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When dueling emotions and conflicting beliefs predict subjective ambivalence: The role of meta-bases☆

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ABSTRACT

Within the emotions and beliefs upon which attitudes are based, people can hold simultaneously positive and negative reactions. In addition, independent from the emotions and beliefs in their attitude structure, people hold subjective perceptions about their affective and cognitive attitudinal bases (i.e., meta-bases), which reflect interest in processing emotions or beliefs, respectively. We tested how much people experience subjective ambivalence when they hold mixed positive and negative affective or cognitive reactions and whether this depends on relevant meta-bases. In Study 1, for an attitude object dominated by affective meta-bases (i.e., strong interest in processing emotions), intra-affect conflict (IAC), but not intra-cognition conflict (ICC), predicted subjective ambivalence (SA). Moreover, individual differences in meta-bases mattered. Even for a normatively affective meta-basis topic, ICC predicted SA among individuals with relatively cognitive meta-bases but not those with relatively affective meta-bases (Study 2). Similarly, even for a normatively cognitive meta-basis topic, IAC predicted SA among individuals with relatively affective meta-bases but not those with cognitive meta-bases (Study 3). In Study 4, both IAC and ICC's effects on SA were moderated by individual differences in meta-bases for a topic without a clearly normative meta-basis. Study 5 demonstrated that ICC caused more SA for individuals who received cognitive meta-bases feedback than those who received affective meta-bases feedback, whereas IAC caused more SA for individuals who received affective meta-bases feedback than cognitive meta-bases feedback. Thus, we shed light on novel distinctions between intra-affect and intra-cognition conflict in the experience of ambivalence.

When it comes to people's attitudes, it is often not as simple as liking or disliking something. Although an attitude is typically considered as an overall positive or negative evaluation, attitudes can have an *affective* component, which reflects the emotions a person has when thinking about the topic and a *cognitive* component, which reflects the beliefs a person holds about the topic. Both affective and cognitive components have been established as important contributors to overall attitudes (Breckler, 1984; Eagly & Chaiken, 1993; Zanna & Rempel, 1988). Furthermore, people can have conflicting positive and negative reactions within their emotions and/or within their beliefs about a topic (e.g., Armitage, 2004; Fong, 2006; Mucchi-Faina, Pacilli, Pagliaro, & Alparone, 2009). For instance, for people's attitude toward a political candidate, someone can have intra-affect conflict (IAC) when they feel both excited and anxious about the candidate, but he or she can also have intra-cognition conflict (ICC) when they believe the candidate is both incompetent and authentic. Indeed, the existence of mixed emotions (e.g., Bagozzi, Wong, & Yi, 1999; Hong & Lee, 2010; Hui, Fok, & Bond, 2009; Larsen & McGraw, 2011; Williams & Aaker, 2002) and conflicting cognitions (see Gawronski and Strack, 2012) have been key programs of investigation across diverse areas of psychology (cf. Itkes, Eviatar, & Kron, 2019). However, very little research has compared the consequences of these different types of intra-component conflict.

We suggest that people are likely to experience a state of subjective ambivalence when they have an attitude comprised of mixed affective reactions (IAC) and/or mixed cognitive reactions (ICC). This experience of attitudinal conflict is often referred to as *subjective ambivalence* (SA; Thompson, Zanna, & Griffin, 1995) and often, although not always, results in discomfort that people try to resolve (Clark, Wegener, &

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Fabrigar, 2008; Newby-Clark, McGregor, & Zanna, 2002; Sawicki et al., 2013). However, we propose that the relationship between IAC and SA, or between ICC and SA, depends on affective-cognitive meta-bases, which capture concerns for or interest in processing emotions or beliefs, and are operationalized by the extent to which people perceive emotions or beliefs as the dominant basis for an attitude. (e.g., See, Petty, & Fabrigar, 2008, 2013). Specifically, we propose a matching hypothesis such that for affective meta-bases, which capture concerns for processing emotions, IAC but not ICC would be a reliable predictor of SA; for cognitive meta-bases, which capture concerns for processing beliefs, ICC but not IAC would be a reliable predictor of SA. We also explore whether differences in SA that arise as a function of intra-component conflict and meta-bases are consequential. That is, we test downstream effects on how much people think their attitude will change or remain the same in the future.

Subjective ambivalence predicts a range of important outcomes such as attitude stability (Bassili, 1996; Luttrell, Petty, & Briñol, 2016), information seeking (Sawicki et al., 2013), information processing and persuasion (Clark et al., 2008), and attitude-behavior consistency (see Armitage & Conner, 2004). Recent work also suggests that SA can have adaptive functions such as to protect oneself from possible rejection (Reich & Wheeler, 2016) or to convey the impression that one is thoughtful (Pillaud, Cavazza, & Butera, 2013). Because SA impacts many outcomes, much research has also examined its antecedents. We suggest that these antecedents can be broadly categorized into structural factors and meta-cognitive factors, and we propose that integrating both the structural and the meta-cognitive approaches can be fruitful.

1. Intra-component conflict and subjective ambivalence

The structural approach assumes that SA exists or is expressed to the extent that it is predicted by "objective" or "potential" attitude ambivalence, which is an indication of how much people actually have both positive and negative evaluations to the topic (e.g., Kaplan, 1972; Priester & Petty, 1996; Thompson et al., 1995; Riketta, 2000; Snyder & Tormala, 2017). However, objective ambivalence (OA) reflects conflict within evaluative reactions overall, so it remains unclear whether SA can be predicted by objective conflict within the emotional component of the attitude (IAC) and/or the cognitive component (ICC) specifically.

Although scholars have called for closer attention to considering the role of such intra-component conflict in SA (Armitage & Conner, 2004; Zanna & Rempel, 1988), little has been done beyond examining people's pre-existing levels of each type of intra-component conflict. For example, people tend to have relatively high degrees of both IAC and ICC in their attitudes toward AIDS testing (Thompson et al., 1995). In addition, people tend to have a greater degree of ICC than IAC for their ingroup (Mucchi-Faina, Costarelli, & Romoli, 2002) and a greater degree of IAC than ICC for outgroups for which fairness norms apply (Mucchi-Faina et al., 2009). In some notable exceptions, studies have revealed the effects of intra-component conflict on outcomes that are known to be related to SA. For example, intra-component conflict has been found to positively predict message processing, although this research did not disentangle the unique effects of IAC versus ICC (Maio, Bell, & Esses, 1996). In addition, greater levels of ICC for alcohol drinking has been associated with lower attitude-behavior consistency, although this research did not compare the effects of ICC versus IAC (Armitage, 2003). Such work was important in establishing that intra-component conflict matters, but the question remains regarding when each particular type of intra-component conflict (i.e., ICC versus IAC) would matter.

Given theorizing in the tripartite model of attitudes (Rosenberg & Hovland, 1960; Zanna & Rempel, 1988) as well as its empirical validation (Crites, Fabrigar, & Petty, 1994; Eagly, Mladinic, & Otto, 1994), we suggest that since emotions and beliefs make unique contributions to attitudes, conflict within emotions and conflict within beliefs should also uniquely predict SA. Moreover, we posit that each type of conflict would matter as a function of affective-cognitive meta-bases at the level of either the attitude object or the individual. Evidence that demonstrates that IAC and ICC are reliable predictors of SA for different topics and different individuals would attest to the utility of considering intra-affect conflict and intra-cognition conflict separately.

2. A matching hypothesis: meta-bases matter

More recently, others have relied on a meta-cognitive framework to predict SA (DeMarree, Briñol, & Petty, 2015; Petty, Briñol, Tormala, & Wegener, 2007; Refling et al., 2013; Sawicki & Wegener, 2018; Tormala & DeSensi, 2008; Wegener & Petty, 1997). Based on this framework, people reflect on their attitudes and develop metacognitions or naïve theories about their attitudes. In other words, people do not only consider the valence of their reactions (e.g., "Do I like this or not?"). People also reflect on these valenced reactions to form secondary perceptions or cognitions (e.g., "Is my attitude biased?" "Am I sure about my attitude?" "What is my attitude based on?"). Of particular relevance, these metacognitions have been found to influence SA. For instance, greater accuracy in recognizing the strength with which opposite reactions are held is suggested to predict greater SA (Refling et al., 2013). As another example, people who are motivated to carefully process a message show greater SA when they perceive that their attitudes are based on source information rather than arguments, presumably because such people prefer to base their attitudes on arguments (Tormala & DeSensi, 2008).

We consider meta-bases ("Are my attitudes based on emotions? Are they based on beliefs?") as a factor for determining which type of intra-component conflict would be more predictive of SA. Affective-cognitive meta-bases refer to the extent to which people consider their attitudes to be based on their emotions or their beliefs. These meta-bases reflect the extent to which people have greater processing concerns for emotions vs. beliefs for the topic. Accordingly, prior research has found that the more cognitive people's meta-bases, the more they judge a beliefs-focused message to be meaningful and worth remembering, compared to an emotions-focused appeal (Keer, van den Putte, Neijens, & de Wit, 2013), and the more affective people's meta-bases, the more time they invest in reading emotions-focused (vs. beliefs-focused) information (See et al., 2013). More affective meta-bases are also related to greater reliance on other people's emotions rather than beliefs toward a topic when forming preferences (See et al., 2008).

It is also worth noting that in prior research, meta-bases were typically operationalized as a difference score that is computed from subtracting responses to the cognitive meta-bases questions from responses to the affective meta-bases questions (or vice-versa). This is because the difference score approach captures directly the extent to which an individual has selective interest in affective over cognitive (or cognitive over affective information), with implications for differences in attention to these two types of information. This difference score approach is often contrasted against an approach where affective and cognitive meta-bases are treated as separate indices, and it is important to clarify that the latter approach allows us to know the extent to which an individual has more affective meta-bases compared to other individuals, independently of the degree to which they have more or less cognitive meta-bases compared to other individuals. Thus, the latter approach does not necessarily reflect selective interest in affective information over cognitive information, and does not allow us to predict when IAC or ICC leads to greater SA.

Similar to prior research, we adopted a difference score approach in the present research. We expect that affective-cognitive meta-bases influence not only the interest that people have in others' emotions and beliefs, but also the interest that people have in their own emotions and beliefs, including the extent to which their own emotions and beliefs are internally conflicted. Thus, given affective meta-bases, people will care more about their emotional reactions to the object, so dueling emotions (IAC) should lead to greater SA than conflicting beliefs (ICC).

Conversely, given cognitive meta-bases, people will care more about their beliefs, so conflicting beliefs (ICC) should lead to greater SA than dueling emotions (IAC).

3. The present research

As explained above, we submit that both structural and meta-cognitive factors matter in predicting SA, and thus seek to demonstrate effects that would otherwise be neglected from focusing only on the tripartite model or only on the meta-cognitive framework.

In the present studies, we assessed intra-component conflict by measuring people's affective and cognitive reactions using unipolar scales. That is, we assessed positive and negative reactions separately for both affect and cognition, which allowed us to compute the degree of conflict between positive and negative affective reactions (i.e., IAC) and between positive and negative cognitive reactions (i.e., ICC). This departs from prior work on the structural bases of attitudes that relied on bipolar scales that measure affective or cognitive reactions on a continuum from positive to negative.

We also examined the role of meta-bases at different levels of analysis. First, the current research examined meta-bases as a function of the attitude object or topic. That is, a topic is considered to have a normatively affective (cognitive) meta-basis across individuals if mean affective meta-bases are greater (lower) than cognitive meta-bases. Such an object-focused approach has been found to be predictive for the structural bases of attitudes (Eagly et al., 1994; Haddock, Zanna, & Esses, 1993; See et al., 2013), and if this approach is also predictive for affective-cognitive meta-bases, then it would suggest that meta-bases can develop from cultural norms.

Second, the current research also examined meta-bases as a function of the individual. That is, individuals vary in how much they have a general tendency to perceive affective or cognitive bases for their attitudes and in how much they perceive an affective or cognitive basis for a specific attitude. Such an individual-focused approach has also proven to be fruitful in prior research (e.g., Keer et al., 2013; See et al., 2008; see also Huskinson & Haddock, 2004), thus suggesting that despite normative trends, individual variation in meta-bases can be impactful. Although there are other individual differences that also differ along affective and cognitive orientations (e.g., Aquino et al., 2016; Wolf et al., 2017; see Haddock & Maio, 2019), it is worth noting that these individual differences such as Need for Cognition (NC; Cacioppo et al., 1996) and Need for Affect (NA; Maio & Esses, 2001) are distinguishable from meta-bases. Indeed, NC and NA have been found to be weakly, if at all, correlated with meta-bases (e.g.,Aquino et al., 2016; See et al., 2008). For instance, high NC individuals prefer mentally complex activities and low NC individuals prefer mentally simple activities (See, Petty, & Evans, 2009). Notably, because the contents in an emotional message can be considered as simple or complex, prior research has found that high NC individuals are as persuaded by emotional messages as low NC individuals when they process the contents in those emotional messages (Petty, Schumann, Richman, & Strathman, 1993). Importantly, individuals with cognitive meta-bases are less persuaded by emotional messages than individuals with affective meta-bases because of their lack of interest in processing emotions (e.g., See et al., 2008). Because the effects of IAC and ICC on subjective ambivalence should depend on interest in processing emotions and beliefs, regardless of how complex or simple the emotions and beliefs are, we focus on individual differences in meta-bases rather than the other individual differences.

We considered three possibilities for the relative impact of topic-level versus individual-level meta-bases. First, if topic-level meta-bases override individual-level meta-bases, then IAC or ICC would be a reliable predictor of SA only when the type of conflict matches the topic's normative meta-basis (e.g., IAC would predict SA for affective meta-basis topics). Furthermore, such effects would be unmoderated by individual differences in meta-bases. Second, if individual-level meta-bases override topic-level meta-bases, then regardless of the attitude object's normative meta-bases, IAC would be a reliable predictor of SA among individuals with more affective meta-bases whereas ICC would be a reliable predictor of SA among individuals with more cognitive meta-bases. Furthermore, such effects would not depend on the topic being examined.

Third, it is possible that both levels of meta-bases matter. In this case, IAC would be a reliable predictor of SA for a normatively affective meta-basis topic and for individuals with more affective meta-bases (even for normatively cognitive meta-basis topics). Put differently, this would mean that as long as processing concerns for emotions are relatively high, whether due to the nature of the topic itself or to one's own idiosyncratic meta-bases, then greater conflict within emotions would be associated with more SA. Similarly, ICC would be a reliable predictor of SA for topics or individuals with *cognitive* meta-bases. These possible patterns would provide evidence for the utility of assessing meta-bases at both the object and the individual levels.

We do not have any a priori reason to expect that individual-level meta-bases would override topic-level meta-bases (i.e., normative meta-basis), or vice-versa. In order for individual-level meta-bases to override topic-level meta-bases, people would need to be so confident in their own meta-bases, despite their meta-bases not being aligned with the normative meta-basis, that they disregard the normative meta-basis and rely completely on their own meta-bases. Likewise, it would be hard for people to ignore their own meta-bases for a particular object to the extent of completely relying on the normative meta-basis. Moreover, research on other characteristics of attitudes, in particular, attitude functions, has shown that both topic-level and individual-level functions matter for attitudinally relevant behavior (e.g., Shavitt, Lowrey, & Han, 1992). Thus, we expected that both levels of meta-bases would matter for subjective ambivalence.

Since no prior study has examined normative meta-bases at the level of the topic, Study 1 was a preliminary investigation that relied on an object-focused approach. Thus, participants reported IAC and ICC for topics that had been pilot tested to be dominated by an affective meta-basis — cats and dogs. Study 2 examined the effects of IAC and ICC on SA for another normatively affective meta-basis topic (running), but this study also included individual differences in meta-bases. Having focused on normatively affective meta-basis topics in Studies 1 and 2, Study 3 then examined a normatively cognitive meta-basis topic (going to the dentist), and also examined individual differences in meta-bases. In addition, Study 4 assessed an attitude object not clearly dominated by a particular meta-basis (the brand *Hershey's*) to test whether the effects obtained in Studies 2 and 3 can be observed within the same study. Finally, in Study 5, we manipulated meta-bases and IAC/ICC for a fictitious animal in order to establish the causal effect of the two variables on subjective ambivalence.

For all studies, full question wording for all measures is provided in the online materials appendix, and data and analysis scripts are available on this project's page on the Open Science Framework (https://osf.io/exs56/?view_only=027ca3c1292240c9b66ae2c2e69bb77c). In all studies, we report all measures, manipulations and exclusions. For all studies, no participants were excluded from analyses, and no further data collection occurred after the analyses.

4. Study 1

The purpose of Study 1 is to demonstrate that for topics that are dominated by an affective meta-basis, IAC but not ICC would be a reliable predictor for SA. But first, the topics of cats and dogs were pilot tested on a separate sample. In this pilot test ($N = 35$) conducted on the same population as in Study 1, participants reported their meta-bases for attitudes toward cats and dogs using 11-point scales anchored at "*not at all driven by my [beliefs/emotions]*" and "*totally driven by my [beliefs/emotions]*." Specifically, they were asked: "To what extent do you think your opinions about [cats/dogs] are driven by your beliefs about [cats/dogs]?" and "To what extent do you think your opinions about [cats/

dogs] are driven by your emotions about [cats/dogs]?" These items were the same as those used in prior research (e.g., See et al., 2008). The normative meta-basis for cats was significantly more affective (M = 8.29, SD = 2.77) than cognitive (M = 6.86, SD = 3.29), $t(34) = 2.42$, p = .02. The normative meta-basis for dogs was also significantly more affective (M = 8.43, SD = 2.34) than cognitive (M = 7.00, SD = 2.99), $t(34) = 2.70$, p = .01. This suggests that cats and dogs are both associated with greater processing concerns for emotions than beliefs.

4.1. Method

4.1.1. Participants

One-hundred and eighteen students at National University of Singapore (M_{age} = 19.84, SD = 1.42; 70.3% female, 29.7% male; 90.68% self-identified as Chinese, 5.08% Indian, 3.39% Malay, 0.85% "Other") participated in return for partial course credit. Power analyses showed that N = 118 provided 80% power to detect a unique IAC effect that is between small and medium (i.e., f^2 = 0.07).

4.1.2. Procedure and materials

Groups of up to seven participants per session completed the study in person. In all in-person studies in the current research (Studies 1, 2, and 5), participants completed the study while seated in visually isolated and partitioned cubicles in a computer laboratory. Materials were presented on 22 in. monitors using Medialab software (Jarvis, 2014), with the distance from the center of the monitor and the participant's eyeline at about 52.2 cm. Participants viewed all stimuli and responded to questions at their own pace, as they clicked on the mouse or pressed the "ENTER" key to proceed to the next screen whenever they wanted.

Participants were randomly assigned to respond to one of two topics with relatively affective meta-bases: cats or dogs. Positive and negative affective and cognitive items, as well as subjective ambivalence items, were presented. In this, and all subsequent studies, participants also responded to demographic questions, and then were debriefed and dismissed.

4.1.2.1. Degree of IAC and ICC. Affect and cognition were first assessed using items from prior research (Crites et al., 1994; Smith & Nosek, 2011). All participants responded to six positive (α_{cats} = 0.91, α_{dogs} = 0.91) and six negative (α_{cats} = 0.85, α_{dogs} = 0.75) items that assess emotions. Examples of the affect items include "Cats/Dogs are one of the animals that I love" and "Cats/Dogs make me feel tense." Participants also responded to six positive (α_{cats} = 0.92, α_{dogs} = 0.79) and six negative (α_{cats} = 0.86, α_{dogs} = 0.66) items that assess beliefs. Examples of the cognition items include "I think that having a dog is beneficial to one's mental health," and "Cats/Dogs are useless as companions."[2]

Two intra-component conflict indices were computed, one for conflicting emotions and another for conflicting beliefs, using the following formula commonly used to compute degrees of attitudinal ambivalence: *Intra-component conflict* = $[(P + N)/2] - |P - N|$, where P is the average of the positive reactions and N is the average of the negative reactions (see Thompson et al., 1995). Scores could range from −2 to +7, with higher scores reflecting greater intra-component conflict.

4.1.2.2. Subjective ambivalence. Participants responded to three items assessing the extent to which they experienced conflict, indecision, and mixed reactions to cats/dogs (Priester & Petty, 1996). Responses to these items were averaged to form an index of SA (α_{cats} = 0.91, α_{dogs} = 0.82).

4.2. Results and discussion

Table 1 presents summary statistics and raw correlations for all key variables.

To test the study's central hypothesis, a multiple regression analysis was conducted, entering IAC and ICC as simultaneous predictors of SA. Results showed that IAC was a significant independent predictor of SA, B = 0.37, β = 0.39, $t(115) = 3.72$, $p < .001$, 95% CI: [0.17, 0.56].[3] ICC, however, was not a significant predictor of SA, B = 0.04, β = 0.04, $t(115) = 0.38$, p = .701, 95% CI: [−0.16, 0.23].

An additional model was run to test whether these effects depended on the specific topic of evaluation (i.e., cats vs. dogs). In a hierarchical multiple regression model with SA as the outcome variable, IAC, ICC, and topic were entered in Step 1, and the IAC × topic and ICC × topic interaction terms were entered in the second step. In this and all subsequent hierarchical multiple regression analyses, results were interpreted from the first step of the model in which they appeared.

Results showed that as expected, neither interaction was significant ($ps > 0.70$), and IAC remained a significant predictor of SA even when controlling for topic in Step 1, B = 0.34, β = 0.36, $t(114) = 3.39$, $p < .001$, 95% CI: [0.14, 0.55]. ICC remained nonsignificant, B = 0.08, β = 0.08, $t(114) = 0.72$, p = .474, 95% CI: [−0.13, 0.29]. Thus, the effects of IAC and ICC on SA did not depend on which of the two affective meta-basis topics was being considered. Instead, Study 1 demonstrated that dueling emotions (and not conflicting beliefs) emerged as a significant unique predictor of SA for topics with normatively affective meta-bases.

5. Study 2

Having demonstrated that IAC but not ICC predicts SA for topics that are associated with greater processing concerns for emotions than beliefs, Study 2 aimed to replicate the same pattern on a different topic that is also dominated by an affective meta-basis (i.e., running). In a pilot test (N = 35), the meta-bases for running were significantly more affective (M = 5.20, SD = 1.57) than cognitive (M = 4.46, SD = 1.67), $t(34) = 2.55$, p = .02. Thus, for this normatively affective meta-basis topic, we predicted that IAC would emerge overall as a reliable predictor of SA.

More importantly, Study 2 aimed to examine the extent that individual differences in meta-bases would matter. Following prior studies (Keer et al., 2013; See et al., 2008, 2013), we first focused on meta-bases as a general individual difference across various topics. That is, whereas

Table 1
Summary statistics and correlations (Study 1).

	M (SD)	1	2
1. IAC	1.95 (1.46)	–	
2. ICC	1.65 (1.46)	0.50**	–
3. SA	3.12 (1.38)	0.41**	0.26**

Note. *$p < .05$, **$p < .01$.

[2] In our original Cats dataset, the survey contained eight items for positive affect, eight items for negative affect, eight item for positive cognition, and six items for negative cognition. Two of the negative affect items, however, loaded negatively on the scale and in retrospect we realized that they were written such that they actually conveyed positive evaluations of cats despite negative emotion ("Cats bring great sorrow to the family when they pass away" and "When I am feeling sad, I would want to spend time with a cat.") For balance, we then also omitted two positive affect items ("I feel that cats are accepted warmly by society" and "I feel that cats would make little children in the house happy") and two positive cognition items ("Providing for a cat is a wholesome activity for its owner" and "Domesticated cats have evolved to be more intelligent than their untamed ancestors"). These latter items were selected because they correlated relatively low with the full scales; however, Cronbach's alpha was not appreciably changed after dropping these items. We retained the six-item standard for each scale for Dogs.

[3] Unless otherwise noted, all reported confidence intervals are for the unstandardized B.

the topic of running is expected to be dominated by affective processing concerns overall, individuals who personally place considerable weight on beliefs in developing their attitudes would be additionally concerned with processing cognitive information. Thus, we predicted an interaction where ICC would predict SA only for individuals with more cognitive meta-bases for their attitudes but not for individuals with more affective meta-bases.

5.1. Method

5.1.1. Participants and design

Participants were 220 introductory psychology students at National University of Singapore ($M_{age} = 19.96$, $SD = 1.29$; 71.4% female, 27.7% male, 0.9% preferred not to say; information on ethnicity was not collected) who received partial course credit. This sample size provided 80% power to detect a relatively small ($f^2 = 0.04$) interaction effect. Groups of up to 7 participants per session completed the study in person in visually isolated cubicles in a computer laboratory.

5.1.2. Measures[4]

5.1.2.1. Individual differences in meta-bases. Participants were first asked to report their meta-bases toward various topics that were not related to running. These objects were birth control, blood donation, chocolate, snakes, and spiders. That is, participants answered the following questions: (a) "To what extent do you think your attitudes toward [topic] are driven by your emotions?" and (b) "To what extent do you think your attitudes toward [topic] are driven by your beliefs?" Participants responded to these questions on 11-point scales with endpoint labels *not at all driven by my emotions/beliefs* and *totally driven by my emotions/beliefs*). Participants' responses to the emotions questions were averaged across topics ($\alpha = 0.66$). The same was done for their responses to the beliefs questions ($\alpha = 0.74$). To create an index for general individual differences in meta-bases, each participant's averaged responses to the emotion questions were subtracted from their averaged responses to belief questions (e.g., See et al., 2008). Thus, more positive values reflected having more cognitive meta-bases overall ($M = -0.25$, $SD = 1.87$).

5.1.2.2. IAC and ICC. Participants then reported affective and cognitive reactions to the topic of running using items like those in Study 1. IAC was computed from responses to three positive ($\alpha = 0.85$; e.g., "I would get pumped up and excited if I knew I was about to go running") and three negative ($\alpha = 0.75$; e.g., "I hate how I get sweaty when I run") emotion-related items. ICC was computed from responses to three positive ($\alpha = 0.67$; e.g., "I believe that running is a useful way to stay fit") and three negative ($\alpha = 0.71$; e.g., "Going for runs can be harmful by straining joints and muscles") belief-related items.

5.1.2.3. Subjective ambivalence. An expanded 6-item measure of SA ($\alpha = 0.93$) was used.[5]

[4] In this study, and subsequent studies, we also measured overall attitudes (e.g., "To what extent are your attitudes toward running [negative/positive]?"). These were ancillary measures not directly relevant to the research question and were not analyzed

[5] We developed this expanded measure to explore the possibility that a more "affective" version of SA (e.g., "To what extent do you feel emotionally torn about running?") would correspond more strongly to IAC and that a more "cognitive" version of SA (e.g., "To what extent do you have mixed beliefs about running?") would correspond more strongly to ICC. We found, however, that the internal reliability for the 6-item measure was very strong and that the two dimensions we attempted to assess correlated highly with one another ($r = 0.83$). Therefore, we treated the full set of items as a single measure of SA in our focal analyses.

5.2. Results and discussion

Table 2 presents summary statistics and raw correlations for all key variables.

We conducted a hierarchical multiple regression analysis with SA as the outcome variable. IAC, ICC, and individual differences in general meta-bases were entered in the first step and the two interaction terms (*IAC* × *general meta-bases* and *ICC* × *general meta-bases*) were entered in the second step. General meta-bases did not predict SA, $B = 0.03$, $\beta = 0.04$, $t(216) = 0.57$, $p = .57$, 95% CI: [−0.07, 0.12]. Importantly, consistent with running's dominant affective meta-basis, IAC uniquely predicted SA, $B = 0.28$, $\beta = 0.35$, $t(216) = 5.55$, $p < .001$, 95% CI: [0.18, 0.38]. Unexpectedly, ICC also predicted SA, albeit to a smaller extent, $B = 0.15$, $\beta = 0.19$, $t(216) = 3.00$, $p = .003$, 95% CI: [0.05, 0.24].

More importantly, there was a significant interaction between general meta-bases and ICC, $B = 0.05$, $\beta = 0.26$, $t(214) = 2.24$, $p = .026$, 95% CI: [0.01, 0.10] (Fig. 1B). Probing this interaction revealed that as hypothesized, ICC uniquely predicted SA among individuals with more cognitive meta-bases (1 *SD* above the mean), $B = 0.25$, $\beta = 0.32$, $t(214) = 3.81$, $p < .001$, 95% CI: [0.12, 0.37]. Among individuals with more affective general meta-bases (1 *SD* below the mean), ICC did not uniquely predict SA, $B = 0.05$, $\beta = 0.07$, $t(214) = 0.85$, $p = .396$, 95% CI: [−0.07, 0.18]. As predicted, there was no interaction between IAC and general meta-bases, $B = -0.02$, $\beta = -0.07$, $t(214) = -0.87$, $p = .385$, 95% CI: [−0.07, 0.03] (Fig. 1A). That is, IAC predicted SA for this topic regardless of individuals' general meta-bases.

6. Study 3

Study 3 differed from Study 2 in two important ways. Firstly, we considered an attitude object with a normatively *cognitive* meta-basis (i.e., going to the dentist). In the same pilot from used for Study 2, meta-bases for going to the dentist were significantly more cognitive ($M = 4.14$, $SD = 1.77$) than affective ($M = 3.23$, $SD = 1.25$), $t(34) = 2.40$, $p = .02$. Given the tendency for cognitive meta-bases to dominate for attitudes about going to the dentist, we expected an overall effect of ICC on SA. In addition, we predicted a meta-bases × IAC interaction such that IAC would predict SA only for individuals with more affective meta-bases for their dentist attitudes but not for individuals with more cognitive meta-bases.

Finally, although it is clear that an individual's general meta-bases are associated with a disposition to process affective versus cognitive content (e.g., Keer et al., 2013; See et al., 2013), more recent research has emerged that demonstrates that a person's meta-bases can also vary by a specific topic (see Teeny & Petty, 2018). Thus, we wanted to more specifically test the effects of meta-bases associated with the specific attitude of interest. That is, whereas Study 2 measured individual differences in the tendency to view a variety of attitudes as having affective versus cognitive bases, in Study 3 we more directly measured how much people thought their own attitude toward going to the dentist had relatively affective or cognitive bases.

6.1. Method

6.1.1. Participants and design

Participants were 115 Ohio State University students ($M_{age} = 19.31$,

Table 2
Summary statistics and correlations (Study 2).

	M (*SD*)	1	2	3
1. General Meta-Bases	−0.25 (1.87)	–		
2. IAC	1.60 (1.80)	−0.10	–	
3. ICC	2.87 (1.89)	−0.01	0.13*	–
4. SA	3.52 (1.46)	0.00	0.37**	0.23**

Note. *$p < .05$, **$p < .01$.

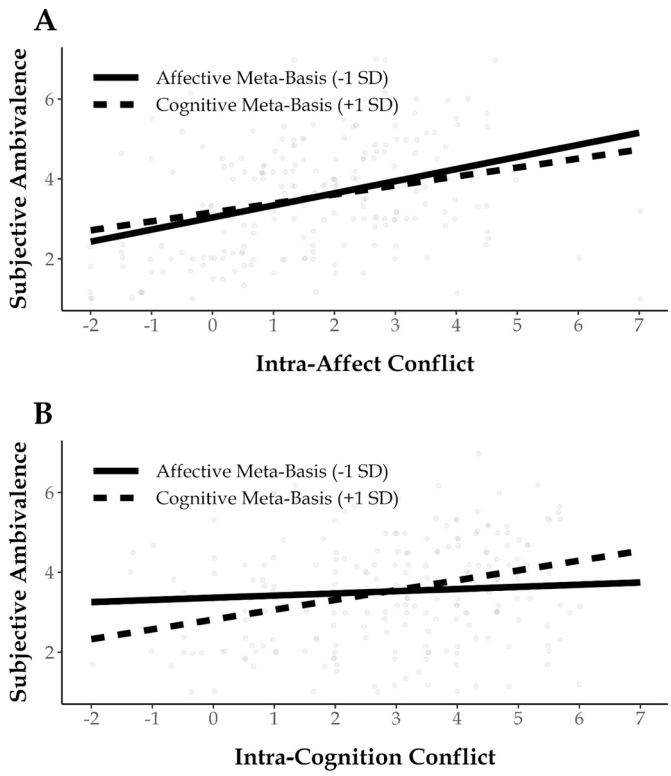

Fig. 1. Meta-bases did not moderate the relationship between IAC and SA (Panel A) but did moderate the relationship between ICC and SA (Panel B) for attitudes toward running (Study 2).

SD = 1.90; 34.8% female, 65.2% male; information on ethnicity was not collected) who received partial credit for a research participation program in their Introductory Psychology courses. The survey was presented online using Qualtrics with black text on a white background. Participants signed up for the study online and could then complete the survey from the location of their choosing using. A survey item asked what device the participant was using; 92.2% reported using a laptop or computer, 4.3% reported using a smart phone, and 3.5% reported using a tablet. All elements of the survey were self-paced.

Power analyses showed that this sample size provided 80% power to detect a meta-bases × intra-component conflict interaction as small as $f^2 = 0.07$. Participants completed the study as an online survey from any location they preferred. Participants first responded to the meta-basis questions before reporting positive and negative emotions and beliefs, and subjective ambivalence. Participants also responded to demographic questions.

6.1.2. Measures

6.1.2.1. Individual differences in dentist meta-bases. Participants' perceptions of how much their attitudes toward going to the dentist were based on affect and cognition were assessed using two items: "To what extent do you think your opinions about going to the dentist are driven by your [feelings and emotions/thoughts and beliefs] about it?" Responses were given on 7-point scales (1 = not at all; 7 = very much). To compute individual differences in meta-bases for going to the dentist, affective meta-bases were subtracted from cognitive meta-bases (M = 1.29, SD = 2.53). Thus, more positive scores reflect more cognitive meta-bases and more negative scores reflect more affective meta-bases.[6]

6.1.2.2. IAC and ICC. Affect and cognition items were developed similar to those in the previous studies, adapted for the new topic. All participants responded to three positive (α = 0.72; e.g., "It feels great when your teeth are so clean after a dentist visit") and three negative (α = 0.66; e.g., "I feel tense when I go to the dentist") items that assess emotions. Participants also responded to three positive (α = 0.94; e.g., "Going to the dentist is valuable for your health") and three negative (α = 0.58; e.g., "Going to the dentist takes a long time and costs a lot of money") items that assess beliefs. Responses were averaged within each positive/negative emotions/beliefs category and used to compute each type of intra-component conflict following the procedure in the previous studies.

6.1.2.3. Subjective ambivalence. Three items like those in Study 1 were used to assess SA (α = 0.87).

6.2. Results and discussion

Table 3 presents summary statistics and raw correlations between key variables.

A hierarchical multiple regression analysis was conducted, with SA as the outcome variable. IAC, ICC, and individual differences in meta-bases for going to the dentist were entered in the first step and the two interaction terms (*IAC* × *meta-bases* and *ICC* × *meta-bases*) were entered in the second step. There was an overall main effect of meta-bases where more affective meta-bases corresponded to greater SA, $B = -0.13$, $\beta = -0.22$, $t(111) = -2.54$, $p = .012$, 95% CI: [−0.23, −0.03]. Importantly, as hypothesized, ICC uniquely predicted SA, $B = 0.25$, $\beta = 0.31$, $t(111) = 3.39$, $p < .001$, 95% CI: [0.10, 0.40], whereas IAC did not, $B = 0.10$, $\beta = 0.12$, $t(111) = 1.35$, $p = .181$, 95% CI: [−0.05, 0.25].

As expected, the *IAC* × *meta-bases* interaction was significant, $B = -0.07$, $\beta = -0.35$, $t(109) = -2.23$, $p = .027$, 95% CI: [−0.14, −0.01] (Fig. 2A). Probing this interaction revealed that as hypothesized, IAC (controlling for ICC) significantly predicted SA among individuals with more affective meta-bases for their dentist attitudes (1 *SD* below the mean), $B = 0.30$, $\beta = 0.36$, $t(109) = 2.56$, $p = .012$, 95% CI: [0.07, 0.53]. Among individuals with more cognitive meta-bases for their dentist attitudes (1 *SD* above the mean), IAC did not uniquely predict SA, $B = -0.07$, $\beta = -0.09$, $t(109) = -0.67$, $p = .503$, 95% CI: [−0.28, 0.14]. Also, as expected, the *ICC* × *meta-bases* interaction was not significant, $B = 0.00$, $\beta = -0.01$, $t(109) = -0.08$, $p = .940$, 95% CI: [−0.06, 0.05] (Fig. 1B). That is, regardless of individuals' meta-bases, ICC predicted SA for this topic.

In sum, ICC emerged as a significant unique predictor of SA for a normatively cognitive meta-basis topic. That is, the greater the degree of

Table 3
Summary Statistics and Correlations (Study 3).

	M (*SD*)	1	2	3
1. Meta-Basis	1.29 (2.53)	–		
2. IAC	2.39 (1.83)	−0.05	–	
3. ICC	2.78 (1.86)	−0.15	0.40**	–
4. SA	2.84 (1.51)	−0.29**	0.29**	0.39**

Note. *$p < .05$, **$p < .01$.

[6] Mirroring the pilot test results, cognitive meta-bases ($M = 5.11$, $SD = 1.64$) were higher than affective meta-bases ($M = 3.83$, $SD = 1.78$), $t(114) = -5.46$, $p < .001$, thus demonstrating that going to the dentist is associated with a normatively cognitive meta-basis.

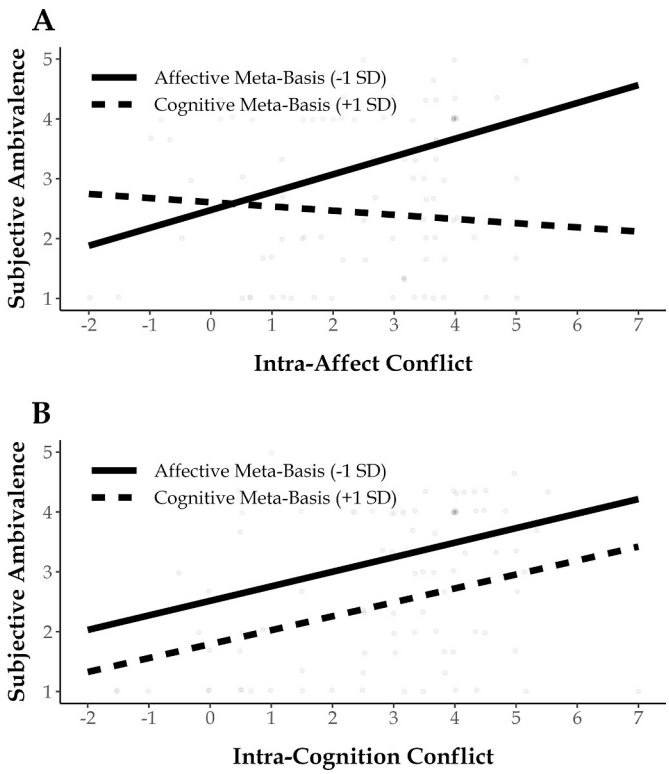

Fig. 2. Meta-basis moderated the relationship between IAC and SA (Panel A) but did not moderate the relationship between ICC and SA (Panel B) for attitudes toward going to the dentist (Study 3).

conflict within beliefs about this topic, the greater the subjective experience of ambivalence when the topic is one that elicits high processing concerns for beliefs. Moreover, even though attitudes toward going to the dentist tend to have relatively cognitive meta-bases, some individuals still hold relatively affective meta-bases for their attitudes on this topic, and thus have relatively high processing concerns for their emotions about the topic. For these people, IAC, or the degree of dueling emotions, also predicted greater SA.

7. Study 4

Studies 2 and 3 both showed that the effect of whichever type of intra-component conflict matched the attitude object's dominant meta-basis was *unmoderated* by individual variation in meta-bases, thus suggesting that a topic's normative meta-bases matter. At the same time, Studies 2 and 3 also showed that people's individual meta-bases moderate ICC's and IAC's association with SA, respectively. However, in any given study, we only observed a moderating effect of meta-bases for either ICC *or* IAC, and it would be ideal to establish the hypothesized moderation patterns for *both* IAC and ICC effects within the same study. Hence, in Study 4, we aimed to examine an attitude object that did not have a dominant meta-basis in order to allow individual differences in meta-bases to moderate both IAC and ICC effects. Based on pilot testing, we decided to measure reactions to the brand *Hershey's*. The pilot study ($N = 100$) measured meta-bases with 5-point scales and found that affective meta-bases for Hershey's ($M = 2.59$, $SD = 1.25$) were not significantly different from the brand's cognitive meta-bases ($M = 2.75$, $SD = 1.26$), $t(99) = 1.06$, $p = .29$. Thus, for this topic, which does not have clearly affective or cognitive meta-bases overall, we predicted both an interaction where ICC would predict SA for individuals with more cognitive meta-bases for their attitudes and an interaction where IAC would predict SA for individuals with more affective meta-bases.

In addition, we adopted a slightly different set of items to measure IAC and ICC. Whereas the previous studies used sets of statements reflecting specific affective or cognitive reactions to the attitude object (e.g., "I hate how I get sweaty when I run"), in Study 4 we adapted the more general approach to measuring affective and cognitive reactions utilized by Crites et al. (1994). Although the measures we used in the previous two studies had acceptable internal reliability, the measures of the items for positive affect and cognition tended to be more reliable than the items for negative affect and cognition. In Study 4, we anticipated that using the more standard items would improve reliability.

Finally, to probe potential consequences of the previous results on subjective ambivalence, we also asked participants to report how stable they thought their attitude would be in the future. Because ambivalence typically signals a weaker attitude, and weak attitudes are those that last less over time, we anticipated that people who feel more ambivalent would expect their attitudes to be less stable over time. Indeed, prior research has shown that SA can predict an attitude's longevity (e.g., Luttrell, Petty, & Briñol, 2016).

7.1. Method

7.1.1. Participants and design

Participants were 400 individuals from the United States recruited via Amazon's Mechanical Turk ($M_{age} = 35.26$, $SD = 10.35$; 47.0% female, 52.5% male; information on ethnicity was not collected) who received US$0.50 to complete a brief survey on "evaluations of consumer brands." The survey was presented online using Qualtrics with black text on a white background. Participants could complete the survey from the location of their choosing using their own computer or device (we did not specifically assess which devices participants used for this study). All elements of the survey were self-paced. Participants first reported their meta-bases, then the items used to assess IAC and ICC, followed by SA and perceived stability.

The sample size is larger in this study to allow for a more powerful test of the core hypotheses. The meta-bases × ICC interaction in Study 2 ($f^2 = 0.023$) and the meta-bases × IAC interaction in Study 3 ($f^2 = 0.046$) were relatively small. If we conservatively estimate that the interactions in Study 4 will be small ($f^2 = 0.02$), a power analysis shows that $N = 398$ provides 80% power to detect such an effect.

7.1.2. Measures

7.1.2.1. Individual differences in Hershey's meta-bases. Meta-bases for this topic were assessed using the same two items from Study 3.[7] To compute individual differences in meta-bases for Hershey's attitudes, affective meta-bases were again subtracted from cognitive meta-bases, resulting in an index in which lower values denote more affective meta-bases and higher values denote more cognitive meta-bases ($M = 0.03$, $SD = 2.21$).

7.1.2.2. IAC and ICC. We selected adjectives used to measure affective and cognitive reactions as bipolar measures in Crites et al. (1994) but instead assessed them as unipolar measures. The result was a simpler assessment of positive and negative affective and cognitive reactions where respondents rated how well a particular adjective described their reaction to the attitude object. For affective reactions, we asked how much a set of adjectives described their feelings toward Hershey's. The list contained three positive (Love, Calm, Delighted; $\alpha = 0.81$) and three negative adjectives (Hate, Tense, Sad; $\alpha = 0.87$). For cognitive reactions, we asked how much a set of adjectives described Hershey's, and the list also contained three positive (Safe, Beneficial, Valuable, $\alpha = 0.82$) and three negative adjectives (Unsafe, Harmful, Worthless; $\alpha = 0.82$). As in

[7] Mirroring the pilot test results, cognitive meta-bases ($M = 4.59$, $SD = 1.67$) did not differ on average from affective meta-bases ($M = 4.57$, $SD = 1.70$), $t(399) = -0.25$, $p = .80$.

the previous studies, responses were averaged within each positive/negative emotions/beliefs category and used to compute each type of intra-component conflict.

7.1.2.3. Subjective ambivalence. The same three-item measure of SA used in Study 3 ($\alpha = 0.89$) was used to create a composite SA variable.

7.1.2.4. Perceived attitude stability. Three items were used to assess perceived stability; participants reported how likely they thought their opinion of Hershey's was to change in the future (reverse-coded), how much their opinion would stay the same in the future, and how different their opinion would be in the future (reverse-coded). Responses were given on 7-point scales and averaged after reverse scoring two items ($\alpha = 0.78$). The result was an index of perceived attitude stability in which higher values corresponded to more stability.

7.2. Results and discussion

Table 4 presents raw correlations and summary statistics for the key variables.

7.2.1. Subjective ambivalence

We first conducted a hierarchical multiple regression analysis with SA as the outcome variable, set up in the same way as the corresponding model in Study 3 and Study 4. Meta-bases did not predict SA, $B = -0.02$, $\beta = -0.04$, $t(396) = -0.95$, $p = .34$, 95% CI: [−0.05, 0.02]. In addition, SA was significantly associated with IAC, $B = 0.18$, $\beta = 0.31$, $t(396) = 5.44$, $p < .001$, 95% CI: [0.11, 0.24], and ICC, $B = 0.16$, $\beta = 0.30$, $t(396) = 5.23$, $p < .001$, 95% CI: [0.10, 0.23].

When adding both interaction terms to the model, results supported a unique meta-basis × IAC interaction, $B = -0.04$, $\beta = -0.12$, $t(394) = -2.38$, $p = .018$, 95% CI: [−0.07, −0.01] (Fig. 3). The interaction was such that IAC was a stronger predictor of SA when meta-bases were relatively affective (1 SD below the mean), $B = 0.25$, $\beta = 0.45$, $t(394) = 5.55$, $p < .001$, 95% CI: [0.16, 0.35], than when meta-bases were relatively cognitive (1 SD above the mean), $B = 0.10$, $\beta = 0.42$, $t(394) = 2.05$, $p = .041$, 95% CI: [0.00, 0.19].

Similarly, results supported a unique meta-basis × ICC interaction, $B = 0.03$, $\beta = 0.10$, $t(394) = 1.97$, $p = .049$, 95% CI: [0.00, 0.06] (Fig) This interaction was such that ICC was a stronger predictor of SA when meta-bases were relatively cognitive (1 SD above the mean), $B = 0.23$, $\beta = 0.42$, $t(394) = 5.00$, $p < .001$, 95% CI: [0.14, 0.32], than when meta-bases were relatively affective (1 SD below the mean), $B = 0.10$, $\beta = 0.18$, $t(394) = 2.10$, $p = .036$, 95% CI: [0.01, 0.19].

7.2.2. Perceived stability

Next, we repeated the previous analysis using perceived stability as the outcome variable rather than SA. Meta-bases were not associated with perceived stability overall, $B = 0.03$, $\beta = 0.06$, $t(396) = 1.48$, $p = .14$, 95% CI: [−0.01, 0.07]. In addition, perceived stability was negatively associated with IAC, $B = -0.29$, $\beta = -0.41$, $t(396) = -6.87$, $p < .001$, 95% CI: [−0.37, −0.21], and ICC, $B = -0.12$, $\beta = -0.17$, $t(396) = -2.90$, $p = .004$, 95% CI: [−0.20, −0.04].

When adding both interaction terms to the model, results suggested a

Table 4
Summary Statistics and Correlations (Study 4).

	M (*SD*)	1	2	3	4
1. Meta-Basis	0.03 (2.21)	–			
2. IAC	−0.17 (1.56)	0.11*	–		
3. ICC	0.37 (1.59)	0.03	0.68**	–	
4. SA	1.67 (0.87)	0.00	0.44**	0.43**	–
5. Perceived Stability	5.69 (1.12)	0.01	−0.50**	−0.43**	−0.57**

Note. *$p < .05$, **$p < .01$.

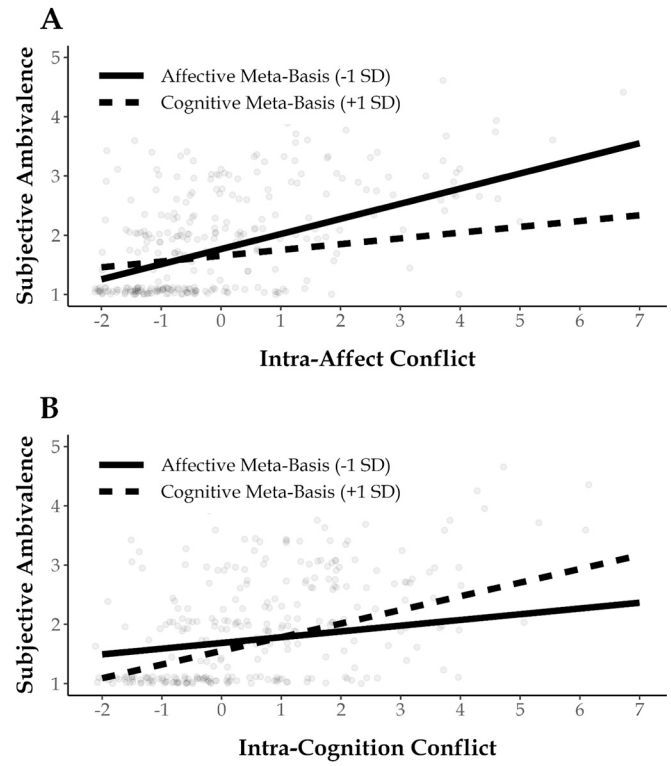

Fig. 3. Meta-basis moderates the relationship between IAC and SA (Panel A) and moderates the relationship between ICC and SA (Panel B) for attitudes toward Hershey's (Study 4).

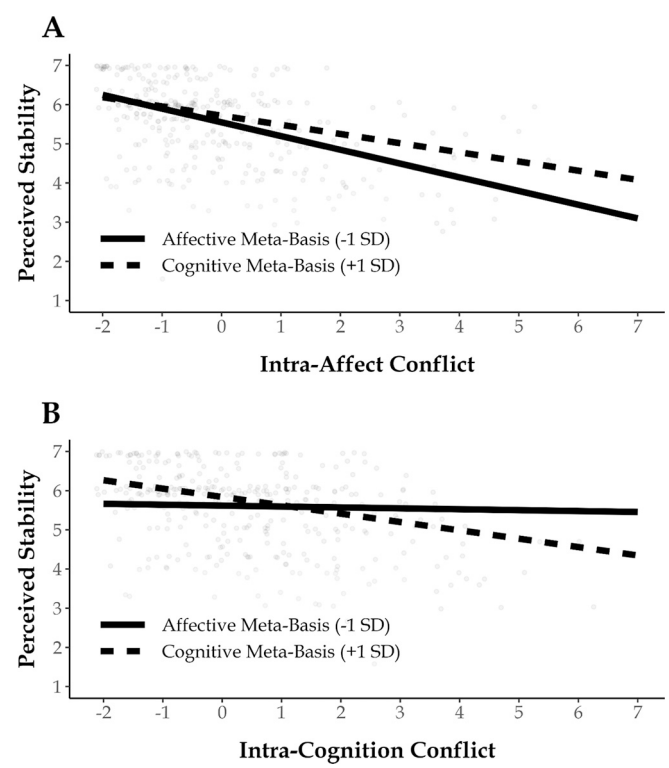

Fig. 4. Meta-basis moderates the relationship between IAC and perceived stability (Panel A) and moderates the relationship between ICC and perceived stability (Panel B) for attitudes toward Hershey's (Study 4).

unique meta-basis × IAC interaction, $B = 0.03$, $\beta = 0.07$, $t(394) = 1.34$, $p = .18$, 95% CI: [−0.01, 0.07] (Fig. 4A). Although nonsignificant, the interaction was such that IAC was more negatively related to perceived stability when meta-bases were relatively affective (1 SD below the mean), $B = -0.35$, $\beta = -0.49$, $t(394) = -5.83$, $p < .001$, 95% CI: [−0.47, −0.23], than when meta-bases were relatively cognitive (1 SD above the mean), $B = -0.23$, $\beta = -0.33$, $t(394) = -3.81$, $p < .001$, 95% CI: [−0.35, −0.11].

The results more strongly supported a unique meta-basis × ICC interaction, $B = -0.04$, $\beta = -0.12$, $t(394) = -2.15$, $p = .033$, 95% CI: [−0.08, 0.00] (Fig. 4B). This interaction was such that ICC negatively predicted perceived stability when meta-bases were relatively cognitive (1 SD above the mean), -$B = 0.21$, $\beta = -0.31$, $t(394) = -3.81$, $p < .001$, 95% CI: [−0.35, −0.11], but not when meta-bases were relatively affective (1 SD below the mean), $B = -0.02$, $\beta = -0.03$, $t(394) = -0.39$, $p = .697$, 95% CI: [−0.14, 0.10].

To test the role of SA in these effects on perceived stability, we conducted a mediation analysis using the *mediation* package for *R* (Tingley, Yamamoto, Hirose, Keele, & Imai, 2014). Specifically, we tested simultaneous effects of the meta-bases × IAC and the meta-bases × ICC interactions on perceived stability via SA, controlling for the main effects of meta-basis, IAC, and ICC. Estimates of the indirect effect were tested using bootstrapping with 10,000 iterations. As anticipated, results supported the indirect effects for both the meta-bases × IAC interaction, $B = 0.02$, $p = .018$, 95% CI: [0.004, 0.04], and the meta-bases × ICC interaction, $B = -0.03$, $p = .05$, 95% CI: [−0.04, 0.00].

7.3. Replication

Although we do not report it in the main text for the sake of efficiency, we conducted a nearly exact replication of Study 4 using a larger sample ($N = 599$) and expanded measures of IAC and ICC in order to probe the robustness of Study 4's effects, especially since some effects were weaker than anticipated. The results of this additional study significantly replicate all of the patterns reported above. In addition, meta-analyzing the meta-bases × IAC and meta-bases × ICC interactions on SA and perceived stability supports the reliability of all four interactions ($ps < 0.02$). We fully report this additional study and details of the meta-analysis in the online supplement.

8. Study 5

Thus far, all the studies have examined the interactive influence of meta-bases and IAC or ICC by measuring the variables. In Study 5, we sought to provide evidence for a causal effect of these interactions on subjective ambivalence by manipulating meta-bases and the type of conflict for their attitudes toward a fictitious animal: the lemphur. We independently manipulated meta-bases and whether participants experienced IAC or ICC, and we expected these variables to interact in their effect on SA. Specifically, we predicted that IAC would lead to greater SA more when people were induced to perceive more affective meta-bases and that ICC would lead to greater SA more when people were induced to perceive more cognitive meta-bases.

8.1. Method

8.1.1. Participants and design

One-hundred students at National University of Singapore ($M_{age} = 20.76$, $SD = 1.56$; 79% female, 21% male; 88.0% self-identified as Chinese, 5.0% "Others", 4.0% Indian, and 3.0% Malay) participated in return for partial course credit. They were randomly assigned to a 2 (meta-bases: cognitive or affective) × 2 (type of conflict: cognitive or affective) design. A sensitivity analysis finds that this sample size provided 80% power to detect a medium-sized interaction between meta-bases and type of conflict.

8.1.2. Procedure and materials

Due to distancing guidelines during COVID-19, groups of up to four, instead of seven, participants per session completed the study in visually isolated cubicles in a computer laboratory. Participants received the meta-bases manipulation and were then presented with conflicting information about the lemphur. They then reported their subjective ambivalence.

8.1.2.1. Manipulated meta-bases. We used two methods simultaneously to nudge people to perceive a more cognitive or affective basis for their attitudes. First, following prior research that manipulated meta-bases (Teeny & Petty, 2018; see also Murray, Haddock, & Zanna, 1996; Salancik & Conway, 1975, for similar manipulations), all participants responded to statements about relying on their emotions and statements about relying on their beliefs in their attitudes. However, in the cognitive meta-bases condition, the statements about relying on beliefs were paired with qualifiers that suggest moderation (e.g., "Sometimes, I find myself being guided by my beliefs when I am evaluating my opinions about an issue") whereas those about relying on emotions were paired with qualifiers that suggest extremes (e.g., "Personal feelings should be the one and only most important factor that influences a person's attitudes"). Therefore, participants in this condition are encouraged to report relatively high degrees of being guided by beliefs but relatively low degrees of being guided by emotion.

For participants in the affective meta-bases condition, the types of qualifiers were reversed. That is, statements about relying on emotions were paired with qualifiers suggesting moderation (e.g., "Sometimes, I find myself being guided by my feelings when I am evaluating my opinions about an issue") but statements about relying on beliefs were paired with qualifiers suggesting extremes (e.g., "Cold, hard logic should always be the one and only most important factor that influences a person's attitudes."). Once again, these survey items would encourage perceptions of frequently turning to emotion but discourage perceptions of turning to beliefs. Second, in addition to responding to statements with different qualifiers, participants also received false feedback about how their responses compared to their peers'. In the cognitive meta-bases condition, participants were told:

Relative to our test norms, your scores fall within the 82.7th percentile for cognitive processing concerns. Respondents who have greater cognitive processing concerns typically base their attitudes on the beliefs that they possess….this can lead to them being efficient in making decisive judgments as they avoid ruminating over irrelevant emotions.

Participants in the affective meta-bases condition, however, were given the opposite feedback. That is, they learned that their scores fell within the 82.7th percentile for affective processing concerns and that they are efficient in making judgments because they avoid over-deliberating on irrelevant beliefs.

8.1.2.2. Manipulated type of conflict. Participants read a brief passage about a fictitious animal that is referred to as a "lemphur." Materials for this task were taken from prior research that manipulated the affective and cognitive bases of attitudes (e.g., Crites et al., 1994; Fabrigar & Petty, 1999; Rocklage & Luttrell, 2021) but were adapted to induce either ICC or IAC. In the ICC condition, participants read a brief description of lemphurs containing facts with both positive and negative connotations. For example, the essay said that lemphurs provide nutrition to coastal communities but also that they deplete the total supply of fish and other aquatic foods. In the IAC condition, participants read a short passage about the lemphur containing both positive and negative affective associations with the animal. For example, the passage conveyed a story in which a lemphur nuzzled in beside a swimmer and made the swimmer feel amazed but also that a lemphur attacked a swimmer and left the swimmer in pain.

8.1.2.3. Subjective ambivalence. The same three-item measure of SA used before ($\alpha = 0.93$) was used to create a composite SA variable.

8.2. Results and discussion

Data were analyzed with a 2 × 2 between-subjects ANOVA on SA scores. We also employed Grice et al.'s (2020) approach to estimating effect sizes by quantifying how many participants demonstrate the expected effects. For each between-group comparison, we compared all possible pairs of responses between each condition. If the person from the condition for which we hypothesized higher SA indeed reported greater SA than the person from the other condition, we count this pair of participants as consistent with the hypothesis.

There were no main effects of Meta-bases or Type of Conflict, $ps > 0.25$. There was a significant Meta-bases × Type of Conflict interaction, $F(1, 96) = 13.84$, $p < .001$, $\eta_p^2 = 0.13$. As predicted, and consistent with the pattern in the previous studies, among those who received positive and negative cognitive information, those with cognitive meta-bases ($M = 5.17$, $SD = 1.74$) reported more SA than those with affective meta-bases ($M = 3.75$, $SD = 1.44$), $F(1, 96) = 10.08$, $p = .002$, $\eta_p^2 = 0.10$. In 74% of these between-group comparisons, the participant in the cognitive meta-basis condition reported higher SA than the participant in the affective meta-basis condition. In contrast, among those who received conflicting affective information, it was affective meta-bases ($M = 5.26$, $SD = 1.19$) that led to more SA than cognitive meta-bases ($M = 5.17$, $SD = 1.74$) reported more SA than those with affective meta-bases ($M = 4.37$, $SD = 1.76$), $F(1, 96) = 4.26$, $p = .04$, $\eta_p^2 = 0.04$.[8] In 60% of these between-group comparisons, the participant in the affective meta-basis condition reported higher SA than the participant in the cognitive meta-basis condition Fig. 5.

9. General discussion

The current research provided evidence for the importance of affective-cognitive meta-bases for understanding when mixed emotions or mixed beliefs are associated with a subjective state of ambivalence. For individuals who were relatively affective in their meta-bases, and for topics that were dominated by normatively affective meta-bases, IAC, but not ICC, was a reliable predictor of SA. At the same time, for individuals who were relatively cognitive in their meta-bases, and for a topic that was dominated by normatively cognitive meta-bases, ICC but not IAC was a reliable predictor of SA. Moreover, the SA that resulted from IAC among individuals with relatively affective meta-bases, as well as the SA that resulted from ICC among individuals with relatively cognitive meta-bases, were ultimately associated with perceptions of less stable attitudes. Finally, the causal effects of affective-cognitive meta-bases and the type of conflict were established, such that the match between meta-bases and mixed emotions or mixed beliefs led to more subjective ambivalence compared to the mismatch between the two.[9]

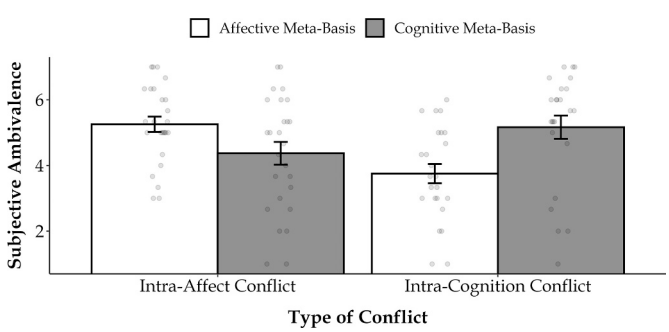

Fig. 5. Subjective ambivalence as a function of meta-bases and intra-component conflict toward lemphurs (Study 5).

The findings suggest that regardless of whether affective-cognitive processing concerns occur as a function of the topic, the individual, or the situational manipulation, as long as these concerns are relatively oriented toward one type of information, the correspondent intra-component conflict (affective or cognitive) would reliably predict SA. It is worth noting that individual differences in meta-bases did not override normative levels of meta-basis for the topic. That is, even among individuals with relatively cognitive meta-bases, IAC for a normatively affective topic still predicted SA for that topic, and did so to the same extent as among individuals with relatively affective meta-bases. Similarly, for a cognitive topic, ICC predicted SA regardless of individual differences in meta-bases. Such patterns are consistent with the suggestion that an attitude object itself exerts an important role in determining the function upon which the attitude is based (Shavitt, 1990). However, individual differences in meta-bases were also predictive *in spite of* an opposing normative meta-basis for the topic. That is, even for a normatively affective topic, ICC was associated with degree of SA for individuals with relatively cognitive meta-bases. Similarly, even for a cognitive topic, IAC was associated with degree of SA for individuals with relatively affective meta-bases. Taken together, either the object-level meta-basis or individual differences in meta-bases are sufficient to predict which type of intra-component conflict is associated with an individual's experience of being conflicted. Further research can examine how affective and cognitive meta-bases develop for topics and among individuals. For example, certain topics, such as the selection of a romantic partner, may be associated with a particular meta-basis due to cultural norms (see also Shavitt, 1990), and individuals might have affective or cognitive meta-bases due to various attitudinal functions (see Maio & Olson, 2000).

9.1. Implications

The present research is consistent with theorizing regarding the meta-cognitions that people can develop regarding their attitudes (Petty et al., 2007; Wegener & Petty, 1997; see also Sawicki & Wegener, 2018). Based on this framework, people reflect on their attitudes, develop meta-cognitions or naïve theories about their attitudes, and even reflect on these meta-cognitions. For example, OA is more strongly associated with SA when people more accurately reflect on their positive and negative evaluations (Refling et al., 2013).While such research demonstrates that reflecting on separate positive and negative evaluations has meaningful

[8] In Study 5, we also measured Need for Cognition (NC) and Need for Affect (NA) in order to rule out these variables as confounding variables. Results from a regression analysis controlling for NC and NA showed that the Meta-bases × Type of Conflict interaction remained significant. Full results from the regression analysis are available in the online supplement.

[9] Another way to conceptualize conflict is the conflict between affect and cognition (e.g., Maio et al., 2000). We do not expect inter-component conflict to interact with meta-bases. This is because when the conflict is between two types of information (e.g., positive emotions and negative beliefs), affective meta-bases individuals should focus more on positive emotions whereas cognitive meta-bases individuals should focus more on negative beliefs, such that neither group will experience more subjective ambivalence than the other. However, when conflict is within one type of information (e.g., positive and negative emotions), selective attention on the particular type information will mean awareness of opposite-valenced reactions, and thus lead to greater ambivalence when the type of information elicits more interest. Nevertheless, we conducted additional analyses for Studies 1–4, and the results revealed only a reliable main effect of inter-component conflict on subjective ambivalence. There was no support for the assumption that meta-bases moderated the effects of inter-component conflict. Full results from examining inter-component conflict are available in the online supplement.

consequences for SA (see also DeMarree et al., 2015), the present findings show that reflecting on separate positive and negative *emotions* versus *beliefs* predicts SA for different topics and individuals. By identifying affective-cognitive meta-bases as an antecedent, the current research also suggests that interest in processing emotions versus beliefs underlies why certain types of structural conflict are reliable predictors of SA and other types are not.

The present findings are also consistent with prior theorizing and research, which has argued that affect and cognition are independent components of an attitude's structure, within which there can be conflicting reactions (Armitage & Conner, 2004; Eagly & Chaiken, 1993; Thompson et al., 1995; Zanna & Rempel, 1988). Such convergent evidence adds insight to our understanding of structural evaluative conflict. Although prior research had shown that ICC matters for attitude-behavior correspondence (Armitage, 2003), the present findings demonstrate the utility of considering intra-affect and intra-cognition conflict separately. These findings also suggest potential mechanisms for previously established phenomena. For instance, prior studies have found that people are more interested in a persuasive message when the message's focus on affective or cognitive considerations matches the recipient's affective-cognitive meta-bases (Keer et al., 2013; See et al., 2008). This may occur because a message that focuses on emotions (or beliefs) can help resolve the type of intra-component conflict that has most contributed to the recipient's subjective evaluative conflict (i.e., the type that matches his or her meta-bases).

9.2. Limitations and future directions

One limitation of the current research is that we did not directly examine the exact mechanism through which meta-bases could influence the relationship between structural conflict and subjective ambivalence. It is possible that for affective (cognitive) meta-bases individuals or topics, the corresponding concerns for processing emotions (beliefs) make people more accurate in recognizing conflict within their emotions (beliefs). Similarly, affective (cognitive) meta-bases may make people more motivated to have coherent affective (cognitive) reactions and thus any existing conflict within that component is especially uncomfortable. Future research can examine these potential underlying mechanisms as well as additional consequences of the SA that is associated with intra-component conflict.

Future research can also consider these effects in the context of cross-cultural differences. For instance, individuals from East Asian cultures have been found to be less bothered by conflicting emotions, compared to individuals from North American cultures (e.g., Hui et al., 2009; Williams & Aaker, 2002). Although some have linked this effect to cultural differences in abstract versus concrete thinking (Hong & Lee, 2010), perhaps cultures also differ in their interest in processing affective information (i.e., their meta-bases), amplifying the effects of affective conflict in cultures with more affective meta-bases. Further, because our findings showed that both IAC and ICC can be strongly associated with feeling conflicted, it would be interesting to also examine whether and when cultures differ in how conflicted they feel about mixed beliefs (cf. Peng & Nisbett, 1999).

Beyond cultural factors, the dyadic context should also be relevant to the link between meta-bases and experiences of intra-component conflict. For example, when people can more accurately estimate their relationship partners' highly affective meta-bases, they are more likely to choose emotional arguments to influence them (Tan & See, 2021). In addition, the better people's affective-cognitive meta-bases are understood by their relationship partner, the more satisfied they are with their relationship (Tan, See, & Agnew, 2015). Given the current findings, however, it would be worth examining whether people's intra-component conflict and subjective ambivalence are reduced when their partners tailor influence attempts to their meta-bases, and the role that such ambivalence reduction plays in relationship satisfaction.

Finally, this work may be extended to other types of meta-bases as well. For example, people can differ in how much they view morality as a basis for an attitude (Luttrell, Petty, Briñol, & Wagner, 2016). Our findings suggest that when people have different moral values with conflicting implications for an attitude (cf. Keele & Wolak, 2006), they may only subjectively experience this as a conflict to the extent that they perceive a moral basis for that attitude.

To conclude, the present research demonstrates the utility of examining conflicting emotions and conflicting beliefs separately in their contribution to subjective ambivalence, and sheds light on when each type of intra-component conflict is predictive. These findings suggest new directions for the affect-cognition distinction in subjective ambivalence as well as its potential implications in various contexts.

Open Practices

Data and analysis scripts for the reported results are available on this project's page on the Open Science Framework: https://osf.io/exs56/. Also included is the article's online supplement, which contains all materials for reproducing the reported methodology.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2021.104204.

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