



Review

# Valence is a basic building block of emotional life

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## Abstract

The goal of psychology is to discover the scientifically viable constructs or categories that will characterize what is variant and invariant in the working of the human mind. In this paper, I outline the idea for one such construct—valenced core affect. I first introduce the idea that valence is a basic, invariant building block of emotional life that derives from the human mind's capacity to engage in the process of valuation (or judging whether something is helpful or harmful). I then review evidence to show that valence is a variant property of emotional responding, in that people differ from one another in the degree to which they focus on valence. Finally, I discuss the possibility that valence focus is not a property of the person that can be meaningfully separated from the psychological situation.

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Psychologists, like all scientists, model variance. Psychologists observe people's thoughts, feelings, or behaviors in some sort of controlled or measured environment, turn those observations into numbers by some recording method, and then examine the numbers to provide a description of what was occurring in the minds of the people who were studied. To be a successful enterprise, psychology must identify the scientifically viable constructs or categories that will characterize this variance well, and in doing so reveal the way that the human mind works. The prevailing wisdom in the philosophy of science is that a viable scientific category should be a natural kind, that is, a grouping or category that is defined by nature (for a discussion, see [Barrett, in press a](#)). Natural kind categories

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are required to support inductive discoveries of the human mind, so that psychological knowledge can steadily accumulate over time. Furthermore, a scientific category will be powerful to the extent that it can be used to represent what is invariant (common to all human minds), and also what is variant (how human minds reliably differ from one another, & how a mind functions differently in different situations).

In this paper, I outline the idea for one such construct—valenced core affect. I first introduce the idea that the valenced property of core affect is a basic building block of emotion life that largely derives from the psychological process of valuation (a simple form of meaning analysis that codes the environment in terms of whether it is good or bad, helpful or harmful, rewarding or threatening at a given instant in time). I then review evidence to show that people differ in their focus on valence, and that this is a stable characteristic of an individual that is related to valuation sensitivity. Finally, I discuss the possibility that valence focus is not a property of the person that can be meaningfully separated from the psychological situation.

### 1. Valence as an invariant characteristic of emotional life

Research on emotion often assumes that discrete categories represented by the English words “anger, sadness, fear” and so on, constitute the building blocks of emotional life. These categories are thought to be biologically “basic”—inherited, reflex-like modules that are homologous in other mammalian species and that in humans cause a distinct and recognizable behavioral and physiological pattern (e.g., Ekman, 1972; Panksepp, 1998). There is accumulating evidence, however, that commonsense categories like *anger*, *sadness*, *fear*, and so on, may not be the best categories to support scientific induction about emotion, because there is no clear biological or behavioral marker for each category (for a review, see Barrett, in press a). These categories of emotion exist in experience (Barrett, in press b), in the sense that people feel angry, and see anger in other people’s behavior, but there is considerable debate over whether *anger* is a scientific category with causal status (e.g., it is not clear that *anger* is an entity that can explain feeling or behavior). A recent review of the available evidence points to the likelihood that *anger* (or any discrete emotion) is a category that is constructed by the human mind, rather than an entity to be discovered in nature (Barrett, in press b).

If emotions are psychologically constructed categories, then assuming that *anger*, *sadness*, *fear*, and so on, are biological entities is an “error of arbitrary aggregation” (for a discussion of this error, see Lewontin, 2000). That is, perceptual processes lead people to aggregate their experiences of themselves and other people into categories that do not necessarily reveal the causal structure of the underlying emotional processing. Scientists often make the error of arbitrary aggregation when they use folk or commonsense concepts to guide scientific inquiry. For example, evolutionary biologists have argued over why natural selection has favored a protruding chin in humans (Lewontin, 2000). Perhaps chins helped humans expand their diet, find mates, or develop language. It turns out, however, that the question is in error. A chin is not a morphological or functional feature of the face that can be shaped by evolution, even though when people look at a face they effortlessly perceive the face in a way so as to see a chin. The feature people identify as the chin is actually made up of two independent bones (the dentate, which holds the lower teeth, and the mandible, which is the jawbone) that are subject to different evolutionary pressures. The reason people see a chin is that the dentary bone is receding in evolution faster than the jawbone. Scientists, at least for some period of time, focused on this perceived feature of the face, rather than on the actual bones underneath, when targeting asking questions about evolution.

Errors of arbitrary aggregation are relative to the particular scientific question being asked. If the goal is to understand what the chin really is, then explaining the separate evolutionary pressures on the dentate and mandible is key, and questions about the pressures on the chin, as an entity, are in error. If the goal is to understand how chins influence the perceptions of facial attractiveness, however, then questions targeting the evolutionary pressures on the bones might not be the most fruitful level of analysis (unless somehow the perceived attractiveness was improving the fitness of those individuals who have bones of a particular size). When we ask “how does a chin influence whether people judge someone as attractive or not?,” we are in fact asking “how does the perception of a chin (since a chin is perception, rather than a real morphological feature of the face) influence judgments of attractiveness?” The proper question is about the chin as an emergent property that exists within perception, not as an entity in the material world.

The case of emotion may be similar to the case of the chin. Although people effortlessly and automatically identify instances of *anger*, *sadness*, *fear*, and so on, in themselves and others, there are no behavioral or physiological patterns to distinguish these emotions from one another, suggesting that these categories exist within the perceiver, rather than in nature. The instances that we identify as emotional episodes are likely made up of more basic or fundamental psychological processes that are themselves, natural kind categories of the sort that can support scientific induction. In focusing on *anger* (or any discrete emotion category) as if it is real entity in the material world, scientists may be making an error of arbitrary aggregation. If the goal is to understand why one person yelled or punched another person, it may be an error to answer “because he was angry.” A more correct answer to the question of what causes emotional behavior would target the basic affective and conceptual processes that produced the behavior (and allow for the perception of anger; Barrett, in press b). If the goal is to understand what *anger* really is, then understanding the causal processes that support the perception of *anger* is key. If the goal is to understand how *anger* influences, say, relational intimacy, or prejudice towards an out group member, then we may be asking the wrong question (since anger is not an entity that causes behavior), or perhaps we are, in fact, asking how perceptions of *anger* (since a anger is perception, rather than a real biological entity) influence intimacy or prejudice. The proper question is about *anger* as an emergent property that exists within perception, not as an entity in the material world.

If discrete emotion categories do not reveal the causal structure of emotional processing, then what are the categories that will support scientific induction about emotion? What are the basic building blocks of emotional life?

In the research conducted in my laboratory over the past decade, we have avoided the error of aggregation by attempting to discover the basic building blocks of emotion experience with a paradigm that does not rely on discrete emotion assumptions. We used a range of experience-sampling procedures to measure many individuals over many occasions, asking them how they felt, and inductively examining what emerged. We observed how people reported their experience with simple English words for emotion in the course of everyday life over several weeks, treated those reports as verbal behaviors, and discovered what patterns emerged. And it was not invariant discrete emotion categories. Some people made categorical distinctions, characterizing their experiences in discrete emotion terms, whereas others characterize their experiences in broad, global terms (Barrett, 1998; Barrett, Gross, Conner, & Benvenuto, 2001; Feldman, 1995). I have called this individual difference emotional granularity (Barrett, 2004).

Individuals who are low in emotional granularity report their experiences in global terms. They use discrete emotion labels such as “angry,” “sad,” etc., to represent only the most general aspects of their internal state (typically pleasure and displeasure). For example, in response to the events of September 11th, 2001, a student who was lower in emotional granularity said, “I felt a bunch of things I couldn’t put my finger on. Maybe anger, confusion, fear. I just felt bad on September 11th, Really bad.” This person was using discrete emotion terms to communicate an unpleasant or negative state. More generally, individuals who are lower in emotional granularity use emotion-related words such as “happy” and “excited” to mean “pleasant,” and the terms “sad” and “angry” to mean “unpleasant.”

Individuals higher in emotional granularity report their experiences in more precise, differentiated terms, using discrete emotion labels in a way that captures the distinctiveness in the words’ meaning. For example, a student who was higher in granularity said “My first reaction was terrible sadness.... But the second reaction was that of anger, because you can’t do anything with the sadness.” This student was communicating fairly distinct experiences and distinguishing them by the degree of action they seemed to promote.

It is tempting to assume that differences in granularity reflect differences in accuracy, that some people are better than others when reading off their internal emotional states and translating them into words. This interpretation, however, presupposes that these distinctive internal emotional states exist, and that they can be quantified with some scientific criterion. Yet, there are currently no instrument-based measures that can scientifically confirm when a person is happy, or angry, or sad. So, although people can automatically and effortlessly perceive instances of *anger*, *sadness*, *fear*, and so on, in others (especially when they are asked to assign facial muscle configurations to emotion categories), individuals do not consistently characterize their own experiences in such terms. The fact that people differ in emotional granularity suggests that not everyone knows the difference between a sad feeling, an angry feeling, a guilty feeling, and so on.

While only some people seem to know the difference between discrete emotion experiences, everyone knows the difference between a pleasant feeling and an unpleasant one. Regardless of their degree of emotional granularity, all individuals used emotion words to communicate the hedonic content of their emotion experience. In some studies, I used *p*-factor analyses to identify the properties of experience contained in reports for each individual participant, thereby estimating the amount of variance accounted for by the various properties, including valence (Barrett, 1998; Feldman, 1995).<sup>1</sup> In other studies, I directly estimated the amount of variance by the more objective means of assessing the extent to the valence-based meanings of the words used in the reporting process accounted for pattern of self-report behaviors (Barrett, 1998, 2004; Barrett & Niedenthal, 2004).<sup>2</sup> The clearest finding to emerge across eight studies was that all individuals (whether or not they represented their experiences with granularity) used ratings to indirectly communicate something about the

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<sup>1</sup> The presence of a valence factor was empirically verified with coefficients of congruence and correlating factor scores to known solutions.

<sup>2</sup> I estimated the proportion variance due to valence in each person’s sample of self-report behavior by computing the structure of their self-reports (the similarity in ratings of different emotional experiences across time), estimating their cognitive structure of emotion language (specifically, the valence-based meaning of the emotion words used in the rating process), and empirically comparing the two to estimate the proportion of variance due to valence for each individual. As such, this estimate does not refer to whether participants are primarily reporting positive or negative states per se. Instead, it reflects the extent that participants emphasize the valence-based content communicated with self-report ratings of experience.

pleasure or displeasure in their momentary emotional state. Every individual communicated the hedonic contents of experience to some extent, without exception (other than what would be expected by chance; see Fig. 2). Furthermore, virtually all cross-sectional studies of emotion experience have documented a valenced property (for a review, see Russell & Barrett, 1999). It is important to note that the valenced content of emotion experience is empirically distinct from social desirability, so that valence cannot be reduced to a response bias (Barrett, 1996). As a result, it is possible to say that valence is an invariant part of emotion experience. All individuals focus on valence as an aspect of their experience.

Valence is not only a basic property of emotion experience, but it is also a fundamental component of emotional responding. Objective measurements used in the study of emotion, such as peripheral nervous system activation (Bradley & Lang, 2000; Cacioppo, Berntson, Klein, & Poehlmann, 1997, 2000), facial movements (Cacioppo et al., 1997, Cacioppo, Berntson, Larsen, Poehlmann, & Ito, 2000; Messinger, 2002), vocal cues (Bachorowski, 1999), expressive behavior (Cacioppo & Gardner, 1999), and neural activations (Barrett, *in press a*; Wager, Phan, Liberzon, & Taylor, 2003) all give evidence of valence or its intensity. These measures are consistent with one another in providing a strong empirical basis for concluding that an affect system, with valence at its core, constitutes the most basic building block of emotional life (for a review, see Barrett, *in press a*; Barrett, *in press b*). Recent theoretical developments in the emotion literature have synthesized this evidence, to propose the concept of core affect as a viable way to represent this affective system.

Core affect is characterized as the constant stream of transient alterations in an organism's neurophysiological state that represents its immediate relationship to the flow of changing events (Barrett, *in press b*; Russell, 2003; Russell & Barrett, 1999). The term "core" in "core affect" is meant to refer to a specific construct that is distinct from the more general usage of the term "affect" (i.e., referring to anything emotional), and signifies several important ideas about this form of affective responding (for a discussion, see Barrett, *in press b*).

This form of affect is "core" because it largely (although not exclusively, see Russell, 2003) results from the process of valuation. Valuation can be thought of as a simple form of meaning analysis in which something is judged as helpful or harmful in a given instance, producing some change in core affective state. Judgments about whether stimuli or events are helpful or harmful, rewarding or threatening (whether those judgments are fleeting and automatic or more deliberate and effortful) help to influence the valenced property of core affect. There is a consensus across a broad swath of psychological research to indicate that humans evaluate, and that evaluation is a basic aspect of mammalian functioning. People continually and automatically evaluate situations and objects (Arnold, 1960; Bargh & Ferguson, 2000; Brendl & Higgins, 1995; Lazarus & Folkman, 1984; Tesser & Martin, 1996) for their relevance and value – that is, whether or not object properties signify something important to well being, leading to moment-to-moment fluctuations in core affect. An object is valuable when it is potentially important to survival (Davis & Whalen, 2001) or relevant to immediate goals (Rogers, 1959; Smith & Kirby, 2001).

The term "core" also signals the idea that objects and events have affective meaning to the extent that they can impact and change the homeostatic (core affective) state of the individual. Computations of value (whether an object is helpful or harmful) are represented as perturbations in a person's internal milieu—these changes are what we mean when we say that a person has an affective reaction to an object or stimulus. They are means by which information about the external world is translated into an internal code or representations (Damasio, 2000; Nauta, 1971; Ongur and Price, 2000). In this sense, core affect may be a

basic kind of “core” knowledge (for a discussion of core knowledge, see Spelke, 2000) whose hardwiring is present at birth (Bridges, 1932; Emde, Gaensbauer, & Harmon, 1976; Spitz, 1965; Sroufe, 1979) and is homologous in other mammalian species (Cardinal, Parkinson, Hall, & Everitt, 2002; Rolls, 1999; Schneirla, 1959). In humans, the intensity of a core affective response (the degree of sympathetic and parasympathetic activation at a given moment in time) results in a perceived urgency to act that is independent of the specific action taken (the specific action being tailored to the particular situation at hand).

The term “core” also signifies that this form of affective responding forms the “core” of experience. Core affect (i.e., the neurophysiological state) is available to consciousness, and is experienced as feeling pleasant or unpleasant (valence) and to a lesser extent as activated or deactivated (arousal) (for a review, see Russell & Barrett, 1999). In a sense, core affect is a neurophysiologic barometer of the individual’s relationship to an environment at a given point in time and self-reported feelings are the barometer readings. Feelings of core affect provide a common metric for comparing qualitatively different events (Russell, 2003).

The valenced property of core affect is a ubiquitous feature in psychology and is as old as psychology itself (for reviews, see Reisenzein, 1992; Reisenzein & Schonpflug, 1992). Many contemporary psychological models of emotion have described a major role for valence (e.g., Ortony & Turner, 1990; Ortony, Clore, & Collins, 1988; Rolls, 1999; Russell, 2003; Smith & Ellsworth, 1985; Scherer, 1984). All known human languages have words to communicate pleasure and displeasure (Wierzbicka, 1992) and the pleasure-displeasure dimension appears pancultural in emotion lexicons (Russell, 1991). The valenced aspect of core affect has been called many things—hedonic tone, utility, good–bad mood, pleasure–pain, approach–avoidance, rewarding–punishing, appetitive–aversive, positive–negative—but the similarity is clear.

## 2. Variations in valence focus

Valence is not only an invariant feature in emotional responding. There is also significant variation in the importance of valence, or *valence focus*. That is, individuals vary in the extent to which they emphasize the hedonic content in their reports of emotion experience. It is possible to discuss variations in valence focus in terms of the person, and I will present some evidence that people show a stable, characteristic level of valence focus. Yet, I will also argue that variations cannot be firmly attributed to either the person or the situation, or even their interaction, in the strong sense. Instead, I will argue that transactions between the mind and the physical surroundings constitute an important source of variability in valence focus.

### 2.1. Valence focus as a property of the person

The fact that individuals vary in the extent to which they emphasize the hedonic contents of their experience can be seen most clearly in Fig. 1. For some people, valence is the only aspect of experience they focus on (i.e., they are highly valence focused). These individuals use emotion terms like “angry,” “sad,” and “nervous” for what they have in common (to indicate feeling negative). For others, valence is one of many aspects that describe their experience (i.e., they are lower in valence focus). These individuals use the same emotion terms, but in a way that emphasizes the distinctiveness in the words, thereby focusing on other properties of experience as well (e.g., arousal).

My lab now has evidence from several experiments to show that variation in valence focus is reliably related to individual differences in the process of valuation. The general hypothesis

is that individuals who are more sensitive to valenced information will experience greater perturbations in their core affect system, leading them to be more valence focused in their reports of experience. In the following sections, I describe the results from a series of studies that establish the construct validity of valence focus by showing how individuals who primarily (or even exclusively) emphasize the valence of their emotion experience (i.e., those high in valence focus) are more sensitive to valenced information than those who focus on many properties of experience (i.e., those lower in valence focus). Some of the findings discussed below are new and are presented for the first time (e.g., the research on dispositional differences in valuation sensitivity), while others are summaries from previously published reports (e.g., the research dealing with perceptual sensitivity to valenced information).

For discriminant validity purposes, most of the studies discussed below include another experience-based individual difference, termed *arousal focus*. Arousal (along with valence) is a basic property of all affective stimuli (for a recent review, see Russell et al., 1999), and it is possible to estimate individual differences in the extent to which people emphasize feelings of activation and deactivation in their self-reports of emotion experience. Individuals who are highly arousal focused (meaning that their self-reports of experience contain more information about feelings of activation and deactivation) are more interoceptively sensitive (Barrett, Quigley, Bliss-Moreau, & Aronson, 2004), but they are not expected to differ systematically from those lower in arousal focus on processes related to valuation.

### 2.1.1. Dispositional sensitivity to reward and punishment

Personality characteristics like neuroticism, extraversion, affect intensity, and so on, are often characterized in terms of a sensitivity to valuation, suggesting that individuals who are higher in valence focus might describe themselves as more sensitive to reward and punishment cues than those lower in valence focus. In this section, I present new evidence from two studies that bear on the relation between valence focus and valuation sensitivity.

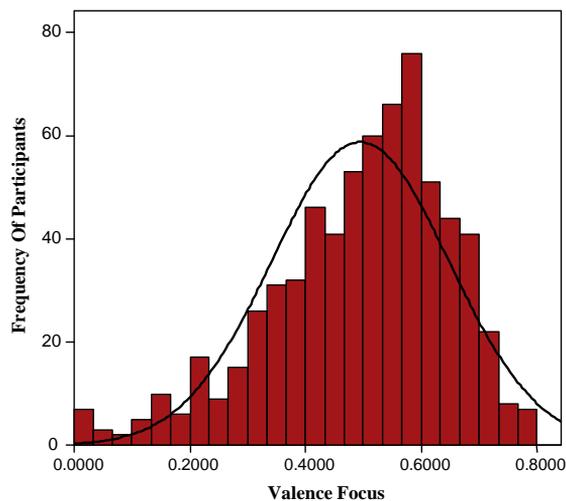


Fig. 1. Variation in the degree of valence focus in verbal reports of emotion experience. Variability in the magnitude of Valence focus indices from eight separate experience-sampling studies are summarized ( $N = 678$ ). Valence focus was estimated as the amount of variation in self-reported ratings of emotion experience accounted for by valence. Valence focus estimates range from zero to one ( $M = .49$ ,  $SD = .15$ ).

Neuroticism is defined as a pervasive sensitivity to negative or punishment cues in the environment (e.g., Costa & McCrae, 1992; Izard, Libero, Putnam, & Haynes, 1993; Larsen & Ketelaar, 1991; McCrae & Costa, 1991; Watson & Clark, 1992). Individuals high in neuroticism automatically orient to novel situational cues (for reviews see Wallace & Newman, 1997; Wallace, Newman, & Bachorowski, 1991) and evaluate those cues for their personal significance, such that they display a sensitivity to punishment cues (Pickering & Gray, 1999) like those that are present in negative social situations (Bolger & Schilling, 1991; Bolger & Zuckerman, 1995). Individuals who characterize themselves as high on neuroticism more easily assess situations as threatening than those who are low in neuroticism (Schneider, 2004). Similarly, extraversion is defined as a sensitivity to positive or pleasure cues in the environment (e.g., Costa & McCrae, 1992; Izard et al., 1993; Larsen & Ketelaar, 1991; Lucas, Diener, Grob, Suh, & Shao, 2000; McCrae & Costa, 1991; Watson & Clark, 1992). Individuals who are high in extraversion are differentially sensitive to reward cues (Pickering & Gray, 1999). Recent findings from cognitive neuroscience investigations are consistent with this view (i.e., Canli, Sivers, Gotlib, & Gabrieli, 2002; Canli et al., 2001; Schwartz et al., 2003).

Moreover, affect intensity is a characteristic that is related to valuation sensitivity. Affect intensity is defined as the characteristic intensity or strength with which an individual reports their pleasant and unpleasant affective experience over time (e.g., Diener, Larsen, Levine, & Emmons, 1985; Larsen & Diener, 1987). Judging a stimulus as self-relevant is a necessary first step in having a valenced affective response, and affectively intense individuals routinely experience situations as being more self-relevant, thereby setting the stage for more frequent and intense pleasant and unpleasant affective reactions. Emotionally intense individuals rate their daily events as being important to them and personalize events more so than less intense individuals (Larsen, Diener, & Emmons, 1986; Larsen, Diener, & Cropanzano, 1987). Individuals who frequently experience intense emotional reactions judge more situations to be self-relevant than those who experience intense emotions less frequently (Smith & Pope, 1992). Whether a given response resolves into a pleasant or unpleasant feeling is determined by whether the circumstances of the situation are consistent or inconsistent with the person's goals. If a personally relevant situation or event is judged to be goal congruent, then pleasure will be experienced; if judged to be incongruent, then displeasure. Thus, individuals high in affect intensity likely perceive many situations or cues to touch upon a personal goal or concern, and respond with greater fluctuations in valenced core affect than do those low in affect intensity.

In the first analysis to examine the link between valence focus and valuation sensitivity, participants were 88 individuals reported in Barrett, 2004 Study (1).<sup>3</sup> In addition to completing a 90-day experience-sampling procedure where they reported on their momentary experiences of emotion three times a day, participants also completed a battery of self-report personality measures prior to experience-sampling. This battery contained the Affect Intensity Measure (AIM; Larsen & Diener, 1987) and the Revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1992) to measure self-characterizations of sensitivity to positive and negative information.

For the purposes of discriminant validity, the battery also contained The Self-Consciousness Scale (SCS; Fenigstein, Scheier, & Buss, 1975) and the Reflection and Rumina-

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<sup>3</sup> Data on valence and arousal focus for these participants have been previously published (in Barrett, 2004; Study 1, where they were used to examine the link between emotion experience and emotion language).

tion Questionnaire (RRQ; Trapnell & Campbell, 1999). These scales were chosen because they contained subscales that measured self-characterizations of introspective ability, which I hypothesized would be related to arousal focus. Variations in felt arousal are associated with attention to the internal aspects of the self and introspection more generally (for a discussion see Scheier, Carver, & Matthews, 1983), such that introspective individuals may experience greater subjective feelings of activation and deactivation, and therefore will be more arousal focused.

Structural equation modeling (SEM) was used to examine the links between personality and affective focus (i.e., valence focus and arousal focus). The AIM, and the neuroticism and extraversion subscales of the NEO PI-R, were used as indicators of sensitivity to valenced information. The internal state awareness items of the private self-consciousness subscale (Burnkrant & Page, 1984) and the rumination subscale of the RRQ served as indicators of introspective ability. Covariance and correlation matrices for measured variables were submitted to an SEM analysis using LISREL VIII (Joreskog & Sorbom, 1993). Since both produced identical results, the results are reported in correlation metric (see Fig. 2). As predicted, individuals who described themselves as more sensitive to positive and negative information demonstrated greater valence focus in their momentary reports of experience for the following 3-month period ( $\gamma = .27$ ,  $p < .01$ ), but these individuals did not demonstrate greater arousal focus. In addition, arousal focus (but not valence focus) was related to self-reports of introspective ability.

The link between valence focus and valuation sensitivity was replicated in a second study where 125 participants completed a battery of self-report measures before completing a 28-day computerized experience-sampling study where they reported on their momentary emotional experiences for up to 10 occasions each day. To measure self-characterizations of valence-based sensitivity, participants completed the BIS/BAS Scale (Carver & White, 1994). Like neuroticism and extraversion, the behavioral inhibition and activation systems (BIS and BAS, respectively) are two general motivational systems that regulate responses to stimuli of value (Gray, 1987). Individuals high on BIS orientation are sensitive to punishment or non-reward cues and are vigilant to novel and negative

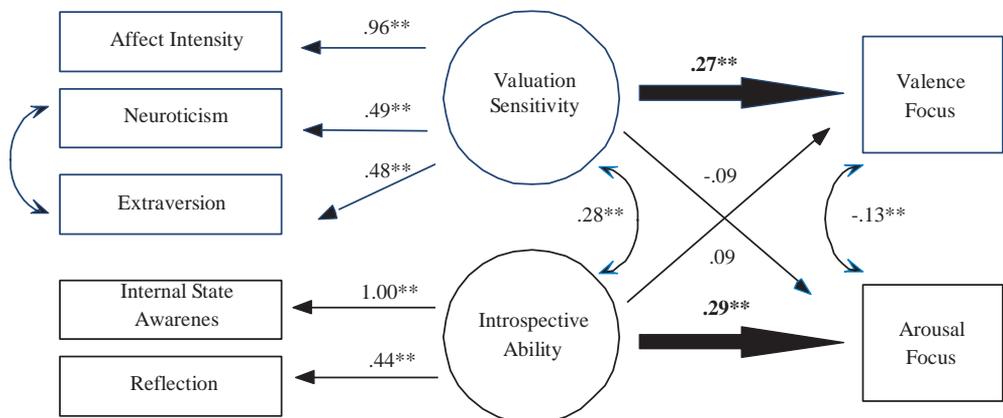


Fig. 2. Valence focus and valuation sensitivity, Study 1. The model fit the data very well:  $\chi^2(9, N = 83) = 6.28$ ,  $p < .71$ , AGFI = .93, CFI = 1.00, RMSEA = 0.037. The structural equation accounted for 14% of the variance in valence focus and 12% of the variance in arousal focus. Standardized parameter coefficients are reported.

(especially, fear) stimuli (Gray, 1987; Pickering & Gray, 1999). Those high in BAS orientation are sensitive to reward cues or incentives (Gray, 1987), as well as conditioned stimuli associated with the cessation of punishment (Corr, Pickering, & Gray, 1995).

For purposes of discriminant validity, introspection was again measured with the internal state awareness items from the private self-consciousness subscale, and the reflection subscale of the RRQ. Participants also completed the experiential engagement subscale of the Rational-Experiential Inventory (REI; Epstein et al., 1996). This subscale includes ten items that assess a general tendency to focus on internal states such as affect and intuition to guide information processing and behavior.

Finally, to further explore the discriminant validity of the valence focus construct, I also examined the relations between valence focus and the general desire to think. This factor described a penchant to think things through in a logical and analytic fashion, as well as a tendency to think about the evaluative properties of objects. Participants completed three measures allowing them to characterize the extent to which they engaged in and enjoyed the act of deliberately thinking about things: the Need for Cognition Scale (NFC; Cacioppo & Petty, 1982) that measured the tendency to engage in or to enjoy effortful cognitive endeavors, the Need to Evaluate Scale (NES; Jarvis & Petty, 1996) used to assess the deliberate tendency to evaluate attitude objects, and the rational engagement subscale of the REI (Epstein, et al., 1996) that tapped a general preference to think logically and analytically.

The SEM analysis conducted on these data was identical to that discussed for the prior study, except that the third latent construct (the propensity to think) was left free to vary with both valence focus and arousal focus. The results are presented in Table 1. As predicted, individuals who characterized themselves as sensitive to valenced cues at the outset of the study demonstrated greater valence focus ( $\gamma = .27, p < .01$ ), but not greater arousal

Table 1  
Valence focus and valuation sensitivity, Study 2

Indicator	Valuation sensitivity	Introspection	Propensity to think
<i>Factor Loadings (<math>\lambda</math>)</i>			
Behavioral inhibition	.38	—	—
Behavioral activation—reward sensitivity	.81	—	—
Reflection	—	—	—
Internal state awareness	—	.73	—
Reflection	—	.70	—
Experiential engagement	—	.38	—
Need to evaluate	—	—	.31
Need for cognition	—	—	.96
Rational engagement	—	—	.88
<i>Regression parameters</i>			
Valuation sensitivity	—	—	—
Introspection	<b>.53</b>	—	—
Propensity to think	.17	<b>.67</b>	—
Valence focus	<b>.27</b>	—	.01
Arousal focus	—	.06	-.10

Note. All factor loadings were statistically significant,  $p < .05$ . Regression parameters in bold were significant  $p < .01$ . VF and AF were negatively correlated ( $\beta = -.22, p < .05$ ). The structural equation accounted for 20% of the variance in VF, and 13% of the variance in AF. Dashes in the table denote paths that were not estimated.

focus. Valence focus was not related to introspection or the propensity to engage in deliberative thinking.

### *2.1.2. Perceptual sensitivity to value*

Perhaps the most compelling link between valence focus and valuation sensitivity is the behavioral finding that individuals with higher valence focus were more efficient in processing valenced information and quicker to detect valence on the face of others. These findings are reported in Barrett and Niedenthal (2004). Participants in this study were the subsample of individuals included in the second personality study who also completed a “morph movies” task. This task played a series of 100-frame computerized movies in which a face displaying a neutral expression gradually changed over the course of the movie to display either a happy, angry, or sad facial depictions. Participants were required to detect the moment of affective onset for each movie, allowing a precise estimate of their sensitivity to perceptual information that was either pleasant or unpleasant. Individuals high in valence focus (1 standard deviation above the mean) perceived the onset of angry faces an average of approximately 25 frames earlier than those lower in valence focus (1 standard deviation below the mean). Individuals high in valence focus perceived the onset of sad faces an average of approximately 37 frames earlier than those lower in valence focus. Individuals higher in valence focus also perceived the onset of happy facial expressions earlier, but this finding failed to reach conventional levels of significance. Perceptual sensitivity was not related to arousal focus.

### *2.1.3. Self-esteem lability*

For individuals with enhanced perceptual sensitivity to information of affective value, small changes in their surroundings will have more psychological consequence. Slight changes in the facial behaviors of interaction partners during a social interaction will have greater psychological meaning, and therefore greater impact. This line of reasoning was supported by the finding that individuals with greater valence focus showed enhanced self-esteem lability (or changes in momentary self-esteem) in response to positive and negative interpersonal cues (Barrett & Pietromonaco, in preparation). Participants in two event-contingent experience-sampling studies reported on every social interaction lasting more than 10 min or longer for seven or fourteen days (Studies 1 and 2, respectively). Participants rated the extent of both positive and negative information available to them during the interaction (e.g., amount of positive emotion expressed by an interaction partner, amount of conflict perceived in the interaction), their momentary self-esteem, and their momentary experience of emotion (from which valence focus was computed). Using hierarchical linear modeling procedures, it was possible to estimate self-esteem lability as the change in self-esteem predicted by the valenced social information, as well as to estimate the extent to which valence focus accounted for the variability in self-esteem lability across individuals. In both studies, participants with greater valence focus demonstrated larger self-esteem lability than did those who were lower in valence focus. Illustrative findings from Study 1 are presented in Fig. 3. Arousal focus was not related to self-esteem lability in either study.

## *2.2. Valence focus and the psychological situation*

Thus far, the empirical findings have demonstrated that valence is an invariant property of emotional life that can be found in virtually every form of emotional responding. In the

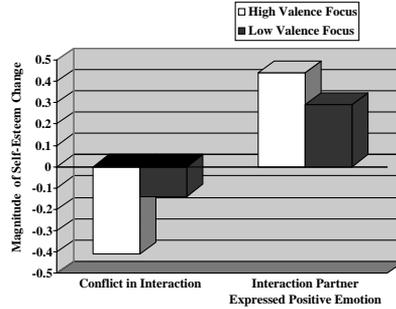


Fig. 3. Valence focus and self-esteem lability. Degree of self-esteem change in response to the amount of valenced information contained in social interactions. Valence focus was related to the magnitude of self-esteem lability in response to conflict,  $b = 1.143$ ,  $t(76) = 2.86$ ,  $p < .001$ , and in response to interaction partners expressing positive emotion,  $b = .59$ ,  $t(76) = 1.96$ ,  $p < .05$ .  $N = 78$  participants, 2514 interactions. The magnitude of self-esteem lability is depicted for those high and low in Valence Focus. Individuals who were low in valence focus fell one standard deviation below the mean of valence focus, and those high in valence focus fell one standard deviation above the mean.

domain of subjective experience, there is reliable and meaningful variation in the focus on valence. Some people largely (even exclusively) focus on the hedonic content of their emotion experience, and emphasize that content in self-reports of those experiences, whereas others focus less on the hedonic content of their experiences. Individuals who largely focus on the hedonic content of their emotion experience (that is, those who are high in valence focus) also describe themselves as having greater sensitivity to valenced cues, evidence a greater perceptual sensitivity to valenced facial affect, and are more psychologically responsive to positive and negative information that is present in naturally occurring social situations.

These studies seem to suggest that the valuation process is stimulus-driven, so that the situation triggers the process of valuation within the individual, thereby producing some degree of valence focus. In this view, the situation is an enabling condition that allows latent behaviors to express themselves. Valenced information in the situation brings forth a process (evaluation) from a mind that is wired in a particular way, to produce an experience with a particular property of experience (valence). This view of the situation, as something external that triggers processes that are internal to the person, places a boundary between the person and the situation as if they are truly independent causes that can interact to produce the behavior in question (in this case, the contents of experience at a moment in time). Viewing the person and situation as independent and separable causes of behavior derives from the Cartesian assumption that natural phenomena can be understood with a machine metaphor (see Lewontin, 2000). In psychology, we assume that the human mind can be understood as a machine (like a computer), where the person and situation can be separated into definable bits and pieces that have no necessary causal relation to one another. Social psychologists typically view person characteristics as a moderator of salient and important situational variation in behavior, whereas personality psychologists view the situation as moderating variation due to person characteristics.

Yet it is distinctly possible, even likely, that the person and the situation are not separable and independent causes of behavior. The concept of the ecological niche is instructive

here. An organism's ecological niche is not defined by the physical surroundings, but by what aspects are relevant to that organism's behavior. For example, there are two kinds of birds (phoebes and thrushes) that live in the same physical surroundings within the Northeastern United States, but their ecological niches are very different (for a detailed discussion of this example, see Lewontin, 2000). The relevant niche, or situation, for each kind of bird is determined by its activities. A phoebe needs grass to build nests, so grass is part of its situation or niche. A thrush requires rocks to crack open seeds—so rocks are part of its situation. Both birds occupy the same physical surroundings that contain grass and rocks, but the potent aspects for each—that is, each bird's situation—are different. Some aspects are physically present, but unnoticed. Similarly, it is possible that within a common physical surrounding there exists different "situations" for different people (or for a single individual at different points in time). This is the basic idea embodied in appraisal models of emotion. It is also consistent with the idea that the mind determines the "active ingredients" or psychological features of the situation (Shoda, Mischel, & Wright, 1994; Wright & Mischel, 1988). In essence, the mind determines the nature of the situation, so that a "situation" does not exist separately from the person. And, as the next set of studies demonstrate, it is these transactions between the mind and the physical surroundings that constitute an important source of variability in valence focus.

### 2.2.1. *Valence focus determines the situation*

Evidence that the person determines the meaning of the physical surroundings (i.e., the psychological situation) comes from two studies linking evaluative priming with valence focus (Conner et al., *under review*). Evaluative priming occurs when the valence of one stimulus influences the judgment of another. When individuals are briefly exposed to a negative word (such as "cancer"), they are quicker to evaluate or merely name a negative target word (such as "war") than when they are briefly exposed to a positive word (such as "flower"). This congruence effect is robust and consistent across numerous studies (e.g., Bargh, Chaiken, Gøvdender, & Pratto, 1992, 1996; Duckworth, Bargh, Garcia, & Chaiken, 2002; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; for a review, see Fazio, 2001). One hundred and eighteen participants evaluated a set of words before their computerized experience-sampling began, and then two weeks later some of those words were used as primes in a standard evaluative priming task.<sup>4</sup> Individuals low in valence focus (1 standard deviation below the mean of valence focus) or moderate in valence focus (those at the mean of valence focus) showed a clear congruence effect for positive and negative targets, whereas those high in valence focus (1 standard deviation above the mean) did not. That is, individuals who were high in valence focus evaluated target words with equal speed, regardless of whether they were primed with a valence-congruent or incongruent word. These findings are depicted in Fig. 4. A diminished congruence effect for those high in valence focus was replicated in a second study where participants were asked to pronounce, rather than explicitly evaluate, target words after exposure to valence-congruent and incongruent primes. Individuals who were highly valence focused during experience-sampling did not show a congruence effect for negative targets, meaning that they evalu-

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<sup>4</sup> Data on valence and arousal focus for these participants have been previously published (in Barrett, 2004; Study 2, where they were used to examine the link between emotion experience and emotion language).

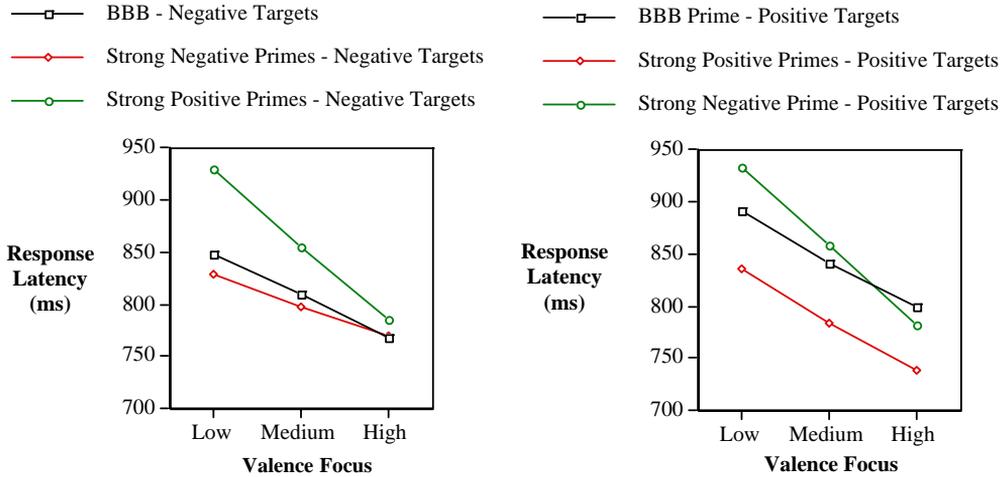


Fig. 4. Congruence effects for positive and negative targets by valence focus. Horizontal axis displays levels of valence focus (1 *SD* below the mean, at the mean, 1*SD* above the mean). Vertical axis displays evaluation latency in ms. BBB refers to control trials where neutral letter strings, rather than words, were used as primes.

ated target words like “war” with equal speed regardless of whether they were primed with “flower” (a strong positive word) or “cancer” (a strong negative word). No congruence effects were observed for positive targets for any participants in the second study.

One way to interpret these findings is that individuals who are strongly valence focused are sufficiently schematic and quick in their evaluations that they were neither facilitated nor inhibited by the words that served as primes. For the average person, the prime had a psychological impact on evaluating the target word. That is, primes were part of the psychological situation for those low or moderate in valence focus. Yet this seems not to be the case for those high in valence focus. They may have responded so quickly to the valenced stimuli that each valenced word may have been experienced as a discrete event. As a result, the primes seemed not to act as a relevant part of the psychological situation in which the targets were being evaluated. What these findings strongly suggest is that even for something as basic as words with affective value, the psychological situation is not the same for everyone. This is so, even when the physical surroundings (the primes and the task requirements) are exactly the same for every person.

The more general point is that there are features of the immediate physical surroundings (or the nominal situation; Shoda et al., 1994) that have significant meaning for some individuals (but not others), and in doing so define the psychological niche for a person. The mind, that is, the internal psychological processes within the person, can be said to construct a psychological niche or the situations that are psychologically present and relevant. A situation is not a description of the physical properties of the environment, but rather can be characterized as containing only those aspects that are relevant to the thoughts, feelings, and behaviors of that particular person at that particular point in time. The science of the person is, in essence, a study of the situations that define the human condition, in the sense that variations in the human mind offer potential ways of effectively dealing with those situations. It might be argued, then, that the study of personality is a study of how the mind creates a psychological niche with some consistency (for a similar view, see Mischel, 2004).

### 2.2.2. *The situation may determine valence focus*

To fully understand what is variable in human behavior, it is necessary to not only understand how people determine their situations, but how people are determined by situations. It is tempting to assume that people differ in valence focus or in their propensity to evaluate because they have a different genetic make-up. For example, people who carry a specific allele of the human serotonin transporter gene (SLC6A4) show stronger activation of the amygdala and medial prefrontal cortex when they are shown aversive pictures and faces with negative facial configurations (Hariri et al., 2002; Heinz et al., 2005). These areas of the brain are also involved in processing pleasant stimuli as well (e.g., Baxter & Murray, 2002; Cahill et al., 1996; Canli et al., 2000; Hamann, Ely, Hoffman, & Kilts, 1999; Lane, Chua, & Dolan, 1999; Kringelbach & Rolls, 2004; Mather et al., 2004), suggesting that the SLC6A4 gene may be related to enhanced valence focus.

Phenotypes (i.e., manifest characteristics) are not made from genotypes (i.e., the specific genetic code) in the absence of environmental influence, however. A genotype does not specify a unique phenotype—it specifies a norm of reaction—a pattern of potential developmental outcomes that can manifest depending on the environment (Lewontin, 2000). As a result, the blueprint for emotional processing does not necessarily unfold in a pre-specified way that is innately encoded in our genes and is independent from environmental input. Behavior is the result of on-going, bidirectional interplay between genetic and epigenetic forces (for a recent review, see Lickliter & Honeycutt, 2003). There are strong, and indelible epigenetic effects that influence gene expressions, such that psychologically potent surroundings can be written into the biology of the person to intrinsically shape core affective responding and alter a person's range of valence focus.

Environmental stimuli impact gene expression (e.g., Meany et al., 1996; Francis, Diorio, Liu, & Meaney, 1999) in ways that are then passed on to successive generations via behavior (also called epigenetic inheritance; Gottleib, 2002; Jablonka & Lamb, 1995; for a review, see Harper, 2005). For example, whether or not a mother rat routinely licks and grooms her pups while nursing, or whether or not an experimenter handles the pups, can provoke changes in gene expression in the brain regions that regulate aspects of a core affective response (both behavioral and endocrine). These changes are transmitted from one generation to the next through the maternal behavior of the female rat pups who grow up to bear their own young.

Similarly, maternal cortisol can cross the placental barrier to significantly alter exposure in a fetus (Gitau, Fisk, Teixeira, Cameron, & Glover, 2001) in ways that can be transmitted across successive generations. Maternal increases in glucocorticoids (secreted in response to stress) influence fetal brain development, and produce dysfunction in the offspring's hypothalamic–pituitary–adrenal axis (HPA) functioning (MacCari et al., 2003), making the offspring more reactive to stress. For example, monkeys who were stressed prenatally (where mothers were exposed to loud noises or a hormone stressor) showed enhanced HPA axis reactivity to stress, as well as an increase disruption in their behaviors (Schneider, Moore, Kraemer, Roberts, & DeJesus, 2002). The neural effects of such stressors are permanent (Francis, Diorio, Plotsky, & Meaney, 2002). Similarly, changes in HPA axis functioning can also occur in early childhood (Bremner, 2003). Early exposure to stress (e.g., a history of early childhood abuse) results in long-term enhancements in HPA reactivity in some women (Elzinga, Schmahl, Vermetten, van Dyck, & Bremner, 2003).

Taken together, this research suggests that prenatal or early childhood stress tunes HPA axis function in a way that is maintained across the lifespan because a genetic vulnerability has been created and maintained (waiting to be activated by stressful environmental conditions). When a female child with this vulnerability grows up to bear their own children, she is predisposed to transmit enhanced HPA reactivity to her own fetus during pregnancy. In a weak sense, this might be a form of Lamarckian evolution at work.<sup>5</sup> HPA reactivity is related to the functioning of the biological system that supports core affect. As a result, these findings suggest that early environmental experiences can shape a person to become more valence focused, which in turn can influence the valence focus of later generations by form of epigenetic inheritance.

### 2.2.3. *Persons and situations: A summary*

In this section, I have attempted to argue that the person and the situation are not separable and independent causes of valenced affect, so that valence neither resides solely in the environment nor in the person. Although people routinely talk about “negative stimuli” and “positive stimuli,” as if valence is a property of the stimuli themselves, this is a convenient form of naïve realism (in the same way as saying that the clown is funny; Jones & Nisbett, 1971). Stimuli are not intrinsically positive or negative. People use their senses (including the interoceptive sense that represents their affective responses) to know the world around them, and in doing so they sometimes forget that this information is contained within them, rather than in the world. When a person refers to a “negative” stimulus, this is just a shorthand way of saying that the stimulus has a negative value because it evokes a certain type of aversive affective response within most individuals, and we confer the property to the stimulus as a function of our common reaction. The risk of using this shorthand, however, is that people can come to forget that one person’s affectively potent stimulus is another person’s background feature. The complementary argument, of course, is that situations can shape how people react (therefore determining the affective value of a stimulus). Certain types of situations (e.g., prenatal or childhood stress) essentially tune the biology of the core affect system to be more reactive, resulting in more frequent and intense perturbations of the internal milieu that supports affective responding. Not only does such tuning have great personal and social consequence (in the form of mental and physical health risks), but it means that even with the “normal” range, early environmental experiences help to determine what has affective value for a person (i.e., what is part of the psychological niche), as well as for his or her offspring.

## 3. Summary and conclusions

In this paper, I have argued that the concept of valence meets the criteria to be a useful category that will support the scientific study of emotional processing. First, valence is a basic, invariant building block of emotional life that can be observed in self-reports of experience as well as in virtually all instrument-based measures of emotion. Valence can be thought of as property of a very basic form of core affect that results from the process of

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<sup>5</sup> Lamarck’s theory of evolution was termed the “inheritance of acquired traits” and was based on the idea that individuals adapt during their own lifetimes and transmit these adaptations to their offspring, producing evolutionary change.

valuation (judging whether something is helpful or harmful), and characterizes a person's relationship to the environment at any one point in time.

Second, people vary in the degree to which they focus on valence as a property of their core affective experience. Valence focus varies as a function of valuation sensitivity. In a constraint satisfaction model of emotional processing (Barrett, Ochsner, & Gross, *in press*), where affective, perceptual, conceptual, monitoring, and regulatory systems shape and constrain one another in an iterative fashion to establish an emotional response, the constraints set by evaluative processing are higher for some individuals than for others, thereby producing observable variation in valence focus and related behaviors.

Finally, and perhaps most importantly, mechanistic accounts may not work for understanding how person characteristics and situations influence affective responding, because persons and situations are not separable sources of variation that can be modeled in behavior. This hypothesis is largely consistent with Lewin's original ideas (Lewin, 1935), but suggests that the typical formulation of the person-situation debate within psychology may be in error. This observation was made by Mischel nearly forty years ago (Mischel, 1968). If person characteristics determine situations, and situations determine person characteristics, then it does not make much sense to have different disciplines within psychology that focus on either the situation, or the person, to explain the variation in human behavior. Descartes' machine metaphor is not only bad biology (Lewontin, 2000), it makes bad psychology (and these days, even bad physics). We clearly need a better metaphor to be able to solve the puzzle of human behavior.

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