligent, compassionate, and honest and is confronted with information inconsistent with that presumption indicating, instead, that one acted in a manner that is dumb, callous, or hypocritical. Under those circumstances, one experiences negative affect and attempts to reduce it via the appropriate attitude change. But is it cognitive consistency as such that actually drives this process? It is difficult to reach this conclusion in light of twin confounds that are typically present in dissonance studies.

One confound is between cognitive inconsistency and updated expectancy. Specifically, it is possible that what matters is not that the new information is cognitively inconsistent with prior expectancy but rather that such information results in an updated expectancy that in conjunction with the undesirable outcome (e.g., of viewing oneself as hypocritical or unintelligent) drives the negative affect. The second confound is, as noted earlier, that between inconsistency and the undesirability of the implied conclusions (i.e., it conveys "bad news"). Presumably, in other cases inconsistency could be conjoined with initial expectancies of a negative event, which when lowered by the inconsistency usher in "good news" that elicit positive affect.

Extant evidence indeed confirms that affect elicited by new information is driven by the updated expectancy rather than by the inconsistency. In this vein, Golub, Gilbert, and Wilson (2009) manipulated via false feedback students' expectations regarding their test results. The affective state of participants expecting positive versus negative results differed significantly while they were waiting for the results but not after participants received the same result: Those among them who received a positive result exhibited positive affect, whereas those who received a negative result exhibited negative affect, irrespective of prior expectancy. In other words, participants whose expectancy of an undesirable state of affairs was disconfirmed by an inconsistency were pleased, and those whose expectancy about a desirable state of affairs was disconfirmed were displeased, and the resultant affect was the same as that of participants whose expectancies about desirable states of affairs or undesirable states of affairs were confirmed by cognitive consistency. In conformance with our theory, then, it is not the confirmation or disconfirmation itself that matters (as the "need for cognitive consistency" notion would imply) but rather updated expectancy of desirable or undesirable outcomes that does so.

Similar findings were obtained in an early study by Ilgen and Gunn (1976). In that research, one group of participants received consistent feedback indicating good performance on a word puzzles task. Another group received inconsistent feedback, where information about failure was followed by that about success. No differences in satisfaction were obtained between those conditions after the final, positive feedback was delivered. This pattern of results was exactly replicated in a recent study by Sjästad, Baumeister, and Ent (2016). Again then, it is not inconsistency as such that

seems bothersome but rather the updated expectancy about a desirable outcome, that is, the state of affairs affirmed by either consistent or inconsistent cognitions that determines the individuals' affective response in the situation. A high (vs. low) updated expectancy about a negative outcome (i.e. "bad news") produces upset, whereas a high (vs. low) expectancy about a positive outcome (i.e., "good news") produces contentment.

Finally, Buechel, Zhang, Morewedge, and Vosgerau (2014) compared participants' reactions to predicted and experienced outcomes. In each of their six studies, researchers included two groups: "forecasters" and "experiencers." The task of forecasters was to predict an emotional reaction to positive and negative outcomes for which expectancies were low or high, whereas the experiencers reported their actual affect in response to such outcomes. Even though forecasters predicted stronger affective reactions to low as compared to high likelihood events, no such difference appeared among the experiencers, who reacted to a positive outcome with positive affect and to negative outcomes with negative affect, irrespective of the outcomes' prior expectancy. In other words, disconfirmation (i.e., lowered expectancy) of an undesirable outcome and/or a confirmation (heightened expectancy) of a desirable outcome elicited a similarly positive affective response, whereas disconfirmation of a positively valenced hypothesis or confirmation of a negatively valenced belief elicited a similarly negative response.

In some studies, disconfirmation of a belief had an even greater effect on the affective response than did confirmation, such that a disconfirmation (vs. confirmation) of a desired belief produced a more negative response and disconfirmation (vs. confirmation) of a negative belief produced a more positive response. For example, Mellers, Schwartz, Ho, and Ritov (1997), and Mellers, Schwartz, and Ritov (1999) found that people who engaged in repeated gambles reacted with greater elation to surprising wins than to expected wins, and with greater disappointment to surprising losses than to expected losses. In the context of real-life outcomes, Shepperd and McNulty (2002) showed that participants who formed prior expectations about having versus not having an undesirable medical condition felt worse when they received unexpected rather than expected bad news but felt better when they received unexpected rather than expected good news. A similar pattern of results was obtained with regard to performance on an intellectual task (McGraw, Mellers, & Tetlock, 2005; Mellers, 2000). The more pleasantly surprised people felt about their performance, the greater was their pleasure with the positive result. This finding was replicated in a sample of basketball players, who were happier with successful shots and more disappointed with failed shots when these were surprising than when the successes or failures were expected (McGraw, Mellers, & Ritov, 2004). Finally, Valenzuela, Mellers, and Strebel (2010) manipulated the expectedness of a gift received by participants at the end of the study. The pleasure reported after receiving the gift was higher when it was unexpected than when it was announced in advance. Note that in these studies, only inconsistency with a desirable

state of affairs elicited negative affect, whereas inconsistency with an undesirable state of affairs elicited positive affect, contrary to the ubiquitous assumption (derived from the need for consistency postulate) that cognitive inconsistency is universally upsetting.<sup>2</sup>

### **Magnitude of Desirable/Undesirable Outcomes**

According to the present theory, the updated expectancy modifies the affective response to the cognitive outcome, whereas such response is primarily driven by the (positive or negative) value that individuals attach to that outcome. Cross-cultural research contains intriguing evidence that members of different cultures attach different degrees of desirability/value to different types of beliefs. As a consequence, they react with correspondingly different affect to invalidation (lessened subjective probability) of such knowledge by inconsistent information.

Attention to this possibility was first attracted by a string of unsuccessful attempts to replicate standard dissonance effects across cultures. Thus, Yoshizaki, Ishii, and Ishii (1975) failed to replicate Festinger and Carlsmith's (1959) classic peg-turning study, in which participants were given a large or small reward for lying about how interesting the study is before reporting their true interest in the study. Sanada and Norbeck (1975) observed a doomsday cult in Japan both before and after an earthquake and failed to replicate Festinger, Riecken, and Schachter's (1956) finding that the prophecy's failure leads to a deepening of faith. Finally, a number of forced compliance studies conducted in Japan failed to obtain the standard attitude change effect under high choice (e.g., Hirose & Kitada, 1985; Kudo & Mitsui, 1974).

In a recent effort to account for some of these inconsistencies, Kitayama, Snibbe, Markus, and Suzuki (2004) carried out four experiments in the free-choice dissonance paradigm and found that Japanese participants showed the dissonance effect (increased liking for chosen items and decreased liking for rejected items) only when self-relevant others were primed. In contrast, European Americans exhibited the dissonance effect regardless of the social-cue manipulations (Kitayama et al., 2004). Similarly, Hoshino-Browne et al. (2005) found that European Canadians exhibited more dissonance reduction when they made a choice for themselves, whereas Asian Canadian and Japanese participants exhibited more dissonance reduction when they made a choice for a friend. These authors also found that an interdependent self-affirmation reduced dissonance for Asian Canadians but not for European Canadians. Apparently, the Japanese attach greater desirability to having an

interdependent versus independent self, whereas Americans attach equal desirability to both (Markus & Kitayama, 1991). More recently, Mu, Kitayama, Han and Gelfand (2015) found that the Evoked Recorded Potential ERP (N400) responsive to inconsistency was more pronounced for social norm violations by Chinese participants (members of a collectivistic culture that attaches considerable desirability to observance of social norms) versus American participants (members of an individualistic culture for whom obedience to norms has lesser desirability).

The preceding evidence suggests that the affective response to motivationally relevant information (i.e., confirming or disconfirming of a desirable or undesirable outcome) is modulated by the strength of the underlying motivation to hold a given belief (cf. Bush, Luu, & Posner, 2000) that may differ across cultures. Again, from the present perspective, however, this research confounds inconsistency of information as such with the updated expectancy produced by the inconsistency, which along with value of the cognitive outcome may crucially enter into a determination of the affective response. Too, whereas cross-cultural replications of dissonance effects address the magnitude of negative outcomes, similar magnitude effects should be obtained with respect to positive affect elicited by positive outcomes qualified by the updated expectancy of their materializing.

### **Time Course Effects?**

In contrast to our argument that affective responses to inconsistent/consistent information are driven by desirability of the cognitive outcomes qualified by the expectancy of their occurrence some authors (e.g., Noordewier, Topolinski, & Van Dijk, 2016) proposed that *any departure* from expectations produces initial negative affect, even when the outcome and subsequent affective reaction are positive. According to this view, it is only after people had the time to understand the meaning of an unexpected event that they can react according to its valence—but until that happens, any interruption elicits affective negativity. To support this argument, Noordewier and Breugelmans (2013) described findings whereby observers perceived emotional reactions by people who experienced a surprising *positive* event to be initially less positive than their perceived reactions a few seconds later. However, a closer examination of these data shows that whereas the perceived reactions became more positive with time, it remains unclear whether they were negative to begin with, as no comparison was available with the baseline or with a neutral reference point.

Although a full comprehension of the desirability of an event and a development of an affective reaction to it may take time, the reaction to an inconsistent event before its valence was determined seems to be essentially affect free. Consistent with this notion, a study of cognitive dissonance in the forced compliance paradigm (Martinié, Joule, Milland, Olive, & Capa, 2013) showed that negative affect in the dissonance condition, as measured by facial electromyography (EMG), emerged only *later* on in the process, and only after participants engaged in the counterattitudinal advocacy. This result suggests that even when inconsistency

<sup>2</sup>The conditions in which expectancy *inconsistency* (i.e., surprise) versus consistency impacts affect beyond the updated expectancy of desirable or undesirable outcome bears additional investigation. It is possible that in studies where inconsistency differences occurred, (a) the updated *expectancy* was different in the inconsistent versus consistent conditions, or (b) in the consistent condition where the outcome was expected, there was an affective adaptation to the outcome so that its desirability or undesirability, that is, its *value*, becomes less extreme. Specifically, individuals may emotionally adapt to expected outcomes that subsequent occurrence is less desirable or undesirable than if the same outcome occurred unexpectedly (Wilson, Wheatley, Kurtz, Dunn, & Gilbert, 2004).

has ultimately a negative effect, dissonance arousal is initially affectively undifferentiated.

### **Need for Nonspecific Closure**

According to our theory, individuals high on the need for nonspecific closure should be upset by any information that reduces their certainty, even if the reduced certainty concerns a negative state of affairs. A high-need-for-closure person should be somewhat disturbed if her initial belief about a negative outcome was contradicted by new information, for instance, if her initial belief that her college application was rejected was now refuted by information that it was not.

### **Dissonance Research**

Dissonance theorists (e.g., Festinger, 1957) already discussed the case wherein *exposure* to information inconsistent with one's important attitudes and opinions (whatever these happen to be) on significant issues is upsetting; to prevent such an aversive experience, individuals were found to selectively bias their informational exposure toward attitude-consistent information (Frey & Wicklund, 1978) and render a negative evaluation of attitude-inconsistent information (Lord, Ross & Lepper, 1979). Existing attitudes and opinions are beliefs that their possessors hold true. Defending them against disconfirmation may represent individuals' resistance to relinquishing *certainty* in domains that matter and a reluctance to face ambiguity and uncertainty. Although individuals' need for nonspecific closure was not measured in selective exposure studies, it seems plausible to assume that individuals high in this need would be particularly likely to exhibit such exposure effects to defend their assured views and opinions.

### **Self-Verification**

A notable research program devoted to informational consistency/inconsistency with significant though nonspecific knowledge is Swann's (1990, 1997, 2011) work on self-verification. Specifically, Swann and his colleagues suggested that even positive information should evoke negative affect when it is inconsistent with important self-knowledge. Multiple studies have documented that individuals with low self-esteem (e.g., depressed people) search for and prefer negative feedback consistent with their self-view, even over positive feedback. For example, they prefer to interact with an evaluator who rated them unfavorably (Swann, Wenzlaff, Krull, & Pelham, 1992), and they are more likely to solicit negative than positive information (Giesler, Josephs, & Swann, 1996). They react with negative affect when a partner views them more positively than they view themselves (Burke & Harrod, 2005) and respond anxiously (Wood, Heimpel, Newby-Clark, & Ross, 2005) and with more negative implicit arousal (Ayduk, Gyurak, Akinola, & Mendes, 2013) after succeeding at a task. This research is consistent with the notion that subjective certainty concerning one's self knowledge, whether flattering or unflattering, is something individuals typically care about. According to our

conceptualization, it is a desire for certainty of beliefs (about the self), that is the need for cognitive closure with respect to an important topic (such as one's self concept), that accounts for the self-verification effects.

This notion is supported further by analyses of the mediators and moderators of self-verification effects. For example, a study by Swann and Pelham (2002) found that only students who were *certain* of their negative self-knowledge preferred roommates who shared their negative self-views; this relation was not significant among students whose self-views were uncertain. Similarly, Swann, Wenzlaff, and Tafarodi (1992) found that the participants were more interested in interacting with the evaluator to the extent that they believed that this person's positive or negative evaluation described them *accurately*. In another set of studies, whereas feedback desirability did not predict the preference for the type of feedback, perceived feedback accuracy did (Giesler et al., 1996), and it fully mediated feedback choice (Bosson & Swann, 1999). Considered collectively, this body of evidence suggests that the self-verification motive exerts its effect through a desire for subjectively accurate and certain self-knowledge (i.e., the need for nonspecific closure), which often is the prior knowledge people possessed about themselves. Again, even though the need for nonspecific closure was not specifically manipulated or measured in self-verification studies, our theory predicts that persons high in this need would exhibit augmented verification effects.

### **Meaning Maintenance**

As noted earlier, Proulx and Inzlicht (2012) proposed that verification of persons' understanding of "themselves, their world, and their relationship to the world" (Proulx & Major, 2013, p. 459) is typically desired, hence it may govern the reactions to cognitive inconsistencies. Consider a study by Townsend, Major, Sawyer, and Mendes (2010), wherein experimenters measured minority group members' cardiovascular threat pattern in response to the prejudiced (vs. nonprejudiced) behavior of majority group members. The authors predicted that minority group members with strong system justification beliefs (Jost, Banaji, & Nosek, 2004) would be more threatened by prejudiced (vs. nonprejudiced) behavior; in contrast, members who believe that the system is unfair would be more threatened by nonprejudiced behavior. The expected interaction was significant, attesting that invalidation of valuable knowledge about the "system's" workings results in negative affect. Additional research reviewed by Proulx and Inzlicht (2012) similarly supports the implication that undermining nonspecific world knowledge that one deemed important engenders negative affect. We assume that the need for nonspecific closure (i.e., the desire for certainty) is responsible for such meaning maintenance effects, hence that individuals high on this need would exhibit stronger such effects than people low on this need.

A study by Webber, Zhang, Schimel, and Blatter (2016, Study 3) lends support to this possibility. In their experiment, participants with high (vs. low) personal need for



structure<sup>3</sup> appeared to be more upset by a video that threatened their sense of meaning—a 5-min excerpt of David Lynch’s absurd film *Rabbits* (Randles, Heine, & Santos, 2013)—than a control video. Their degree of upset was inferred from the stiffer bail that participants assigned to a woman arrested for prostitution, interpreted as a reaffirmation of their meaning system.

In general, our theory uniquely implies that where individuals’ need for closure (NFC) is particularly pronounced, they should be upset by an inconsistency even if it betokens “good news.” In contrast, individuals with low need for closure should be upset by negative, “bad news” type inconsistency but not by positive inconsistency. Specifically, for high NFC individuals, the desire for certain knowledge may override their desire for flattering outcomes, whereas for low NFC the former desire is stronger. We recently conducted an experiment to test this hypothesis as described next.

### *Need for Closure and Reactions to Cognitive Inconsistency*

Participants were randomly assigned to either a high or a low NFC condition. They then performed a cognitive task and were led to believe that they were moderately successful in the first three bouts of the task (cf. Aronson & Carlsmith, 1962; Plaks & Stecher, 2007). In the final bout of the same task, one group of participants received feedback that was consistent with their previous performance. Two other groups received inconsistent feedback, indicating that their scores were either much worse (inconsistent negative feedback) or much better (inconsistent positive feedback) than their previous performance. Upon task completion, participants reported their positive and negative (anxiety and upset) affect. Whereas the analysis of positive affect yielded no significant effects, the negative affect variable revealed a significant main effect of feedback and, of particular interest, a significant interaction between NFC and feedback. As shown in Figure 2, participants in the high NFC condition experienced more negative affect after receiving both positive and negative feedback when it was inconsistent with their expectations, as compared to the consistent feedback group. In contrast, in the low NFC condition, participants in the inconsistent negative condition were significantly more negative than in both the inconsistent positive and the consistent feedback conditions. In summary, our data suggest that when the need for nonspecific closure is strong (vs. weak), evidence that undermines one’s hypothesis elicits a greater amount of upset.

The foregoing study, and research by Webber et al. (2016), shows that some people, or most people in some situations (viz., situations that induce a high need for nonspecific closure), may be particularly upset by expectancy-inconsistent information that undermines their certainty on a topic of interest. In the same way, some people (or most people in some situations) may experience a particular desire for a given belief content, hence be upset if inconsistent information undermined that belief. But those instances

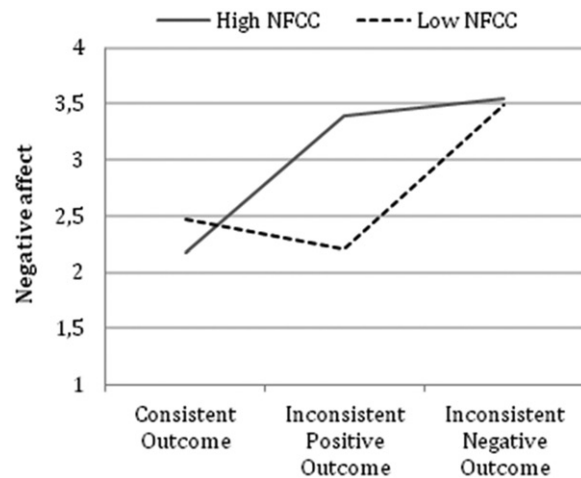


Figure 2. Negative affect as a function of need for cognitive closure (NFC) and consistent/inconsistent outcome.

hardly establish a universal need for cognitive consistency (hence a universal upset with inconsistency), because as reviewed earlier, in other instances people may react positively to inconsistent information if it disconfirms undesirable beliefs, or undesirable certainty on given topics (cf. Gigerenzer & Garcia-Retamero, 2017).

### *Undermining Motivationally Neutral Cognitions*

Evidence reviewed thus far suggests that the less one cares about (is motivationally invested in) a cognitive outcome invalidated by inconsistent information, the weaker is one’s affective response to inconsistent or consistent information on this issue. By extrapolation, information inconsistent or consistent with an outcome about which one cared not at all should have no affective resonance whatsoever. For instance, we might expect that a given store or tree was at a specific location and find it to be no longer there, or we might expect our colleague to wear glasses and find out that she switched to contacts instead. We might be (mildly) surprised in those circumstances without experiencing any particular affect (whether positive or negative).

Although the foregoing examples have intuitive plausibility, they are inconsistent with the concept of a universal need for cognitive consistency. If such unadulterated need indeed existed, it should be frustrated by any inconsistency no matter the topic, hence giving rise to at least some negative affect.

### *Reactions to a Trivial Inconsistency*

To illustrate these notions empirically, we carried out a simple study (Kruglanski et al., 2016). Participants were shown on a computer a picture of a jar filled with 10 balls, some of which were red and others blue. They were further told that one ball would be randomly drawn from the jar. Strength of outcome expectancy was varied between participants by presenting a jar with different proportions of red and blue balls. In all conditions, a blue ball was then drawn from the jar. Participants indicated the extent to which they were surprised by this event and the extent to which they experienced anxiety, positive affect, and negative affect. There was

<sup>3</sup>An alternative term for describing what later became known as the Need for Closure (cf. Kruglanski et al., 1997; Kruglanski & Freund, 1983).



a strong and significant effect of the outcome expectancy manipulation on surprise, such that the higher the prior expectancy of getting the blue ball, the less surprised participants were when they received it yet our manipulation had no significant effects on either anxiety, positive affect, or negative affect.

The foregoing data illustrate our point that although unexpected events inconsistent with prior expectancy elicit surprise that varies as a function of expectancy strength, they do not necessarily evoke negative affect when the hypothesis in question is of little motivational relevance to the individual. These findings contradict the notion of a general need for consistency. Indeed, in a statement closely aligned with our analysis, Reisenzein (2000) commented on the distinction between surprise and affect as follows:

It may be argued that the subjective experience of surprise differs in crucial respects from that of other emotions because, in contrast to the latter, (a) it is *hedonically neutral* [emphasis added], and (b) the information that it provides is uniquely metarepresentational. ... That is, both surprise and pleasure-displeasure can be viewed as nonconceptual outcomes of a mechanism that compares newly acquired beliefs with preexisting mental representations. However, in surprise, newly acquired beliefs are compared with preexisting beliefs, whereas in pleasure and displeasure, they are related to *preexisting desires* [emphasis added]: pleasure is felt if a newly acquired belief is congruent with a preexisting desire; displeasure, if it is incongruent. (p. 275)

Whereas the data of our study reveal no traces of negative affect in response to a trivial inconsistency, some empirical findings were interpreted to mean that even the latter inconsistencies do, in fact, evoke affective negativity. Those suggestions were made in two separate areas, specifically related to the phenomena of (a) cognitive fluency and (b) meaning maintenance effects. We examine those in turn.

### Fluency Research

Although “fluency” is related to the way information is processed while consistency/inconsistency validate/invalidate the contents of information (Winkielman, Huber, Kavanagh, & Schwarz, 2012), due to its inherent characteristics (e.g., familiarity, expectedness, coherence), consistency may induce a sense of fluency. A research program on reactions to semantic coherence by Topolinski and Strack (2009a, 2009b) showed that coherent word triads were liked more than incoherent triads, activated facial muscles related to positive affect, and relaxed muscles related to negative affect (Topolinski, Likowski, Weyers, & Strack, 2009).

On a basic perceptual level, Topolinski, Erle, and Reber (2015) found that Gestalt-containing (vs. Gestalt-lacking) dot patterns and possible (vs. impossible) Necker’s cubes evoked greater activation of the (smiling) zygomatic muscle and were liked more. In yet another study by Topolinski and Strack (2015), highly surprising versus less surprising trivia elicited greater corrugator activity, interpreted as indicative of negative affect. In all of those studies, authors identified cognitive fluency as a mechanism that accounts for the link between even very subtle congruencies and positive affect. Numerous other studies have

demonstrated that fluency enhances the positive evaluation of even seemingly unimportant stimuli (e.g., Chinese ideographs (Zajonc, 1968) or random dot patterns (Winkielman, Halberstadt, Fazendeiro, & Catty, 2006), and leads to positive affect (cf. Winkielman & Cacioppo, 2001). This might be interpreted to suggest that consistency is indeed sought out and preferred by default.

However, recent research has questioned the generality of the preference for fluency and demonstrated that this effect is moderated by various factors, suggesting that the hedonic value of fluency may vary depending on the context (Unkelbach & Greifeneder, 2013; Winkielman et al., 2012). Although reading comprehension or perceptual sense making seem to be positively related to participants’ goals in the studies just described, the relation between fluency and goal facilitation may differ in other contexts. For example, a study by Hansen and Topolinski (2011) showed that an exploration (vs. control) mind-set reversed the typical effect of higher liking of more prototypical objects, which suggests that when inconsistency is in line with an active goal it is evaluated positively. In another set of studies, people preferred familiar stimuli only when they were in a bad mood, presumably because familiarity indicates safety, which is of value when people expect negative events (de Vries, Holland, Chenier, Starr, & Winkielman, 2010). However, a happy mood eliminated the preference for familiar stimuli, as indicated by measures of self-reported liking and physiological measures of affect. Similarly, familiar stimuli were evaluated more positively when people were in a prevention focus compared to a promotion focus (Higgins, 1997), but the effects were reversed for novel stimuli (Gillebaart, Förster, & Rotteveel, 2012). Finally, it has been shown that disfluency can acquire a positive meaning when it is goal relevant (Labroo & Kim, 2009; Pocheptsova, Labroo, & Dhar 2010). All in all, then, the available body of evidence suggests that the relation between disfluency and affect depends on the motivational relevance of the disfluency, that is, the extent to which people care about the outcomes affected by the disfluency/fluency.

### Compensatory Effects

The possibility that trivial (even unconscious) inconsistencies induce negative affect was raised in reference to meaning maintenance phenomena. In one study conducted by Proulx and Major (2013), participants played a game using either a normal deck of cards or a trick deck that was created by reversing the normal color of the card (hearts and diamonds were colored black, clubs and spades were colored red). Participants who initially endorsed the belief that social inequality is unjust reported stronger support for affirmative action after playing with the anomalous cards as compared with a standard deck of cards. In another study (Sleegers, Proulx, & van Beest, 2015), participants who were presented with the anomalous cards evinced reduced markers of conflict arousal (as indicated by degree of pupil dilation) and increased affirmation of their ideological values. Finally, a series of experiments (Proulx & Heine, 2008) showed that participants interacting with an experimenter who was later

replaced by a different person wearing the same clothes engaged in the compensatory affirmation of their moral beliefs by punishing a criminal more harshly than participants in the control condition. These results were interpreted as a palliative endorsement of one's worldview in reaction to the presumed negative affect elicited by the meaning threats, that were irrelevant to the consciously pursued goals, and hence presumably of trivial motivational significance to participants.

However intriguing, the foregoing findings do not unequivocally indicate the evocation of negative affect by motivationally irrelevant inconsistencies. Thus, the subconscious registration of the anomalous stimuli might have induced a nonvalenced excitation or arousal (Russell, 1980), which then intensified participants' habitual reactions to pertinent situations (cf. Dutton & Aron, 1974). Such arousal might have augmented participants' endorsement of their worldviews, for example, by recommending a more severe punishment of a criminal or by asserting more emphatically their support for affirmative action; this may have occurred without necessarily being mediated by emotional reaction. Consistent with this possibility, past theories of expectancy violation proposed that although any violation of expectancy may induce increased attention (Meyer, Reisenzein, & Schützwohl, 1997) and/or arousal (Mandler, 1989), the emotional valence of the response depends on the specific context and the relation of the incongruous event to the individual's goals.

In summary, it seems fair to conclude that the degree to which the so-called "trivial" inconsistencies elicit negative affect depends on the extent to which they are nontrivial in fact, that is, relevant to individuals' goals in the situation. Absent such relevance, and consistent with our theory, there is little evidence for the notion that trivial inconsistencies evoke negative affect.

## Recapitulation and Conclusion

### *Do Humans Have a General Need for Cognitive Consistency?*

For more than six decades, the topic of cognitive consistency has captivated social and cognitive psychologists like few others (cf. Abelson et al., 1968; Gawronski & Strack, 2012); our fascination likely stemmed from the presumption of a universal human need for consistency, the frustration of which produces aversive tension and upset. In the present article, we systematically examined this presumption based on a clear definition of what cognitive and inconsistency is and what it does, that is, how it functions in the epistemic process.

New information (whether consistent or inconsistent with prior beliefs) updates one's expectancy concerning a cognitive outcome of some sort. Whether the updated expectancy evokes an affective reaction and what kind if any it evokes depends entirely on desirability to the individual of the cognitive outcome in question. The stronger the expectancy of (i.e., belief in) a desirable outcome (and the greater its desirability), the more positive the individual's affective

reaction. Similarly, the higher the expectancy or belief in an undesirable outcome (and the greater its undesirability), the more negative the affective reaction. Our analysis thus suggests that it is not cognitive consistency or inconsistency that matters but rather the updated expectancy<sup>4</sup> as it interacts with value of the outcome or desirability. From that perspective, cognitive consistency research in its diverse manifestations simply addressed people's reactions to "bad" or "good" news.

Accordingly, our theory questions the presumption of a universal need for cognitive consistency the frustration of which by an inconsistency engenders negative affect. Whereas the need for consistency notion implies a negative affect to all inconsistencies, we have shown that inconsistency (or consistency) could engender positive affect, negative affect, or no affect whatsoever.

## Empirical Support

Extant empirical data offer a broad base of support for the present theory. At a basic level, ample evidence suggests that information that lowers the expectancy of a desired belief (e.g., about one's positive self-concept or other positive outcomes) results in negative affect (often reduced via cognitive change of some sort). Evidence also attests that information that heightens the expectancy of an undesirable belief or lowers the expectancy of a desirable belief engenders negative affect. Similarly, information that lowers the expectancy of an undesirable belief or heightens the expectancy of a desirable belief engenders positive affect, all in proportion to the degree of desirability or undesirability of the beliefs at stake. Whereas prior research often interpreted negative affective reactions to cognitive inconsistency, for example, with a positive self concept, as caused by cognitive inconsistency *as such*, we presently interpret those reactions as caused by the lowered expectancy of a desirable outcome rather than by the inconsistency. In other words, cognitive consistency research typically confounded inconsistency with lowered expectancy, and it is the updated expectancy (of desirable or undesirable outcomes) that, according to available evidence, drives the affective response to new information.

There is also evidence that on topics for which *certain* knowledge was generally desired (e.g. as concerns one's self knowledge) and for individuals who value certainty more than others (i.e. persons high in the need for closure), undermining certainty engenders negative affect, proportionately to the magnitude of the desire (need) for certainty. Finally, cognitions that impact the expectancy of trivial beliefs absent any motivational significance (or desirability) appear to engender no affect of any sort, neither negative nor positive.

<sup>4</sup>That could end up being the same irrespective of whether it was determined by information inconsistent or consistent with initial expectancy.

### What's New?

The present analysis offers several novel suggestions concerning the cognitive consistency paradigm. Thus, it clears up several persistent ambiguities concerning what cognitive consistency *is*, *what* it does, and *why* it does it. In so doing, it builds upon existing concepts and findings and extends them into a broader theoretical framework.

Consider Festinger's (1962) distinction between the two elemental determinants of cognitive dissonance: (a) individual's ratio of dissonant to consonant cognitions, and (b) importance to the individual of those cognitions. Note that the *ratio of dissonant to consonant cognitions* should affect one's expectancy about the state of affairs affirmed in the cognitions; this concept thus anticipates the present concern with the *epistemic* impact of new (consistent or inconsistent) information. Furthermore, *importance* of the cognitions involved anticipates the present concern with the *motivational* impact of informational consistency. In this sense, Festinger's early insights foreshadow the present theoretical developments.

Nonetheless, Festinger (1957, 1962) did not elaborate how the two determinants of dissonance interact: Does each exert an independent influence on dissonance? Do they interact, and if so, how? He was also not explicit about what "importance" is (cf. Jones & Gerard, 1967, p. 190) and whether inconsistency with "important" cognitions invariably results in negative affect. As we have shown, it does not, where the "important" cognitions refer to highly (hence "importantly") undesirable outcomes, nor were these issues disambiguated in subsequent work on cognitive consistency. Later-day consistency models eschewed the (epistemic) issue of cognitive consistency altogether and focused instead on specific motives having to do with ego defense (e.g. Aronson, 1968), or self-verification (Swann, 1990; cf. Greenwald & Ronis, 1978). Subsequent work (e.g., represented in Gawronski & Strack's, 2012, volume) either focused on the epistemic aspect as such (cf. Read & Simon, 2012) or focused on specific motives assumed to be uniquely impacted by inconsistency (e.g., Markman & Beike, 2012; Stone, 2012).

In contrast, the present theory (a) stresses the *interaction* between the epistemic and motivational aspects of consistent/inconsistent cognitions; (b) questions the notion of a general need for cognitive consistency; and (c) suggests that the motive base for inconsistency effects is not restricted to the ego defense, or other self-related motives, but rather pertains to all desirable or undesirable cognitive outcomes, stemming from any conceivable motive individuals might have.

### What Next?

A useful theory should not only account for the body of existing data but also generate further predictions testable via future research. The present theory is no exception. For instance, we claim that the ample body of research on cognitive dissonance typically confounds the effects of inconsistency with the updated (lowered) expectancy of a desirable state of affairs that the inconsistency produces. Novel

research could test this claim by investigating whether the same undesirable consequence produced by an inconsistency (e.g., indicating that one failed on a task) would be equally aversive if expected in advance, especially controlling for the need for nonspecific closure, which predisposes individuals to experience negative affect in response to any reduction of certainty (cf. Golub et al., 2009; Ilgen & Gunn, 1976; Sjästad et al., 2016).

The juxtaposition of the needs for specific and nonspecific cognitive closure should yield different affective outcomes depending on the relative magnitudes of those needs that could be measured or manipulated experimentally. Experimentally creating a situation in which the need for nonspecific closure is higher than that for a specific closure should privilege certainty over desirability of a given outcome, whereas a situation wherein the need for specific closure is higher should privilege desirability over certainty.

The present claim that all human motives (rather only those related to one's self concept) are subject to inconsistency/consistency effects could be conjoined with the notion (cf. Higgins, 1987, 2012) that different motives give rise to different affective reactions. This should afford research looking at qualitatively distinct responses to cognitive consistency and inconsistency. For instance, according to Higgins (2012), promotion needs when undermined give rise to sadness, and dysphoria, whereas undermined prevention needs engender anxiety and agitation. It should follow that cognitive consistency or inconsistency that elevates or lowers the expectancies of promotion or prevention outcomes should yield different types of affect, rather than the same aversive tension as postulated originally by Festinger (1957).

Conditions under which surprising versus nonsurprising findings engender stronger positive or negative affect (cf. Mellers et al., 1997) versus those in which surprise has no effect (Golub et al., 2009; Ilgen & Gunn, 1976; Sjästad et al., 2016) could be further explored. According to the present analysis, this has to do with the value (desirability) of the outcome and the process of adaptation such that the undesirable outcomes become less undesirable if expected, whereas desirable outcome becomes less desirable when expected (Wilson et al., 2004). These possibilities and the conditions for such affective adaptation could be profitably pursued in further research.

Finally, whereas prior research considered cognitive consistency and inconsistency categorically (whereby two cognitions are consistent, inconsistent, or irrelevant to each other), the present theory depicts a probabilistic continuum whereby both the degree of consistency/inconsistency and the ultimate updated expectancy vary in degree. Further research could explore this aspect of our analysis and explore the quantitative changes in affective magnitudes that our model implies.

### Coda

Affective response to new information is a ubiquitous phenomenon that expresses people's reactions to life's challenges, from the miniscule to the momentous. Emotion



generated in those circumstances contributes an impetus to action designed to mend or promote individuals' processes of self-regulation (Harmon-Jones, Amodio, & Harmon-Jones, 2009). Prior theorizing in social cognition assigned considerable role in these phenomena to cognitive consistency and inconsistency. The present article distinguishes between the epistemic and motivational aspects of cognitive constellations to conclude that consistency effects are less central to the affect-cognition nexus than has been surmised thus far. Rather, affective responses are best understood as driven by the desirability of outcomes that the cognitions depict qualified by expectancies that those outcomes are real. Our analysis builds on prior theory, criticism, and data within the cognitive consistency domain and casts a novel light on the cognition-affect nexus that could guide future efforts to understand this crucial psychological junction.

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### References

- Abelson, R. P. A. E., McGuire, W. J., Newcomb, T. M., Rosenberg, M. J., & Tannenbaum, R. H. (1968). *Theories of cognitive consistency: A sourcebook*. Chicago, IL: Rand McNally.
- Aronson, E. (1968). Dissonance theory: Progress and problems. In R. P. Abelson, E. Aronson, W. J. McGuire, T. M. Newcomb, M. J. Rosenberg, & R. H. Tannenbaum (Eds.), *Theories of cognitive consistency: A sourcebook* (pp. 5–27). Chicago, IL: Rand McNally.
- Aronson, E. (1992). The return of the repressed: Dissonance theory makes a comeback. *Psychological Inquiry*, 3(4), 303–311.
- Aronson, E., & Carlsmith, J. M. (1962). Performance expectancy as a determinant of actual performance. *Journal of Abnormal and Social Psychology*, 65(3), 178–182.
- Aronson, E., & Mills, J. (1959). The effect of severity of initiation on liking for a group. *The Journal of Abnormal and Social Psychology*, 59(2), 177–181.
- Avnet, T., & Higgins, E. T. (2003). Locomotion, assessment, and regulatory fit: Value transfer from “how” to “what”. *Journal of Experimental Social Psychology*, 39(5), 525–530.
- Ayduk, Ö., Gyurak, A., Akinola, M., & Mendes, W. B. (2013). Consistency over flattery: Self-verification processes revealed in implicit and behavioral responses to feedback. *Social Psychological and Personality Science*, 4(5), 538–545.
- Bosson, J. K., & Swann, W. B. (1999). Self-liking, self-competence and the quest for self-verification. *Personality and Social Psychology Bulletin*, 30, 412–422.
- Brehm, J. W. (1956). Postdecision changes in the desirability of alternatives. *Journal of Abnormal Psychology*, 52(3), 384–389.
- Brehm, J. W., & Cohen, A. R. (1962). *Explorations in cognitive dissonance*. Hoboken, NJ: John Wiley and Sons.
- Buechel, E. C., Zhang, J., Morewedge, C. K., & Vosgerau, J. (2014). More intense experiences, less intense forecasts: Why people overweight probability specifications in affective forecasts. *Journal of Personality and Social Psychology*, 106(1), 20–36.
- Burke, P. J., & Harrod, M. M. (2005). Too much of a good thing? *Social Psychology Quarterly*, 68(4), 359–374.
- Bush, G., Luu, P., & Posner, M. I. (2000). Cognitive and emotional influences in anterior cingulate cortex. *Trends in Cognitive Sciences*, 4(6), 215–222.
- Canon, L. K. (1964). Self-confidence and selective exposure to information. In L. Festinger (Ed.), *Conflict, decision, and dissonance* (Vol. 3, pp. 83–97). Stanford, CA: Stanford University Press.
- Cooper, J., & Fazio, R. H. (1984). A new look at dissonance theory. *Advances in Experimental Social Psychology*, 17, 229–266.
- Cosmides, L., & Tooby, J. (1996). Are humans good intuitive statisticians after all? Rethinking some conclusions from the literature on judgment under uncertainty. *Cognition*, 58(1), 1–73.
- Deutsch, M., & Krauss, R. M. (1965). *Theories in social psychology*. Oxford, UK: Basic Books.
- de Vries, M., Holland, R. W., Chenier, T., Starr, M. J., & Winkielman, P. (2010). Happiness cools the warm glow of familiarity: Psychophysiological evidence that mood modulates the familiarity-affect link. *Psychological Science*, 21(3), 321–328.
- Dostoevsky, F. (1864). *Notes from the Underground*. St. Petersburg, Russia: Epoch.
- Dutton, D. G., & Aron, A. P. (1974). Some evidence for heightened sexual attraction under conditions of high anxiety. *Journal of Personality and Social Psychology*, 30(4), 510–517.
- Feather, N. T. (1982). *Expectations and actions: Expectancy-value models in psychology*. Hillsdale, NJ: Erlbaum.
- Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row.
- Festinger, L. (1962). *A theory of cognitive dissonance* (Vol. 2). Stanford, CA: Stanford University Press.
- Festinger, L., & Carlsmith, J. M. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal Psychology*, 58(2), 203–210.
- Festinger, L., Riecken, H. W., & Schachter, S. (1956). *When prophecy fails: A social and psychological study of a modern group that predicted the end of the world*. London, UK: Pinter & Martin.
- Frey, D., & Wicklund, R. A. (1978). A clarification of selective exposure: The impact of choice. *Journal of Experimental Social Psychology*, 14(1), 132–139.
- Frijda, N. H. (2004). Emotions and action. In A. S. R. Manstead, N. Frijda, & A. Fischer (Eds.), *Feelings and emotions: The Amsterdam symposium* (pp. 158–173). Cambridge, UK: Cambridge University Press.
- Gawronski, B., & Strack, F. (2004). On the propositional nature of cognitive consistency: Dissonance changes explicit, but not implicit attitudes. *Journal of Experimental Social Psychology*, 40(4), 535–542.
- Gawronski, B., & Strack, F. (Eds.). (2012). *Cognitive consistency: A fundamental principle in social cognition*. New York, NY: Guilford Press.
- Giesler, R. B., Josephs, R. A., & Swann, W. B. Jr. (1996). Self-verification in clinical depression: the desire for negative evaluation. *Journal of Abnormal Psychology*, 105, 358–368.
- Gigerenzer, G., & Garcia-Retamero, R. (2017). Cassandra's regret: The psychology of not wanting to know. *Psychological Review*, 124(2), 179–196.
- Gilbert, D. T., & Jones, E. E. (1986). Perceiver-induced constraint: Interpretations of self-generated reality. *Journal of Personality and Social Psychology*, 50(2), 269–280.
- Gillebaart, M., Förster, J., & Rotteveel, M. (2012). Mere exposure revisited: The influence of growth versus security cues on evaluations of novel and familiar stimuli. *Journal of Experimental Psychology: General*, 141, 699–714.
- Golub, S. A., Gilbert, D. T., & Wilson, T. D. (2009). Anticipating one's troubles: The costs and benefits of negative expectations. *Emotion*, 9(2), 277–281.
- Greenwald, A. G., & Ronis, D. L. (1978). Twenty years of cognitive dissonance: Case study of the evolution of a theory. *Psychological Review*, 85(1), 53–57.



- Hansen, J., & Topolinski, S. (2011). An exploratory mindset reduces preference for prototypes and increases preference for novel exemplars. *Cognition and Emotion*, 25(4), 709–716.
- Hardin, C. D., & Higgins, E. T. (1996). Shared reality: How social verification makes the subjective objective. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of motivation and cognition. Handbook of motivation and cognition, Vol. 3. The interpersonal context* (pp. 28–84). New York, NY: Guilford Press.
- Harmon-Jones, E., Amodio, D. M., & Harmon-Jones, C. (2009). Action-based model of dissonance: A review, integration, and expansion of conceptions of cognitive conflict. *Advances in Experimental Social Psychology*, 41, 119–166.
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94(3), 319–340.
- Higgins, E. T. (1997). Beyond pleasure and pain. *American Psychologist*, 52(12), 1280–1300.
- Higgins, E. T. (2012). *Beyond pleasure and pain: How motivation works*. New York, NY: Oxford University Press.
- Hirose, Y., & Kitada, T. (1985). Actors' and observers' attributions of responsibility and attitude change in the forced-compliance situation. *The Japanese Journal of Psychology*, 56(5), 262–268.
- Hoffrage, U., Krauss, S., Martignon, L., & Gigerenzer, G. (2015). Natural frequencies improve Bayesian reasoning in simple and complex inference tasks. *Frontiers in Psychology*, 6.
- Hoshino-Browne, E., Zanna, A. S., Spencer, S. J., Zanna, M. P., Kitayama, S., & Lackenbauer, S. (2005). On the cultural guises of cognitive dissonance: The case of easterners and westerners. *Journal of Personality and Social Psychology*, 89(3), 294–310.
- Ilgel, D. R., & Gunn, J. D. (1976). Affective consequences of disconfirming performance expectations. *The Journal of Social Psychology*, 100(2), 245–255.
- Jones, E. E., & Gerard, H. (1967). *Foundations of social psychology*. Oxford, UK: Wiley.
- Jost, J. T., Banaji, M. R., & Nosek, B. A. (2004). A decade of system justification theory: Accumulated evidence of conscious and unconscious bolstering of the status quo. *Political Psychology*, 25(6), 881–919.
- Kitayama, S., Snibbe, A. C., Markus, H. R., & Suzuki, T. (2004). Is there any “free” choice? Self and dissonance in two cultures”. *Psychological Science*, 15(8), 527–533.
- Knill, D. C., Kersten, D., & Yuille, A. (1996). Introduction: A Bayesian formulation of visual perception. *Perception as Bayesian Inference*, 1, 1–21.
- Kruglanski, A. W. (1989). *Lay epistemics and human knowledge: Cognitive and motivational bases*. New York, NY: Plenum.
- Kruglanski, A. W., Atash, M., DeGrada, E., Mannetti, L., Pierro, A., & Webster, D. M. (1997). Psychological theory testing versus psychometric nay-saying: Comment on Neberg et al.'s (1997) critique of the Need for Closure Scale. *Journal of Personality and Social Psychology*, 73(5), 1005–1016.
- Kruglanski, A. W., & Freund, T. (1983). The freezing and unfreezing of lay-inferences: Effects on impression primacy, ethnic stereotyping, and numerical anchoring. *Journal of Experimental Social Psychology*, 19(5), 448–468.
- Kudo, T., & Mitsui, H. (1974). The magnitude of incentive, timing and attitude change. *Japanese Psychological Review*, 17(4), 384–402.
- Kuhn, T. S. (1962). *The structure of scientific revolutions*. Chicago, IL: University of Chicago Press.
- Labroo, A. A., & Kim, S. (2009). The instrumentality heuristic: Why metacognitive difficulty is desirable during goal pursuit. *Psychological Science*, 20, 127–134.
- Lewin, K., Dembo, T., Festinger, L., & Sears, P. S. (1944). Level of aspiration. In J. M. Hunt (Ed.), *Personality and the behavior disorders* (pp. 333–378). Oxford, England: Ronald Press.
- Linder, D. E., Cooper, J., & Jones, E. E. (1967). Decision freedom as a determinant of the role of incentive magnitude in attitude change. *Journal of Personality and Social Psychology*, 6(3), 245–254.
- Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37(11), 2098–2109.
- Mandler, G. (1989). Affect and learning: Causes and consequences of emotional interactions. In D. B. McLeod & V. M. Adams (Eds.), *Affect and mathematical problem solving* (pp. 3–19). New York, NY: Springer Verlag.
- Markman, K. D., & Beike, D. R. (2012). Regret, consistency, and choice: An opportunity X mitigation framework. *Cognitive Consistency: A Fundamental Principle in Social Cognition*, 305–325.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98(2), 224–253.
- Martinie, M.-A., Joule, R.-V., Milland, L., Olive, T., & Capa, R. (2013). Evidence that dissonance arousal is initially undifferentiated and only later labeled as negative. *Journal of Experimental Social Psychology*, 49, 767–770.
- McGraw, A. P., Mellers, B. A., & Ritov, I. (2004). The affective costs of overconfidence. *Journal of Behavioral Decision Making*, 17(4), 281–295.
- McGraw, A. P., Mellers, B. A., & Tetlock, P. E. (2005). Expectations and emotions of Olympic athletes. *Journal of Experimental Social Psychology*, 41(4), 438–446.
- Mellers, B. A. (2000). Choice and the relative pleasure of consequences. *Psychological Bulletin*, 126(6), 910–924.
- Mellers, B. A., Schwartz, A., Ho, K., & Ritov, I. (1997). Decision affect theory: Emotional reactions to the outcomes of risky options. *Psychological Science*, 8(6), 423–429.
- Mellers, B., Schwartz, A., & Ritov, I. (1999). Emotion-based choice. *Journal of Experimental Psychology: General*, 128(3), 332–345.
- Meyer, W. U., Reisenzein, R., & Schützwohl, A. (1997). Toward a process analysis of emotions: The case of surprise. *Motivation and Emotion*, 21(3), 251–274.
- Mitchell, T. R. (1982). Motivation: New directions for theory, research, and practice. *Academy of Management Review*, 7(1), 80–88.
- Mu, Y., Kitayama, S., Han, S., & Gelfand, M. J. (2015). How culture gets embrained: Cultural differences in event-related potentials of social norm violations. *Proceedings of the National Academy of Sciences*, 112(50), 15348–15353.
- Noordewier, M. K., & Breugelmans, S. M. (2013). On the valence of surprise. *Cognition & Emotion*, 27(7), 1326–1334.
- Noordewier, M. K., Topolinski, S., & Van Dijk, E. (2016). The temporal dynamics of surprise. *Social and Personality Psychology Compass*, 10(3), 136–149.
- Pelham, B. W. (1991). On confidence and consequence: The certainty and importance of self-knowledge. *Journal of Personality and Social Psychology*, 60(4), 518–530.
- Pelham, B. W., & Swann, W. B. Jr. (1994). The juncture of intrapersonal and interpersonal knowledge: Self-certainty and interpersonal congruence. *Personality and Social Psychology Bulletin*, 20(4), 349–357.
- Pepitone, A. (1968). The problem of motivation in consistency models. In R. P. Abelson, E. Aronson, & W. J. McGuire (Eds.), *Theories of cognitive consistency: A sourcebook* (pp. 319–326). Chicago, IL: Rand McNally.
- Plaks, J. E., & Stecher, K. (2007). Unexpected improvement, decline, and stasis: A prediction confidence perspective on achievement success and failure. *Journal of Personality and Social Psychology*, 93(4), 667–684.
- Pocheptsova, A., Labroo, A. A., & Dhar, R. (2010). Making products feel special: When metacognitive difficulty improves product evaluation. *Journal of Marketing Research*, 47(6), 1059–1069.
- Proulx, T., & Heine, S. J. (2008). The case of the transmogrifying experimenter affirmation of a moral schema following implicit change detection. *Psychological Science*, 19(12), 1294–1300.
- Proulx, T., & Inzlicht, M. (2012). The five “A” s of meaning maintenance: Finding meaning in the theories of sense-making. *Psychological Inquiry*, 23(4), 317–335.
- Proulx, T., & Major, B. (2013). A raw deal: Heightened liberalism following exposure to anomalous playing cards. *Journal of Social Issues*, 69(3), 455–472.

- Randles, D., Heine, S. J., & Santos, N. (2013). The common pain of surrealism and death acetaminophen reduces compensatory affirmation following meaning threats. *Psychological Science, 24*(6), 966–973.
- Read, S. J., & Simon, D. (2012). Parallel constraint satisfaction as a mechanism for cognitive consistency. *Cognitive Consistency: A Fundamental Principle in Social Cognition*, 66–86.
- Reisenzein, R. (2000). The subjective experience of surprise. In H. Bless and J. P. Forgas (Eds.), *The message within: The role of subjective experience in social cognition and behavior* (pp. 262–279). Philadelphia, PA: Psychology Press.
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology, 39*(6), 1161–1178.
- Sanada, T., & Norbeck, E. (1975). Prophecy continues to fail a Japanese sect. *Journal of Cross-Cultural Psychology, 6*(3), 331–345.
- Shepperd, J. A., & McNulty, J. K. (2002). The affective consequences of expected and unexpected outcomes. *Psychological Science, 13*(1), 85–88.
- Sjastad, H., Baumeister, R. F., & Ent, M. (2016). People underestimate the sweetness of high-hanging fruit: Evidence for a sour-grape effect in future thinking. Unpublished manuscript, Florida State University, Tallahassee, FL.
- Sleegers, W. W., Proulx, T., & van Beest, I. (2015). Extremism reduces conflict arousal and increases values affirmation in response to meaning violations. *Biological Psychology, 108*, 126–131.
- Stone, J. (2012). Consistency as a basis for behavioral interventions: Using hypocrisy and cognitive dissonance to motivate behavior change. *Cognitive Consistency: A Fundamental Principle in Social Cognition*, 326–347.
- Swann, W. B., Jr. (1990). To be adored or to be known? The interplay of self-enhancement and self-verification. In E. T. Higgins, & R. M. Sorrentino (Eds.), *Handbook of motivation and cognition: Foundations of social behavior*, (Vol. 2, pp. 408–448). New York, NY, US: Guilford Press
- Swann, W. B. (1997). The trouble with change: Self-verification and allegiance to the self. *Psychological Science, 8*(3), 177–180.
- Swann, W. B. Jr. (2011). Self-verification theory. In P. A. Van Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 23–42). New York, NY: Sage Publications.
- Swann, W. B., Jr., & Pelham, B. W. (2002). Who wants out when the going gets good? Psychological investment and preference for self-verifying college roommates. *Self and Identity, 1*(3), 219–233.
- Swann, W. B., Jr., Wenzlaff, R. M., & Tafarodi, R. W. (1992a). Depression and the search for negative evaluations: More evidence of the role of self-verification strivings. *Journal of Abnormal Psychology, 101*(2), 314–317.
- Swann, W. B., Jr., Wenzlaff, R. M., Krull, D. S., & Pelham, B. W. (1992b). The allure of negative feedback: Self-verification strivings among depressed persons. *Journal of Abnormal Psychology, 101*(2), 293–306.
- Tenenbaum, J. B., Griffiths, T. L., & Kemp, C. (2006). Theory-based Bayesian models of inductive learning and reasoning. *Trends in Cognitive Sciences, 10*(7), 309–318.
- Tolman, E. C. (1955). Principles of performance. *Psychological Review, 62*(5), 315–326.
- Topolinski, S., Erle, T. M., & Reber, R. (2015). Necker's smile: Immediate affective consequences of early perceptual processes. *Cognition, 140*, 1–13.
- Topolinski, S., Likowski, K. U., Weyers, P., & Strack, F. (2009). The face of fluency: Semantic coherence automatically elicits a specific pattern of facial muscle reactions. *Cognition and Emotion, 23*(2), 260–271.
- Topolinski, S., & Strack, F. (2009a). The analysis of intuition: Processing fluency and affect in judgments of semantic coherence. *Cognition and Emotion, 23*(8), 1465–1503.
- Topolinski, S., & Strack, F. (2009b). Scanning the “fringe” of consciousness: What is felt and what is not felt in intuitions about semantic coherence”. *Consciousness and Cognition, 18*(3), 608–618.
- Topolinski, S., & Strack, F. (2015). Corrugator activity confirms immediate negative affect in surprise. *Frontiers in Psychology, 6*, 134–150.
- Townsend, S. S., Major, B., Sawyer, P. J., & Mendes, W. B. (2010). Can the absence of prejudice be more threatening than its presence? It depends on one's worldview. *Journal of Personality and Social Psychology, 99*(6), 933–947.
- Unkelbach, C., & Greifeneder, R. (2013). Thinking about “experiences of thinking”: Fluency in six principles. In C. Unkelbach & R. Greifeneder (Eds.), *The experience of thinking: How the fluency of mental processes influences cognition and behaviour* (pp. 257–261). New York, NY: Psychology Press.
- Valenzuela, A., Mellers, B., & Strebel, J. (2010). Pleasurable surprises: A cross-cultural study of consumer responses to unexpected incentives. *Journal of Consumer Research, 36*(5), 792–805.
- Vroom, V. H. (1964). *Work and motivation*. New York, NY: John Wiley & Sons.
- Webber, D., Zhang, R., Schimel, J., & Blatter, J. (2016). Finding death in meaninglessness: Evidence that death-thought accessibility increases in response to meaning threats. *British Journal of Social Psychology, 55*, 144–161.
- Wilson, T. D., Wheatley, T. P., Kurtz, J. L., Dunn, E. W., & Gilbert, D. T. (2004). When to fire: Anticipatory versus postevent reconstruction of uncontrollable events. *Personality and Social Psychology Bulletin, 30*(3), 340–351.
- Winkielman, P., & Cacioppo, J. T. (2001). Mind at ease puts a smile on the face: Psychophysiological evidence that processing facilitation elicits positive affect. *Journal of Personality and Social Psychology, 81*(6), 989.
- Winkielman, P., Halberstadt, J., Fazendeiro, T., & Catty, S. (2006). Prototypes are attractive because they are easy on the mind. *Psychological Science, 17*(9), 799–806.
- Winkielman, P., Huber, D. E., Kavanagh, L., & Schwarz, N. (2012). Fluency of consistency: When thoughts fit nicely and flow smoothly. *Cognitive Consistency: A Fundamental Principle in Social Cognition*, 89–111.
- Wood, J. V., Heimpel, S. A., Newby-Clark, I. R., & Ross, M. (2005). Snatching defeat from the jaws of victory: Self-esteem differences in the experience and anticipation of success. *Journal of Personality and Social Psychology, 89*(5), 764–780.
- Yoshizaki, S., Ishii, S., & Ishii, K. (1975). The effects of reward magnitude and choice freedom on opinion change. *Japanese Journal of Experimental Social Psychology, 15*(1), 35–44.
- Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*(2), 1–27.

## Appendix: The Bayesian Perspective on Consistency Phenomena

Adopting the Bayesian perspective, the impact of cognition  $y$  on strength of belief in  $x$  is influenced by two factors: (a) *strength* of the prior belief that  $x$  is the case (cf. Pelham, 1991; Pelham & Swann, 1994; Swann & Pelham, 2002) and (b) the *degree* to which cognition  $y$  is consistent or inconsistent with  $x$ .

### Strength of Prior Beliefs

It is plausible that the updating of beliefs on the basis of new information should depend on strength of one's prior beliefs. After all, such beliefs were presumably warranted by credible prior information, thus they should be taken into account and integrated with new information. For instance, Gilbert and Jones (1986) showed that when perceivers were given an initial person description that was then contradicted by subsequent information, the initial description tended to be tossed away but how readily it was disregarded depended on who was the source of the description. If the source appeared to be the target person him- or herself or a close friend, both representing highly knowledgeable sources, then people hung with it longer even in the face of contradictory information. This constitutes evidence that strength of prior belief affects the degree to which it is swayed by additional relevant information. In Bayesian terms, a *strength of prior belief*

can be referred to as *prior odds*—the ratio of the (subjective) probability of  $x$  to the (subjective) probability of not- $x$ , that is  $\frac{p(x)}{p(\sim x)}$ .

### Cognitive Consistency

Generally speaking, cognition (information) consistent with belief  $x$  should increase the knower's confidence in  $x$ , whereas cognition inconsistent with  $x$  should decrease the individual's confidence in  $x$ . We capture this common-sense intuition using the Bayesian concept of the *likelihood ratio*, which is described next.

### Degrees of Consistency/Inconsistency

Typically, in prior cognitive consistency literature notions of informational consistency and inconsistency were treated *categorically* (whereby

two cognitions are either consistent, inconsistent or irrelevant to each other), and without consideration of the *confidence* (subjective probability) with which the relevant cognitions were held (for a critique of this approach, see Deutsch & Krauss, 1965, pp. 69–70). In contrast, we presently assume *degrees* of consistency and inconsistency, that is, a continuum. Specifically, we express degrees of consistency/inconsistency in terms of the *likelihood ratio* (**LR**) of the probability of cognition  $y$  occurring if  $x$  were the case to the probability of cognition  $y$  occurring if not  $x$  were the case:  $LR = \frac{p(y|x)}{p(y|\sim x)}$ . In those terms, we consider  $y$  to be consistent with  $x$  if **LR** > 1, irrelevant to  $x$  if **LR** = 1, and inconsistent with  $x$  if **LR** < 1.

The *updated belief strength* that  $x$  versus not  $x$  is the case, following the consideration of  $y$  is expressed then as a posterior odds,  $\frac{p(x|y)}{p(\sim x|y)}$ , and is a function of the prior odds times the likelihood ratio, or degree of consistency between  $y$  and  $x$ :  $\frac{p(x|y)}{p(\sim x|y)} = \frac{p(x)}{p(\sim x)} \times LR$ .

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