POSITIVE AFFECT, INTUITIVE PROCESSING, AND VISUAL ENCODING

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A Thesis presented to the Faculty of the Graduate School

University of Missouri, Columbia

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In Partial Fulfillment of the Requirements for the Degree

Master of Arts

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by

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DECEMBER 2012

The undersigned, appointed by the Dean of the Graduate School, have examined the thesis entitled

POSITIVE AFFECT, INTUITIVE PROCESSING, AND VISUAL ENCODING

Presented by Samantha J. Heintzelman

A candidate for the degree of Master of Arts

And hereby certify that in their opinion, it is worthy of acceptance.

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ACKNOWLEDGEMENTS

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POSITIVE AFFECT, INTUITIVE PROCESSING, AND VISUAL ENCODING

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ABSTRACT

The effects of positive affect (PA) on cognitive outcomes have been studied extensively.
These effects map on squarely to a Cognitive-Experiential Self Theory (CEST)
framework (Epstein, 1991; 1994). One component of CEST that has yet to be studied in
the emotion literature is the theoretically-proposed tendency of the experiential system to
encode information in visual images. The current study explored how PA and intuition
affect a person's use of mental imagery using a perceptual priming paradigm. For
participants who experienced a mood manipulation, PA and intuition interacted to predict
facilitated response latencies to words that were primed by words representing objects
sharing the same prototypical color controlling for reaction times to semantically primed
targets and unprimed targets. This study lays the groundwork for future research on
mental imagery and individual differences in intuitive processing.

Positive Affect, Intuitive Processing, and Visual Encoding

That the way we feel influences the way we think is an established effect in the social cognitive literature and a commonly acknowledged aspect of daily life. Elucidating the influence of mood on cognitive processes is a major area of concern in social cognitive inquiry and research has shown that positive and negative affect (PA and NA) have (different) replicable effects on information processing. Although the ways mood influences cognition are now a matter of record, why mood directs information processing as it does remains an open question. In particular, the consequences of PA for cognitive outcomes lack a strong conceptual framework to unite the varied literature. Here, I suggest that Cognitive Experiential Self Theory (CEST; Epstein, 1991; 1994) provides such a framework. Moreover, I will argue that integrating CEST into the established effects of mood on cognition suggests innovative predictions about the potential outcomes associated with PA and will explore one such outcome, mental imagery, empirically.

PA encompasses various pleasant mood states such as happy and cheerful and has been found to have wide ranging effects on various cognitive processes (see Forgas, 2001 for review). Taken together, this literature suggests that PA is associated with a "quick-and-dirty" version of cognitive processing. However, such a conclusion glosses over important nuances in the research literature. A more fine-grained approach could prove both telling and generative.

The cognitive effects of PA cover a diverse array of domains. PA increases reliance on heuristics and stereotypes when processing information and making decisions (see Bodenhausen, 1993 for review; Bodenhausen, Kramer, & Süsser, 1994; Huntsinger,

Sinclair, Dunn & Clore, 2010; Park & Banaji, 2000; Ruder & Bless, 2003) and heightens

gullibility (Forgas & East, 2008; Ruder & Bless 2003). PA also fosters a global focus,

leading one to "see the forest rather than the trees" (Fredrickson & Branigan, 2005;

Gasper & Clore, 2002, Huntsinger, Clore, & Bar-Anan, 2010). Additionally, individuals

induced to be in a positive mood are more creative than those in neutral or negative

moods, an effect identified in a number of experimental studies utilizing multiple

methods for assessing this dependent variable (see Baas, De Dreu, & Nijstad, 2008 for

review; Hirt, Melton, McDonald, & Harackiewicz, 1996; Isen, Daubman, Nowicki, 1987;

Isen, Johnson, Mertz, & Robinson, 1985). Finally, PA also improves performance on

overlearned association tasks such as the semantic coherence judgments called for in

Mednick's (1962) Remote Associates Task (RAT; Bauman & Kuhl, 2002; Bolte &

Goshke, 2008; Bolte, Goshke, & Kuhl, 2003). This task involves linguistic triad stimuli

(e.g,. snow, base, dance) to which participants are to guess as quickly as possible whether

or not the triad has a fourth word that unites the other three (e.g., ball). Importantly,

participants are not asked to identify this word in this version of the task, but rather to

make speeded judgments of whether or not they think such a word exists.

Viewing the literature at this level of detail, the effect of PA on cognition seems

quite broad, with each effect identified depending, essentially, on the dependent variable

considered. Explanations of such effects have been similarly disparate. For example, the

tendency for individuals in a happy mood to rely on heuristics has been attributed to a

decreased processing capacity when in this positive mood (Mackie & Worth, 1989).

Alternately, mood management has been proposed as a reason happy people use

cognitive shortcuts in lieu of mood deflating cognitive efforts, assuming that happy

people are motivated to preserve their happy state (Taylor, 1991). The effect of PA on performance on RAT-like tasks is typically attributed to enhanced spreading of activation which increases the breadth of activation to include items further from the target in its conceptualization (e.g. Bolte, et al., 2003). A similar explanation can also explain the effect of PA on creativity (Isen, et al., 1987). Finally, the "affect as information hypothesis" also attempts to explain why PA leads to heuristic processing (Schwarz & Clore, 1983; 1988). According to this view, PA serves as a signal that "all is well," an assessment that impacts the processing strategies that are then recruited for use (Schwarz, 1990). Thus, the safe environment implied by the feeling of PA suggests that it is acceptable to rely on heuristic processing (as opposed to negative affect, which would indicate that there is an environmental need to switch to more careful cognitions in order to deal with threats or problems).

Although promising explanations for subsets of the literature's extensive data, each of these explanations falls short when viewing the findings as a coherent whole. For instance, shortcomings in processing capacity or the motivation to maintain a good mood are irrelevant to the effects of PA on the facilitation of creativity. Indeed, happy people become more flexible thinkers and are capable of altering processing strategies to accommodate situational demands (Bodenhausen, et al., 1994; Gasper, 2003; Isbell, 2004; Ruder & Bless, 2003). Such findings would seem to speak against the notion that PA is somehow related to decreased processing capacity or motivation. Similarly, the theory of spreading activation does not account for the effects of PA on stereotypes and heuristics. The affect as information hypothesis falls similarly short in explaining this mix of findings, not accounting for how PA can lead to both increased reliance on

heuristics and also increased creative associations and to both endorsement of stereotypes and also to a broadened, global perspective. Since each of these explanations fails to account for the breadth of findings in this domain, a comprehensive conceptual scheme to provide a unified theory regarding such effects is needed. CEST (e.g., Epstein, 1994) is a broad personality theory that provides needed structure to these otherwise seemingly disparate, and perhaps even contradictory, findings (Burton, Heintzelman, & King, 2012).

Cognitive Experiential Self Theory: An Organizing Framework

The cognitive effects of PA map uncannily well onto the components of Cognitive Experiential Self Theory (e.g. Epstein, 1991, 1994; see Table 1). CEST is a theory akin to other dual-systems information processing models in social and personality psychology (e.g. Bargh, 1999; 2007; Chaiken & Trope, 1999; Higgins, 1999; 2006; Strack & Deutsch, 2004). Each posits a System 1 which is automatic and rapid and a System 2 that is effortful and slow. However, CEST moves beyond these other models in its impressive breadth of tenets (reviewed below) and in its unique acknowledgement of individual differences in a person's reliance on each of these systems.

CEST proposes two coordinate processing systems: experiential and rational. The experiential (or intuitive) system operates rapidly and outside of conscious awareness, communicating information through gut feelings and vibes (Epstein, 1991; 1994). Intuitive knowledge involves knowing without the ability to articulate *why* one knows. Experiential processing relies on associations as well as heuristics making it holistic and general (Epstein, 1991; 1994). Alternately, the rational system is conscious, slow, and deliberate (Epstein, 1991; 1994). This system draws upon logic and reason, rather than feelings, in the processing of information.

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It seems unlikely that the close overlap between the components of CEST and the cognitive outcomes of PA is merely coincidental (Burton, Heintzelman, & King, 2012). Rather, PA may function to bring this host of experiential skills to the fore. Whereas a negative mood constrains functional processing strategies, PA may give individuals the "green light" (Clore & Palmer, 2009) to process information with the automatic system.

Using CEST as an organizing framework for the PA and cognition literature suggests that the various outcomes associated with PA ought to be recognized as representing the adaptive capacities of the experiential system. PA appears to shift the balance of processing over to this system. This integration has at least two essential implications. The first is that the effects of PA on cognition might be moderated by individual differences in reliance on intuition. Although the literature on PA and cognitive processing suggests straightforward main effects of mood, CEST acknowledges individual differences in processing styles. Thus, we might predict that the extent to which PA leads to various outcomes will depend on the extent to which a person is dispositionally prone to follow his or her hunches. There is some empirical evidence supporting the moderation of the effects of PA on cognition by individual differences in Faith in Intuition (FI).

FI, the individual difference measure assessing one's general reliance on the experiential system, moderates the effects of PA on gullibility (King, Burton, Hicks, & Drigotas, 2007). In a series of studies, intuitive people in a good mood were the most likely to attribute meaning to videos of purported UFOs and ghosts and behaved in ways that suggest susceptibility to sympathetic magic (King, et al., 2007). PA and intuition also interact to predict endorsement of magical thinking (King & Hicks, 2009). A similar

moderation was found with the Remote Associates Task (a semantic coherence judgment task) as the dependent variable, as happy, intuitive people performed the best at this task (Hicks, Cicero, Trent, Burton, & King, 2010). Data also support the prediction that induced PA leads to greater stereotypical responding only for those high on intuition (Trent & King, 2012).

A second implication of the integration of CEST as a guiding framework for research on mood and cognition is that the theory suggests novel hypotheses for the kinds of outcomes that ought to be tested as outcomes of PA. The current study draws on this second implication, looking to CEST to suggest a novel hypothesis about the potential role for PA and intuitive processing in visual encoding.

Extending the Pattern of Findings

Despite the nearly seamless overlap between CEST and findings from the cognition and emotion literature, there are additional components of CEST that have yet to be explored within cognition and emotion. Namely, Epstein (1991) posited that the experiential system encodes reality in concrete images, metaphors, and narratives. Given the commonalities between this disparate theory and literature, exploring the effect of PA and intuition on image encoding is a logical next step towards a more coherent understanding of both this potential phenomenon as well as the previous findings.

Mental imagery seems especially well suited to this framework. First, perceptual symbol formation seems to occur unconsciously and automatically (Barsalou, 1999; Lang, Potter, & Bolls, 1999; though see Hasher & Zacks, 1979 who propose imagery is an effortful encoding technique). Freud (1923/1949, p. 359), for example, stated that "thinking in pictures stands nearer to unconscious processes than does thinking in words,

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and is unquestionably older than the latter both ontogenetically and phylogentically."

Such philosophical observations have been bolstered with empirical research. For example, the idea that imagery is the primary mode of cognition prior to full development of language skills (e.g. Church, 1961) is supported by developmental research with pre-lingual children and adults. Whereas adults can remember differences in different sentences that produce identical mental images, children do not (Kosslyn & Bower, 1974). This suggests that children are adept at processing images, even prior to the development of higher-order rational abilities, a finding that speaks to the automatic nature of mental imagery.

Further evidence for the unconscious nature of mental imagery processes can be drawn from research exploring the unconscious processes involved in visual perception. The vast overlap between such visual processing in the presence of an external stimulus and the visual processing of mental images (Kosslyn, Thompson, & Alpert, 1997) allows parallels to be drawn from work in the area of visual processing to mental imagery processing. To understand that visual processing shares a special relationship with the unconscious system, one only needs to look as far as the ample priming literature. These studies repeatedly demonstrate the robust influence of stimuli presented outside of awareness (e.g., Dijskterhuis & Aarts, 2010; Morsella & Bargh, 2010). Beyond the central implications discussed in the context of this literature, these findings also suggest that visual stimuli can be processed unconsciously. As such, the intuitive system seems to sense and process a plethora of external (visual) stimuli without this information ever reaching consciousness.

The link between intuitive processing and visual processing is further sustained by the overlap in the brain structures supporting each process. For example, the basal ganglia are the major brain structures linked to intuitive processing (Lieberman, 2000) and are also essential for eye movement (Hikosaka, Takikawa, & Kawagoe, 2000). In addition, the orbitofrontal cortex (OFC) receives sensory input (Kringelbach, 2005) and is also tied to many intuitive processes (Volz, Rübsamen, & von Cramon, 2008). Indeed, neuroimaging studies demonstrate that OFC is activated in intuitive judgments of coherence for visual stimuli (Volz & von Cramon, 2006). This body of work suggests that mental imagery, like the parallel processes involved in visual perception, may also operate unconsciously.

Beyond the connection between visual and intuitive processing, the pursuit of moderators in this area of research is further supported by the variability present across people's experiences of imagery. Some people do not experience imagery to the extent that others do (Barsalou, 1999) and these differences extend to the degree to which people are able to form and rely on mental imagery (Kosslyn, 1981; Kosslyn, Brunn, Cave, & Wallach, 1984). Self-reported differences in mental imagery ability predict various behavioral performance measures, for example, tasks that require participants to rotate an imagined object (Mast & Kosslyn, 2002). Additionally, brain activation during imagery tasks differs by these skill differences with individuals reporting high vividness of images displaying greater fMRI activity in the visual cortex (Cui, Jeter, Yang, Montague, & Eagleman, 2007).

Along with the theoretical alignment of findings within the emotion and cognition literature, the factors outlined above encourage the exploration of image encoding within this framework of PA and individual differences in information processing.

Encoding in Images

Knowledge representations are not limited to semantic activations (Kieras, 1978). Likewise, the brain systems involved in processing language are not limited strictly to the Broca and Wernicke areas (Damasio, Tranel, Grabowski, Adolphs, & Damasio, 1999). Rather, information processing operates more broadly, encompassing not only the semantic associations typically linked to language comprehension and production, but also imagistic representations of objects and ideas as well. An image is defined as "a pattern of activation in the visual buffer that does not arise from a stimulus in the outside world" (Kosslyn & Shin, 1991, p. 529). Images are generated either by activating previously stored images or by attending to a specific area of the visual buffer (Kosslyn & Shin, 1991). These simulations facilitate semantic interpretation (Barsalou, 1999) and lead to an enhanced memory performance due to a redundancy in the information stored (Kieras, 1978; Paivio, 2007).

Barsalou (1999) has laid forth a theory of cognition in which cognition and perception are linked at cognitive and neural levels. According to this theory, the encoding of information involves the formation of modal perceptual symbols which are represented in the same system that would create them perceptually (Barsalou, 1999). A great deal of research supports the idea that common neural systems underlie processes of both imagery and perception (e.g. Deschaumes-Molinaro, Dittmer, & Vernet-Maury, 1992; Farah, 1988; Kosslyn, Ganis, & Thompson, 2001). As mentioned previously, a

visual perceptual symbol is represented by the same system that would be at work if the image was being physically perceived. Indeed, a positron emission tomography study suggests that about two-thirds of the brain areas used in either visual perception or visual imagery are common across the two processes (Kosslyn, et al., 1997). Specifically, retrieving information about the visual attributes of the object named via written word activates not only the general semantic network, but also the right posterior inferior temporal (PIT) cortex and the left PIT region for color attributes and the right medial parietal cortex for size judgments (Kellenbach, Brett, & Patterson, 2001).

Interestingly, patterns of brain activation following the presentation of a word depend on the unique characteristics of the category from which the word is drawn (Barsalou, 1999). When presented with tool words, motor areas are activated, whereas when presented with animals, the left medial occipital lobe, a visual processing region, is activated (Martin, Wiggs, Ungerleider, & Haxby, 1996). This seems to suggest that visual images are most likely to be formed for categories for which details of the image aid in identifying objects and distinguishing them from similar items.

In addition, research suggests that the details of an image depend on the context in which the information is presented. Zwann, Stanfield, and Yaxley (2002) presented sentences about an object to participants. In each sentence, a change was made to the context of the object to suggest that it was situated in a different shape, (e.g. an egg in a carton vs. in a pan). Participants then saw a picture of the object mentioned either situated in the same way implied in the prior sentence or differently, and were asked to decide if the object was mentioned in the sentence. Performance on this task was hastened when the implied shape of the object in the sentence was matched with the orientation of the

object in the description, and presumably in the mental image as well (Zwann et al. 2002). Similar findings emerged when the sentences implied object orientation (e.g. a pencil in a cup—vertical vs. in a drawer—horizontal). Subsequent images were responded to more quickly when they matched the orientation implied by the preceding sentence (Stanfield & Zwaan, 2001).

Beyond context, the size of the mental image formed also seems to affect the functionality of the process as well. Kosslyn (1976) asked participants to decide whether a property was associated with an animal. Some properties were highly associated with the animal yet small in terms of physical surface area (e.g. bee/stinger) whereas some were less strongly associated with the animal but physically bigger (e.g. bee/wings). Participants naturally respond faster to the strongly associated properties. However, following instructions to create visual images of the animal, this pattern was reversed and responses to the larger physical features were then facilitated (Kosslyn, 1976). The research reviewed thus far confirms that people create mental images which aid in various cognitive processes. Additionally, it seems that these images contain more than simply semantic information, but also information specific to the visual appearance of the target object.

The activation of the visual characteristics of an object has been shown in a number of studies. For instance, participants who were shown a display of four pictures and then 200 ms later heard a word, fixated their gaze longest to a shape congruent picture rather than a picture that was semantically or phonologically related to the target word (Huettig & McQueen, 2007). In another study, participants were shown a display of four pictures for 5 seconds (long enough to identify the object in each image) before

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hearing a sentence (Huettig & Altmann, 2007). The sentence included a word describing an object that matched the shape of an unrelated object from the display (i.e. snake and cord). Participants fixated on the shape congruent object upon hearing the shape congruent word, but not before hearing the word despite that the object was predictable from the sentence (Heuttig & Altmann, 2007).

An eye-tracking study explored the effect of object color on eye gaze (Heuttig & Altmann, 2011). Participants were shown a display of four black and white images. A sentence was then audibly presented containing either an object with the same prototypical coloring as the target object in the display or containing an unrelated object (e.g. picture display contains frog and the word is either spinach or radish). Participants fixated more on a picture of the black and white target object when the color-congruent object was mentioned in the sentence compared to when the unrelated object was mentioned (Heuttig & Altmann, 2011). Interestingly, this pattern persisted even when the image was displayed in a non-prototype color rather than in black and white (e.g. a yellow frog; Heuttig & Altmann, 2011).

Similar findings have been found for the shape of an object (Yee, et al., 2011). Participants who were shown a picture of an object in one form (i.e. a triangular slice of pizza) and then a display of objects, one matching the prototypical shape of the original object (in the case of the pizza, a flat, circular shape: a Frisbee) fixated on the form congruent object longer than the distracter objects (Yee, et al., 2011, study 1).

Together, these studies make it clear that the visual properties of an object are an important element in the cognitive processing of language-mediated input. The current

study seeks to understand the use of images in cognition, incorporating emotion and individual differences in information processing strategies.

Hypotheses

The cognitive effects of PA seem to be organized under the broad personality theory of CEST so the effects of PA should extend to the properties and capacities of the experiential system as described by Epstein. The present study sought to examine visual encoding as a property of the experiential system and a potential consequence of PA. The study tested the following hypotheses. First, if visual encoding is a property of the experiential system, individual differences in FI ought to relate to visual encoding. Further, if PA indeed facilitates the use of the experiential processing system, induced PA ought to lead to enhanced visual encoding. Thus, two main effects are predicted. These main effects were predicted to be qualified by a significant FI by PA interaction, such that in the positive mood condition, FI will share a positive relationship with visual encoding. Hypotheses were be tested using a perceptual priming task. If happy, intuitive people encode information in visual images, they should be faster to name a word that shares *physical features* with the word that precedes it in a perceptual priming task than all other groups.

Methods

Participants

Participants were 97 (63 men and 34 women) University of Missouri, Columbia students ranging in age from 18 to 22 ($M = 19.02$ years, $SD = 0.87$). Represented ethnic groups included 89% White/European American, 6% Black/African American, 3% Asian, 1% Hispanic, with the remaining participants identifying as "other." Participants

were all enrolled in an introductory psychology course and received course credit for their participation.

Materials and Procedures

Participants were run individually with only one participant in the laboratory at a given time. Following an informed consent process, participants completed pre-measures of mood and FI.

Mood pre-measure. First, participants completed a mood pre-measure to assess their mood prior to the experimental manipulation to follow. Participants rated the extent to which they felt four positive mood adjectives (happy, cheerful, enjoyment/fun, and pleased) on a scale from 1 (*not at all*) to 7 (*extremely)* right now ($M = 4.56$, $SD = .97$, $\alpha = .87$).

Faith in Intuition. To measure individual differences in intuitive information processing, participants completed the FI subscale of the Rational Experiential Inventory (Pacini & Epstein, 1999). This scale contains 20 items including, "I believe in trusting my hunches," and "I rely on my intuitive impressions." Each was rated on a scale from 1 *(not at all)* to 7 *(extremely much).*

The FI scale was factor-analyzed to select for a subset of items most appropriate for use in analyses. Seven items emerged as strong indicators of trusting one's gut and hunches (see Appendix A for items) and were averaged to form the FI measure used for all analyses reported below ($M = 4.39$, $SD = 1.05$, $\alpha = .87$).

Mood Manipulation. Participants were then randomly assigned to one of two experimental conditions, positive or neutral mood. In the positive mood condition ($N = 48$), participants received a surprise cash payment of $20 (following Hicks, et al., 2010,

study 3). These participants were told, "Although we are not allowed to advertise this detail, this is actually a paid study. So that I don't forget to pay you at the end of the study, let's just get this taken care of now. Here is your $20 payment for participating in this study." Individuals in the freestanding neutral mood condition ($N = 49$) did not receive this payment. All participants were then escorted to a computer terminal on which the remaining tasks were completed.

Manipulation Check. The effectiveness of the manipulation was tested by asking participants to rate how they see themselves right now. The descriptors "happy" and "cheerful" were embedded amongst other irrelevant descriptors (e.g. creative, athletic) and were rated on a scale from 1 (*not at all*) to 7 (*extremely*) ($M = 5.45$, $SD = 1.02$, $r = .51$, $p < .001$).

Priming Task. A visual-perceptual priming task was used to assess the degree to which individuals encode words as visual representations. In such a task, the primes and target words are connected on a single physical attribute shared by the objects, unlike semantic primes which are related by meaning.[1]

Participants were shown 45 word pairs (15 perceptually related pairs, 15 semantically related pairs, 15 unrelated pairs) and 40 nonwords in random order. Perceptually related words shared the same typical color (e.g. apple, stopsign (*red*); see appendix B for complete stimuli list) as color is a convenient property to use for such a task given that object's color, while an intrinsic and automatically activated property in object representation (Naor-Raz, Tarr, & Kersten, 2003), can be easily separated from its meaning (Heuttig & McQueen, 2007).

The order of the words in each word pair was determined randomly in each trial. For each word pair, the first word presented was considered the prime and the second the target word. Thus a word that was a prime for one participant may have been a target for another.

Each word (both primes and targets) appeared at the center of the computer screen for 1000 ms with a blank screen displayed between each word for 100 ms. Participants were asked to make a lexical decision judgment (i.e., "word"/ "not word") for each letter string displayed. They were to press the "z" key for words and the "/" key for nonwords. Reaction times (RTs) to the onset of participants' responses were recorded using DirectRT precision timing software (v2004.1.0.37) written by Blair Jarvis.

Debriefing. Participants were debriefed thoroughly and probed for suspicion. No participants reported noticing the color relationship between some of the word pairs in the task.

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Results

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Data Preparation

RTs were trimmed to reduce the positive skew inherent to such data (Fazio, 1990). First, all incorrect responses were eliminated. Next, means and standard deviations were calculated for each participant's responses for each of the three classes of target words (perceptually primed targets, semantically primed targets, and unrelated targets). RTs greater than two standard deviations from a participant's mean for a class of target were changed to the value two standard deviations from that mean (following Bartholow, Riordan, Saults, & Lust, 2009; Klauer, Rossnagel, & Musch, 1997). Mean RTs for each target category were then calculated using these trimmed values, as can be

seen in Table 2. Overall, the types of primes influenced RTs to the targets. A multivariate analysis of variance examined whether type of prime (treated as a within participant factor) interacted with mood condition to predict RTs. Only the main effect of type of prime was significant, multivariate $F(2,94) = 38.41$, $p = .0001$.

Mood Manipulation Check

To test whether the mood manipulation was effective, a *t*-test was conducted comparing the mean of the two positive mood items from the manipulation check between the two mood conditions. The two groups did not differ significantly on the mood manipulation check ($t(95) = 1.56$, $p = .12$). Furthermore, the means were counter to expectations as those in the positive mood condition ($M = 5.29$, $SD = .93$) actually reported slightly *lower* PA in the manipulation check than did those in the neutral mood condition ($M = 5.61$, $SD = 1.08$).

Examination of the mood pre-measure elucidates this unexpected manipulation failure. Participants in the neutral mood condition ($M = 4.77$, $SD = .92$) were significantly happier than those in the positive mood condition ($M = 4.35$, $SD = .99$) prior to the manipulation ($t(95) = 2.15$, $p = .03$). Difference scores between the mood measure in the pre-test and the mood measure in the manipulation check verify that the positive mood manipulation did slightly improve participants' positive mood ($M_{change} = .06$, $SD = .93$), however, this improvement was not enough to compensate for the group differences displayed prior to the manipulation (neutral group: $M_{change} = -.06$, $SD = 1.01$). Though keeping in mind that these comparisons are between scales containing different items, this seems to suggest a chance failure of random assignment rather than a truly faulty mood manipulation.

It remains possible that the mood manipulation could effectively operate as expected in the analyses. Introspection is not always a reliable indicator of psychological states and processes (Nisbett & Wilson, 1977). Perhaps the induction impacted participants' mood in ways that were not captured by the self-report measure used. Accordingly, several analyses below proceeded using the manipulation as an independent variable to test the predictions. Additional analyses either split the file by mood condition and report the effects separately or disregard the manipulation all together, substituting instead, the self-report mood ratings from the manipulation check as the mood variable. These distinctions will be made explicit throughout the remaining results reported.

Main Analyses

The main hypothesis, that intuitive individuals in a good mood would respond more quickly to perceptually primed words than all others, was tested with a regression equation predicting RTs to perceptually primed target words.

This hypothesis was first tested using the dichotomous mood manipulation as the sole mood variable. In a regression equation, RTs to unrelated targets and to semantically primed targets were entered as standardized control variables followed by main effects for mood condition (coded 0 = neutral, 1 = positive) and FI on the second step. These main effects were standardized and their product was computed and was entered on the third step of the equation (Aiken & West, 1991).

There were no main effects for mood or FI and the interaction between the two was not a significant predictor of RTs to perceptually primed target words ($\beta = .03$, $p =$

.77). FI and the positive mood induction, independently nor together, did not facilitate response latencies to perceptually primed target words.

The null effects from the previous analyses could possibly have arisen due to the faulty mood manipulation. As such, the manipulation was dropped from the next regression equation and was replaced by the self-report PA ratings from the manipulation check. Again, in the first step of the equation, standardized RTs to unprimed targets and to semantically primed targets were entered. Main effects for self-report PA and FI were entered on the second step followed by the product of these standardized variables on the equation's third step.

There were no main effects for PA or FI and the interaction between the two was not a significant predictor of RTs to perceptually primed target words ($\beta = -.05$, $p = .47$). FI and self-reported PA did not predict facilitated response latencies to perceptually primed target words.

Though PA, whether assessed with self-report items or experimentally manipulated, and FI did not, in the previous analyses, predict RTs to perceptually primed words, it remains possible that the mood manipulation may have altered the meaning of mood for the task. The two groups experienced very different situations: Unexpectedly receiving $20 is a meaningful event for most undergraduates. To test the possibility that processes may have differed across condition, the mood manipulation and the self-reported mood variable were considered simultaneously. RTs to unprimed targets and to semantically primed targets were entered as standardized control variables on the first step of the regression. Mood condition (coded $0 =$ neutral, $1 =$ positive), self-reported PA at the manipulation check, and FI were entered as main effects on the second step. The

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continuous variables were standardized and all two-way interactions between the three independent variables were computed and entered on the third step of the regression followed by the three-way interaction between mood condition, PA, and FI on the final step.

The three-way interaction between mood condition, PA, and FI was a significant predictor of RTs to the perceptually primed targets controlling for RTs to semantically primed targets and unrelated targets (β = -.27, p = .007).

This interaction was probed by dividing the data on the categorical variable, mood condition, and conducting identical analyses removing this variable from the regression equations. This left the control variables which were entered on the first step of the equation, the main effects for self-reported mood and FI which were entered on the second step, and the interaction between these two variables entered on the third step.

For the neutral mood condition, the two-way interaction between PA and FI was not a significant predictor of RTs to the perceptually primed targets (β = .148, p = .170) nor were the main effects for either variable. For the positive mood condition, in the absence of main effects, the two-way interaction between PA and FI was a significant predictor of RTs to perceptually primed target words (β = -.229, p = .023).

As shown in Figure 1, following the positive mood induction, individuals high in FI responded to perceptually primed words faster when in a good mood. Conversely, individuals low in FI responded more slowly to the perceptually primed targets when in a good mood. For participants reporting a good mood following the positive mood induction, those high in FI displayed faster RTs than those low on this individual difference measure.

In each of the previous analyses, the specificity of the priming effects to the perceptually primed targets was established by including RTs to both semantically primed targets and the unprimed targets as control variables. Another approach to testing whether these effects are unique to perceptual priming rather than to facilitated processing of all words is to examine difference scores between the classes of target words. Therefore, in the following analyses, these differences scores were computed and used as the dependent variable.

First, RTs for the control targets were subtracted from the RTs to the perceptually primed targets to create the difference score between these times ($M = 57.66$, $SD = 96.59$). Since unprimed targets were generally responded to more quickly than responses to perceptually primed targets (likely due to stimulus differences which will be discussed later) most values for this difference score were positive. Larger values indicate that perceptually primed targets were responded to increasingly slower than responses to unprimed targets. Smaller values indicate greater perceptual priming effects. A regression equation was constructed predicting this variable with main effects for mood manipulation, self-reported PA, and FI entered on the first step, all two-way interactions between these variables on the second step, and the three-way interaction on the third. In the absence of significant main effects and two-way interactions, the three way interaction between mood condition, PA, and FI significantly predicted this difference score ($\beta = -.428$, $p = .004$).

To probe this interaction, the file was split on the dichotomous mood condition variable. In the neutral mood condition there were no significant effects. In the positive mood condition, however, in the absence of main effects, the interaction between self-

reported PA and FI significantly predicted the difference in RTs between perceptually

primed targets and targets preceded by unrelated words (β = -.369, p = .017; see Figure 2

panel 1). Following the positive mood manipulation for participants reporting high PA,

individuals high in FI responded to the perceptually primed targets faster in relation to

unprimed words compared to individuals low in FI.

Identical analyses were conducted using the difference score computed by

subtracting the RTs to the semantically primed targets from the RTs to the perceptually

primed targets (M = 90.76, SD = 102.55). Again, larger values indicate that perceptually

primed targets were responded to increasingly slower than responses to semantically

primed targets. In the absence of significant main effects or two-way interactions, the

three-way interaction with mood condition, self-reported PA, and FI significantly

predicted the difference between RTs to perceptually and semantically primed targets (β

= -.314, p = .038). Follow-up analyses dividing on mood condition revealed no

significant effects in the neutral mood condition. However, in the positive mood

condition, the two-way interaction of PA and FI was marginally significant (β = -.268, p

= .087; see Figure 2 panel 2). Again, following the positive mood manipulation for

participants reporting high PA, individuals high in FI responded to the perceptually

primed targets marginally faster in relation to semantically primed targets compared to

individuals low in FI.

Lastly, analyses were conducted to understand how mood and intuition affected

responding to each class of target word. Given the pattern in the preceding findings,

these analyses focused only on those participants who were exposed to the positive mood

induction using the self-reported mood from the manipulation check as the PA variable of

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interest. As noted in Table 2, the mean RTs across the three classes of word targets differed.[2] To allow appropriate comparisons across target classes, then, RTs for each class of targets were standardized within each type of prime, removing mean differences by giving all RTs a mean of 0 and a standard deviation of 1. Note that these standardized measures tell us about how each type of prime influenced responses within each participant. Regression equations were computed for each of the three classes of target words. On the first step, main effects for PA and FI were entered followed by the product of these standardized variables on the second step. There were no significant effects in any of the three equations.

Generated means were calculated for each class of target word responses since the interactions consisted of two continuous variables. Graphing these generated means reveals an interesting trend in the RTs across different types of word targets (see Figure 3). For individuals high in FI, PA seems to facilitate response times to words primed both semantically[3] and perceptually and inhibit response times to words that were not primed. For those low in FI, on the other hand, PA led to faster responses for semantically and unprimed words while slowing responses to perceptually primed targets.

Examining the slopes for the effect of PA on perceptual primes across high and low FI is an interesting exercise (see Figure 4). Whereas PA facilitates processing speed to perceptually primed targets for individuals high in FI, it seems to interfere with processing latency for individuals low in FI.

Discussion

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The current study sought to examine the role of PA and individual differences in FI in the processing of mental images and used a perceptual priming paradigm to do so. Based on the tenets of CEST, I predicted that if imagistic processing is a characteristic of the intuitive processing system and if PA enhances intuitive processing, then PA and FI would interact to predict faster RTs to perceptually primed words.

Examining mean RTs to each class of target word suggests that the words may have differed in difficulty. That participants responded, on average, more slowly to perceptually primed targets than to semantically primed targets would seem to suggest that though semantic primes facilitate processing (as is a well-established effect in psychological literature), perceptual primes do not. However, that perceptually primed targets elicited slower responses than did unprimed targets suggests that differences between classes of targets may be attributable to word differences rather than the priming processes themselves. Therefore, the potential that perceptual priming did occur remained viable and analyses proceeded as planned, examining the role of PA and FI in such processes.

Initial analyses revealed that response latencies to perceptually primed target words controlling for the target words from the two other classes were not predicted by mood condition and FI nor by self-report PA and FI. Speeded RTs to perceptually primed target words, however, were predicted by a regression equation containing mood condition, self-report PA, and FI simultaneously. For individuals in the positive mood condition only, individuals high in FI responded faster when in a good mood than when in a bad mood whereas individuals low in intuition responded slower when in a good mood than when in a bad mood. This pattern of effect held when the difference score

between RTs to perceptually primed targets and unprimed targets was used as the dependent variable and was marginally replicated with the difference score in RTs between perceptually primed targets and semantically primed targets as the dependent variable.

It seems that the function of PA changed depending on the mood condition. It is not unreasonable to expect these two groups to differ given the meaningful differences between the environments encountered by participants. According to the Situated Inference Model, the effects of primes can vary according to the context in which they are encountered (Loersch & Payne, 2011). Similarly, the meaning of mood could be expected to shift in these divergent research settings. The direction of these effects still warrants thoughtful consideration.

Positive Mood

It was only in the positive mood condition that the predicted effects emerged. In this study, the expected effects were found only when self-reported mood tracked the external manipulation (i.e., when high PA followed the positive mood induction). In this case, individuals high in FI were faster than individuals low in FI on the perceptual priming task. This would seem to suggest that in order for PA to facilitate processing in this preferred method (i.e., intuitively for individuals high in FI) on a given task, the affect needs to track events in the environment that the participant finds relevant. PA stemming from sources irrelevant to and clearly distinct from the task at hand may not have the same effects. It may be that for PA to matter for FI, it needs to be considered a relevant or proximally local source of information.

Topolinski and Strack (2009) discuss two forms of affect and have shown how each contributes to intuitive processes. First, there is general affect that a person brings to a situation. This type of affect, either measured or experimentally manipulated, has been consistently shown to facilitate a rough reliance on intuitive processing strategies, as mentioned previously (e.g., Baumann & Kuhl, 2002; Bodenhausen, 1993; Bodenhausen, et al., 1994; Bolte, et al. 2003; Clore & Palmer, 2009; Ruder & Bless 2003). Additionally, there is affect that stems from task stimuli itself through fluent processing. Stimuli that are processed fluently elicit PA, as marked by facial musculature changes and measures of liking (Winkielman & Cacioppo, 2001), and this information is then used to inform processing. Though the source of this affect may not be discernible consciously, the feelings themselves drive processing (Topolinski & Strack, 2009).

On the face, the affect in the current study qualifies as straightforward general affect, stemming from the experimental manipulation rather than the outcome task itself. Theoretically, as described earlier, this affect serves intuitive processing by bringing this set of skills, when possessed by the individual, to the fore. Stepping back, however, the participants' subjective definitions of the "task" may become important. Given the close link between the two components of the study design, participants may have viewed the manipulation as information directly relevant to the task, changing the meaning of PA for the participants in this group. In the neutral mood condition, participants may or may not have had salient cues available for the source of their mood states, there is no way in the current data to tell, but it is in no way task-specific and very well may have been disregarded entirely. The effects may have only emerged when the manipulation made PA a relevant source of information. Perhaps general PA is only applied to tasks that

seem related to the source of that feeling. For the neutral group, although participants may have experienced PA and this may have brought intuitive processing strategies to the fore, these strategies may have only been applied to tasks seen as relevant to the source of the PA. General PA following the positive mood manipulation, however, may be been seen as relevant to all tasks associated with the study.

This possibility may be tenuous given previous work that has shown general affect facilitates intuitive processing on a number of tasks. However, it remains difficult to discern how general affect functioned in these previous studies. As such, these concepts could be tested with future research using dependent variables previously found to be affected by PA and FI. Manipulating distinctions in the environmental setting in which mood manipulations are administered and outcome tasks are completed would be informative. Specifically, a portion of the study (i.e., the mood manipulation) could take place in one setting, and then the outcome task in another. Ostensibly marking a distinction between components in the study with a change of room, research personnel, and even an explicit cover story regarding participation in two distinct studies, could test whether there are differences between the applicability of PA loosely associated with vs. detached from the task of interest. This would allow more confident conclusions regarding the differential function of PA between experimental conditions in the current study.

The post-hoc explanations presented for the trends in the current data are certainly viable, however, taken alone they are merely speculation. Additional research is required to make any confident claims about the role of CEST in the PA literature or the inclusion

of imagistic processing under this rubric of intuitive processing. As such, the remaining discussion will explore future directions for this line of work.

Future Directions

Given the lack of clarity in the present findings, additional work is needed before making strong conclusions either in support of or in opposition to the proposed hypotheses. One option for future work on this topic would be to make small changes to improve upon the important limitations of the current procedures. First, target words across classes should be matched so that the same words are used as targets three times (in random orders). Each target should be primed perceptually, semantically, and by unrelated words on separate trials so that the RTs to the words in each of the conditions can be compared more appropriately. Additionally, replicating the study with another sample in which the participants in each condition begin as equal on the pre-measures would help to ensure an effective mood manipulation and then a more appropriate test of the hypothesis.

Further changes can also be made to the methodology to not only improve upon the current findings, but also to extend them. For example, changing from a lexical decision task to a response latency task would be informative. The lexical decision task employed here likely drew participants' attention to the semantic qualities of the words presented, perhaps causing shifts away from other favored encoding strategies. A response latency task would bypass this encoding conflict and would more appropriately inform the research question. Indeed, previous studies employing such a task have found larger and more consistent effects than those found for a lexical decision task (Pecher, Zellenberg, and Raaijmakers, 1998; Schreuder, Flores d'Arcais, & Glanzenborg, 1984).

Additionally, in the current study, all primes were presented supraliminally and were subject to the same classification as the target words. As such, the process observed was mediated through awareness. An interesting alteration on the methodology would be to present primes subliminally. This would align with intuitive processing characteristics. Perhaps the processes of interest are carried out prior to the involvement of awareness and intentional reasoning and would thus be more evident if studied in this manner.

Another strategy for future research would be testing the general hypotheses proposed here using alternate methodological paradigms. The predictions made in this study and the overarching theoretical considerations being tested are in no way married to the methodology chosen and perhaps a more direct test of the predictions could be developed. A number of such studies can be easily conceived with merely a review of previous imagery research.

An important foundational study might consist of simply examining the correlation between FI and perhaps also performance on tasks previously found to be related to intuitive processing (e.g., the Remote Associates Task) with self-reported individual differences in imagistic processing use and abilities. Individual differences in imagery ability have long been noted (Galton, 1880) and can be measured well with self-report measures such as Marks' (1973) Vividness of Visual Imagery questionnaire or simply a 1-10 single-item rating of the vividness of an image (Baddeley & Andrade, 2000). Such self-reports of visual imagery predict brain-activity during imagery tasks (Amedi, Malach, & Pascual-Leone, 2005; Cui, et al., 2007) and predict behavioral measures of the application of such an ability, such as mental rotation task performance

(Mast & Kosslyn, 2002). Examining this correlation is an important foundational piece on which to build this line of research.

These behavioral tasks in which measured performance depends on the ability to perform operations on mental images could be used to examine the effects of PA and intuition on visual imagery. A procedure parallel to the current methodology, in which FI is measured and mood is manipulated and measured and then performance on these tasks is measured as the dependent variable, would speak to these hypotheses.

Methods from studies described earlier could also be replicated in the context of PA and FI to address the question posed. Investigating PA and FI as moderators on the effects found by Zwann and colleagues in which the context in which an object is represented in a verbal description situates that object in a manner that either matches or mismatches testing stimuli images of the object (Stanfield & Zwaan, 2001; Zwann et al., 2002) is one example of integrating these variables into methodologies previously used in the mental imagery literature. Eye-tracking studies (following Heuttig & Altmann, 2007; Huettig & McQueen, 2007; Yee, et al., 2011) incorporating these variables could also inform the hypotheses.

Diverging a bit beyond simply inserting PA and FI into previous studies directly from the mental imagery literature, methodologies from a broader survey of relevant areas can also be used to test the presented hypotheses. Naor-Raz and colleagues (2003) investigated the role of color in object representation using a variation of the Stroop (1935) paradigm. In this task, participants who were presented with images of an object in an aprototypical color (a purple banana) took longer to identify the color than when the object was its prototypical color (a yellow banana). Furthermore, when participants were

presented with the words representing the object (the word banana rather than a picture of a banana) printed in atypical or typical colored fonts, the same effect emerged. Adding a mood manipulation and a FI measure to these procedures would be another way to test the hypotheses presented here.

Considering the robust effects of mental imagery on memory suggests another angle from which to test the proposed hypotheses. The method of loci is a mnemonic strategy dating back to the ancient Greeks and Romans. This strategy involves mentally picturing a known path that one travels along frequently and converting a list of items to be remembered into images which are then placed at salient locations along the well-known path. To remember the items, then, one mentally travels the path "looking" for the objects that were placed along it (Roediger, 1980). Theoretically, enhanced memory for a word list following the use of this technique should rely upon the ability to form clear mental images. As such, incorporating PA and intuition into this paradigm would seem to be an appropriate test of the presented hypotheses.

Finally, these hypotheses could be expanded even further. Elliot and colleagues have embarked on a line of research examining the psychological effects of colors (Elliot & Maier, 2007). To name a few examples, they have shown that red enhances attraction (Elliot & Niesta, 2008) and green facilitates creative performance (Lichtenfeld, Elliot, Maier, & Pekrun, 2012). Integrating PA and intuition into this work might be an interesting undertaking and could expand upon the other studies mentioned above that more directly test the proposed hypotheses. If individuals high in PA and FI are the most prone to these metaphorical color effects, this may suggest that beyond using mental imagery more often and more effectively, this use is coupled with a general tendency to

attend to the perceptual qualities of objects. Along a similar line, it may be interesting to treat word forms themselves as stimuli that are encoded as images. Priming a word with an outline of that word would, perhaps, allow a study of imagistic encoding that precludes the need to transfer a word to a meaning and then to an image.

Clearly, there are a host of methodologies that could be employed to test the hypotheses presented in the current work and to expand this line of research more broadly. Each holds inherent strengths coupled with unique weaknesses. As with most research programs, the utilization of a combination of methodological approaches to test the hypotheses proposed would be the ideal approach to produce the most informative program of research.

Conclusions

The current study provides support, however limited, to the notion that mental imagery is a process carried out by the experiential system and also that PA plays a role in facilitating such processing strategies. For participants who experienced a mood manipulation, PA and intuition interacted to predict facilitated response latencies to words that were primed by words representing objects sharing the same prototypical color controlling for RTs to semantically primed targets and unprimed targets. Broad claims cannot be drawn from this study alone, however, the findings encourage the pursuit of future work in the area.

Footnotes

[1] Perceptual priming tasks have been used before in a number of studies. Schreuder, Flores d'Arcais, & Glanzenborg (1984; 1985) found priming effects for objects that were perceptually related in terms of shape (e.g. cherry and ball). These effects were found for a lexical decision task and especially for a pronunciation response latency task. Pecher, Zellenberg, and Raaijmakers (1998) present evidence to support their claim that perceptual priming only occurs under very specific conditions. Perceptual priming was found by these researchers in one study in which participants processed the perceptual qualities of the objects prior to the pronunciation priming task (experiment 4). This task has also been examined using additional physiological measures. In a study that did not find differences in RTs across conditions on a perceptual priming task, a strong N400 priming effect did emerge (Kellenbach, Wijers, & Mulder, 2000). This points to similarities in brain activation between visual-perceptual priming tasks and associative semantic priming tasks.

[2] These differences may have resulted from noise in the data since the targets differed across class. The words in one class of targets may have been more difficult to identify than words from another class of targets for various reasons including differential word length. Totaling the letters for all potential targets in each class of targets (though each participant saw a random sampling of 15 of the 30 words as targets while the others were primes) the perceptual targets contained a total of 170 letters whereas the semantic targets consisted of 134 letters and the unrelated targets 152.

[3] Storbeck and Clore (2008) found that PA and freestanding neutral moods led to greater semantic priming effects compared to NA. Supplementary analyses were conducted in this sample with semantically primed targets as the dependent variable. Standardized

RTs to perceptually primed and unprimed targets were entered in the first step of a regression equation with main effects for mood condition, self-report PA, and FI on the second. On the third step, all two-way interactions were entered followed by a three-way interaction on the fourth step. No significant effects emerged. Positive and neutral mood and FI did not predict differential semantic priming effects. This replicates the previous finding which only found a difference when NA was involved.

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Table 1

Comparison of the experiential system and the cognitive effects of PA

Experiential System (adapted from Epstein, 1991)	**Effects of PA**	**Citations from PA literature**
Holistic	Global focus	Isen, 1987; Fredrickson, 2001; Gasper & Clore, 2002; Rowe, Hirsh, & Anderson, 2007
Automatic, effortless	Reliance on less effortful judgment heuristics and scripts	Bodenhausen, Kramer, Süsser, 1994; Ruder & Bless, 2003; see Isen, 1984 for review; Bless, et al. 1996
Affective: pleasure-pain oriented	Hedonism	Kunzmann, et al., 2005
Associationistic connections	Enhances performance on overlearned associations	Bauman & Kuhl, 2002; Bolte & Goshke, 2008; Bolte, Goshke, & Kuhl, 2003
Behavior mediated by "vibes" from past events	*Area for future research*	
Encodes reality in concrete images, metaphors, and narratives	*Area of current research*	
More rapid processing: oriented towards immediate action	Reliance on rapid processing heuristics	see Isen, 1984 for review
Slower and more resistant to change	Limited evidence suggests happy people less likely to correct for their prejudice	Bodenhausen, Kramer, Süsser, 1994; Devine, 1989
More crudely differentiated: broad generalizations; stereotypical, categorical thinking	Use of stereotypes; Top-down processing	see Bodenhausen, 1993 for review; Bless, et al., 1996; Forgas, 2002; Bless 2000; Huntsinger, Sinclair, Dunn, & Clore, 2010
More crudely integrated: dissociative, context specific processing	Creativity and unusual associations	Isen, et al., 1985; Isen, et al., 1987; Estrada, et al., 1994; Hirt, et al., 1996; see Baas, De Dreu; & Nijstad, 2008 for review
Experienced passively and preconsciously	Reliance on general knowledge structures	Bless, et al., 1996
Self-evidently valid: "Experiencing is believing"	Gullibility	Forgas & East, 2008

(adapted from Burton, Heintzelman, & King)

Table 2

Descriptive Statistics for Reaction Time (ms) by Target Class and Condition

	Overall Sample* $N = 97$ M (*SD*)	Neutral Mood Condition $n = 49$ M (*SD*)	Positive Mood Condition $n = 48$ M (*SD*)
Perceptually Primed Targets	641.51 (143.51)	629.02 (106.86)	654.25 (173.78)
Semantically Primed Targets	550.75 (107.82)	541.63 (87.95)	560.06 (125.18)
Unprimed Targets	583.84 (118.14)	574.49 (102.27)	593.38 (132.83)

Note. * All means significantly differ. Paired *t* tests ranged from 4.96 for the difference between semantic and control primes to 8.71 for the difference between semantic and perceptual primes (*p's* < .001). Effect sizes for these comparisons ranged from $r = .45$ to $r = .66$.

Figure Captions

Figure 1. Reaction times (ms) to perceptually primed target words by Faith in Intuition

(FI) and self-reported positive affect (PA) split by mood condition.

Figure 2. Differences in reaction times (ms) between perceptually primed target words

and unprimed target words (panel 1) or semantically primed target words (panel 2) by

Faith in Intuition (FI) and self-reported positive affect (PA) for participants who were in

the positive mood condition. Lower values indicate greater perceptual priming effects

Figure 3. Standardized reaction times for positive affect (PA) by target type for high and

low faith in intuition (FI).

Figure 4. Standardized reaction times to perceptually primed targets by positive affect

(PA) and faith in intuition (FI).

Figure 1
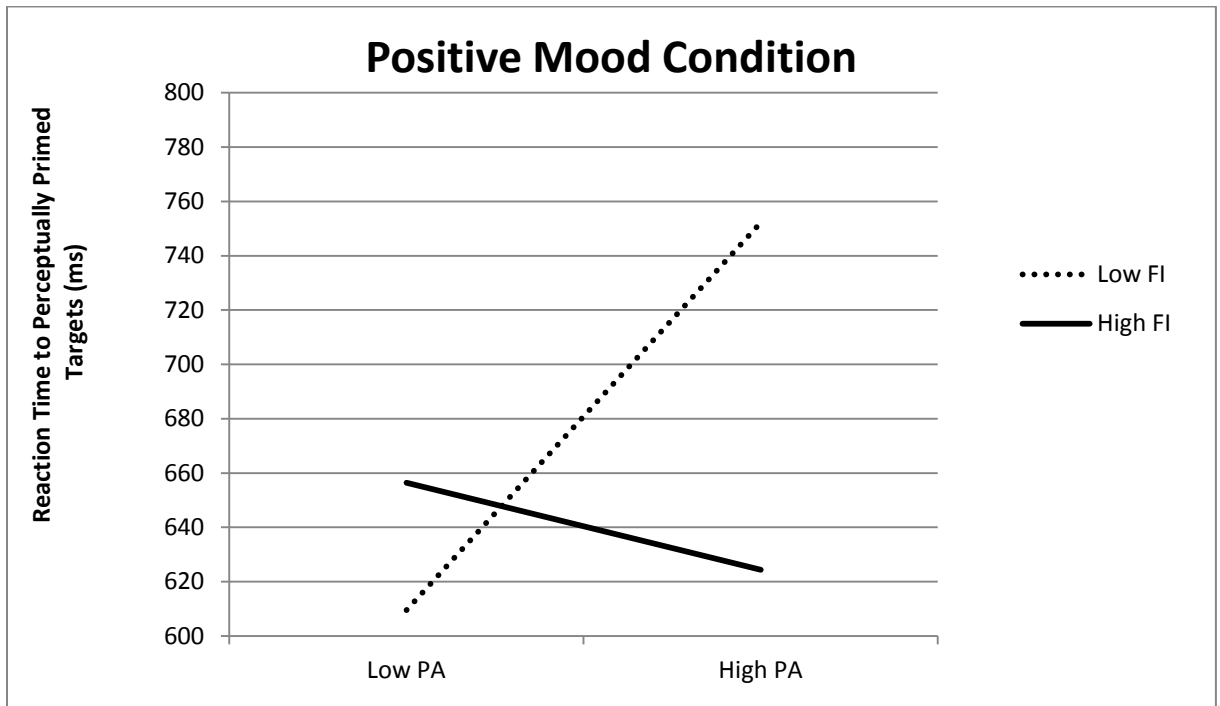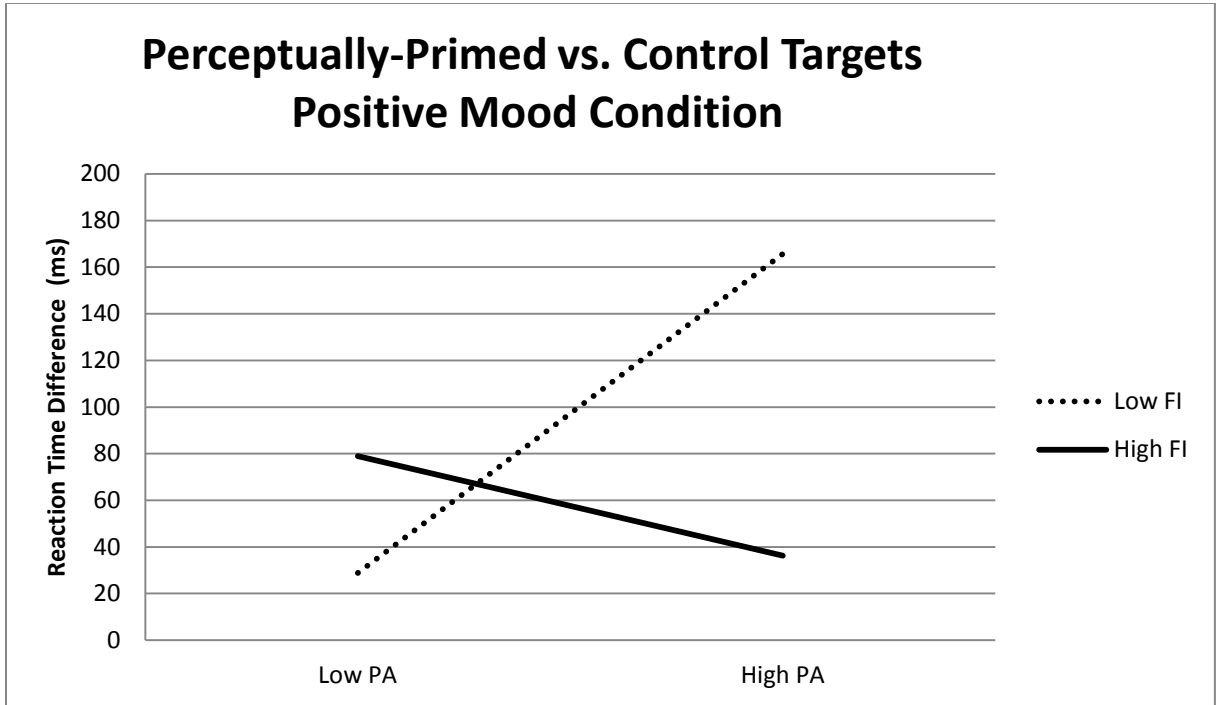*Self-report mood X faith in intuition interactions split by mood condition*

Panel 1

Neutral Mood Condition

Panel 2

Positive Mood Condition
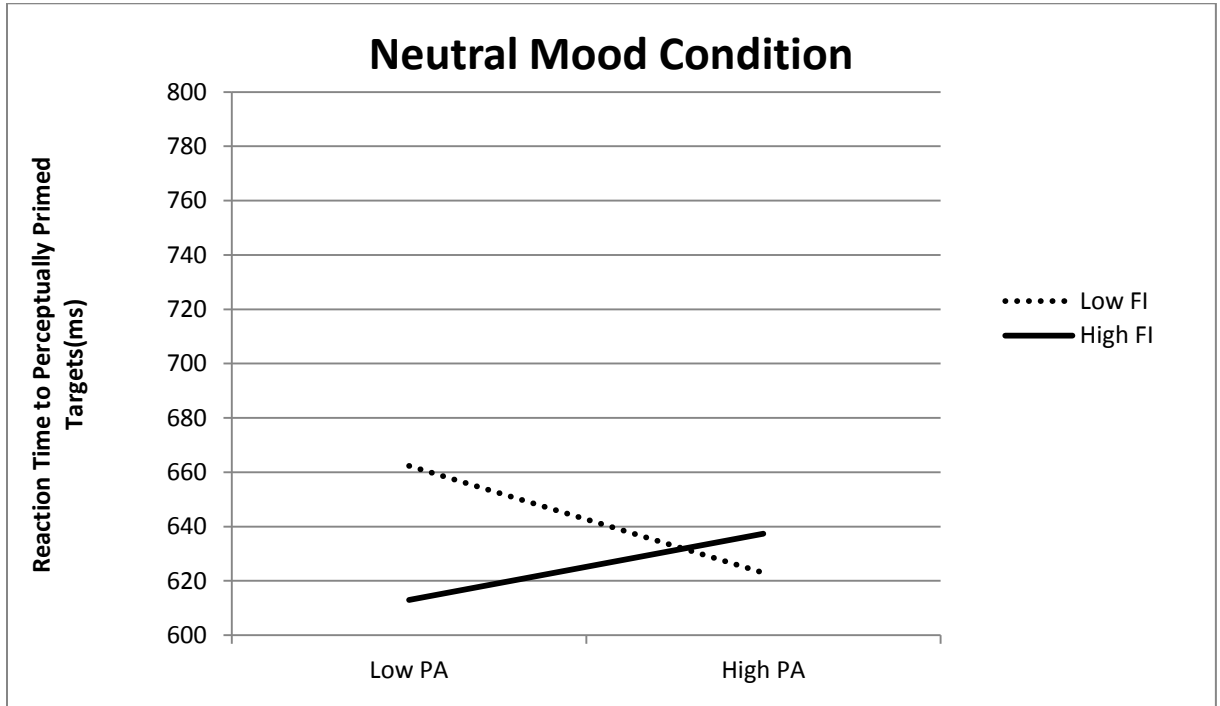
Figure 2

Difference Scores

Panel 1

**Perceptually-Primed vs. Control Targets
Positive Mood Condition**

Panel 2

**Perceptually- vs. Semantically-Primed Targets:
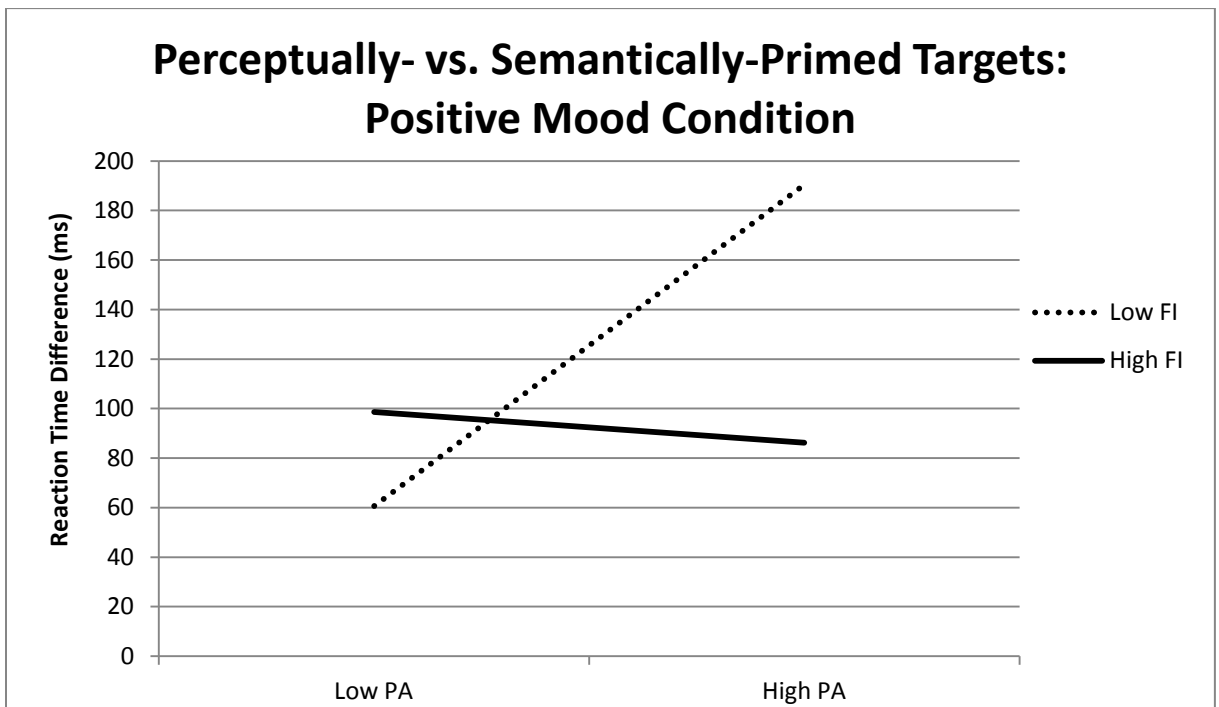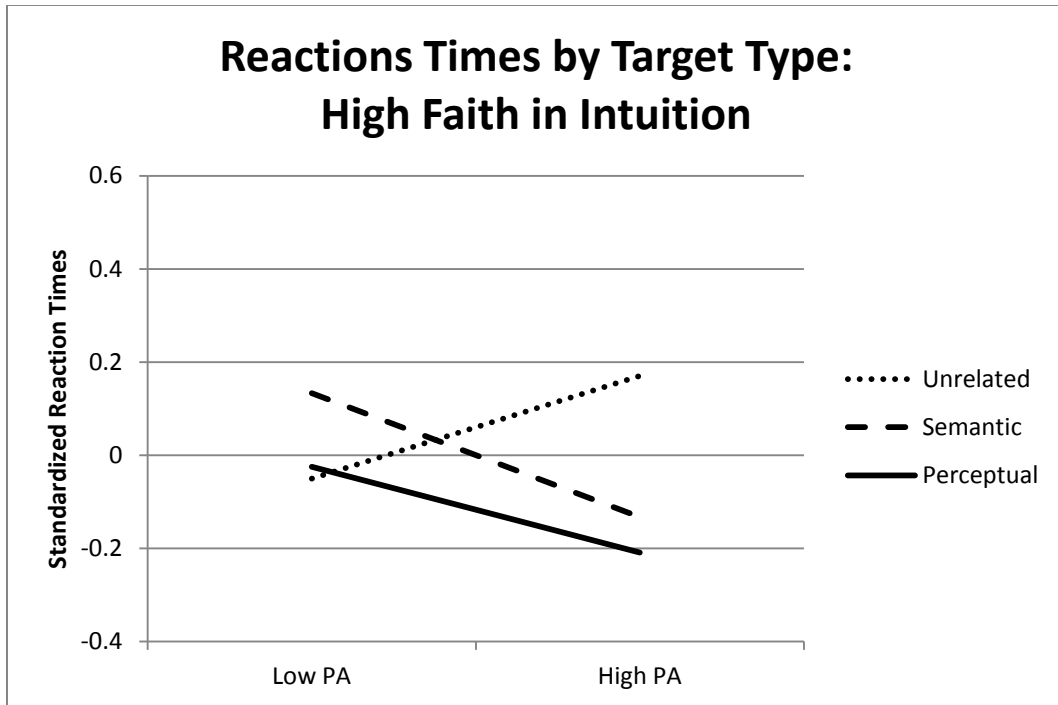Positive Mood Condition**

Figure 3.

Reaction times by target types
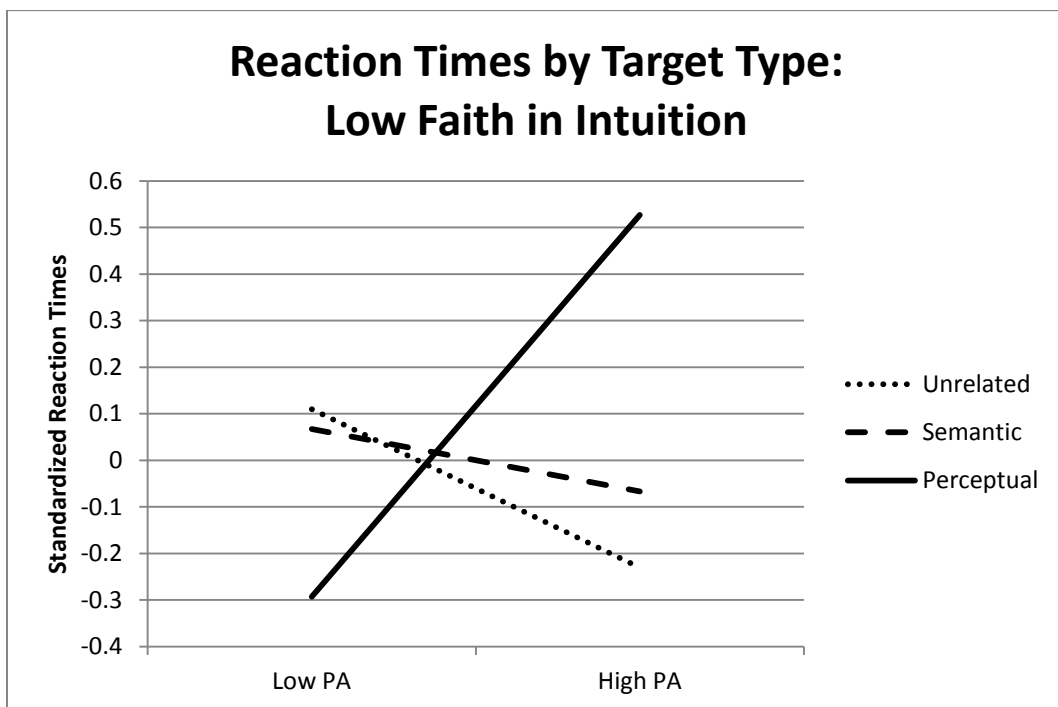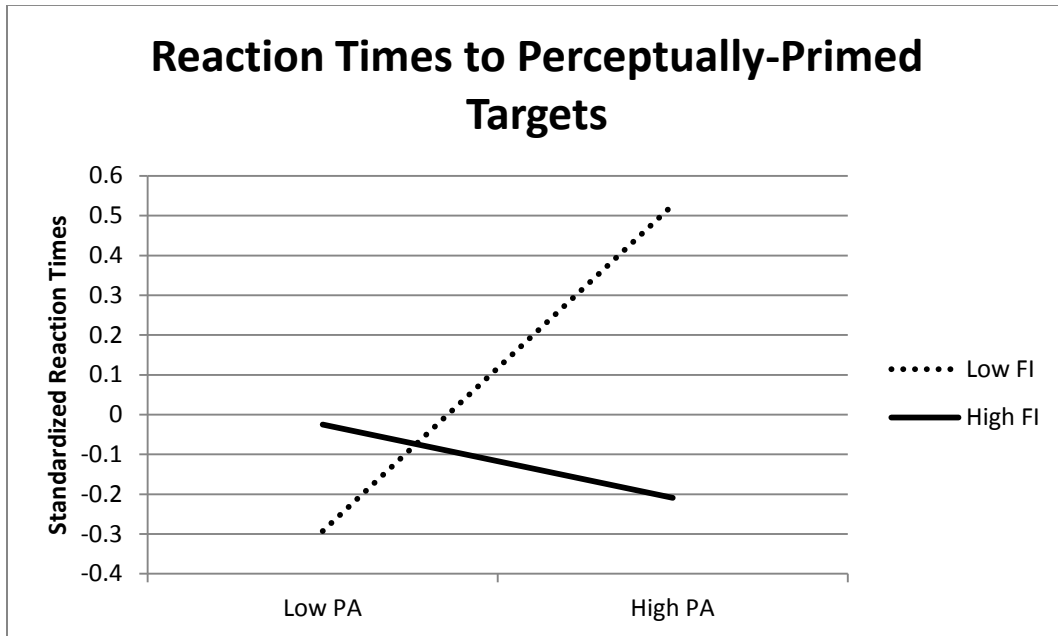
Panel 1

Panel 2

Figure 4.

Reaction times to perceptually-primed targets by PA and FI

Appendix A

Faith in Intuition Items Used in Analyses

- Using my gut feelings usually works well for me in figuring out problems in my life.
- I believe in trusting my hunches.
- I often go by my instincts when deciding on a course of action.
- When it comes to trusting people, I can usually rely on my gut feelings.
- I trust my initial feelings about people.
- I hardly ever go wrong when I listen to my deepest gut feelings to find an answer. (reverse scored)
- I tend to use my heart as a guide for my actions.

Appendix B

Word Stimuli by Type

Perceptually-related	Semantically-related	Unrelated
Apple/Stopsign	Bread/Butter	Sugar/Airport
Canary/Banana	Heart/Lung	Egg/Candle
Dollar/Grass	Autumn/Spring	Watermelon/Rope
Onion/Snow	Dog/Cat	Garden/Steel
Hot/Tomato	Hand/Foot	Balloon/Salt
Mars/Cardinal	Hat/Scarf	Wood/Arm
Love/Raspberry	Car/Truck	Button/Dish
Sad/Cold	Nail/Screw	Bed/Penguin
Sunflower/Cowardly	Oak/Elm	Bird/Chair
Broccoli/Money	Rain/Wind	Mask/Potato
Lime/Clover	Blanket/Pillow	Clock/Celery
Go/Frog	Tape/Glue	Cookie/Drum
Pure/Cauliflower	Peas/Carrots	Earth/Cereal
Cotton/Pearls	Ring/Bell	Fork/Lion
Barney/Plums	Bag/Basket	Gloves/Map