

Original Paper

Hidden Affections: Presumptions that Continue to Misshape The Measurement of Emotion

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Abstract

All empirical investigations rely on formative presumptions. Over the past 70 plus years, research on emotion has long been reliant on data collected using subjective responses and by experimental exposure to target stimuli, and increasingly with various brain scanning technologies. During this period neuroscience research greatly contributed to our understanding of how emotions are formed and what functions they perform in the realm of politics and social life more generally. I identify a number consequential presumptions, in some differing combinations, that have been the foundations for commonly used measures of emotion and measurement practices. These presumptions enable research that has generated a considerable empirical literature. But these presumptions have become increasing tenuous as insights produced by neuroscience has slowly been integrated into the measurement of emotion. The measurement of emotion has gradually adopted these new insights. The adjustments and benefits that derive are described in the final section.

Keywords

Emotion, operationalization, presumptions, preconscious awareness, conscious awareness

Hidden Affections: How Presumptions Shape The Measurement of Emotion

“In a very crucial sense there is no methodology without logos, without thinking about thinking. And if a firm distinction is drawn—as it should be—between methodology and technique, the latter is no substitute for the former. One may be a wonderful researcher and manipulator of data, and yet remain an unconscious thinker.”

Giovani Sartori (1970, p. 1033)

“People are not liable to be mistaken in their feelings, but they are frequently wrong in the names they give them, and in their reasoning about them.”

Edmund Burke (2009, p. 30)

1. Introduction

Emotion, once it emerged from its prior disregard in the social sciences, has become an essential topic in the effort to secure a sound understanding of how people form judgments, especially political judgments (Brader & Marcus, 2013).

Scientific inquiries begin with selecting a methodology for generating data. The validity of substantive conclusions rest on the validity of the data used to reach those conclusions. As to measuring emotion there have been a number of important journal articles on emotion measurement in psychology and political science that have advanced our understanding of how to measure the emotions people experience. Among these are those by David Watson and colleagues (Watson et al., 1988; Watson, 1988; Watson & Clark, 1991; Watson & Clark, 1997; Gray & Watson, 2007; Watson et al., 2017); Harmon-Jones and colleagues (Harmon-Jones et al., 2016); Albertson and Gadarian (Albertson & Gadarian, 2016); Searles and Mattes (Searles & Mattes, 2015); Marcus and colleagues (Marcus & MacKuen, 1995; Marcus et al., 2006; Marcus et al., 2017); Rhodes-Purdy and colleagues (Rhodes-Purdy et al., 2021); Karl Scherer (Scherer, 2005); and, Junge and colleagues (Junge & Reisenzein, 2013; Junge & Reisenzein, 2016). While advancing the measurement of emotion, there remain aspects of emotion measurement not yet fully explored. In this review I seek to identify some remaining problems with some extant measures and practices.

Giovanni Sartori's directive suggests that some scientific understandings can be so comfortably settled that their influence is both powerful and hidden. And, as such, they may block reaching better understandings (Danner et al., 2016). This can be the case even as many contemporary emotion theorists make no mention of these presumptions.

My intentions are to make visible the presumptions that underly four commonly used measurements of emotion and measurement practices. Each of these have been selected because the measurements and validation practices preclude testing the validity of their presumptions:

- 1) Feeling thermometer and other measures reliant on a valence formulation of emotion.
- 2) Embedding a "think instruction" before asking people to rate a target stimulus using a list of emotion words.
- 3) Continued use of the PANAS schedule on the preemption its list of twenty affect words is a comprehensive sample of emotions.
- 4) Use of target stimuli and other means of affect induction without any or with insufficient manipulation checks.

One theme this review will be to show that developments in the neuroscience of perception and of emotion challenge the validity of these practices. Another theme is to demonstrate how the development of new measures and modes of analysis of emotion freed from these presumptions has generated new and consequential understandings of emotion and then new insights on the ways emotions impact on action and judgment.

Table 1 list four presumptions that have continued to shape empirical investigation of emotions.

Table 1. Presumptions Influential in Emotion Measurement

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1. Depicting Emotion as Valence
-
2. Thinking generates more accurate emotion assessments
-
3. Focusing on ‘Peak’ Emotion
-
4. Understanding Emotion as Monochromatic
-

2. Presumptions

2.1 *Affect as Valence*

A core presumption has long been that humans respond to reward and punishment (Skinner, 1969; Wilson et al., 1989a; O’Dougherty et al., 2001). This focus on reward-approach and punishment-avoidance has long been a central feature of models of learning and psychology more generally (Patterson et al., 1987; Tesser & Martin, 1996). Thus, identifying any external individual, group, or other object as positive or negative serves to address this fundamental concern. As Lodge and Taber (2005, p. 456) put it:

“All political leaders, groups, issues, symbols, and ideas thought about and evaluated in the past become affectively charged—positively or negatively—and this affect is linked directly to the concept in long-term memory. This evaluative tally, moreover, comes automatically and inescapably to mind upon presentation of the associated object, thereby signaling its affective coloration...”

Emotion, here, has been tasked with identifying the reward-punishment status of any object or activity under consideration. Valence remains a core accepted scientific concept as for example in investigations of “campaign sentiment” (Geer, 2006; Haselmayer, 2021) as well as the broad class of theories, such as utility theory and prospect theory, that attend to gain or loss; punishment or reward (Skinner, 1969; Kahneman & Tversky, 1979).

2.2 *Think Instructions Elicit more Accurate Responses*

The presumption is that if one directs people to think about the matter that will yield, on balance, more accurate assessments than leaving people to muddle through without such a direction. The well-established Elaboration Likelihood model gives weight to this presumption. Hence, it can be safely anticipated that invoking focused attention to a judgment task will enhance the motivation to secure a more accurate understanding (Petty & Cacioppo, 1986, p. 127).

2.3 *The Peak Emotion Presumption*

The peak emotion presumption holds that peak levels of any discrete emotion, be it, joy, fear, anger, or any other discrete, or basic, emotion, reveals what is necessary to know about that emotion. Moreover, peak emotions are presumed to take over, that is, exclude other emotions from playing a concurrent role of consequence with the exception of the condition of ambivalence, discussed below. Hence, it is best to study a given emotion in circumstances where it can be expected that emotion is most likely to be

prominent. For example, in the realm of negative emotions it is the attention grabbing events such as terror attacks, financial crises, pandemics, or high stake political confrontations, that best reveal the influence of negative emotions (Finseraas & Listhaug, 2013). As a result there has been less interest in low levels of discrete emotions because discrete emotions in the mundane normal activities of life are presumed to have less consequence on judgment. And, it encompasses the possibility of a state of mind that is non-emotional (Gennaro & Ash, 2021).

2.4 The Monochromatic Presumption

Attitude theory and cognitive appraisal theories long presumed that people, at any given moment, normally experience one singular dominant emotion. This is the monochromatic presumption. If we describe ourselves as feeling happy, that is because we are happy. If we describe ourselves as fearful, that is because we are fearful (Roseman, 1984).

The notion of ambivalence, a condition thought to arise when people experience simultaneous conflicting feelings about someone or something, asserts the possibility that people may experience multiple concurrent emotions (Craig & Martinez, 2005). However, the study of ambivalence envisions a very limited possibility of multiple concurrent emotions. Two conceptual limitations have constrained this research area. First, the general view is that instances of ambivalence are relatively rare. Second, the notion of ambivalence expressly limits the consideration of multiple emotions to two, the “bi” in ambivalence, one of which is positive and the other being negative, the “valence” in ambivalence (Lavine et al., 2012). An expanded consideration of multiple concurrent emotions and their distinct consequences foretells the future of research on emotion. One of the most enduring and detrimental impact of this presumption can be viewed in emotion induction experiments.

I next turn to the data generation practices that to some extent are dependent on one or more of these presumptions.

3. Measuring Emotion

3.1 Measuring Emotion as Valence

Feeling thermometers seek to answer to the question: Is this something we like and are inclined to approach, or something we dislike and are inclined to avoid (Cosmides & Tooby, 2000)? Feeling thermometers conceive emotion as a single valence factor. The American National Election Studies (ANES) operationalization is shown in Table 2. It remains a popular and frequently used measure of emotional attachment (Warner et al., 2021).

Table 2. The Feeling Thermometer

“I’d like to get your feelings toward some of our political leaders and other people who are in the news these days. I’ll read the name of a person and I’d like you to rate that person using something we call the feeling thermometer. Ratings between 50 degrees and 100 degrees mean that you feel favorable and

warm toward the person. Ratings between 0 degrees and 50 degrees mean that you don't feel favorable toward the person and that you don't care too much for that person. You would rate the person at the 50 degree mark if you don't feel particularly warm or cold toward the person. If we come to a person whose name you don't recognize, you don't need to rate that person. Just tell me and we'll move on to the next one."

Source: (Overseers, 2021, p. 83).

The measurement scheme precludes challenges to its validity. Willingness to rate leaders, groups, events, or policies does not thereby establish its scientific validity.

Challenges: Three challenges to the validity of feeling thermometers have arisen over the past half-century.

First, the identification of feelings as measuring emotional *response*, i.e., as a mechanism of memory, has been challenged by research holding that affective appraisals arise well before consciousness (Lodge & Taber, 2005).

Second, also more fully discussed below, when multiple measures of emotion are gathered, initial analyses found two dimensions of response, commonly labeled positive emotion and negative emotion. That is they find they do not use the multiple measures to produce single valence measure (Abelson et al., 1982; Watson & Tellegen, 1985).

Finally, thirdly, the feeling thermometer measure also rests on the presumption that negative emotion is a coherent scientific property (Hibbing et al., 2014; Mattes & Redlawsk, 2014). Yet for over twenty years the identification of two "negative" emotions, fear and anger, each with different neural underpinnings, each with different consequential antecedents, and each with differing downstream impacts on information processing generally, and judgment specifically, have been readily available in political science and psychology journals (MacKuen et al., 2010; Marcus et al., 2019; Lerner & Keltner, 2000; Lerner et al., 2003; Skitka et al., 2006; Suhay & Erisen, 2018). Indeed, this recent recognition of bifurcation within the domain of negative emotions had arisen many years prior (Arnold, 1950; Ax, 1953).

There has been one effort to reassert the validity of valence. James Russell accepted that data gathered by multiple emotion word check lists does generate a dense two-dimensional array. He shows how, by rotating the dimensions by 45°, the two dimensions that then be plausibly be labeled valence and arousal (Russell et al., 1989). Russell's alternative leaves us with two dimensions, as before, just relabeled in a fashion that serves to preserve a nominal valence dimension. Related to this proposal is the idea of "core affect" (Bakker et al., 2021). Central to this construction is the notion of good-positive-liking versus bad-negative disliking, the essence of the valence concept. But, as Karl Popper argued (Popper, 2000, p. 333):

“Every ‘good’ scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is. A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.”

While feeling thermometers are not themselves a theory, they are dependent on the validity of the theoretical claim that emotion is validly treated as a singular dimension that ranges from strongly like to strongly dislike.

3.2 Improving Accuracy when Measuring Emotion

As a social species, humans have a robust capacity to join with others into a group, whether small, as in a family, or very large, such as citizens of a nation. Hence, exploring group identification has been a central focus of research in the social sciences (Huddy, 2001; Huddy, 2018). The standard party identification measure in the United States, then and now, instructs study participants to *think* who they align with rather than how they *feel* about the parties. The instruction is “Generally speaking, do you usually think of yourself as [a Democrat, a Republican, an independent, or what?” (Note 1) Here, questions beginning by instructing people to *think* about their feelings of attachment is presumed to produce more accurate and valid responses.

A recent example of this belief that accuracy in the measurement of emotion is enhanced by the “think” instruction is offered by Rhodes-Purdy and colleagues (Rhodes-Purdy et al., 2021). The rationale for using this instruction is worth quoting (Rhodes-Purdy et al., 2021, p. 7):

Our approach should lead to more accurate reports of discrete emotional responses in several ways. ... Forcing individuals to think in greater depth about a topic causes them to produce responses that are more complex ... More effortful processing of information, as required by this two-step task, can lead to better decision-making ... that is slower and more logical ... which may give us higher quality, and more accurate, self-reports of emotion.”

Challenges: There is considerable evidence from a number of studies showing that the think instruction condition does indeed change how people respond when compared to either no instruction or to feel instruction conditions. But rather than improving accuracy, these studies show that the think instruction generates biased estimates (Wilson et al., 1989b; Theiss-Morse et al., 1993). Specifically, with respect to measuring partisan attachment, measuring emotional identification to one’s party that use the “think” instruction yield distributions that overstate the percentage of Democrats and understate the percentage of Republicans in any given sample (Burden & Klobstad, 2005; Neely, 2007).

3.3 Using Emotion Words to Measure Emotion

In the 70s and 80s the then popular “cognitive appraisal theories” of emotion offered a number of more complex taxonomic arrays than the simple one dimensional valence conception (Tomkins, 1984; Ortony et al., 1989; Roseman, 1984). The fundamental presumption, applicable to all variants of the cognitive appraisal approach, was that general considerations are sequentially applied which then determine the “basic” or “discrete” emotions that is made manifest in consciousness (Smith et al., 1993). Basic emotions are commonly understood as a set of affective states that form a taxonomy of

monochromatic states. Various taxonomies of these "discrete" states were proposed (Tomkins, 1984; Ekman, 1992; Ortony et al., 1989; Roseman, 1991; Lazarus & Lazarus, 1994).

The Izard Differential Emotion Scale (Izard, 1977) was one of the earliest efforts to operationalize the discrete approach to emotion. Study participants are presented a list of discrete emotions and then asked which of these they have ever felt, either recently or over a specified prior period. There is no external target, i.e., the interest was in the subjective state of the individual, not feelings about something out there. In political science research on emotion has generally not been directed at the introspective, rather emotions have been examined as informative reactions to the state of the world (Conover & Feldman, 1986). In psychology, Norbert Schwarz (1990) also argued for this shift in focus, to emotions as informative about some aspect of the external world.

In the 1980 Election Study, of what is now the American National Election Studies (ANES), introduced a version of the Izard Differential Emotion scale. The exact wording of this operationalization reveals the embedded presumptions. Below is the instruction for the Candidate Feeling Scale:

"Now we would like to know something about the feelings you have toward the candidates for President. I am going to name a candidate, and I want you to tell me whether something about that person, or something he has done, has made you have certain feelings like anger or pride."

Thereafter, the major presidential candidates were named and for each candidate seven emotion words randomly presented: *angry, hopeful, afraid, proud, disgusted, sympathetic, and uneasy*. (Note 2)

Challenges: It quickly became apparent that individuals, when given a check list of supposed discrete emotions did not treat them as mutually exclusive alternatives. Rather, they treated them as equally useful markers for their feelings (Abelson et al., 1982; Tellegen, 1985; Watson & Tellegen, 1985). Moreover, when such lists were offered analyses of these responses generated a "circumflex" (i.e., a dense circle wherein all emotion words can be plotted) that is a two-dimensional space. (Note 3)

This development enabled a new line of inquiry into emotion. Rather than the longstanding interest in which emotion becomes active, emotion word check lists enable emotion to be treated as *appraisal* rather than as *response*. And, further, directs attention to how changing levels of any given emotion, across the full range of that emotion, impact on downstream action and thought.

Using lists of emotion words as multiple indicators of latent scientific concepts of emotion treats emotion words as a way of identifying their meaning rather than by reference to a dictionary (Sullivan & Feldman, 1979). The immediate challenge was, and remains, how to select emotion words from the hundreds available in the English lexicon (Storm & Storm, 1987; Clore & Ortony, 1988; McEachrane, 2009). David Watson and colleagues (Watson et al., 1988), after examining many emotion words, selected the following twenty emotion words as reliable indicators covering the diverse domain of emotion: *interested, distressed, excited, upset, strong, guilty, scared, hostile, enthusiastic, proud, irritable, alert, ashamed, inspired, nervous, determined, attentive, jittery, active, and afraid*. These words formed the Positive and Negative Affect Schedule (PANAS).

David Watson, not long after publishing the PANAS scale, recognized the relative paucity of negative emotion words suitable to identifying anger as an emotion distinct from fear. He, and his colleague Lee Anna Clark, developed a far fuller array of emotion words in the PANAS-X schedule to correct this lacunae (Watson & Clark, 1994). However, that important elaboration has not gained sufficient attention as many researchers continue to use the original PANAS schedule (Heubeck & Wilkinson, 2019). The PANAS-X schedule has been largely ignored thereby delaying exploration of the distinction between fear and anger (Marcus et al., 1995; Lerner & Keltner, 2000).

Much depends on which of the hundreds of emotion words best define a distinct emotion. Consider the word choices English speakers have available to describe their feelings when violated in some fashion by someone or some group. They might choose any of these: *rage, angry, wrathful, ire, annoyed, hassled, vexed, bothered, upset, insulted, peeved, pestered, offended, menaced, troubled, hateful, exasperated, irritated, ruffled, affronted*. There are more than just these twenty readily available (e.g., *cross, disgusted, disdain, bitter, incensed, infuriated, resentful*, and, *scorn*). Why so many and, more importantly, how are they different?

One type of difference in emotion words is that some are equally applicable to a single appraisal, either as synonyms for that one appraisal, or as names of different levels of that appraisal, i.e., identifying whether the underlying feeling is more robust or more mild. Moreover, even if some of the many words are synonyms one might choose one rather than another because of the social context, for example, being among friends, or alone, or among strangers.

Another way emotion words might differ in meaning is by identifying differences of kind. We say we are “angry” when we feel we have been wronged, i.e., have a grievance. On the other hand, we might say we are “happy” when we feel some success. Each emotion word identifies a different distinct appraisal, how much grievance for the first, and how much success for the second (Calder et al., 2001). Inattention as to whether emotion words differ in their use as identifying the level of a given property or by identifying difference in kind is common in the social sciences (Dunn & Schweitzer, 2005). That inattention has led to considerable taxonomic confusion as to which emotion words identify differences in degree (i.e., applicable to stronger and weaker levels of a given emotion), and which are differences in kind.

Some hold that disgust and anger are different emotions, that is different in kind (Clifford & Jerit, 2018; Molho et al., 2017; Giner-Sorolla & Russell, 2019). Others argue for a distinction between fear and anxiety (Cheung-Blunden et al., 2018) or for contempt as distinct from anger and from disgust (Roseman et al., 2020). Others hold that hope and enthusiasm are distinct emotions (Just et al., 2007) and yet others that there are ten different positive emotions (Van Zomeren, 2021). Some argue for more distinctions, while others hold for fewer. For example, some hold that disgust, contempt, fear, anger just members of the negative class of emotion (Hibbing et al., 2014). That is, emotion as valence is valid and a valence measure can be used to capture what emotions are and what they do (König et al.,

2021). Testing whether these named emotions are different from each by degree or kind is, too often, largely absent. This leaves the category of “basic” emotion largely ill-defined.

There are multiple criteria that can be used to test claims of that specific emotion words identify difference in kind while others identify as synonyms. Among these are:

- 1) Do people use some emotion words as synonyms for a single emotion and do they differentiate that emotion from others (Marcus et al., 2017)?
- 2) Are different antecedents showing differentiating effects on the distinct emotions (Gerbella et al., 2019)?
- 3) Have distinguishing consequences for judgment and behavior that have been empirically demonstrated, for example, as to fear versus anger (MacKuen et al., 2010)?
- 4) Have distinct neural structures and processes identified distinct neural affective appraisals (Calder et al., 2001; Paulus et al., 2010; Maratos et al., 2012; Phillips et al., 2004)?

Too often none of the above are used to justify treating emotion words as being valid markers of a given emotion. (Note 4)

3.4 The Validity of the Experimental Practices and Emotions Research

Experiments are a popular method for exploring emotion. Experiments on emotion commonly rest on the presumption that it is possible to induce the discrete emotion of interest. Experiments begin by randomly assigned some participants to receive the target emotion induction. This group can then be compared to others who have not been given that induction. Richer research designs can and do include differing inductions so that some participants would be induced to experience emotion A while others emotion B, and so on. The induction might make use of one or more faces from the set of Ekman faces (2005) or of the pictures that make up the Lang Universal Affect Inventory (1988). Some researchers have generated specific materials to induce the emotions of interest (Searles & Mattes, 2015). Yet, another approach is to ask participants to recall and describe a specified discrete feeling state thereby presumably making the emotion of interest consciously present (Valentino et al., 2011). Additionally sound, generally, and voice, specifically, have been used to activate a specific emotion (Bradley & Lang, 2000; Brader, 2006; Dietrich et al., 2019; Kim et al., 2016). The benefit of using stimulus of some proven validity is of obvious value but that value, as I shall argue below, has limitations.

Challenges: An important means of validating the claim that the treatment has the intended effect is the use of manipulation checks (Fiedler et al., 2021). Emotion induction, as practiced (Fakhrhosseini & Jeon, 2017), is commonly reliant on the presumption that the impact of the induction on the target emotional state is monochromatic. This presumption has the effect of obscuring the need exclude the possibility that other emotions might also be impacted by exposure to the treatment. Research has shown there is considerable evidence that multiple concurrent affective appraisals is the norm, not the exception (Whalen et al., 2001; Maratos, 2011; Maratos et al., 2012; Marcus et al., 2017).

As Mutz and Permante (2015) have persuasively argued, it is essential to include manipulation checks to validate the claim that the affective state of interest has been successfully manipulated by the

treatment. However, it is equally vital to use manipulation checks to assess whether other concurrent affective states have not been manipulated or, if altered, have data on these concurrent affective changes so that they can be controlled by multivariate statistical analysis.

Producing better measures and analysis practices for research on emotion requires is a new theoretical foundation. I turn to that next.

4. A Neuroscience Informed Theory of Perception

Various appraisal theories hold the presumption that appraisal is prior and emotion is the consequential result, hence emotion is commonly labeled: emotional *response*. For example, the emotion regulation approach from the outset presents emotion as a derivative response (Katz et al., 1974; Gross, 1998; Tamir et al., 2020). The recognition that there are consequential information processes that act before conscious awareness has long been shown to be ubiquitous (Libet et al., 1979; Zajonc, 1980; Freeman & Johnson, 2016). But this recognition is often couched in spatial terms, e.g., subliminal versus liminal (Winkielman & Berridge, 2004) or the lower and higher reaches of the brain (Kosslyn & Miller, 2013). Finding the right language to describe how affective processes and consciousness are related requires a new understanding of perception. This new understanding is briefly described below.

In the late 60s and early 70s neuroscience research revealed some important insights that profoundly undermined the psychology of perception that had hitherto provided the foundation for ongoing programs of research into emotions. The research of neuroscientist Benjamin Libet (1979) revealed that though conscious awareness come with a sense of immediacy this sense is largely an illusion, see also (Nørretranders, 1998). His research revealed that during the 500 milli-second period that lies between the arrival of sensory signals to the human brain and the availability of consciousness, massive parallel preconscious processes are creating actionable understandings that shape and control much of what we do (Castiello et al., 1991). The brain generates actionable awareness considerably earlier than does the conscious mind.

Preconscious processing enables deft and swift control of habituated actions well before and well beyond what conscious control can sustain (Freeman & Johnson, 2016; Hoffman, 2019). Three features of preconscious processing are of particular importance.

First, preconscious multiple concurrent, but distinct appraisals, have greater capacity than the more limited serial subjective experience of consciousness (Grossberg, 2000). For example, our tongues have difference kinds of taste cells each tuned to a different facet of taste: sweet, sour, salty, bitter, and umami. These, together with yet other types of cells in the mouth that add assessments of pain, temperature, and texture, generate in consciousness the coherent taste and feel of something we've ingested.

The brain does not wait for the mind's late awareness to take action. Swift identification and initiating the disgorging response to what is foul is vital to limit the danger of ingesting something poisonous and dangerous to life (Rozin & Fallon, 1987). Waiting for the necessary passage of time for *conscious*

recognition after ingesting something possibly poisonous is an unlikely route for securing environmental fitness (Herzog et al., 2016).

Second, in addition to being slow, consciousness does not have introspective access to the full sensory information the brain receives from the senses. Preconscious neural processes are far more capable of handling the vast volume of sensory and somatosensory inputs than is conscious awareness. Consciousness has available a late and far simplified representation of that information.

Third, affective preconscious appraisals, because of their early and greater capabilities, are essential to successful thought and action (Bechara et al., 1995). In addition to having earlier and richer capacity to assess sensory and somatosensory input, preconscious processes also have access to essential neural systems that conscious awareness lacks. Among these are the vestibular system, procedural memory, and the motor cortex, to name but three of the most important. This changes how we should think about emotion, rather than understanding “Emotions [as having] the power to change how people perceive the (political) world” (Widmann, 2021, p. 163), we should understand that emotions are preconscious perceptions of the world.

Perception is best understood as beginning with multiple concurrent appraisals (Luo et al., 2007). The illusion of consciousness as giving humans instantaneous access to all we perceive is so powerful that social scientists, as do we all, use spatial terms—such as liminal versus subliminal—in discussing mental dynamics (Kouider & Dehaene, 2007; Baumeister et al., 2007). Figure 1 presents a schematic map reimagining perception and its relationship to emotion.

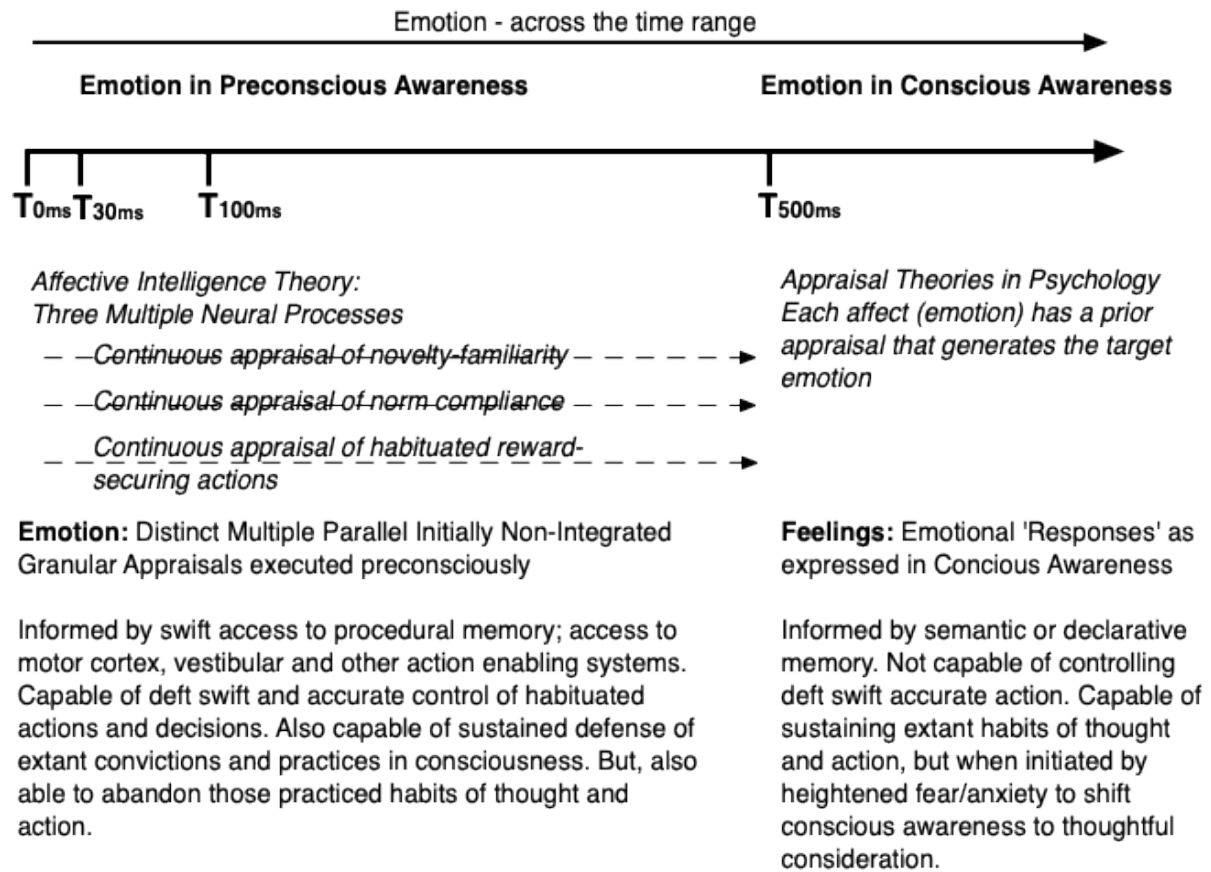


Figure 1. Preconscious Emotion and Conscious Awareness

Figure 1 displays a fundamental shift from *where* emotion and thinking are located to *when* they each take place and which variant of reasoning is thereby made manifest and by which actions deftly executed. The temporal border between the preconscious realm and that of conscious awareness is generally placed at 500 milliseconds after sensory signals arrive in the brain (Matsushashi & Hallett, 2008). Moreover, this new understanding redefines emotion as cognitive in that these affective appraisals are fundamentally information processing. This reformulation focuses on the continuously shifting levels of multiple affective appraisals and the dynamic consequences that flow there from *before* consciousness is available (Sander et al., 2005).

Some appraisal scholars have begun to accommodate to the newer understanding of perception (Scherer & Moors, 2019). Appraisal theorists continue important comprehensive programs of research (Scherer & Moors, 2019; Barrett & Satpute, 2019) but, a not inconsiderable portion of contemporary published research has become narrowly focused on individual affective states or to some seemingly ad hoc selection of emotions intermixing those that differ in degree, for example, happy and sad, with emotions that differ in kind, such as fear and anger (Mills & D'Mello, 2014).

4.1 Measuring Emotion Driven by Neuroscience Insights

We can map the changing conceptions of emotion over time. As shown in Figure 2, below, the conception of emotion has shifted from a one-dimensional formulation, valence, to a two-dimensional

formulation, two dimensions that depict a dense ‘circumplex’, to, more recently, a dense ellipsoid volume. The ellipsoid is a shaped generated by using three axes to represent three ongoing active appraisals scanning for three essential aspects of securing and support individual and collective agency. In the case of the two-dimensional circumplex the axes are conventionally treated as orthogonal. In the case of the ellipsoid that is not the case. Studies exploring threat, and using validated measures of fear, anger, and enthusiasm generally find the two threat related appraisals, fear and anger, are highly correlated (Marcus et al., 2017). Hence these two axes are positioned at an acute angle, reflecting their joint relevance in identifying the two different facets of threat. On the other hand, the axis depicting the ongoing appraisal of reward seeking habituated behavior is located somewhat oblique to the other two. (Note 5) Not depicted in Figure 2 is the shift in understanding from emotion as a result of prior appraisal to emotion as the neural mechanism of appraisal.

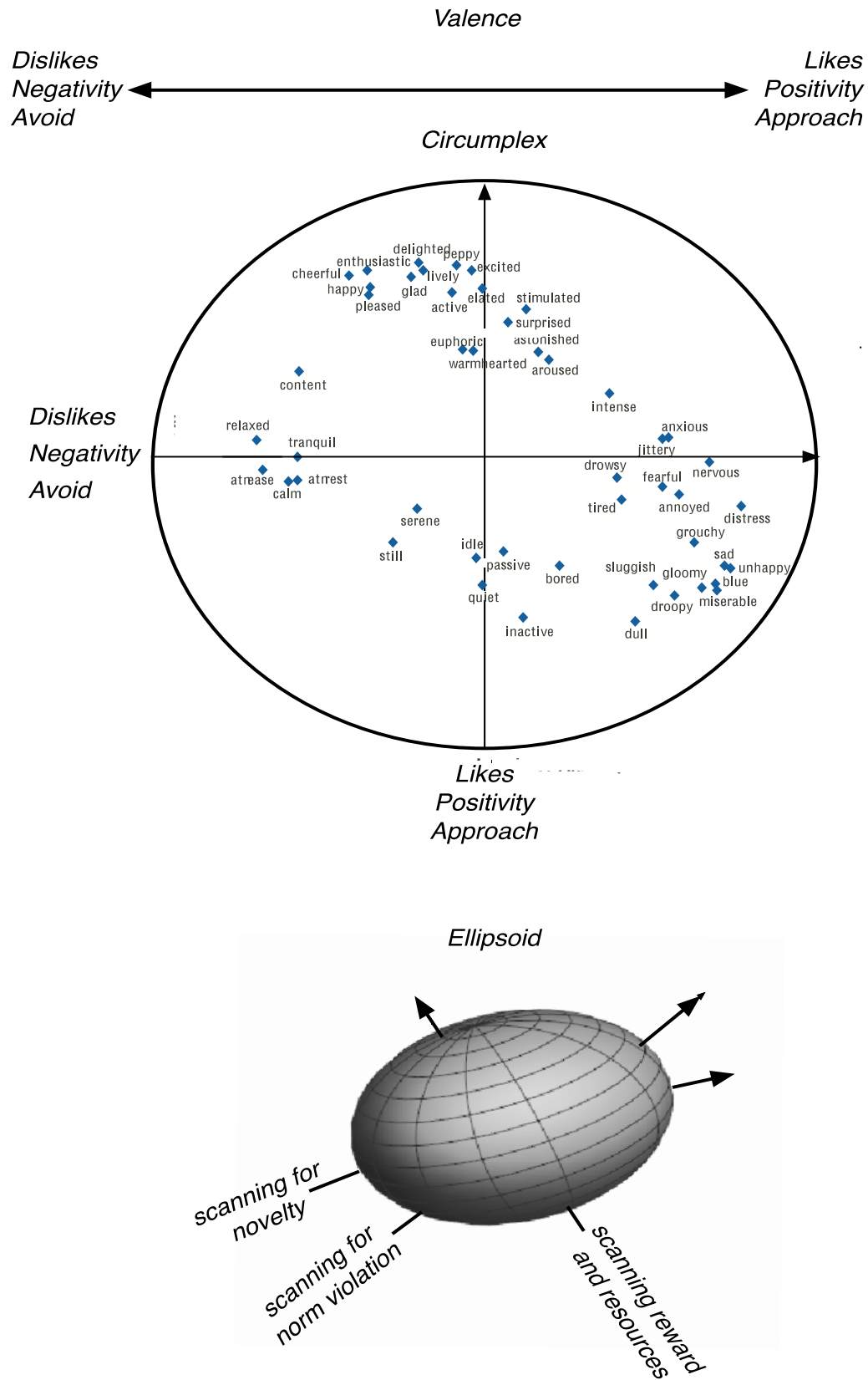


Figure 2. Changes in Emotion Conception: Valence, Circumflex, and Ellipsoid

One new insight that flows from unpacking negativity is that threat can now be understood not one property, but two. Threat is multi-faceted. Fear identifies one facet of threat: the degree of novelty evident in the moment. Anger identifies another facet of threat: the presence of one or more violation of norms that dictate the proper behavior for ourselves, our family and friends, and strangers (Haidt, 2001). While we have long thought that it is sufficient to describe threats as being one thing, varying from weak and inconsequential to robust and deadly, our brains had long been using preconscious emotional appraisals to tell us that such abstractions were obscuring strategically consequential differences between threat as novelty and threat as norm violation (Marcus et al., 1995). More broadly, reliance on valence-based measures of emotion will continue to mask the attention the human brain gives to more nuanced and focused appraisals.

The long-standing focus on fear as the marker of threat (Hobbes, 1968; Jost & Napier, 2012) now becomes more complex as fear is but one vital appraisal used to identify threat. Research prompted by the concurrent presence of the anger appraisal has not only identified anger's prominent role in identifying threat but reallocates many of the downstream consequences from fear to anger (Vasilopoulou & Wagner, 2017; Marcus et al., 2019). Pursuing that more complex understanding mandate methods of measuring emotion that can capture the independent dynamic shifting of fear and of anger in threat conditions.

Finally, if changing levels of these appraisals initiate changes in later, downstream processes such as openness to persuasion, or social bonding, and the like, then all levels of these appraisals are consequential (Marcus, 2021). "Peak" levels are important, but then so too are all the levels of any specific appraisal. If fear is low, signaling a familiar environment, then swift reliance on the 'tried and true' is deft mode of judgment and action (Bargh & Chartrand, 1999). Both high and low levels of novelty are consequential. Similarly, if very low levels of anger signal the absence of norm violations, then people are better able to exercise their individual agency, a consequence of some contemporary relevance (Webster, 2018; Marcus, 2019).

5. Discussion

A principal purpose of this inquiry is to explore how often unattended presumptions have directed the operationalization of emotion. The presumptions considered here identify the attributes thought to define emotion. The earlier approaches have a very long history and so their advantages and disadvantages can be more readily observed and assessed than the more recent. Older missteps are more easily identified than current practices. We can expect that as we learn more, the current practices and measures thought to be valid will be improved or replaced.

The understanding of emotion as a holistic, subjective state, has made way for a new more complex dynamic understanding of emotion as multiple ongoing appraisals. And, these appraisals, at all levels of each appraisal, have consequence (Neuman et al., 2018). Hopefully further work on measuring emotion will enable both old ideas and new to be continuously re-evaluated, further enriching our

understandings of our affections in all their sundry influences. This is not a final reckoning, only the most recent. Measurement of concepts is an essential feature of empirical research. But measures serve best when their foundational presumptions are made visible so that their validity can be tested.

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Notes

Note 1. Follow up questions further refine identifiers as strong or not so strong, and if independent whether they lean to one or the other major party.

Note 2. The criteria by which some emotion words are taken to be naming basic emotions and which are names of 'non-basic' emotion remains largely unresolved (Celeghin et al., 2017; Ortony, 2021; Caruana, 2017).

Note 3. The instruction to participants also included the direction has made you, i.e., past tense. However, subsequent research demonstrated that people respond as if the instruction is here and now (Watson, 1988).

Note 4. Psychophysiological measures have long been of interest as a promising means by which one could obtain valid measures of discrete emotions but over the past three decades little progress has been made in that venture (Cacioppo et al., 2000; Bakker et al., 2020). There is one exception to that assessment, FacialEMG (Cacioppo et al., 1986; Van Boxtel, 2010).

Note 5. These are approximations. As more data becomes available, from more studies, it is likely that we will find these axes are dynamically related.