Review

Understanding all inconsistency compensation as a palliative response to violated expectations

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It has been repeatedly shown that, when people have experiences that are inconsistent with their expectations, they engage in a variety of compensatory efforts. Although there have been many superficially different accounts for these behaviors, a potentially unifying inconsistency compensation perspective is currently coalescing. Following from a common prediction error/conflict monitoring mechanism, any given inconsistency is understood as evoking a common syndrome of aversive arousal. In turn, this aversive arousal is understood to motivate palliative efforts, which manifest as the analogous compensation behaviors reported within different psychological literatures. Based on this perspective, compensation efforts following both 'high-level' (e.g., attitudinal dissonance) and 'low-level' (e.g., Stroop task color/word mismatches) inconsistencies can now be understood in terms of a common motivational account.

A common understanding of inconsistency compensation

Across eras and disciplines, psychologists have presented participants with experiences that are inconsistent with their beliefs or goals and have observed a variety of analogous compensation behaviors. When explaining why it is that people engage in inconsistency compensation, different theorists have proposed a series of overlapping, variably consistent motivational accounts, each tied to different sources of inconsistency or to individual compensation behaviors (e.g., [1–10]; see Table 1). In what follows, we outline the scope of what we take to be a common psychological response to any experience that is inconsistent with expectation. We then outline an emerging perspective that proposes a common mechanism of inconsistency detection and a common motivational mechanism underling all inconsistency compensation efforts. Rather than understanding these behaviours as unrelated phenomena or in terms of unrelated theoretical accounts, this integrative perspective construes 'inconsistencies' as any detected expectancy violation, whatever the content or context; 'compensation' behaviors are understood as palliative responses to a basic, biologically based pattern of aversive arousal that follows from any given prediction error [11]. By specifying a unified motivational mechanism underlying all inconsistency compensation, it may be possible to integrate existing research disciplines that too often operate in isolation or opposition to one another.

The scope of the inconsistency compensation

Over 60 years ago, Bruner and Postman [12] explored people's responses to a simple visual anomaly: reverse-colored playing cards. According to Bruner and Postman, people maintain mental representations of expected relationships among their perceptions – 'paradigms' – that allow them to understand what they are experiencing. When people are presented with anomalous cards (e.g., a black four of hearts), they may assimilate their perception in such a way that it is consistent with their paradigmatic expectations (e.g., 'see' the black heart as a spade). Alternatively, they may also (eventually) recognize the anomalous nature of the card and

Glossary

Assimilation: reinterpreting experiences in such a way that they are consistent with expected relationships (e.g., 'seeing' a white crow as a dove).
Accommodation: revising expected relationships so that they are consistent with experiences (e.g., allowing for the existence of albino crows).
Affirmation: heightened commitment to alternative expected relationships following the violation of expected relationships. The affirmed expected relationships may share content with the violated relationships (e.g., affirming a controlling God after personal control has been violated) or share no content with the violated expected relationships (e.g., punishing a criminal more harshly following a visual anomaly).
Abstraction: implicit learning of relationships between elements of experience. This often involves the implicit, statistical learning of complex patterns embedded in visual data streams (e.g., an artificial grammar 'hidden' in lengthy letter strings).
Cognitive dissonance: aversive arousal following a perceived mismatch of experience and expectation (e.g., walking into the rain and not getting wet, or behaving in a manner that conflicts with ones attitudes).
Misattribution of arousal: the misattribution paradigm has been used to test whether the negative arousal that follows inconsistency detection causes compensation efforts. Assuming that individuals will seek to make sense of an internal state when its source is ambiguous, researchers have posited that individuals may misattribute the actual cause of the increased negative arousal to something else that seems plausible (e.g., the pill they ingested). It is hypothesized that misattribution manipulations also diminish the negative arousal and remove the necessity for subsequent palliative compensation efforts. In support of this hypothesis, compensation efforts following a wide array of inconsistencies are reliably extinguished following a misattribution of arousal manipulation.
Prediction error: signal that is crucial for reinforcement learning, indicating when events are worse or better than expected. Dopaminergic neurons are thought to be sensitive to changes in the fit between expectations and actual events, with a phasic drop in dopamine when an event is worse than predicted and phasic rise in dopamine when it is better than predicted.

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accommodate their paradigm accordingly (e.g., 'This is an altered deck of playing cards'). Bruner and Postman also noted a surprising response to these trivial anomalies: 'acute personal distress'. Such a response may be less surprising following inconsistencies addressed in the clinical psychological literature: unexpected, tragic events. According to Janoff-Bulman [13], people maintain a general belief that bad things only happen to people who deserve them. When this 'worldview' is violated, people tend to assimilate the event so that it is consistent with their expectations (e.g., 'That sexual assault victim was dressed provocatively') or they may revise their worldview to accommodate the event (e.g., 'Sometimes tragedy strikes people who don't deserve it'). These traumatic events also arouse what Janoff-Bulman terms a 'double dose of anxiety'; the first of these 'doses' follows directly from the tragic nature of the event, whereas the second 'dose' follows from having one's committed worldviews violated more generally. In a similar fashion, Festinger [1] understood most social psychological phenomena as reactions to 'cognitive dissonance' (see Glossary) following experiences that violate people's expected relationships (e.g., walking out into the rain and not getting wet). In the most frequent and reliable example of dissonance reduction behaviors, people are subtly induced to behave in ways that contradict their attitudes (e.g., have students argue in favour of a tuition increase) and respond by accommodating their attitudes to account for the behaviour (e.g., 'I guess I actually support tuition increases.'). In short, the most commonly studied compensatory responses to inconsistency are 'assimilation' and 'accommodation'. Both of these reactions, however, are accompanied – and likely instigated – by aversive arousal.

In addition to these analogous assimilation and accommodation behaviors, psychologists have explored compensatory 'affirmation' efforts: a heightened commitment to alternative beliefs or values following many of the same inconsistencies that evoke assimilation or accommodation. For example, if people are induced to behave in a manner that conflicts with their attitudes (e.g., students arguing in favor of a tuition increase), they will not only accommodate their relevant attitudes, but also affirm unrelated values (i.e., political beliefs [14]). Additionally, hundreds of studies have demonstrated analogous values affirmation following reminders of one's mortality [3], belongingness affirmation following social exclusion [15,16], or control affirmation following reminders of situations where they lack control [4,17]. Perhaps the most common examples of compensatory affirmation involve efforts toward 'ego-defense,' whereby people affirm their personal competencies after their self-esteem has been otherwise threatened [18], or affirm their self-concept after their identity has been otherwise violated [19]. These affirmation responses are also accompanied by anxious [20] or subjective [21] uncertainty and, as is the case with assimilation and accommodation efforts, it is likely that affirmation efforts are instigated by this aversive arousal [22].

Motivational theories of inconsistency compensation

Across and within research disciplines, these analogous phenomena involve (i) an inconsistency between expectation and experience, (ii) a state of aversive arousal and (iii) a common array of compensation efforts. We suggest that these phenomena are analogous because they represent different manifestations of the same psychological phenomenon: experiences that trigger a common error detection mechanism will evoke aversive arousal and, consequently, palliative attempts to reduce this arousal via various compensation efforts. And although there are many inconsistency theories that describe how a given inconsistency may be resolved (e.g., the implicit reinterpretation of anomalous phonemes [23] or explicit revision of assumptions to account for logical inconsistencies [24]), there are no inconsistency theories that offer a unitary, biologically specified account of why we are motivated to engage in any given compensation effort (e.g., assimilation, accommodation or affirmation) following from any given source of inconsistency (e.g., perceptual anomaly [25] or worldview violation [6]). Instead, there are a multitude of literature-specific theories that offer overlapping motivational accounts for every instantiation of inconsistency compensation (as if Newton had replaced his theory of gravity with a separate theory for every object that falls).

For example, Piagetian theorists describe a negative feeling that follows from violations of schemata – the mental representations that are drawn from our experiences and that are imposed on subsequent experiences [8]. Whether a violated schema represents propositional beliefs or moral values, the resulting sense of disequilibrium is understood to motivate assimilation or accommodation compensation processes. Similarly, the MAID model of attitudinal ambivalence [9] describes two general responses to conflicting attitudes: a 'problem focused' accommodation of attitudes to reduce the inconsistency, or a 'less effortful' assimilation of perceptions to mask the inconsistency. This model also posits a distinct mode of arousal that follows from ambivalent attitudes – a feeling of uncertainty that both underlies and necessitates subsequent compensation efforts.

Given that these perspectives are separated by eras and disciplinary boundaries, it may not be surprising that they offer different theories of what is likely a singular psychological phenomenon. What may be surprising is the continued proliferation of ostensibly distinct theories within a single contemporary discipline: social psychology. For example, 'compensatory control' researchers argue that aversive arousal motivates the affirmation of control beliefs following violations of personal control [22]. Similarly, 'terror management' theorists argue that the affirmation of cultural values following mortality reminders is motivated by efforts to avoid 'potential terror [3].' According to the 'tripartite security' model, the affirmation of cultural values following violations of personal attachment are motivated by feelings of 'insecurity', as are efforts to affirm attachment following violations of self-esteem [26]. Both 'system justification theory' [27] and 'worldview verification theory' [28] understand ideological affirmation as a product of experiences that arouse 'uncertainty' or 'anxiety.' Similarly, a 'compensatory zeal' [20] account of ideological affirmation rests on 'personal uncertainty,' whereas an 'uncertainty management' [5] account of fairness affirmation involves experiences that evoke 'subjective uncertainty.' Despite the substantial overlap, these different

Table 1. A selection of inconsistency compensation theories

Theory	Violation	Aversive State	Compensation	Refs
Cognitive Dissonance Theory	any knowledge/experience mismatch	dissonance	accommodation	[1]
Reactive Approach Motivation	goal frustration	anxious uncertainty	affirmation	[2]
Terror Management Theory	mortality reminder	potential terror	affirmation	[3]
Compensatory Control Theory	absence of control	arousal	affirmation	[4]
Uncertainty Management Model	self-understanding/ experience mismatch	personal uncertainty	affirmation	[5]
System Justification Theory	social inequality	uncertainty	assimilation affirmation	[6]
Meaning Making Model	traumatic life events	anxiety	assimilation accommodation affirmation	[7]
Piaget's Theory of Cognitive Development	any schema/experience mismatch	disequilibrium	assimilation accommodation	[8]
Model of Ambivalence-Induced Discomfort	conflicting attitudes	uncertainty	assimilation accommodation	[9]
Meaning Maintenance Model	any meaning/experience mismatch	meaninglessness	assimilation accommodation affirmation abstraction	[10]

social psychological theories purport to address distinct psychological phenomena. Nevertheless, we propose that all of these theories share a common instigator (inconsistency), a common motivator (drive to reduce aversive arousal) and a common set of behavioral outcomes (assimilation, accommodation, affirmation). As such, they are in fact describing the same general phenomenon.

To the extent that social psychologists have proposed a single phenomenon to unite these perspectives, however, it has not been a biologically specified motivational mechanism. Rather, these efforts have involved an attempt to identify some common content that is undermined by any given inconsistency and that is restored following any given compensation effort. This has generally involved understanding all relevant theoretical perspectives in terms of 'ego defence': efforts aimed at restoring some aspect of the self after it has been threatened (Box 1). This 'ego-defence' construal originates in the late 1960s, when accommodation efforts that had been previously explained as general dissonance reduction behaviors came to be understood as efforts to preserve one's 'self-concept' [29], then 'self-image' [14], then 'self-evaluation' [30] – all efforts to restore some aspect or other of the 'self' after some aspect or other of the 'self' has been violated by contradictory experiences. Likewise, compensatory affirmation following violations of personal goals, a sense of control, social affiliation and mortality reminders can be (and are) understood in terms of their self-restorative implications – often as distal efforts to restore self-esteem [31], identity [14], subjective [21] or personal certainty [5], and symbolic immortality [3].

Although this 'ego-defence' perspective has become a dominant construal in the field of social psychology, we propose that it addresses a general phenomenon whose scope lies far beyond the boundaries of self-construal, ranging from implicit auditory perception [23] to explicit justice worldviews [6]. As such, we understand these 'ego-defence' efforts as but one of many instantiations of a general inconsistency compensation process, a singular psychological phenomenon that is unified by a common motivational mechanism rather than a common propositional content, self-relevant or otherwise. Whether the source of a given inconsistency lies within logical propositions [24] or frustrated goals [2], we believe that the primary motivation to compensate for inconsistency bottlenecks is an effort to reduce a common syndrome of aversive arousal —one that is evoked by any given expectancy violation. To date, no integrative framework has offered a unified account of the palliative process that likely underlies any given inconsistency compensation behavior.

Box 1. Why did cognitive dissonance theory become a theory of ego defence?

Beginning in the 1960s, cognitive dissonance researchers primarily employed a compliance paradigm, inducing individuals to act contrary to an attitude they possess. This is illustrated in Festinger and Carlsmith's [71] experiment, in which participants told another person that a boring task was interesting in exchange for $1 or $20. Participants paid $1 were more likely to evaluate the boring task more positively than participants paid $20. Later research revealed, however, that attitude change was most likely to occur when participants believed that their counter-attitudinal statement would cause harm to someone else [72]. These results were interpreted to mean that one's 'ego' needed to be involved – that one needed to be concerned about having acted immorally. In the 1990s, however, research revealed that dissonance responses could occur in the induced compliance paradigm even when the counterattitudinal behavior occurred in private and no one knew of the behavior [50], as long as the experiment was trimmed of unnecessary complexity. Dissonance theory became an 'ego-defence' theory because scientists working with the theory used only one paradigm and focused on a version of it that produced reliable results rather than designing 'cleaner' experiments that created a simple inconsistency between attitude and behavior.

At the same time as researchers were designing complex social situations to test dissonance theory, Festinger took dissonance theory in a direction more consistent with the formulation proposed here. With Doug Lawrence, he found that even rats show evidence of dissonance responses [52]. In other work, he sought to create a situation in which the individual experienced dissonance between two 'cognitions' that were both highly resistant to change [73]. To do this, he had participants don prism goggles that made the edge of a door appear curved and asked them to run their hand along this edge. Festinger presumed that participants would experience dissonance between these two perceptions: the visual one that indicated the door was curved and the tactile one that indicated that the door was straight. Much to his surprise, they experienced no dissonance but instead had the illusion that the door was in fact curved! This research suggests that some cognitive inconsistencies, perhaps those involving percepts that are highly resistant to change, cause no dissonance reduction efforts because they are fully assimilated by the perceptual system and cause no conflicts between skeletal muscle plans [74].

A unified motivational account of inconsistency compensation

However, this broadly integrative framework is currently coalescing [2,32–36]. The key motivational mechanism of this framework does not derive from any given source of inconsistency (i.e., self-relevant or otherwise; e.g., the absurdity of a finite human existence [3] or anomalous playing cards [12]). Rather, it originates in a common, biologically-based pattern of aversive arousal that is believed to follow from any given inconsistent experience and which is understood to motivate all subsequent compensation behaviors. This general process begins with the violation of expectations that follow from networks of related propositions, often termed 'schemata' [8] or 'meaning' [7,10]. These inconsistencies are detected by neurocognitive structures that evoke a common syndrome of aversive arousal [37–40], often termed 'dissonance' [1], 'disequilibrium' [8] or 'uncertainty' [2,5,36]. This state may motivate one or more compensation behaviors. For example, if the violation is experienced below the threshold of conscious awareness [12] or people lack the cognitive capacity to address the violation [8,9], they will generally assimilate the experience such that it is consistent with their expected relationships. If people recognize the violation and possess adequate cognitive resources, they may accommodate their expected relationships to resolve the inconsistency [1]. Alternatively, people may affirm other consistent relationships that address the source of the inconsistency [31]. And, although they may prefer to affirm relationships that address the inconsistency [41], people will also affirm consistent relationships that share no content with the source of the inconsistency whatsoever [42,43]. Finally, people may engage in a recently identified mode of inconsistency compensation: the enhanced motivation [44,45] and capacity [46] to abstract (i.e., learn) consistent relationships in their environment; again, these abstracted relationships may share no content whatsoever with the source of the initial inconsistency. As such, inconsistency compensation cannot be about any specified content (e.g., the self) or resolving inconsistencies *per se*. Rather, these behaviors are palliative responses to the aversive arousal that follows from any experience that is inconsistent with expected relationships [37,47,48].

Evidence for general inconsistency compensation

There is a growing body of research that demonstrates analogous compensation behaviors following a wide array of inconsistencies that share no common content, self-relevant or otherwise. For example, if a research participant is speaking to an experimenter who is covertly switched with a different person while the participant is momentarily distracted, the participant will generally assimilate the perceptual violation such that they will not consciously notice the switch (i.e., change blindness [25]). Notably, participants will also engage in the affirmation of moral beliefs, punishing a criminal more harshly than those in a control condition [42] and to the same extent as those who have read an absurd joke [49], who are subliminally flashed nonsense word pairs (e.g., quickly blueberry) [46] or who are reminded of their own mortality [42]. In the same vein, accommodation behaviors will follow from non-self-relevant 'cognitive dissonance' manipulations, in addition to those that are typically self-relevant. For example, engaging in a behaviour that is inconsistent with a newly formed trivial attitude (e.g., toward a beverage just consumed) will evoke attitude change, even though the same manipulation does not influence self-esteem or self-directed negative emotions [50,51]. (It should also be noted that laboratory rats [52] and capuchin monkeys [53,54] – not known for their elaborate self-understandings – engage in behaviours that look a good deal like cognitive dissonance reduction.) More recently, it has been demonstrated that violations of personal control [44] or a Franz Kafka story [45] will enhance people's motivation to perceive consistent relationships in their environment (e.g., infer causation between unrelated events or determine patterns in letter strings). More remarkably, it has been shown that identity violations [45] or subliminal nonsense word pairs [46] actually enhance the ability to abstract statistical relationships in seemingly random letter strings. In all of these examples, the relationships that are affirmed or abstracted in no way address the initial inconsistency or share any common content. This renders it unlikely that compensatory responses are directly aimed at restoring the violated expectations or resolving the source of the inconsistencies. Rather, these behaviors are more likely palliative efforts to reduce the aversive arousal that follows from any given experience that is inconsistent with expectations.

Evidence for a common syndrome of aversive arousal

There is substantial indirect evidence for aversive arousal that follows from a variety of unrelated inconsistencies and which evokes different compensation behaviors. For example, accommodation behaviors following from a cognitive dissonance manipulation are extinguished if people are given the opportunity to misattribute their arousal to an alternative source (e.g., a placebo pill [55,56]). Similar 'misattribution of arousal' manipulations also extinguish affirmation behaviors following experiences that violate personal control [22] or the explicitly assimilated experience of covertly switched experimenters [42]. In the field of psychophysiology, direct evidence has emerged for physiological arousal following the same kinds of violations that evoke the same compensation behaviors [37,50]. For example, people will predictably demonstrate a cardiovascular threat response when their self-understanding is violated [57] or following a trivial expectancy violation, such as interacting with an Asian experimenter who has an Alabama accent [38] (for a review, see [34]). Conversely, violating expectations in a manner that is self-relevant – but in a positive way – will also evoke aversive arousal. For example, minorities who believe that social discrimination is rampant will demonstrate a cardiovascular threat response if they are not being discriminated against [58]. Moreover, people will report conscious anxiety after learning that their test scores have improved if this knowledge violates their expectations about how people learn [59].

The detection of and reaction to expectancy violations have analogues in contemporary neuroscience (Box 2), where the concept of 'prediction error' has gained prominence [11]. According to the 'reward prediction error hypothesis,' the occurrence of a mismatch between experience and

Box 2. Detecting and relieving inconsistency: brain mechanisms

Experiences that are inconsistent with expectations activate two separate brain processes: a process for detecting and reacting to inconsistency and a process for relieving the distress such detection evokes. Although many brain systems are likely recruited for the detection and reaction to inconsistency (e.g., amygdala, striatum, nucleus accumbens, locus-coeruleus, etc. [75,76]), the anterior cingulate cortex (ACC) may play an especially important role. A number of studies have implicated the ACC in 'high-level' inconsistency (i.e., cognitive dissonance [65,66]) and 'low-level' inconsistencies produced by stimuli high in response conflict (e.g., the word 'red' printed in green [62,63]). Many studies have also implicated the ACC in 'low-level' expectancy violation that occurs when people receive feedback indicating that ongoing events differ from expectations [60]. These findings have been interpreted by some as evidence that the ACC plays an important role in monitoring the potential for inconsistency [77] and by others as evidence that the ACC receives 'prediction errors' that recruit attention to unexpected events [39,40]. A more integrated account suggests the ACC plays a more general outcome-monitoring function, detecting instances when the outcome of actions is different than expected [78]. Importantly, ACC activity may reflect more than mere detection of outcome/expectation mismatches but also the negative affective responses that accompany this detection [79,80]. Inconsistency is not only associated with the ACC but also sympathetic nervous system arousal, as indexed by skin conductance, heart-rate and pupil dilation [37,81–83], and negative affect, as measured by the startle eyeblink response [51,84]. In short, the ACC is associated with the detection and distressed reaction to inconsistency. The subsequent brain process is implemented to relieve this state of aversive arousal and this is where approach motivation plays a key role. Approach motivation is associated with activation in the left dorsolateral prefrontal (DLPFC) [62,85] and medial orbitofrontal (OFC) cortices [86]. Approach-motivated states are thought to reduce the distress brought on by the detection of inconsistency by accommodating inconsistent experiences and therefore facilitating effective action [87] or by affirming consistent commitments that act as a palliative [2]. Although not abundant, neuroscience studies suggest that 'high level' inconsistency evokes relatively greater left than right prefrontal cortical activity [88], which acts to reduce inconsistency [89]. Furthermore, 'low-level' inconsistency is muted by relative left prefrontal cortical activity [90]. Taken together, these studies identify the ACC as critical to the process of detecting/reacting to inconsistency, and the left DLPFC and medial OFC as critical to the process of relieving the arousal such detection evokes.

expectancy is signalled by a drop in midbrain dopamine levels, including in the anterior cingulate cortex (ACC) [39]. Paralleling psychophysiological findings, the ACC responds not only to 'negative' expectancy violations (e.g., when performance is worse than expected) but also 'positive' violations (e.g., when performance is better than expected), regardless of whether the violations are relevant to the self [60] or not [61]. In recent years, much attention has been given to how the ACC responds to inconsistencies, with studies demonstrating that ACC activity is greater during experimental trials that are high in response conflict compared to those low in conflict [62,63]. Subsequent research has demonstrated ACC activation following the same types of inconsistencies that evoke accommodation behaviors in cognitive dissonance research [64]. Furthermore, the types of 'high-level' behavioral conflicts associated with cognitive dissonance research activate the ACC in line with 'lower-level' forms of conflict typically studied in the cognitive neuroscience literature (e.g., in studies using the color/word mismatch of the Stroop task) [65,66]. Moreover, a 'misattribution of arousal' manipulation has recently been found to diminish ACC activation in 'low level' conflicts, suggesting that these 'low level' conflicts prompt aversive arousal just as 'high level' conflicts do [67]. Perhaps most tellingly, ACC activation from these 'low-level' conflicts is diminished if people are allowed to engage in the affirmation of 'high level' values, such as religious beliefs [68], which again suggests that 'high' and 'low' level inconsistency processes involve the same neurocognitive systems.

Concluding remarks

At the 20th anniversary of cognitive dissonance theory, Greenwald and Ronis [69] described the gradual narrowing of Festinger's 'consistency among cognitions' account into a theory of 'ego defence.' They raised a 'final, disturbing thought: What if the original dissonance theory, which has now surrendered its name to somewhat different ideas, was correct?' ([17], p.53). Over 30 years later, a new perspective is picking up this mantle, imagining accommodation following 'ego violations' as but one manifestation of a general inconsistency compensation phenomenon. This new perspective goes much further, understanding assimilation, accommodation, affirmation or abstraction behaviors as following from any experience that is inconsistent with expectations, insofar as any detected inconsistency is understood to evoke the same syndrome of aversive arousal that likely motivates these palliative responses. Converging evidence for this unified motivational account has rapidly proliferated in the past five years, eroding the boundaries between theories that describe these compensation behaviours as they differently manifest in various research disciplines.

Inconsistencies that evoke assimilation [42] and accommodation [14] will also evoke affirmation; inconsistencies that evoke affirmation [45,46] will also evoke abstraction; inconsistencies that violate entirely different expectations, presented consciously or unconsciously, self-relevant or otherwise, will evoke the same affirmation [42,43,49] and abstraction [45,46] compensation behaviors, where these efforts involve affirming and abstracting relationships that share no content whatsoever with the expectations that were violated. Identical modes of physiological arousal [38,57] and ACC activation [62,63,66,68] follow from a wide array of divergent inconsistencies that follow from equally unrelated expectations, whether they are 'low-level' or 'high-level,' 'negative' or 'positive' [39,58,59]. Finally, the same misattribution of arousal manipulations dampen the aversive arousal related to both 'low-level' [67] and 'high-level' [22,42,55,56] inconsistencies and will extinguish accommodation [55,56] and affirmation [22,42] behaviors following inconsistencies that share no common content. In the coming years, we believe that it is inevitable that psychologists of differing disciplines will question the utility of offering wholly 'distinct' motivational accounts for each instantiation of this general inconsistency compensation phenomenon. Even though there can be little doubt that content and context are relevant in determining which compensation process is evoked and how each manifests [70], we believe that generating a new theory for each and every instantiation has meant that we know remarkably little

Box 3. Outstanding questions

- There is evidence that people will prefer to affirm beliefs that directly address an inconsistency, rather than beliefs that do not [35,41]. Does affirming inconsistency-relevant beliefs serve an enhanced palliative function compared to affirming distally related or entirely unrelated beliefs?
- Some violations provoke identical modes of compensatory affirmation [42], whereas others do not [70]. What are the features of a given inconsistency (e.g., content, emotional valence, context) that determine how and whether a given commitment is subsequently affirmed?
- More generally, what are the features of a given inconsistency (e.g., implicit vs. explicit, positive vs. negative expectancy violation, perceptual vs. propositional, self-relevant vs. non-self-relevant) that determine the preferred or possible modes of compensation (i.e., assimilation, accommodation, affirmation or abstraction)?
- Compensatory abstraction is a recently demonstrated mode of inconsistency compensation [45,46]. Are there other modes of inconsistency compensation that have yet to be empirically identified?
- Does a universal syndrome of aversive arousal follow from any given inconsistency? If so, are there elements of this syndrome that are separately responsible for differing modes of compensation?
- Given evidence that the dorsal ACC is implicated in aversive affect and psychological pain, can its implication in the detection of cognitive conflict signal that this 'detection' is an affective experience?

about why we engage in these efforts – in particular, the motivational role of aversive arousal that is implicated in these analogous behaviors (see also Box 3). Many of these answers will come from psychologists of various fields comparing notes and compiling existing observations under a content-general inconsistency compensation framework – with a common nomenclature and common understanding of the core motivational phenomenon. From there, a unitary, discipline-straddling account of inconsistency compensation can uncover the true boundaries of this phenomenon, as well as compensation behaviors that have yet to find a disciplinary label.

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