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### **Authors**

Dahl, Hartvig

Teller, Virginia

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# Emotions Just *Are* Cognitions

Hartvig Dahl ([dahl@hscbklyn.edu](mailto:dahl@hscbklyn.edu))

Department of Psychiatry; SUNY Health Science Center  
450 Clarkson Avenue, Brooklyn, NY 11203 USA

Virginia Teller ([teller@roz.hunter.cuny.edu](mailto:teller@roz.hunter.cuny.edu))

Department of Computer Science; Hunter College CUNY  
695 Park Avenue, New York, NY 10021 USA

## Abstract

Emotions are a special class of Intentional states with structural components and properties similar to those of the traditional somatic appetites of thirst, hunger and sex. These were originally part of a hardwired, phylogenetically adapted, nonverbal information system for implicitly conveying information about these states both among and within individual members of the species. A classification system provides **two major functional classes** of emotions, (1) those serving as Appetitive Wishes toward objects, and (2) those serving as Beliefs about the status of fulfillment of those and other significant wishes. Thus, emotions such as **Anger** and **Fear** indicate a wish to attack or escape from some object or situation, while **Love** and **Surprise** indicate wishes to care about or explore an object or situation. Emotional wishes, like their somatic brethren, require Consummatory Acts for their fulfillment. The result of these acts are emotions such as **Anxiety** and **Depression**, which indicate Beliefs that the relevant wishes will be hard or impossible to satisfy, or **Contentment** and **Elation**, which function as Beliefs that the wishes have been or are being fulfilled. Together, emotional wishes and beliefs form a comprehensive wish-belief information feedback system with manifold causal consequences.

## Emotions are Cognitive Processes

If the *prima facie* goal of cognitive science is to understand how we **know** the world around us and ourselves in it, then it is essential that the science include a theory of emotions. Our claim is that a vast amount of our knowledge about ourselves, our goals, the behavior of other human beings, and that all pervasive but elusive thing called common sense, is based on the *implicit* information content of emotions. To the degree that this knowledge *is* implicit, we need a coherent, scientific, empirically testable theory of emotions, such as the one proposed here.

The theory we outline is quintessentially *cognitive* in the sense of *perceiving* and *knowing*. It views emotions as having evolved as a (the?) primary means for our mammalian ancestors to communicate with and understand fundamentally important intentions of other members of their own species. In this sense emotions constitute a basic *information processing*, *i.e. cognitive*, capacity. Moreover, emotions are the first language of every human infant before symbolic language is acquired.<sup>1</sup> And the commonsense knowledge that each of us has of our own and others' emotions underlies all of

our human interactions. What we need is a theory that accounts for the *cognitive* function of emotions, a theory that explains rather than takes for granted our knowledge of classes of emotions with radically different functions.

This version of Dahl's theory<sup>2</sup> is based upon three basic propositions: (1) a 3-dimensional classification scheme of emotions, (2) the intentional (cognitive) concepts of *wishes and beliefs*,<sup>3</sup> and (3) the biologically rooted concept of *appetites*. The ground covered includes:

1. A 3-dimensional classification scheme;
2. Basic definitions of *wish, pleasure, unpleasure, and appetite*;
3. Two major functional classes of emotions;
4. A causal feedback model of the two classes;
5. The relationship of the model to commonsense knowledge of emotions.

## A 3-Dimensional Classification of Emotions

We take for granted that any theory of emotions must include some account of both their similarities and their diversity; such an account implies, at a minimum, some system of classification. This system is an adaptation of the *n*-dimensional scheme that de Rivera (1962) used in his "decision" theory of emotions: the three polarities are the same as those that Freud (1915) claimed are basic to mental life, *i.e.* Subject-Object, Pleasure-Unpleasure, and Active-Passive.

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<sup>1</sup>Searle (1983) wrote: "... it seems to me obvious that infants and many animals that do not in any ordinary sense have a language or perform speech acts nonetheless have Intentional states. Only someone in the grip of a philosophical theory would deny that small babies can literally be said to want milk and that dogs want to be let out or believe that their master is at the door. ... the causal basis of the animal's Intentionality is very much like our own, ... [and] we can't make sense of his behavior otherwise."

<sup>2</sup>For the previous versions, and background and support for some of the major claims see Dahl (1978, 1979) and Dahl and Stengel (1978).

<sup>3</sup>These terms from our everyday common sense were first given a more formal status in Heider's (1958) "commonsense" or "naive" psychology and later in "folk" psychology (Stich, 1983) and intentional system theories, *e.g.*, Dennett (1978, 1987, 1988), Searle (1983) and many others.

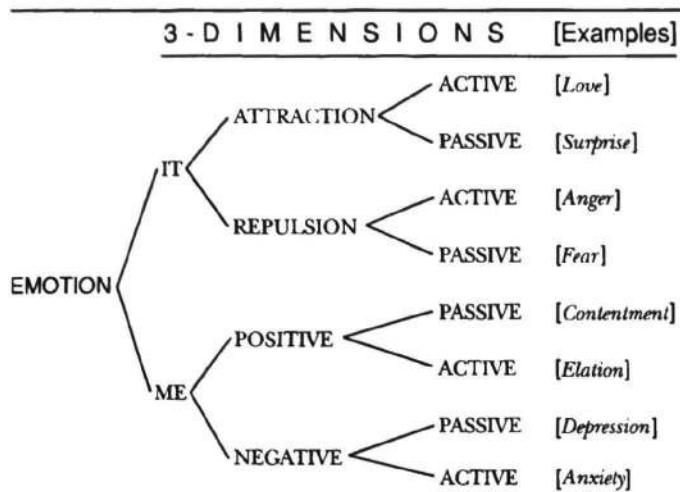


Figure 1

Our adaptation employs the following three polarities:<sup>4</sup>

Orientation	[IT-ME]
Valence	[ATTRACTION/REPULSION- POSITIVE/NEGATIVE]
Control	[ACTIVE/PASSIVE]

A classificatory tree showing the results of the intersections of these dimensions is illustrated in Figure 1 together with typical examples of emotion names for each of the eight resulting categories.

If such a scheme has any validity it surely implies that ordinary people have some kind of internal representation of these dimensions and ought to be able to use them to classify emotions. In fact, in his dissertation de Rivera showed that 20 judges could reliably classify 188 emotion words based primarily on their knowledge of definitions of these abstract dimensions. Dahl and Stengel (1978) replicated and extended his empirical classification using the above three dimensions. They gave 58 judges definitions of each dimension and had them classify 400 emotion words to see if they actually did share both the implicit knowledge of the dimensions and knowledge of the internal states referred to by each emotion label. The reliabilities (coefficient alphas) of these judgments by 58 judges for each of the three dimensions were .95, .99+, and .97, respectively, and the intercorrelations among the dimensions were nil, providing important evidence for the empirical independence of the dimensions. Approximately

<sup>4</sup>Among those who have proposed n-dimensional schemes only de Rivera among emotion researchers, along with Descartes (see Stone, 1980) and Freud, has stressed the importance of the Subject-Object (IT-ME) dimension (cf. Wundt, 1907; Tolman, 1923; Schlosberg, 1954; Osgood, Suci and Tannenbaum, 1957; and Davitz, 1969). No theoretical (as distinguished from commonsense) rationale for this distinction is provided by any other major theory except perhaps that of Pribram and Melges (1969). The terms "orientation," "valence," and "control" provide abstract terms intended to capture the essential properties of the dimensions.

65% of the judged words were decided at  $p < .05$  on all three dimensions; for 153 words the splits were significant at  $p < .001$  on all three dimensions (a joint chance probability of  $< 1$  in 1 billion). Moreover the judges' ages and sex were uncorrelated with their choices.<sup>5</sup>

Thus, despite the obvious fact that each person only has *direct* access to his own particular emotional states and in principle cannot have such access to another's internal state, and despite the fact that each person has his own unique set of memories derived from his own developmental interactions, it seems necessary to assume substantial shared experiential referents in order to account for the judges' shared variance and agreement.

However even if we accept the tidy simplicity of this scheme, there is a certain arbitrariness to all classifications of emotions, as James (1890) noted when he suggested that "the only question would be, does this grouping or that suit our purposes best?" For purposes of outlining this theory, there were two results of special interest.

The first was that these abstract dimensions produced 12 major categories, 8 main categories (as shown in Figure 1 and Tables 1 and 2) and 4 intermediate categories (not shown) which together include most of the emotions that others have regarded as fundamental, based on a variety of criteria such as behavioral expressions (Darwin, 1872), instincts (McDougall, 1923), facial expressions (Tomkins, 1970; Izard, 1971, 1977; Ekman, 1973) and other (Plutchik, 1962; Davitz, 1969; Ortony, Clore & Foss, 1987).

The second result was that the classification provided a *principled distinction* for two major *functional* classes of emotions, here called **IT** and **ME**. Schwartz and Trabasso (1984) produced evidence for the psychological reality of the IT-ME distinction in a study which showed that 6-year olds implicitly understand the classificatory dimensions as well as the implicit wishes and beliefs associated with the IT and ME emotions. Skeptics who find the *n*-dimensional classification implausible on other grounds should remind themselves that in the course of evolution just such *n*-dimensional computations were selected very early, allowing mobile animals with multiple senses to orient themselves in space and time by vision, smell and sound. It is conceivable that evolution, having once selected whatever powerful computational methods underlay these capacities, might also use *n*-dimensional computational strategies for solving new problems such as the apparent need for conspecifics both to express and to recognize each other's intentions, i.e. wishes and beliefs.

## Basic Definitions and Characteristics

### *Wish, Pleasure and Unpleasure*

The theory of emotions as wishes and beliefs rests firmly on a definition of a *wish* as *an attempt to achieve perceptual identity and/or symbolic equivalence with a previous*

<sup>5</sup>For a complete list of the words (with the distribution of the judges' choices on each dimension) and a display of the classifications see Dahl and Stengel (1978). See also Dahl, Hölzer & Berry (1992).

*experience of satisfaction.*<sup>6</sup> *Pleasure*, in this model, is the *satisfaction of a wish* and *unpleasure* is the *nonsatisfaction of a wish*. These definitions have several decisive implications, some obvious, some not quite so. First, certain basic *initial experiences of satisfaction* are phylogenetically adapted, that is, they are wired in by evolution. As Deutsch and Deutsch (1966) put it:

It is the taste of water, the feeling of satiety, the sensations from the genitalia that an animal finds rewarding. The connection of these sensations with need reduction is not one which is made by each individual animal. Such a connection . . . has been made by the process of natural selection. Only those animals which have found certain sensations rewarding have survived. Learning . . . has already occurred in the species; the individual need not recapitulate it. (pp. 143-144)

Second, memory is required to record the experiences. Third, memories, when activated by any means, serve as a *goal*, which is to repeat the same experience of satisfaction (pleasure), i.e. to achieve *perceptual identity*. Freud (1900) even postulated that the initial activation might be an hallucinatory fulfillment, i.e. activation of the memory to hallucinatory intensity. Implausible as this may appear, Helen Keller (see Dahl, 1965) vividly described just such hallucinatory memories of previous experiences of satisfaction (e.g. the taste of ice cream) during the period before she acquired language at about the age of six. The activation of memories is the attempt to achieve perceptual identity; until then the wish remains latent, that is, potential or descriptively and/or dynamically unconscious.<sup>7</sup> Fourth, the inclusion of symbolic equivalence provides for the well known human capacity for finding and satisfying alternate wishes as substitutes for primary experiences of satisfaction.

And last, lest we be limited to highly restricted and stereotyped behavior, it is necessary to assume, with good evidence to support the assumption (cf. Wolff, 1966; Sroufe and Waters, 1976; Nachman, Stern and Best, 1986), that novel experiences, for all their variety, are perceptually identical in the sense of being classified on the property of their unexpectedness and the aroused emotion of mild surprise. Novelty *qua* novelty is an intrinsic experience of satisfaction. This attraction to novelty assures a truly interesting creature,

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<sup>6</sup>This definition is adapted from Freud's (1900) famous Seventh Chapter of the Interpretation of Dreams (cf. Dahl, 1965, 1978, 1979, 1983), in which he proposed two very different models of motivation: one based on wishes, a very modern-looking cognitive model, and the other on instinctual energy. The instinctual energy model prevailed. How different psychological history might have been had the cognitive model survived instead!

<sup>7</sup>Koob and Bloom (1988:720), as a result of their studies of "cellular and molecular mechanisms of drug dependence," have in a sense reinvented the wheel (*wish* in this case) in their attempt to account for the intense craving experienced by opiate and cocaine addicts undergoing withdrawal. They wrote, "If craving is defined as a memory for the pleasant aspects of the drug, then . . . various external and internal signals can act as discriminative stimuli for eliciting the memory of drug experiences and these memories may serve as motivational factors in drug recidivism."

one with built-in opposing tendencies: on the one hand to repeat the same old experiences of satisfaction, but on the other to enlarge its repertoire, to satisfy its curiosity, and to expand its range of experiences. Whereas once we were content with the taste of milk alone, we can eventually acquire an appetite for such odd tastes as a dry martini with onion.

### ***Appetite***

There are four essential structural components to an *appetite*:

- (1) A *perception* of a specific internal (partly bodily) state, e.g. thirst or genital sensations,
- (2) an *implicit wish* to reinstate (achieve perceptual identity with) a *previous experience of satisfaction*, e.g. the taste of water or the sensations from copulation,
- (3) a *consummatory act*, e.g. drinking water or copulation,
- (4) a *reafferent perception* of the feedback from the consummatory act, e.g. the taste of water or the genital sensations and their motor accompaniments, which eventually terminate the act.

Lorenz (1965) emphasized the learning that takes place in the context of appetitive behavior via the teaching function of phylogenetically adapted motor patterns interacting with "the refference which the organism produces for itself by performing the consummatory act in the adequate consummatory situation." In other words the teaching is accomplished by the feedback that terminates a consummatory act, i.e. that satisfies the wish. As Dahl (1978) wrote, "Using the model of infant feeding, we can say that the infant's consummatory act of sucking teaches it that the incoming fluid satisfies its appetites of hunger and thirst because that is the way the infant is built." And, we would now stress, built by natural selection in the course of evolution.

Appetites also have a number of conspicuous properties:

- (1) *Peremptoriness*, i.e., they function as *instructions*.
- (2) *Selectivity* of objects, i.e., there are objects that are specifically necessary for their satisfaction.
- (3) *Displaceability* of objects, i.e., in the absence of the specific objects substitutes may suffice.
- (4) A tendency to *self-stimulation* when satisfaction is possible.
- (5) A tendency to *expansion of range* and *refinement of discrimination* of experiences that will satisfy—in other words a tendency to acquire new 'tastes.'

### **Two Major Functional Classes of Emotions**

According to this theory, *Emotions* are a special class of appetites, exhibiting the same structure as somatic appetites plus all of the above properties of appetites. They function as *wishes* and *beliefs* in an evolutionarily given, phylogenetically adapted, nonverbal feedback information system, a system that is quintessentially *cognitive* in the sense of *knowing*. For the animal without symbolic language (which includes our evolutionary ancestors and every human before acquiring symbolic language) emotions are the primary *intelligence* system for surviving in a complex world of many dangers and for communicating and recognizing the intentions of members of one's own species.

The essential difference between emotions and somatic appetites lies in the fact that two major classes of emotions, the IT and the ME emotions, are specialized to fulfill different structural components of appetites. The IT emotions include the functions of the first three structural components: (1) the *perception of a specific intentional state*, (2) an *implicit wish* toward an object, and (3) a *consummatory act*. The ME emotions function as the fourth structural component of an appetite, namely (4) the *reafferent perception* of the feedback information about satisfaction or nonsatisfaction accompanying the consummatory act. Thus we have the following definitions and examples:

IT Emotions have objects, function as *appetitive wishes* about those objects, and can be represented as: *P wishes that x*, where *x* is one of four formally definable classes of *consummatory acts*, defined by the intersection of two dimensions, valence (Attraction-Repulsion) and control (Active-Passive). Table 1 shows the four generic emotional appetites for objects, each with its generic wish and generic consummation and an arbitrary category number.

Table 1

Generic Wish	GOAL: To Perform Consummatory Act	Sample Emotion
[1] Active Attraction (to) IT	Take Care of It	Love
[2] Passive Attraction (from) IT	Explore It	Surprise
[5] Active Repulsion (to) IT	Get Rid of It	Anger
[6] Passive Repulsion (from) IT	Escape From It	Fear

ME Emotions do not have objects, function as *beliefs*, and can be represented as: *P believes that y*, where *y* is information about the status of *satisfaction* or *nonsatisfaction* of appetitive and other significant wishes. The satisfaction of wishes results in the experience of *pleasure*, while nonsatisfaction results in the experience of *unpleasure*. Four generic classes are defined by the intersection of the two dimensions, valence (Positive-Negative) and control (Active-Passive). Table 2 shows the four generic ME emotions, each with its generic belief, unique experience, goal, and typical name.

Table 2

Generic Belief	Experience (Goal)	Sample Emotion
[3] Passive Positive ME <i>Wishes have been satisfied</i>	PLEASURE	Contentment
[4] Active Positive ME <i>Wishes going well</i>	(Repeat)	Elation
[7] Passive Negative ME <i>Wishes can't be satisfied</i>	UNPLEASURE	Depression
[8] Active Negative ME <i>Wishes not going well</i>	(Get Rid Of)	Anxiety

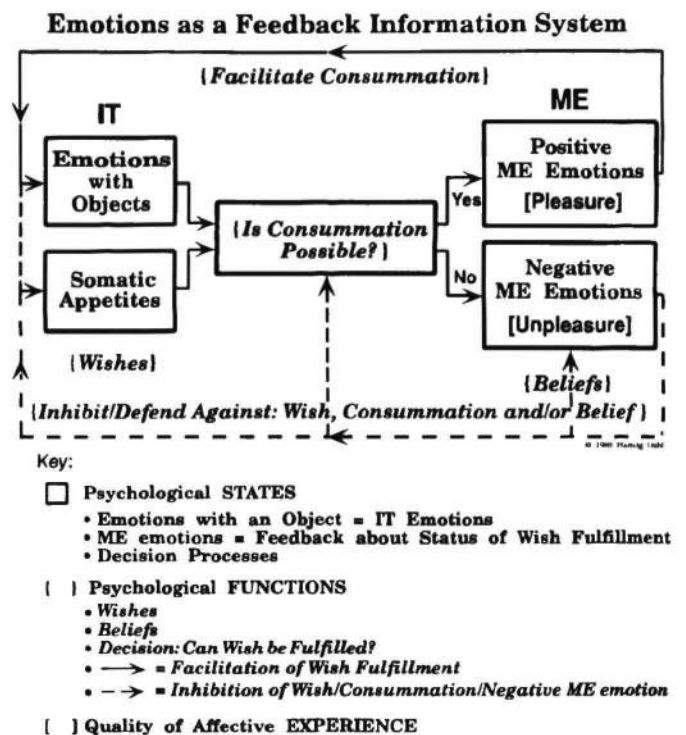


Figure 2.

### A Causal Feedback Model

In Figure 2 the question, "Is Consummation Possible?" involves a computation that is assumed to be made automatically following the activation of *any* significant wishes including the wishes implicit in the IT emotions. The outcome of this computation, *Yes* or *No*, determines the resulting major category of ME emotion. Many factors, historical and situational, influence the computation. Similarly, the consummatory act may or may not actually be carried out depending on many of the same factors. Part of a comprehensive program of research on emotions would have to include systematic investigation of these determinants.

The causal effect of the positive ME emotions is that of *facilitation* in the sense of helping to stabilize the memory of the experience of satisfaction, promoting both its reactivation under suitable conditions and fantasies about the objects involved.

Similarly, the causal effect of negative ME emotions is that of *inhibition* in the sense of a signal to invoke some kind of defense against: (1) the wish itself, that is, the activation of the memory of the experience of satisfaction, (2) the consummation of the wish, and/or (3) the negative ME emotion itself. Needless to say there is great variation in the success of such defenses, particularly against the negative emotion itself, often leading to auxiliary means such as alcohol and other drugs to get rid of the aversive quality of negative ME emotions.

### Emotion Model and Commonsense Knowledge

An unassuming little scenario, created by Trabasso (1982), illustrates an everyday commonsense application of the theory. In Table 3, column 1 tells a story about John, column 2

Table 3

A Story about JOHN and MARY and FRED [adapted from Trabasso, 1982]

<i>NARRATIVE</i>	<i>JOHN'S EMOTIONS</i>	<i>JOHN'S WISHES &amp; BELIEFS</i>
John sees Mary, an attractive classmate, at a party.	Interested, curious	<b>ACTIVE/PASSIVE ATTRACTION IT</b> Wish: [Cat 1-2] <i>to get acquainted with Mary.</i>
John feels attracted to Mary.	Affectionate, fascinated, friendly	<b>ACTIVE/PASSIVE ATTRACTION IT</b> Wish: [Cats 1&2] <i>to consummate his several appetites.</i>
John imagines what he and Mary will do; he walks toward her.	Eager, enthusiastic, bold, adventurous, optimistic	<b>ACTIVE POSITIVE ME</b> Belief: [Cat 4] <i>his wishes will be satisfied.</i>
Mary suddenly turns to Fred, John's friend.	Anxious, distressed, upset, worried	<b>ACTIVE NEGATIVE ME</b> Belief: [Cat 8] <i>his wishes may not be satisfied.</i>
Fred joins hands with Mary and they leave together.	Dejected, depressed, lonely, discouraged	<b>PASSIVE NEGATIVE ME</b> Belief: [Cat 7] <i>his wishes can't be satisfied.</i>
John imagines that Fred has a serious accident.	Angry, jealous, envious	<b>ACTIVE REPULSION IT</b> Wish: [Cat 5] <i>to get rid of Fred.</i>

lists some of John's emotions that one might plausibly infer from each event in the story. Column 3 translates these emotion names into the formal terms of the theory including John's corresponding wishes and beliefs and the emotion category numbers (from tables 1 and 2) which they represent. The relationship between columns 1 and 2 is based on everyday commonsense knowledge and that between columns 2 and 3 is based on both the empirically established relationships between emotion words and the classification dimensions and the definitions of the theory.

One not necessarily self-evident advantage of these concepts lies in their representation of the cognitive content of emotions as wishes and beliefs.<sup>8</sup> Since emotions can be systematically represented as propositional attitudes, their propositional content can be incorporated into models and/or simulations of human cognitive processes, in particular, artificial intelligence models of cognition. Dyer (1983), for example, built commonsense knowledge of emotions into BORIS, a computer program designed to understand the

<sup>8</sup>Even, or perhaps especially, among emotion researchers there is still remarkable disagreement and unclarity over the cognition/emotion distinction. There are those who believe (e.g., Lazarus, 1984, following Arnold, 1960) that "appraisal" precedes emotional states and those who believe (e.g., Zajonc, 1980, 1984) that "preferences need no inferences." Our position is that emotions are another given-by-evolution form of *knowing*, that is, of *cognizing*. For example, *anger* just is a computation by the nonverbal system whose generic knowledge (read *cognitive*) content is: a repulsion toward an object, and *anxiety* just is a computation whose generic cognitive content is: there is a probability that a relevant wish cannot be satisfied.

emotions implicit in stories about everyday situations such as two people getting divorced

Moreover one can systematically incorporate this model of the fundamental functions of emotions into intentional system theories that also use wishes and beliefs to predict and explain the behavior of complex bio-psycho-social systems. Both Dennett (1978, 1987, 1988) and Searle<sup>9</sup> (1983), for example, claim that emotions are typical intentional states, yet neither has proposed or borrowed a theory of emotions that accounts for the inclusion of emotional states as wishes and beliefs.

Finally, we agree with Ortony and Turner (1990) that:

... the question "Which are the basic emotions?" is not only one that probably cannot be answered, it is a misdirected question, as though we asked, "Which are the basic people" and hoped to get a reply that would explain human diversity.

The emotion theory outlined here addresses two different questions: What are the *functions* of the different emotions that we can readily identify? And what wishes and beliefs do they entail?

<sup>9</sup>Among 48 states that Searle (1983) listed as potential intentional states were 37 explicit emotion states (italicized here): belief, *fear*, *hope*, *desire*, *love*, *hate*, *aversion*, *liking*, *disliking*, *doubting*, *wondering whether*, *joy*, *elation*, *depression*, *anxiety*, *pride*, *remorse*, *sorrow*, *grief*, *guilt*, *rejoicing*, *irritation*, *puzzlement*, *acceptance*, *forgiveness*, *hostility*, *affection*, *expectation*, *anger*, *admiration*, *contempt*, *respect*, *indignation*, *intention*, *wishing*, *wanting*, *imagining*, *fantasy*, *shame*, *lust*, *disgust*, *animosity*, *terror*, *pleasure*, *abhorrence*, *aspiration*, *amusement*, and *disappointment*.

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