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Evaluating the status of theories of emotion in political science and psychology

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Emotion is an increasingly influential area of research in psychology, political psychology, political science, and other social sciences. Research is best when driven by theory because the absence of theory generates research that can lack coherence and precision of language and meaning from one study to another, from one program of research to another. In brief, a theory provides essential binding foundations that enable scientific explanations to be rigorously tested. Furthermore, reliance on incomplete or unsound theories tends to generate flawed results. I evaluate four current emotion research programs to assess whether each constitutes a comprehensive theory of emotion. The programs under consideration, in alphabetical order, are appraisal theories in psychology and in political science, emotion regulation, and valence-based accounts. A review of the elements that constitute a theory of emotion of each of these programs persuades me that each has weaknesses that should be addressed. In sum, I find that the ambition to have a comprehensive theory of emotion awaits fulfillment.

KEYWORDS

emotion, valence, appraisal theory, affective intelligence theory, emotion regulation, neuroscience

1. Introduction

Millennia before the development of the social sciences, it was common to view emotion as a singular phenomenon, most often juxtaposed antagonistically to reason (Maiz, 2011; Gottlieb, 2016). The turn to science to understand emotion offered three advantages not hitherto available to those seeking a better understanding of what emotion is and what influences it has on human judgment and agency.

The first advantage of adhering to scientific best practices is that such practices provide clarity in defining the phenomenon being studied. Every scientifically valid concept must identify a specific property. Furthermore, the property must take on different levels, ranging from less to great amounts of that property. It is for this reason that the empirical manifestation of scientific concepts is commonly labeled as a variable. This rigor prevents confusion that flows from concepts that have multiple elements embedded therein.[1]

The second advantage is that scientific theories advance explicit causal claims. Causal claims are explanations for why one or more variables cause variations in other variables. In brief, do changes in variables X (and, or, A, B, C, etc.) explain changes in variable Y? The availability of theory helps reduce the ever-present risk of ignoring consequential factors, that is to say, "third" variables. Ignoring third variables often yields misleading results. A clear, coherent, and comprehensive theory helps those wrestling with the seeming mystery of emotion achieve accurate, validated measures thus avoiding the production of equivocal or even incorrect

1 In everyday parlance, many words identify compound or complex facets of any given object. In science, such concepts are treated as confounds. Confounded terms conflate multiple diverse phenomena. That, in turn, generates analytic problems as conflated concepts preclude identifying which facets are doing what.

findings. How good any given theory proves to be depends on the extent to which its claims are sustained by empirical research.

The third advantage of employing strong scientific theories is that reliance on theoretical claims enables scholars to set aside naked authorial claims as to the truth of the matter. Instead, scientists rely on empirical data to confirm or disconfirm theoretical asserted causal claims. Obviously, any one specific empirical result is not by itself definitive. New data often lead to revelations not previously observed. It follows, then, that the heavy hand of embedded convictions has less purchase. Reliance on evidence to test claims ensures that theoretical claims are always subject to disconfirmation. This advantage is very important as it inspires scientists to continually pursue yet better understandings.

My ambition is to describe projects on emotion in different disciplines over the past 70 or more years. The breadth of this inquiry will necessarily preclude a more granular examination that ideally should also be undertaken. What then is required to constitute a scientific theory of emotion? The answer depends on when the criteria are posed (Lynggaard, 2019; Reisenzein, 2021). I begin with a list of pre-1970 criteria.

2. What constitutes a theory of emotion?

2.1. Five essential elements of theory

The five elements I have identified are a modest beginning. Any theory should successfully address at least the following to be recognized as a theory. A theory, then:

(1) offers an explicit scientific definition of emotion;
(2) offers a clear taxonomy that defines the explicit criteria for the assignment of each member of the class by reliance on these criteria;
(3) advances testable claims of cause and effect;
(4) advances a measurement component to enable operationalizing latent concepts as empirical variables; and,
(5) follows Karl Popper's admonition that scholars should be ambitious in testing their conceptions (more on that later).

Turning to the first, a rather uncontested point of agreement is that a consensus definition of emotion has proven to be elusive (Kleinginna Jr., and Kleinginna, 1981). To illustrate this, I turn to the second edition of the textbook, *Psychology of Emotion* (Niedenthal and Ric, 2017). The authors, Paula M. Niedenthal and François Ric, present two definitions of emotion. Keltner and Gross (1999, p. 468) offer the following:

> "We define emotions as episodic, relatively short-term, biologically based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities."

A second definition, by Cole et al. (2004, p. 319), is also presented:

> "Emotions are a kind of radar and rapid response system, constructing and carrying meaning across the flow of experience. Emotions are the tools by which we appraise experience and prepare to act on situations."

To state the obvious, these two definitions of emotion are incompatible. They differ in many elements. Among these, one issue deserves special attention. For the first, emotions come and go. For the second, emotions are continuously present, generated by a "radar response" system, that is always active and always on. Review articles frequently include some thoughtful efforts to generate proper definitions of emotion (Adolphs, 2017; LeDoux, 2017).

Beyond that high level of abstraction, there are additional questions that only theories of emotion can address. Among these are:

- What do emotions do?
- Are there commonalities that apply to all emotions?
- Are there differentiating antecedents and differentiating "downstream" impacts?
- Are some more connected to procedural and declarative memory systems, and others less so?

Furthermore, emotions have long been cast as the antagonist to reasoning (Maiz, 2011). Is this malign characterization still merited, and, if so, does that apply to "emotion" or to some emotions but not others?

The next requirement of a theory is to advance a comprehensive taxonomy of the members that constitute an overall class.[2] A common taxonomic approach has been to turn to emotion words. Here, the challenge is that there are hundreds of emotion words in the English lexicon (Storm and Storm, 1987). Consider some 34 of the many English emotion words available to identify feelings of grievance: *angry, wrathful, ire, annoyed, hassled, miffed, vexed, bothered, upset, insulted, disdainful, livid, peeved, maddened, pestered, offended, troubled, hateful, exasperated, irritated, ruffled, affronted, outraged, cross, disgruntled, disgusted, resentful, bitter, contemptuous, incensed, infuriated, displeased, annoyed,* and, *pestered*.[3] Does this incomplete list of emotion words identify 34 unique emotions? Or, perhaps, some share a common underlying property while others identify yet another? If some differ in what manner do they differ? This problem has long been recognized but remains unresolved (Clore and Ortony, 1988). As noted later, especially with respect to appraisal theories, the absence of taxonomy has often generated research that too casually treats emotion words as if they each identify different emotions (Tunç et al., 2022).

On what basis do we move from hundreds of emotion words to a reduced, but more importantly, validated set (Kron, 2019; Ortony, 2021)? Before a theory of emotion can be seriously considered, it should present at least a provisional taxonomy of emotion. That requires an explicit statement presenting the theoretical and empirical grounds by which some emotion words are accepted and others rejected (Celeghin et al., 2017). After all, *emotion* is a lay word, one of the many lay words also used to name this class of phenomenon. Among these are *feelings*, *desires*, *moods*, *sentiments*, *intuitions*, and *passions* (Rorty, 1982; Montagu, 1994; Reddy, 2001;

2 Some argue that this requirement is not essential, because much can be learned without having a taxonomy (Adolphs and Anderson, 2018).

3 For reasons of decorum I exclude the many slurs used to express a person's outrage directed toward some disfavored target. To that, one can add the many facial displays and hand gestures intended to wound or intimidate others. Most of us can readily bring forth the rich array of slurs that disparage others and anticipate just when people are most likely to use them (Gould, 2003; Fischer et al., 2018).

Dixon, 2006). Lay words are often poor candidates for scientific terms because they rarely satisfy the requirement of having a singular property-identifying criterion.

Moreover, are emotion words the right place to begin? Darwin (1998) focused on emotions as they are expressed in humans and in other species in non-semantic forms, i.e., as facial expressions and gestures see also Ekman and Oster (1979), Lang and Ohman (1988); and Bradley and Lang (2000a). While the human capacity to assign words to things is of great value, especially with respect to emotion, words are too often too crude to capture the fullness of emotions as they are experienced. Furthermore, do conventional emotion words apply to experiences of emotion that are not represented in consciousness?

Indeed, LeDoux (2017) warns against confusing the words used to describe a subjective feeling state with the relevant neural process, see also Adolphs and Anderson (2018, pp. 227–228). They suggest that identifying neural systems that subserve emotion might well prove to be a better foundation for validating taxonomy. Neuroscience, in fact, offers a variety of tools for identifying neural structures that process different dynamic functions. Among these are lesion studies; split-brain experiments, facial EMG; various technologies for scanning active brains such as fMRI, PET, and EEG; assessment of the functions of specific neurotransmitters; and other techniques that enable data gathering that can test various aspects of theories of emotion.[4] These tools, and others, properly understood their limitations, have proven very useful in testing the validity of theoretical formulations (Gray, 1987; Paulus et al., 2010; Maratos, 2011; Decety and Cacioppo, 2012; Maratos et al., 2012; Rolls, 2014).[5]

Fourth, a substantive theory of emotion should include a measurement component to generate reliable and validated operational measures of theoretically identified emotions. Measurement begins with a theory to identify the scientific phenomenon of interest. Such operationalizations of concepts are then used to generate empirical data to test the claims theories advance.

In 1993, Popper (2000; pp. 336–337) set forth some important standards for scholars engaged in the testing of theories. Though not directed specifically to theories of emotion, they are applicable and worth quoting at length:

> "Confirmations should count only if they are the result of risky predictions; that is to say, if, unenlightened by the theory in question, we should have expected an event which was incompatible with the theory—an event which would have refuted the theory."
>
> Every "good" scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is. A theory that 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.
>
> Every genuine test of a theory is an attempt to falsify or refute it. Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others; they take, as it were, greater risks.
>
> Confirming evidence should not count except when it is the result of a genuine test of the theory; and this means that it can be presented as a serious but unsuccessful attempt to falsify the theory.
>
> Some genuinely testable theories, when found to be false, are still upheld by their admirers—for example, by introducing *ad hoc* some auxiliary assumption, or by reinterpreting the theory *ad hoc* in such a way that it escapes refutation. Such a procedure is always possible, but it rescues the theory from refutation only at the price of destroying, or at least lowering, its scientific status."

I apply Popper's challenge by posing two questions to each candidate's theory. First, does the operationalization of emotion generate data that can challenge the enabling definitional presumptions? Second, do the proponents of a theory expressly take on the challenges posed by contrary claims advanced by competing theories?

2.2. Neuroscience—Two core disruptions

During the 1960s and 1970s, neuroscientists produced two insights that have direct consequences for understanding emotions. The first insight, now a general consensus, is that conscious awareness is not immediately available (Libet et al., 1979; Matsuhashi and Hallett, 2008). Consciousness becomes available ∼500 ms after sensory signals arrive in the brain (Hoffman, 2019). Well before conscious awareness becomes available, the human brain can and does considerable preconscious processing of sensory and interoceptive inputs (Sawada et al., 2022). Thus, the preconscious realm complicates the older differentiation between consciousness and subconsciousness. As Dehaene et al. (2006; p. 208) put this insight nearly two decades ago:

> "Instead of the classical binary separation between nonconscious and conscious processing, we introduce here a tripartite distinction between subliminal, preconscious, and conscious processing. . . . We have shown how this distinction is theoretically motivated and helps make sense of neuroimaging data".[6]

4 I mention, here, one example of how the absence of theory can undermine the value of empirical data. fMRI (functional magnetic resonance imaging) identifies active regions of the brain by measuring the ebb and flow of oxygen uptake therein. This variation is displayed as colored images. Dark areas in these images indicate regions with little blood uptake. Vivid red areas indicates high blood uptake (intermediate colors identifying intermediate levels of uptake). But neural systems work both by activation and inhibition. Identifying inhibited areas requires prior theoretical identification of the specific brain regions that ought to be dark. Absent a theory, those dark areas might dark because they are just in a normal resting states (Brascamp et al., 2015). For a recent comparison of the temporal and spatial resolution capabilities of these various methods for mapping brain activity see Prasad et al. (2019, p. Figure 9).

5 Use of non-human species provides another useful approach as it enables a greater span of methodologies than would reliance on humans, but it has its risks. The human species has evolved strategies that are not replicated in any other species making some conclusions, as for example, how other species respond to threat, inaccurate when applied to the human species (Adolphs and Anderson, 2018, p. 55; Mlodinow, 2022).

6 Of course, this was not then a novel insight as others in psychology, neuroscience, and political science advanced this point many years prior (Zajonc, 1980, 1984; Gray, 1985a; Marcus et al., 1998).

TABLE 1 Overview of emotion as preconscious affective appraisals and subjective feelings.

Facets	Emotion as preconscious appraisals	Emotion as subjective feelings states
Information processing	Multiple concurrent	Often experienced as singular ("I feel angry.")
	Ubiquitous and continuous	Often seemingly occasional ("I am not emotional now.")
	Available very early	Available late
	Fast and rapidly updating	Slow and updating at a slower rate
Action related	Capable of influencing thought and action	Generally limited in doing so
	Generally unbiased and precise	Generally biased and crude (down sampled)
	Always consequential	Often considered to be ephemera

The human brain takes advantage of these preconscious appraisals and benefits by not waiting until consciousness becomes available (Zajonc, 1980). Some of these assessments are among the most vital to the survival of the human species, for example, sexual attractiveness (Rule and Ambady, 2008; Rule et al., 2009; Hoffman, 2019). This claim is hard for most to accept as the human brain has the robust capacity to construct the illusion of instantaneous access to the world in all of us (Nørretranders, 1998).[7]

Second, the general character of neural processing before conscious awareness is quite unlike the serial character of conscious awareness (Cisek and Kalaska, 2010). The principal feature of preconscious neural processing is a massive parallel processing (Rumelhart and McClelland, 1986; McClelland and Rumelhart, 1988). With respect to emotion, multiple neural processes are executed in parallel and each well before consciousness. These appraisals are quite different from subjective feelings on a variety of factors. Table 1 offers a broad overview of these differences (Aglioti et al., 1995; Maratos, 2011; Marcus, 2013).

Furthermore, each preconscious appraisal has a different appraisal task and each initiates different downstream consequences (Gray, 1987). Hence, a comprehensive theory of emotion should identify each of the multiple distinct neural processes, identify what each attends to, and identify what each influences before, as well as later during conscious awareness (Gray, 1991; Rolls, 2015). Failure to do so may lead to misattribution of causal effects as has already been shown to be the case in the distinct influences of fear and anger on human judgment (Lambert et al., 2010, 2019; MacKuen et al., 2010; Vasilopoulos et al., 2019; Erisen and Vasilopoulou, 2022). I discuss this more fully in the Section Why we need a theory of Emotion, Redux: Threat in Human Species.

These early, fast, preconscious, and parallel, affective processes offer continuously updating focused assessments. It is only the more robust and persistent of these assessments that, reduced and simplified, are subsequently expressed in consciousness as subjective feeling states. Thus, for example, fear is tasked with identifying the presence of the novel and the unexpected. The lower ranges of fear are not generally expressly manifest in conscious awareness. Rather, it is the moderate to high levels of fear that are expressed in consciousness.

Furthermore, if each affective process is active alongside others, and each remains actively influential, then failure to have a defensible taxonomy leaves unclear which affective processes must be considered. This, in turn, can lead to gravely misspecified theories in which empirical results generate statistics estimates that are either over- or under-estimated. Moreover, without theoretical guidance on where to look, any mediation and moderating effects of concurrent affective appraisals are likely to remain hidden (Miller et al., 2009).

Moreover, it is now clear that conscious awareness is generally not only too slow to ubiquitously generate timely self-initiated actions but it is also too limited because conscious awareness does not have direct access to procedural memory (Schacter, 1996; Kim and Baxter, 2001), nor to the vestibular system (Cheng and Gu, 2018; Öztürk et al., 2021), nor to the motor cortex (Jeannerod and Jacob, 2005) as well as other limitations. See Hoffman for an excellent overview (Hoffman, 2019).[8]

Research in the neurosciences challenges the long-held normative view that consciousness is the preferred platform for judgment. It does so because conscious awareness is not capable of executing the normative imperatives long thought to be reasoning's responsibility (Bechara et al., 1997; Pinker, 2021). Consciousness is a platform that is very limited in its ability to construe the world. That diminishes the importance of subjective feeling states in as much as many of the actions humans undertake are deftly executed well before the conscious availability of feeling states (Zajonc, 1980; Hoffman, 2019).

These insights add two additional requirements for a useful theory of emotion. First, does the theory take into account the affective neural processes active during the preconscious period? Second, does it account for multiple concurrent active affective appraisals during the period of preconscious neural processing (Calder et al., 2001)?[9]

7 Appropriately, some have challenged the specific methodology of Libet (Miller et al., 2011). Nonetheless, a considerable array of research confirms the general claim of Libet: that conscious awareness is not instantaneous. Additionally, consciousness is not especially accurate in its representation of the world before us (Aglioti et al., 1995; Bechara et al., 1995; Celeghin et al., 2015). In sum, the brain has more information than is displayed in consciousness, has more accurate information than the mind, has that information before it is available to the mind, and generally acts thereupon well before conscious awareness.

8 For a contrary view, one that understands preconscious affective processes as "rudimentary" and irrational (see Winkielman and Berridge, 2003).

9 This work also led to a new understanding of consciousness. Though we all experience conscious awareness as giving us instantaneous access to a global representation of ourselves, others, and the world wherein we move and reside, that temporal sense of immediacy is a brain-created illusion (Nørretranders, 1998). Rather than being one thing, consciousness shifts between two states (Petty and Cacioppo, 1986; Chaiken and Trope, 1999; Kahneman, 2011; Sherman et al., 2014). The default state of consciousness is well named as intuitive or "motivated reasoning" (Kunda, 1990; Mercier and Sperber, 2011). The second is best named motivated deliberation (Marcus, 2002b; MacKuen et al., 2010). Preconscious processes play a vital role when we rely on the

TABLE 2 Core components of a theory of emotion.

Conventional components for a theory of emotion
A formal definition of the phenomenon: Emotion
A taxonomy of emotions
Causal claims—both as to antecedents and consequences
A measurement component
Two Karl Popper Criteria
Requirements following the neuroscientific revolution
Integrates preconscious affective neural processing
Integrates multiple affective parallel processing

2.3. Summary of core elements that form a full theory of emotion

Table 2 shows seven components that form a minimum set of requirements for a theory of emotion. This list is neither definitive nor final.

3. Approaches: Three from psychology; one from political science

Space does not allow a full exploration of each of the four approaches, nor does space allow for the consideration of those offered by an individual or team of scholars. For a succinct review see Adolphs and Anderson (2018, chapter 10). Thus, it is certainly appropriate to view the descriptions that follow as too slight to sustain firm conclusions.

I have set aside two approaches, cognitive appraisal theory and the circumplex, later described as the two-dimensional approach (Watson and Tellegen, 1985; Plutchik, 2001).[10] The former has been recast as appraisal theory that is dropping the word "cognitive."[11] The second approach was an unanticipated empirical finding. When researchers asked people to assess, say a politician, they began to present multiple emotion words for study participants to check if they had ever felt that way about the target. Each emotion word in the list was selected because each was thought to identify a distinct emotion. Instead, these emotion words elicited responses that were found to describe two dimensions (Kinder et al., 1979; Russell, 1980; Abelson et al., 1982; Watson et al., 1988). The result was an *ad hoc* finding, an empirical result that lacked a theoretical foundation.

Perhaps not surprisingly, that empirical result proved to be short-lived. Watson and Clark soon came to understand that their list of 20 emotion words was seriously incomplete. They went on to develop a better list with their revised PANAS-X schedule (Watson and Clark, 1994). The enriched PANAS-X list of emotions words reveals that anger and fear are distinct dimensions, a result that should have come as no surprise (Arnold, 1950; Ax, 1953).

In any case, research on "positive" and "negative" emotions continues even as the notion of "negative emotion" as a coherent scientific phenomenon no longer has much validity, for fear and anger have different antecedents, have different downstream consequences, and are largely concurrent and separate in their affective appraisals (Marcus, 2021). Hence, I set aside the cognitive appraisal and two-dimensional models for further consideration here.[12]

At the outset, for each theory approach, I list some core readings for those that seeking a fuller account. I then turn to the principal assertions of each, followed by an assessment of its status as a fulsome theory of emotion using the criteria listed in Table 2. At the end of the presentation of the four candidate theories, Table 3 offers summary evaluations of the four candidates.

Following this review, I will use the challenge of understanding threat to demonstrate the importance of having a credible theory of emotion, of "getting it right" both as a matter of science, but also as a matter of political significance.

3.1. Valence as a theory of emotion

Selected Core Readings (Bradley and Lang, 1994, 2000b; Russell, 2003; Barrett, 2006; Hibbing et al., 2014).

3.1.1. A too-succinct summary of its claims: Emotion definition

An ancient presumption has long been accepted as self-evident: humans respond to reward and punishment (Skinner, 1969; O'Dougherty et al., 2001; Rilling and Sanfey, 2011). This focus on reward (approach) and punishment (avoid) has long been a central feature of models of learning (Mowrer, 1973). Thus, the presumed ability to swiftly identify all individuals, groups, or anything else as either positive or negative would seem to address this fundamental concern (Cosmides and Tooby, 2000; Brandt et al., 2015). 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... "

Here, emotion is tasked with identifying the reward-punishment status of any object or activity under consideration. Valence remains a presumed scientific concept, for example, in investigations of campaign sentiment (Geer, 2006), and, it is central to utility theory and prospect theory, as well, each of which attends to gain or

default mode and when we abandon extant certainties for, instead, thoughtful consideration (Marcus and MacKuen, 1993; Haidt, 2001).

10 I also set aside a "constructivist" approach to emotions such as that offered by Barrett (2017) as beyond the available space to include here. For another wide-ranging comparison of theories of emotion (see Moors, 2022).

11 Perhaps best understood as a deft, if limited, response to Zajonc (1980, 1984) and Lazarus (1984).

12 For a rich discussion of the bipolar view of affect (see Green et al., 1993; Cacioppo et al., 1997; Russell and Carroll, 1999a,b; Watson and Tellegen, 1999).

loss, punishment or reward (Skinner, 1969; Kahneman and Tversky, 1979).

This valence conception leaves unresolved whether emotion serves:

(A) as a storage system of prior experience tagged with an assigned value, positive or negative; or,
(B) emotion serves as a very fast system of contemporary affective appraisal; or,
(C) both.

3.1.2. Taxonomy

The valence conception of emotion leaves neither theoretical nor empirical space for any other emotions. When valence research explores the influence of "core affect" it, perhaps unintentionally, acknowledges that there are other emotions, the non-core variants. The use of the phrase "core affect" seemingly offers a semantic justification for such research as needing *only* to consider "core affect" (Russell, 2003; Bakker et al., 2021). Besides, that presumption carries considerable weight as there is little empirical evidence that at any given time people experience one and only one affect response. On the contrary, the evidence is that multiple emotional responses are ever-present (Abelson et al., 1982; Watson and Tellegen, 1985; Watson et al., 1988; Watson and Clark, 1994; Marcus et al., 2017; Neuman et al., 2018).

3.1.3. Causal claims

The fundamental claim is that this "affective tally" serves to guide choices, such as, for example, which candidates to support and which to oppose. What is typically absent is any consideration of non-"core" emotions and what roles they might play in impacting choices.

3.1.4. Measurement model

A common measurement of valence, the feeling thermometer, gathers data that preclude its falsification (Zavala-Rojas, 2014; Marcus, 2022). It remains presumed valid when it is used to measure "affective polarization" (Jost et al., 2022). People choose between how much they like or how much they dislike the target of inquiry. The measurement prevents people from giving non-confirming responses.[13] The data cannot test the internal validity of the construct. Other approaches to measuring valence have been used. For example, experiments use exposure to a stimulus thought suitable to trigger an affective response so briefly that it cannot be consciously perceived (Lodge and Taber, 2005). As previously noted, the validity of this approach rests on confirming that the stimulus induces the intended emotion and does not impact other emotions. Such demonstrations are exceedingly rare (Marcus, 2022).

13 The American National Election Studies have been using feeling thermometers for many years. This is the instruction given to study participants (Overseers, 2021): "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 and 100° mean that you feel favorable and warm toward the person. Ratings between 0and 50° 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° mark if you don't feel particularly warm or cold toward the person".

3.1.5. Popper criteria

Beginning in the 80s and continuing since, research uniformly demonstrates that when people are able to report their feelings with an available list of emotion words, their responses cannot be reduced to one dimension (Abelson et al., 1982; Marcus, 1988; Brader et al., 2019). These studies have generated some limited *post-hoc* theorizing. One response, by those wedded to the idea of valence, is to preserve the status of valence by labeling one of the two evident dimensions as "valence" or "core affect" (Rahn and Rudolph, 2000; Russell, 2003). However, once the measurement of fear and anger began to be concurrently examined, the scientific validity of "negative" emotion, either as a dependent or as an independent variable, collapses. This is because fear and anger, the principal components of "negative" emotion, each have different antecedents and different downstream consequences on thought and action.

In sum, the concept of "negativity" remains in use because researchers and reviewers ignore the extensive research showing negativity is a concept that conflates two contrary emotions. Furthermore, they employ methods of data collection that preclude securing data that could challenge its validity (Marcus, 2022). Put succinctly, fear and anger are distinct properties. They do not share an underlying "negative" property (Watson and Clark, 1994; Lerner and Keltner, 2001; MacKuen et al., 2010; Lambert et al., 2019).

Valence remains widely used by many without any acknowledgment of the challenges valence scholars have long failed to address. Those using valence simply disregard contrary evidence (Hibbing et al., 2014; Brandt et al., 2015; Fournier et al., 2020; Bellovary et al., 2021; Johnston and Madson, 2022; Schumacher et al., 2022).

3.1.6. Neuroscience criteria

As to the first of the two neuroscience considerations, that emotion is deeply engaged in the preconscious processing of sensory and somatosensory signals, there is Lodge and Taber's "hot cognition" account (Lodge and Taber, 2005). As to the second, there has been no recognition of the fundamental character of preconscious processing as massively multi-channel concurrent appraisals, especially as to emotion (Rumelhart and McClelland, 1986; McClelland and Rumelhart, 1988).

Needless to say, valence does not account for the entirety of affect but, more importantly, the negative segment of valence is a confound of two discrete "negative" affects, fear and anger. This is especially problematic when these two components are not stable as to their respective contributions to the confound across different circumstances. In conclusion, valence remains in force because it is sheltered. Its continued use is a testament to its enshrined status for those who remain loyal adopters.

3.2. Appraisal theories

Selected Core Readings (Scherer, 1987, 2005; Ekman, 1992; Smith and Kirby, 2001; Moors et al., 2021; van Kleef and Côté, 2022).

3.2.1. A too-succinct summary of its claims: Emotion definition

As Moors (2017, p. 1) puts it: "The basic premise of appraisal theories is that emotions are caused and differentiated by an appraisal process in which values are determined for a number of appraisal factors such as goal relevance, goal in/congruence, un/expectedness, control, and agency." Contained therein are two core claims:

(1) The manifestation of a given emotion is the consequence of a unified appraisal process.
(2) The primary task of appraisal is to identify which discrete emotion is then made manifest (Brosch and Sander, 2013; Scherer and Moors, 2019).

Hence, there is a clear idea of what emotions are: emotions are subjective feelings expressed in consciousness.

3.2.2. Taxonomy

Little progress has been made in developing a comprehensive taxonomy of emotions. Ekman, early on, proposed six "basic" emotions based on his analysis of facial expressions (Ekman and Oster, 1979). In that same period, Izard proposed 10 emotions (Izard, 1977). Shaver et al. (1987), using a lexical analysis of emotion words, claimed 25 distinct categories of emotion. More recently, Keltner et al. (2022) have proposed 20 emotions. There are yet other continuing efforts to secure a comprehensive taxonomy (Scherer, 1987; Cowen et al., 2019; Keltner, 2019; Scherer and Moors, 2019; Wiedman and Tracy, 2020).

If, as appraisal theorists generally hold, only one discrete emotion is generally manifest at any given moment, then the number of discrete emotions and their specific characteristics is of lesser importance. If only one emotion is manifest, then research can focus on that one manifest emotion. But of course, this determination rests on the same presumption that drives valence approaches, that at any given moment, one emotion is salient and therefore the only one that is consequential.

Many appraisal scholars acknowledge the difficulty of generating a taxonomy of emotions (Ortony, 2021). Even here, the focus is not on all variants of emotion. Little attention is given to whatever falls into the non-basic emotions class, let alone identifying what functions non-basic emotions might serve or what influences they might have.

While many studies compare a presumed set of basic, or discrete, emotions to other supposedly basic emotions, the choice of the emotions to compare is largely *ad hoc* (Trafimow et al., 2005; Young et al., 2011; Valenzuela and Bachmann, 2015; Harmon-Jones et al., 2016; Fridkin et al., 2020). There is infrequent reliance on a defined taxonomy to guide the selection. This often leads to selecting some emotion words, each presumed to identify a different emotion, even when some of those chosen emotion words have long been shown to be effective markers for the same emotion (Just et al., 2007; Bil-Jaruzelska and Monzer, 2022).

Studies that analyze one emotion are vulnerable to misspecification because such studies rely on the aforementioned presumption: that a given affect's influence can be accurately assessed without determining and controlling for the possible influences of other concurrent, and active, affective appraisals. That presumption has been shown to be unsound (Paulus et al., 2010; Marcus et al., 2017; Neuman et al., 2018; Marcus, 2021). More significantly, research focused on one specific discrete emotion often does not entertain the need to collect data that could test that presumption, thereby violating one of Popper's tenets.

Focusing on a specific emotion, often not attending to the emotion word emotion dilemma, invites a balkanized research literature that is largely inward-looking. This is not merely a hypothetical warning. For example, it continues to be a core presumption that threat elicits fear. Indeed, Choi et al. (2022, p. 1) speak of this clearly in a recent article: "…people are constantly exposed to threatening language, which attracts attention and activates the human brain's fear circuitry." However, a considerable body of literature has demonstrated that fear is but one of the two crucial appraisals that threats elicit, anger being the other (Wagner, 2014). Furthermore, much of what has been attributed to heightened fear is actually driven by heightened anger (Vasilopoulou and Wagner, 2017; Amengay and Stockemer, 2019; Lambert et al., 2019; Marcus et al., 2019; Vasilopoulos et al., 2019; Wagner and Morisi, 2020). I will discuss this more fully in the penultimate section, below.

3.2.3. Causal claims

Psychology-based appraisal theories have largely focused on direct effects and treat affective appraisals as if they can each be understood without the consideration of other active affective appraisals.[14] Appraisal research in psychology has largely been inattentive to research published elsewhere showing robust interactions between fear and diminished reliance on otherwise influential dispositions (Marcus and MacKuen, 1993; Marcus et al., 2000; Brader, 2005, 2006; Valentino et al., 2008) and that anger also has a robust interaction in enhancing political action (Valentino et al., 2011). In addition, research on anger shows a robust effect of anger-enhancing reliance on extant dispositions and blocking attention to contrary information and sources (Webster and Abramowitz, 2017; Suhay and Erisen, 2018; Vasilopoulos et al., 2019; Lüders et al., 2020). Much of this research is published in political science.

In psychology appraisal theories, the treatment of discrete emotions is focused on how each discrete emotion differs from other supposed discrete emotions. As a result, appraisal theories tend to treat each discrete emotion more as a constant rather than as a variable and by attending solely to the high range of any emotion, basic or not, any consideration of what lower ranges of any given discrete emotion generates in thought and action has been largely absent (Rempel et al., 2019).

3.2.4. Measurement model

Appraisal theory-directed research into emotions uses a diverse array of available analytic and operationalization practices to measure emotion. Many studies pay attention to the reliability and validity of their measures. However, especially with respect to validation, many

14 I set aside the investigation of ambivalence. Ambivalence is a very constrained understanding of co-occurring emotions, as the conception limits the number of concurrent emotions to two (bi), one pro and one con (valence) (Craig and Martinez, 2005; Lavine et al., 2012; Groenendyk, 2016). While it does acknowledge multiple concurrent appraisals, it is too constrained to offer a comprehensive account of how multiple affective appraisals can influence thought and action.

of these efforts are undermined by inattention to the second of the two neuroscientific insights. I will take that issue up, later.

3.2.5. Popper criteria

As to the Popper criteria, though some of the relevant research outside of the discipline of psychology gains some attention from some psychologists, it would be a stretch to say that psychologists are eager to explore what lies beyond their discipline's borders. As I noted earlier, the swift effort to disarm Zajonc's claim that cognition was not necessary to account for the influence of emotion on judgment is telling (Lazarus, 1982, 1984; Tsal, 1985).

3.2.6. Neuroscience criteria

In appraisal approaches, the issue of timing has been often ignored.[15] Subjective feelings are not instantaneously available in conscious awareness. They become available well after sensory information arrives in the brain. Moreover, given the limited capacity of conscious awareness, the more fleeting, swiftly shifting, and less elevated appraisals are gated from being displayed therein. That leads to an often-unstated presumption that whatever seems to be the dominant affective state is the only influential affective state (Dias and Lelkes, 2022).

Investigations into subjective feelings can constitute a very restricted range of any given emotion. Until research demonstrates that emotion has no influence on human action and thought unless and until it is manifest as subjective feelings in conscious awareness, the failure to model the preconscious affective processes across their full ranges leaves us with misspecified models.

Attention to parallel processing has largely been largely ignored. As noted earlier, parallel processing is the fundamental feature of preconscious processes, while serial processing is the fundamental characteristic of conscious awareness.

The focus on a presumed singular dominant discrete emotion also impacts the use of manipulation checks to secure the validation of treatment effects. Validating that an experimental treatment impacts a specific appraisal is insufficient if does not also assess whether other concurrent appraisals are impacted (Marcus, 2022).

Another common presumption is that there is such a thing as a no-emotion condition (Wood and Rünger, 2016; Gasper, 2018; Gasper et al., 2019, 2021). While feeling states in consciousness can be quite low, and such are often described as non-emotional, that does not mean that the preconscious affective appraisals are inactive and inconsequential. Consider the influence across all levels of fear. At every level, fear has a consequence on thought and behavior. The lowest part of that appraisal's range, i.e., low levels of fear, signal an absence of novelty, or the unexpected. Low levels of fear enable efficient and deft focused reliance on the vast inventory of habits of thought and action (Marcus, 2002b). Research focusing only on the "high" end, emotions, those expressed in subjective awareness, i.e., in the mind, is not exhaustive of the range of influences that preconscious affective appraisals execute.

In sum, while neuroscientific research on neural processes has received some attention, attention to the centrality and importance of these multiple concurrent affective processes as prior to subjective feelings manifest in conscious awareness remains largely absent in appraisal theories (Brosch and Sander, 2013; Todd et al., 2020).

3.3. Affective intelligence theory

Selected Core Readings (Marcus and MacKuen, 1993; Marcus, 2002a; Brader, 2006; MacKuen et al., 2010; Marcus et al., 2019).

3.3.1. A too-succinct summary of its claims: Emotion definition

The research that later became the theory of affective intelligence, hereafter AIT, commenced in the 1980s in political science (Marcus, 1988). From the outset, it has been an appraisal theory. However, unlike the purpose of appraisal theory in psychology, the purpose of appraisal in AIT is to theorize what each preconscious affective appraisal identifies in the sensory streams and the downstream consequences that follow from each appraisal. AIT took its foundations from the work done by neuroscientist Jeffrey A. Gray (1985b, 1987). Gray viewed appraisal's task as assigning a value to sensory and interoceptive data arriving in the brain. However, rather than generating one value that results from one integrated appraisal, AIT argues that multiple concurrent focused appraisals are each tasked with ascertaining the status of a specific strategic feature.

The theory of affective intelligence from the outset adopted the two neuroscience premises (Marcus, 1988; Marcus et al., 2000). It adopted Gray's view that novelty identification was a central function of one of the preconscious systems. One output of this system, when it identifies novel conditions, is to diminish the otherwise normal reliance on the vast inventory of habits of thought and action (Marcus, 1988). It accepted Gray's insight that humans have two available judgment orientations. One, commonly labeled motivated reasoning, serves to enhance the default reliance on habits (Gigerenzer, 2008) and, the other, motivated deliberation, serves to enable reflexive deliberation so as to enable conscious self-awareness to function as an "error correcting space" (Gray, 2004). That insight has since become formalized in psychology as the dual-process model of judgment (Chaiken and Trope, 1999; Kahneman, 2011).

In brief, emotion is a central element in an array of preconscious neural processes, each of which assesses a strategically vital aspect of human action and interaction well before subjective feelings are expressed in conscious awareness (Öhman et al., 2000). Of particular importance is how these affective appraisals influence the shift from conditions of individual agency to collective agency and back (Valentino et al., 2009, 2011; Groenendyk and Banks, 2014).

3.3.2. Taxonomy

The taxonomic structure of the theory of affective intelligence is not an array of emotion words that each define a specific state, such as joy, anger, or sadness. Rather each element in the emotion taxonomy of AIT is a range of the possible values of a specific

15 The very long history of conceptualizing passion and reason in spatial terms has been the source of lay and scientific descriptions even as a passion became emotion and emotion became affect. Spatial metaphors have continued to be the common parlance of science on emotions such as, inside outside, or lower-order versus higher-order processing (Kosslyn and Miller, 2013).

appraisal: levels of fear identifying levels of apparent uncertainty being one such example.

Most importantly, emotions are not understood as binary categories, one is angry or not, elated or sedated, and so on.[16] Emotions are rather the language of appraisals that are inherently variable. There are many emotion words available to use across the full range of each appraisal. For the appraisal of novelty, emotion words such as *fearful, anxious, uncertain, worried, troubled, at ease, calm, surprised,* and so on, all depict different values along the same underlying appraisal of how much novelty/uncertainty is present.

At the outset, AIT took as foundational the two neural systems identified by Gray (1987), one of these being responsible for monitoring and controlling the execution of habituated reward-seeking actions of thought and action and the other responsible for monitoring the uncertainty/novelty of external circumstances. Later, a third preconscious appraisal tasked with monitoring norm compliance was added (Marcus et al., 1995). This third preconscious system is fundamentally normative, as it identifies breaches in the execution of salient norms (Marcus, 2002b). However, AIT has not been especially interested in subjective feelings states other than to identify, and therein measure, the traces of preconscious appraisals (Marcus et al., 2017).

Jeffrey Gray offered a useful analogy to explain his understanding of emotions (Gray, 1985a). He analogized emotions pre- and post-awareness to color pre- and post-color awareness. In the case of color, three types of cells, called cones, arrayed at the back of the retina, are each sensitive to a different portion of the visual spectrum. One type responds to light in the red range of the color spectrum. Another type responds to the green range of the color spectrum. A third type responds to the blue portion of the color spectrum. Each of the very many cone cells generates a continuous electrical signal that reports to the brain, even as in consciousness we see any given object as having a singular generally temporally stable color. The preconscious appraisal of color is manifold, but any object is typically presented in consciousness as a single hue.

Color in awareness is a consequence of three different color appraisals. Before something arrives within the different ranges of human senses, it does not yet exist for us. Once it does, the human brain examines it *via* the array of human senses: sight, sound, taste, touch, and smell. Given the value of these initial points of contact, the human brain gives special priority to securing answers to ongoing queries that have existential implications. One of these queries answers the question of whether this object (inanimate or animate) seems familiar. If so, past experiences can be very useful in predicting the forthcoming interaction. If not, then past experience will be devalued and set aside for new learning and the explicit development of new modes of interaction. Another of these queries asks the question, does this object (animate or inanimate) pose harm and/or constitute a norm violation? If so, resources should be mounted to protect against harm and mobilize to re-establish the norms that enable collaborative agency in matters large and small, intimate, and society-wide.

The human brain consolidates the multiple streams of information and down samples to accommodate the limited serial capabilities of awareness. In sum, the initial preconscious appraisals above take precedence over more descriptive processes that generate the later available multi-sensory representation of conscious awareness.

3.3.3. Causal claims

An important feature of these developments is a change from understanding emotion as a passive receptacle—as an emotional response—to understanding emotion as being active, ubiquitous, and continuous, investigation of current circumstances, i.e., emotion as emotional appraisals (Wolak and Marcus, 2007). Currently, AIT has a focus on three distinct affective appraisals:

Enthusiasm covers the range marking failure to success. Understanding the implications of each level in that range adds considerably to such questions as the persistence or abandonment of actions taken, or of actions anticipated. Procedural memory is deeply implicated in this process as it stores the various learned routines, in all their variants. These memorialized habits set up the expectation of success and the manner of adaptions that can swiftly be adjusted to meet familiar but variable circumstances.

Fear marks the range from all is familiar, normal, to sudden potentially grave uncertainty. Here also, attention to the lower level of the range which reports on the normality of the circumstances at that moment enables focused attention to the task at hand, and efficient reliance on the habits of thought and action (Bargh and Chartrand, 1999; Gigerenzer, 2008). Here again, the procedural and declarative memory systems are vital as they define the normal against which current circumstances are compared.

Anger focuses on the range from norm compliance to norm violation. Here, attention to the low-range reports on the ongoing actions of those distant, immediate, strangers and intimates, as to their evident norm compliance. As with the two other appraisals, memory is deeply engaged, especially procedural memory, where the majority of norms and prior experiences of harm are made available (Haidt, 2001; Holbrook et al., 2016). Appraisals at the lower level of this range enable collaborative and independent actions to be taken without doubts as to the trustworthiness of each and all. Such appraisals enable humans to anticipate swiftly whether others will be complying with the norms, given the place and circumstances.

Thus, for AIT, each appraisal generates values within the specific range of that appraisal. This differs from other appraisal theories that select an emotion word, presume it to be an actual emotion, and further presume that it can be properly studied in isolation from other emotions (Close and van Haute, 2020; Capelos et al., 2021; Coifman et al., 2021). Validation of the AIT taxonomy rests on research on the neural systems that subserve each of the identified preconscious emotion channels (Gray, 1987; Calder et al., 2001; Rolls, 2014; Caruana, 2017; Celeghin et al., 2017; Lüders et al., 2020).

An additional array of causal claims is prominent in AIT. AIT identifies affective appraisals that enhance reliance on extant habituated patterns of thought and action, specifically anger and enthusiasm appraisals. The novelty appraisal system is able to inhibit reliance on those self-same dispositions when novel/uncertain circumstances are identified. Thus, when fear elevates the fear

16 Which words are chosen is influenced by other factors beyond the continuously incoming preconscious affective appraisals, notably the social context in which the selected word will be deployed (Barrett, 2017). Moreover, the language of feelings is richly engaged with the current and prior systems of gender practice among other hierarchies of various sorts, especially with regard to interactions of dominance and submission and with disputes over what constitutes proper social practices (Marcus, 2002b).

system initiates explicit consideration of the novel contemporary circumstances freed from the otherwise constraining grip of extant convictions (Marcus and MacKuen, 1993; Tiedens and Linton, 2001; Marcus et al., 2019). The evidence is that these systems are largely parallel, concurrent, and remain largely independent of each other in their downstream influences (Miller et al., 2009; Marcus, 2021). This theoretical extension of the roles of emotion to interactions with extant dispositions remains largely opaque to many (March et al., 2018; Xu and McGregor, 2018).

As to politics, AIT has made important contributions to understanding why people defect, when and why people learn, when and why people rely on extant convictions such as party and ideological identifications, and when they abandon them, thereby opening up the possibility of persuasion (Brader and Marcus, 2013; Vasilopoulos, 2019; Erisen, 2020; Wagner and Morisi, 2020). Rather than seeing contemporaneous information flows as uniformly moving people this way or that, research has mapped how anger and enthusiasm strengthen existing reliance on political habits of thought and action, as well as binding people more strongly to their extant political identities, while fear inhibits that otherwise default reliance, thereby enabling both deliberation and reliance by individuals on self-aware considerations rather than on collective agency.

Notwithstanding that record, the causal claims of AIT are insufficient to fully account for emotions' numerous roles in human decision-making and agency. As described earlier, AIT incorporated what has become known as the dual-process model of judgment with affective processes accounting for when people really on fast preconscious control of thought and action and when people shift to later conscious awareness for reliance on reflexive deliberation. While AIT has given considerable attention to the reflexive part of that dynamic, it does not say much if anything about the role of subjective feelings either in the state of intuitive motivated reasoning or when people have shifted into the "error-correcting space" (Gray, 2004). It is not hard to see that void as a mark of theoretical incompleteness especially given the prominence of subjective feeling states in human experience (Tracy et al., 2007).

3.3.4. Measurement model

AIT has a substantial measurement literature (Marcus and MacKuen, 1995; Marcus et al., 2006, 2017; Marcus, 2022). The measurement work has focused on measuring emotions in surveys as most political science research is done with large surveys and survey experiments, hence requiring simultaneous data collection of the three affective appraisals. That presumes, even if properly done, that the preconscious appraisals will leave traces such that vetted instruments can derive robust reliable measures thereof. Not all will find the validation studies persuasive. The operationalized batteries developed by ANES (Brader et al., 2019) and its AIT precursor (Marcus et al., 2017) have been replicated and validated. However, more could and should be done to offer a sounder foundation for the measurement of preconscious affective appraisals.

3.3.5. Popper criteria

As to the Popper criteria, AIT emerged from the discipline of political science, a discipline that has a long history of looking outside its boundaries for theoretical possibilities. The rational theory came over from economics, and theories of group formation, perceptual bias, and persuasion came over from psychology. Such disciplinary openness made it relatively easy to add yet another import, this one from neuroscience. Beyond that, AIT has shown some, if modest, interest in expanding its reach rather than defending its current formulation.

3.3.6. Neuroscience criteria

The two neuroscientific criteria were and are its primary foundations. However, there is little interest in exploring any independent roles for emotions as expressed as subjective feelings states within consciousness. Whether self-aware subjective feelings augment preconscious appraisals or act in some more independent fashion remains to be explored and incorporated into AIT (Tracy et al., 2007).

AIT began with a two-dimensional model adapted from Jeffrey Gray's seminal work (Gray, 1987; Marcus, 1988; Marcus and MacKuen, 1993). It later expanded by incorporating anger as a third preconscious appraisal (Marcus et al., 1995; MacKuen et al., 2010). Others have argued the case for disgust as being a robust appraisal distinct from anger (Rozin and Fallon, 1987; Kam and Estes, 2016; Clifford and Jerit, 2018; Aarøe et al., 2020). Extant research suggests that empathy would be an obvious candidate (Decety and Cacioppo, 2012; Decety, 2015; Decety et al., 2015; Decety and Cowell, 2016). Yet other preconscious appraisals are likely to be promoted by emotion scholars. More can, and should, be done to identify still other preconscious affective channels.

3.4. Emotion regulation

Selected Core Readings (Gross, 1998, 2015; Elkin et al., 2015; Tamir, 2016; Ruiz and Robazza, 2020).

3.4.1. A too-succinct summary of its claims: Emotion definition

Gross (2015, p. 3), a leading proponent of emotion regulation advances this definition of emotion: "Emotions involve loosely coupled changes in the domains of subjective experience, behavior, and peripheral physiology." This definition does not clearly differentiate emotion from other neural processes. It generally treats emotion as subjective feeling states.

Emotion regulation holds that people seek to manage their feelings so as to guide their actions. Emotion regulation is the thought that (Tamir, 2016, pp. 199–200):

> " … people try to change an existing emotion into a desired emotion. … emotion regulation involve desired emotional states (e.g., less anxiety), in particular. These desired emotional states serve superordinate end-states that may or may not be emotional themselves (e.g., to perform well). For the sake of simplicity, goals in emotion regulation are defined here as desired emotional states (e.g., less anxiety). Motives in emotion regulation are defined here as broad classes of desired outcomes (e.g., to perform well), that are not necessarily emotional themselves, whose attainment can be promoted by emotion goals (e.g., less anxiety)."

3.4.2. Taxonomy

There is no specific taxonomy guiding emotion regulation research. There is some *ad hoc* mention of presumed distinct emotions, as well as the mention of positive and negative dimensions of emotion as viable descriptors (Gross, 2015). There is little other than a broad generic claim, undifferentiated across all emotions, that subjective feelings serve as a standard for self-medication.[17] Essentially, emotion regulation holds that subjective feeling states serve as end-state goals to serve as means to achieve environment fitness and that people actively choose to manipulate them to achieve a desired affective state. There has been some effort to identify the neural processes that are engaged with affective experience (Elkin et al., 2015). As the focus is on subjective feeling states as expressed in conscious awareness, there has been little attention to the actual timing of these processes, and no attention to parallel processing by which the multiple concurrent appraisals are simultaneously engaged in directing downstream actions of thought and action.

3.4.3. Causal claims

Emotion regulation is notably vague as to the actual causal claims emotion regulation advances. As Gross recently put the matter (Gross, 2022, p. 10):

> "It is now thought that there are many different valuation systems, although just how many is not yet clear (Rangel et al., 2008). My own view is congruent with Elliot's (2006) proposition that "humanity's lengthy evolutionary history appears to have resulted in multiple levels of valence-based evaluative mechanisms, ranging from rudimentary spinal cord reflexes (Sherington, 1906) to subcortical affective computations [sic] (LeDoux, 1995; Shizgal, 1999) to our vaunted cortical processes (Davidson, 1993; Lang, 1995)" (p. 113). These valuation systems differ in many important ways. For example, different valuation systems "care" about different types of inputs. They also differ in the time scale over which they operate, in their plasticity (how much they change due to experience), and in the actions, they prompt when they encounter a significant input (an input that is relevant to that particular valuation system) (Ochsner and Gross, 2014)."

That leaves a conspicuous void as to identifying the tactical options available to execute emotion regulation, affect by affect, or identifying the target level that serves as the desired standard, affect by affect. This leaves us without clarity as to whether the regulation is a process that takes place in conscious awareness or whether emotion regulation takes place during ongoing preconscious affective appraisals (Zhang et al., 2022).

In sum, the various accounts are quite vague as to where and when the regulatory process takes place, by what means it takes place, precisely what the desired end states are, from what "tool kit" regulatory efforts are drawn, and what controls which options are selected. Where and how does the regulation process override, or augment, the continuing incoming flow of affective appraisals as ever newer information is received? Moreover, if different affective appraisals serve different tactical and strategic functions, each of these operating concurrently, then we must ask if there are multiple ongoing emotion regulatory processes each specific to a given affective appraisal, or if there is one unified regulatory process attending to just one or to all of those ongoing affective appraisals.

3.4.4. Measurement model

As to the measurement model, those in the emotion regulation camp have used a variety of approaches (Elkin et al., 2015; Gross, 2015). The process of cycling each appraisal and the timing of subsequent consequences requires methodologies that can accurately monitor the timing of each concurrent appraisal. Furthermore, downstream processes that are influenced by the distinct channels of affective appraisal both as to activation and as to inhibition for each concurrent parallel process must have validated measurements. Such efforts, it is fair to say, are at a rather early stage of development and have not as yet developed to the point of being able to provide accurate estimates across all these requirements. For some useful contributions, see (Fox et al., 2000; Paulus et al., 2010; Herbert et al., 2011; Maratos, 2011; Frühholz and Grandjean, 2013).

What awaits is greater clarity on the following questions:

When does emotional regulation occur? And is that process uniform across all emotional appraisals?

How does emotional regulation actually integrate with the ongoing updating of preconscious affective appraisals? Are those separate streams of influence blended, in some constant or variable fashion?

What are the desired end states and are these constant or variable? And, are they the same circumstance to circumstance, and appraisal to appraisal?

Is there a taxonomy of regulation interventions, general, or specific to each emotional appraisal?

3.4.5. Popper criteria

The idea of equipoise as a matter of health, proper decorum, and civility as an essential feature of a functioning social order has long been part of the western canon (Nussbaum, 1994; Locke, 1996). Thus, it was easy to refigure such pre-scientific understandings as emotion regulation. Until such time as those engaged in research under this rubric address the missing elements, it would premature to offer a final assessment. However, appealing and promising, at this juncture, as to the Popper criteria, an "incomplete" might be a generous assessment for this approach.

3.4.6. Neuroscience criteria

Preconscious affective appraisals are generally available and influential at roughly 100 ms (±, ∼50 ms) after sensory signals arrive in the brain. Indeed, there is evidence of even earlier availability (Sawada et al., 2022). Yet, conscious feelings are not available until ∼500 ms.

The general benefit of preconscious multiple processing is the speed of analysis. Rather than engaging in a serial process, step 1, followed by step 2, and so, until a final actionable understanding is generated and represented in consciousness, the multiple preconscious processes generate actionable understandings faster, more fully informed, with faster recycling, and with a greater range of sensory and interoceptive processing than is possible with conscious awareness (Marcus, 2013).

17 Though see Tamir (2016).

TABLE 3 Core components of a theory of emotion—assessing contemporary approaches.

		Assessments			
		Valence approach	Appraisal theories	Affective intelligence theory	Emotion regulation approach
Conventional components for a theory of emotion	A formal definition of the phenomenon: Emotion	Yes, very limited	Yes, partial and often *ad hoc*	Yes	Yes, by importing from elsewhere
	A taxonomy of emotions	Yes, but limited	Contending candidates	Yes, but likely incomplete	No
	Causal claims—both as to antecedents and consequences	Thin	Incomplete, especially as to interaction effects	Incomplete, especially as applied to subjective feelings	Thin
	A measurement component	Highly Constrained	Constrained	Yes	Limited
	Two Karl Popper criteria	No	No	Partially	No
Requirement following the neuroscientific revolution	Integrates preconscious affective neural processing	Modestly	Yes, but not universally	Yes	Yes, but not universally
	Integrates multiple affective parallel processing	No	Generally, no	Yes	No

From an evolutionary fitness perspective, it would seem strange that the benefits of preconscious appraisals would be put on hold by as much as 300 ms before acting on each of those appraisals. The evidence is that such a delay is not normal practice (Williams et al., 2007; Paulus et al., 2010; Maratos, 2011; Maratos et al., 2012). Using a crude, biased, and late standard as the guide to enable humans to achieve evolutionary fitness would seem to be a rather strange arrangement given that swift, deft, and flexible appraisals best serve social collaborative success (Axelrod, 1983; Gigerenzer, 2008). The evidence is that people continuously rely on three concurrent appraisals: (1) changing levels of fear to assess the presence of novelty; (2) changing levels of anger to assess the presence of norm violations; and (3) changing levels of enthusiasm to assess the ongoing success of reward-seeking actions (Neuman et al., 2018).

Emotional regulation should not be abandoned as an analytic tool. On the contrary, this approach can be enriched and strengthened by more fully considering the insights brought to us by neuroscience (Gross and Barrett, 2011; Klimecki et al., 2018; Yih et al., 2018; Coifman et al., 2021). Hopefully, those who position their research within this rubric can offer a more complete account that strengthens the viability of this pathway.

Table 3 offers and overview of the status of the four approaches to emotion as a comprehensive theory of emotion.

4. Why we need a theory of emotion, redux: Threat in human species.

Given the increasing understanding of the ubiquitous influences of emotion in human affairs, the need for a comprehensive theory of emotion would seem to be a clear case for its research importance (Todd et al., 2020). Beyond scholars' interest in advancing human knowledge, there are actual consequences in the real world when the dominant understanding is wrong. An oft-used example of this is the story of the medical treatment given to George Washington that led to his death. His physicians were among the most learned of the time. So it was that when Washington returned from a long ride in the rain on horseback with a fever, it was natural that his physicians relied on what was then considered to be the best medical practice: Following Galen's theory of illness, they applied leeches to his body, taking 5L of blood (Chernow, 2010).[18] He did not survive.

Humans, as do all living species, confront threats of many sorts. Human societies are fragile. They can and have collapsed (Tainter, 1988; Diamond, 2005). Protecting the fragility of societies begins with identifying threats. Threats are often grouped into categories, such as illness, that is threats to health, financial crisis, that is threats to financial wellbeing, or acts of terrorism, that is threats to body politics. Notwithstanding such categorization, there is an explanation of ancient provenance for how humans know they face a threat. One emotion has long been cast as central to that process: fear. Psalm 23 (2021) presents fear as that mechanism: "Yea, though I walk through the valley of the shadow of death, I will fear no evil: for thou art with me; thy rod and thy staff they comfort me."

We may be oblivious to the threats we face. We may misconstrue the moment, being fearful when no threat is upon us. But fear is the means, however fallible, by which we know we face a threat. Hobbes (1968) tells much the same as that of Psalm 23, though replacing god as the protector with his leviathan. In sum, people identify they face a threat through heightened fear and seek security by bonding to a potent protector.[19]

Journalists and political leaders understand this embedded narrative very well and so they seek to address what they assume is fearfulness in the public in response to certain groups of people and events and their presumed demands for security when in threatening times (Roosevelt, 1933; Ball, 2016). In a speech Governor of New York, Andrew Cuomo, after a terror attack in 2017, appeared to be

18 Usually credited to an ancient medical practitioner, Galen, the core idea is that health depended on the proper balance among four bodily fluids, humors, one of them being blood. Fevers were believed to be caused by an excess of blood. Acceptance and therapeutic reliance on the germ theory of illness were not yet widely practiced in America at that time. In the case of Washington having physicians who could not correctly diagnose, his medical state had grave consequences. His treatment, the bleeding, was reliant on an erroneous theory of illness. Having a sound theory does not guarantee a good result. But having a bad theory, while not always fatal, would seem far less likely to produce good outcomes (Marcus, 2013).

19 For the scientific restatement of this account, see Jost et al.'s (2003).

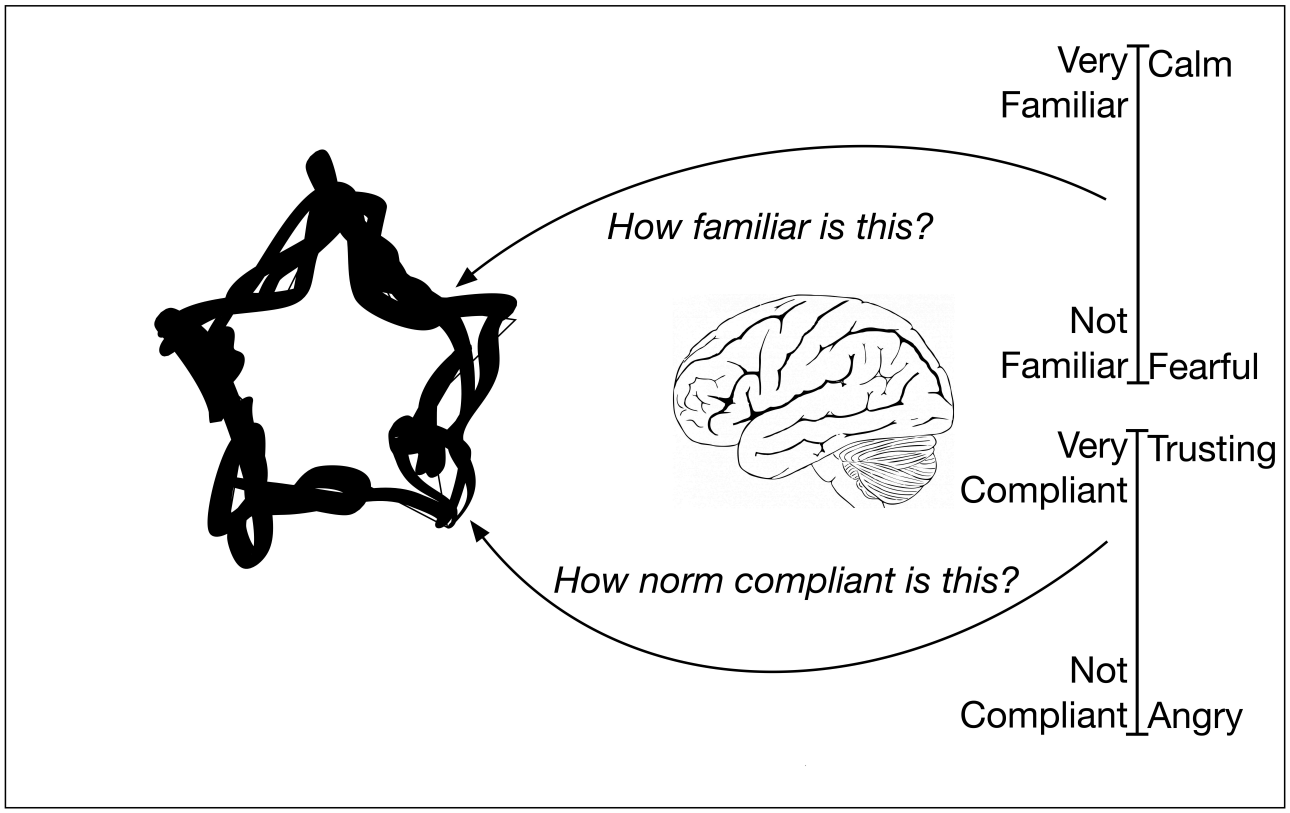

FIGURE 1
Two foundational features identified in all potential threats.

channeling FDR (Cuomo, 2017): "The effort yesterday killed eight people, but in my opinion the effort failed, because the effort was not to kill eight people. The effort was to destruct us, to terrorize us, to scare us, to create mayhem. That's the effort. That's the goal on all of these attacks." As it has conventionally been assumed that fear is the response to a perceived threat, it would follow that strong leader should aspire to assuage fear and calm the public in the face of threatening events.

It might, however, be instructive to consider that naming fear as the primary source of our discomfort in response to threats—in both public/political and private realms—is ill-conceived. Why? As noted in the Introduction section, neuroscience research identifies the preconscious realm as one in which a multitude of analyses are concurrently, and very rapidly, executed. If so, when political leaders address the public in dire times, if they take it that their primary task is to quiet the public's fears, that may prove to be especially ill-advised if they do not also address anger when grievances are predominant.[20]

A considerable array of research has suggested that threats of any and all sorts are an admixture of two very different facets, each so different that each has its own neural foundation. Figure 1 shows how the brain assesses a newly apparent phenomenon by seeking answers to two existential questions. Figure 1 augments the ancient story, by adding anger to the identification task. Fear is tasked with one appraisal and anger with another. Each asks: is there a threat imminent? But each is asking a different question. Apparently, it suits environmental fitness to differentiate between these two features. Each enables a different course of action (Marcus, 2021). So vital is each that they continuously reassess each independent of the other and each executes its appraisal well before conscious awareness. Because these appraisals are executed before the availability of conscious awareness, I have obscured the representation of the object displayed in Figure 1 (Gazzaniga and Smylie, 1983; Weiskrantz, 1986; Gelder et al., 2001; Bertini et al., 2019; Gerbella et al., 2019; Hoffman, 2019; Streimber et al., 2019).

When we scan our environment to answer the question of whether or not a threat is imminent and find nothing out of the ordinary, we can safely rely on our many learned routines, comforted that they will produce the familiar results prior experience has taught us. We can thus confidently interact with others—friends and strangers alike—safely anticipating that one's trust will be met by actions of others that conform to a shared understanding of what is a secure space for such interactions. If, in contrast, we notice something unusual, reliance on our habits of thought and action is not likely to serve us well. Instead, the better course is attentive consideration of what is going on and how best to manage the uncertainty the change in our environment has caused.

20 Early on in the Trump presidency it was common to describe Trump as engaging in fear-mongering (Ball, 2016; Collinson, 2018; Gelfand and Denison, 2019). Even he claimed to have gained power through the use of fear (Woodward, 2018). As his mode of operation became more familiar, it became clear that he actually was mobilizing anger to augment and mobilize support (Valentino et al., 2018; Woodward and Costa, 2021).

If we find ourselves operating in a context in which there are no violations of established norms apparent then we can safely engage with others, the absence of anger gives us comfort that we can trust them. However, if we sense that some are intentionally causing or otherwise violating critical norms that enable safe cooperative behaviors then rising anger will warn of the need to punish and in other ways restore/strengthen norms. This impulse is not driven by heightened fear, but by heightened anger.

This new account does a number of things. First, it recasts anger as defending the integrity of the traditions, norms, and practices. Thus, interpretations holding that populism is driven by fears, economic or cultural, as many have claimed, have begun to give way to an understanding that supports populism is more commonly driven by grievances over challenges to traditions of hierarchy and identity (Valentino et al., 2018; Marcus et al., 2019; Vasilopoulos et al., 2019). Second, it recasts fear, not as the driver of support for strong leaders, but the emotion that enables the fearful to turn away from conventional practices; initiating a search for new understandings and new options; and, all considered through deliberate consideration of who would be best to lead and deal with the novel circumstances (Marcus, 2021).

Understanding how emotion governs our response to threats is critical to the wellbeing of both democratic and autocratic regimes. A partial, incomplete understanding can lead to weakened or even failed regimes. This new understanding, if supported by yet more research, has important ramifications for what political leaders need to consider in addressing threats, what journalists need to attend to in reporting conditions of threat, how to cover the public's responses, and how publics need to understand their own emotional engagements when threats are apparent (Sullivan and Masters, 1988; Masters and Sullivan, 1993). Threats that generate predominantly heightened fear signal a threat that is predominantly unexpected and of unknown provenance. People, when fearful, seek new information, new coalitions, and new solutions to these novel circumstances (Marcus and MacKuen, 1993). Moreover, they are more open to deliberating, unfettered by the normal reliance on past loyalties to traditions of thought and action. In such instances, it would behoove political leaders to correctly attend to the threats that highlight novelty, the sorts of expertise that should be recruited to respond to them, and finally, when to invite the public to deliberate along with them as to which options—old and new—seem most promising.

To the extent that the threat is predominantly one of harm and norm violations, political leaders will need to address the grievances of those harmed and those loyal to the norms being attacked. To their followers, they should present as strong steadfast defenders of the realm. In democratic societies, unlike autocratic regimes, many norms are themselves, sources of dispute. At this moment in time, for example, new norms of gender equality compete with traditional norms of male superiority.

Political leaders walk a fine line when their constituencies are profoundly polarized. They must address heightened anger by addressing the grievances of those who experience harm or perceive that norms they cherish are under attack. At the same time, leaders also must respond to those loyal to other norms. Clearly, this requires deft leadership.

The role of journalists in democratic societies is just as important. They, too, must be able to identify correctly the sorts of threat people are facing—threats of novelty and threats of grievance. If political leadership, journalists, and all of us who engage in general public discourse are inattentive to this essential division of affective labor between fear and anger, political responses to threat, such as COVID-19, financial crises, the Russian invasion of Ukraine, are likely to be ineffectual.

5. Conclusion

For millennia, passion was understood to be a singular phenomenon of considerable, and often malign, influence on the human condition. Passion, long thought to have one form, is now better understood as becoming composed of two temporal states (see Table 1). One is early, continuously updating a set of preconscious concurrent appraisals. The second is a later state, a reduced array of subjective feelings made available in conscious awareness.

Traditional conceptions of reason and passion shared accounts of the functions of each in conscious awareness. That understanding did not countenance the role of preconscious processes. At this time, there is no theory that adequately integrates both preconscious affective processes and subjective feeling states. Because of that, too little has been done on some important issues. That the subjective experience of emotion is heavily impacted by the particulars of the culture is well demonstrated (Barrett, 2017; Boiger et al., 2018; De Leersnyder et al., 2018; Mesquita, 2022). Does cultural specificity apply to preconscious affective appraisals? If so to all or but some, and if so to what end? That remains largely unexplored.[21]

The older understanding of emotion has remained influential thus delaying imagining the possibility that affective processes are manifold and that each serves a distinct essential purpose. That possibility has gained considerable purchase from neuroscience research on emotions. It has led to an improved understanding of the many essential roles of emotions in human affairs.

All forms of social organization, not just nations, depend on norms to guide, indeed enable, the collaborative agency that is a central feature of the human species' adaptive inventory (Haidt, 2001). Psychologist Gelfand's research on nations as to how loosely or tightly they demand adherence to their national societal norms is relevant here (Gelfand et al., 2011, 2017). That same variation can be observed across the social science disciplines. One can easily array political science, psychology, and economics from less tight to more tight. Some political scientists began to attend to neuroscience research bearing on emotion in the mid-80s (Marcus, 1988) and some psychologists did so even earlier (Zajonc, 1980), but, few economists did so much before the turn of the last century (Akerlof and Shiller, 2009) and with only modest influence on the discipline's persistent adherence to utility theory and rational choice.

In this review, I identify some progress. At the conceptual level, three changes have occurred in the past half-century. First, emotion had long been conceived as a passive receptacle, as an emotional response. Increasingly it is understood as being active in swiftly identifying strategically vital changes that enable swift adjustments to thought and action. Second, emotion has begun to lose its malign characterization. Third, preconscious emotion has become a new, rich domain of research on emotion. Considerably more needs to be done before anything like a fully comprehensive theory of emotion is available. Table 3 makes clear that there is not

21 Though see Gündem et al. (2022).

yet a comprehensive theory of emotion. That failure has been duly noted in psychology (Reisenzein, 2021). Hopefully, this comparison offers trajectories worth pursuing and gaps in our understanding worth addressing.

Researchers, editors, and reviewers face an immediate challenge. The failure to account for multiple concurrent affective appraisals has been shown to produce biased results (Miller et al., 2009; Vasilopoulou and Wagner, 2017; Vasilopoulos et al., 2018; Lambert et al., 2019; Marcus et al., 2019). Moreover, studies that rely on manipulation checks that fail to show that treatment effects are specific to the affective evaluation of interest are likely similarly vulnerable. There are numerous studies that compare an atheoretical selection of emotion words some of which are synonyms, and others of which are just different degrees of a specific emotional appraisal. Addressing these challenges, and other challenges already identified beyond those just discussed, will certainly contribute to a more fully evolved theory of emotion.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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