



PHIL 474/673 -NATURAL RATIONALITY – WEEK 10 – MARCH 22

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## NEUROECONOMICS AND EMOTIONS

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*The Platonic metaphor of the mind as a charioteer driving twin horses of reason and emotion is on the right track—except that cognition is a smart pony, and emotion a big elephant.*

(in an earlier version of Camerer *et al.*, 2005)

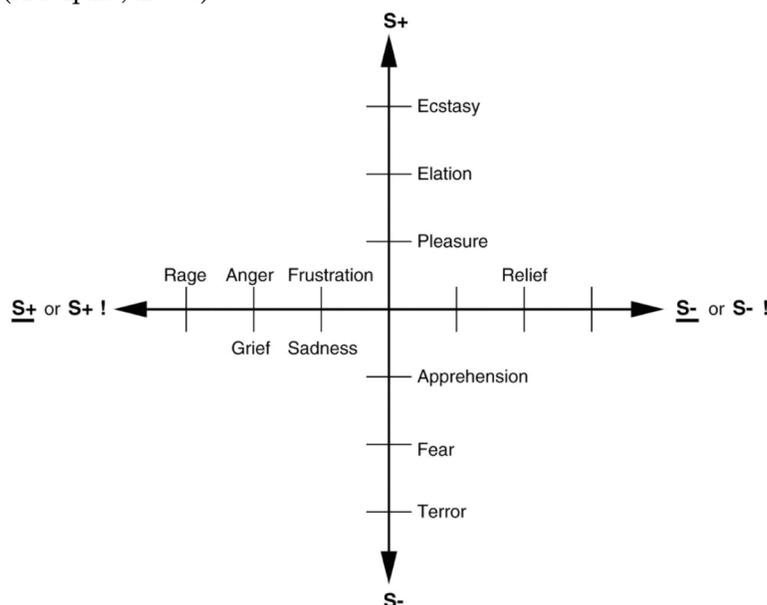
### 1 Emotions: different perspectives

#### 1.1 General definition

- An affective state, partly conscious, of a negative or positive valence, that can have a formal object
  - (target, focus, and/or propositional object): “*property implicitly ascribed by the emotion to its target, focus or propositional object, in virtue of which the emotion can be seen as intelligible.*” (de Sousa, 2003)

#### 1.2 Conceptual space

- withholding or administration of positive (+) or negative (-) stimuli
- (Adolphs, 2006)



(Adolphs, 2006)

TABLE 1  
TWO DIMENSIONS OF NEURAL FUNCTIONING

	Cognitive	Affective
Controlled Processes		
<ul style="list-style-type: none"> <li>■ serial</li> <li>■ effortful</li> <li>■ evoked deliberately</li> <li>■ good introspective access</li> </ul>	<b>I</b>	<b>II</b>
Automatic Processes		
<ul style="list-style-type: none"> <li>■ parallel</li> <li>■ effortless</li> <li>■ reflexive</li> <li>■ no introspective access</li> </ul>	<b>III</b>	<b>IV</b>

(Camerer *et al.*, 2005)

### 1.3 Other distinctions

- Backward-looking: regrets, rejoicing.
- Forward-looking: hope, fear, and terror
- Instantaneous: liking, disgust, anger (Gordon, 1969)
- Occurrent emotions vs. emotional dispositions (Lyons, 1985), such as passing emotional dispositions (e.g. phobia) or emotional traits (irritability)
- emotions (intentional objects) vs moods, (depression, irritability) that do not have intentional objects
- long-term emotions and short-lived emotions
- Object (what the emotion is about) vs. cause (what caused the emotional state) of emotions. Can coincide or not.
- Goal congruent (happiness, pride, love) vs. goal incongruent (anger, shame, envy) emotions (Lazarus, 1991)

### 1.4 Psychological features (Dolan, 2002)

- Stereotyped patterns of facial expression, comportment, and autonomic arousal.
- Less susceptible to our intentions than other psychological states
- less encapsulated than other psychological states
- *“when we are sad the world seems less bright, we struggle to concentrate, and we become selective in what we recall.”* (p. 1191)

### 1.5 Externalist/social- constructionist approach

- *“social signals coded in culturally evolved intentional conventions that find their identity conditions outside of individuals, in the social environment”* (Averill, 1980; Ross & Dumouchel, 2004) Individuals learn emotions (e.g. shame),
- *“the emotions are viewed here as transitory social roles, or socially constituted syndromes. The social norms that help to constitute these syndromes are represented psychologically as cognitive structures or schemata. These structures -*

*like the grammar of a language - provide the basis for the appraisal of stimuli, the organization of responses, and the monitoring of behavior".(Averill, 1980, pp. 305-306)*

- (Averill, 1985; Harré, 1986; Oatley, 1993)

## **1.6 Behaviorism**

- Emotions are behavior (Ryle, 1949): “shame” and “joy” are complex patterns of behavior.

## **1.7 Existentialism, phenomenology**

- (Sartre, 1948): emotions as strategies for coping with difficult situations

## **1.8 Cognitivism**

- Emotions are propositional content; they are intentional objects, that are *about* something else, their 'formal object'. E.g. my fear is about, refers to, that barking dog. (Nussbaum, 2001)
- Thus emotions have a propositional content that may refer to non-existent object.
- Belief-desire framework: A is angry because she believes that P and desires that Q.
- Able to distinguish between similar emotions, for example indignation, resentment, contempt, scorn and loathing, or love, adoration, admiration and respect (Solomon, 1998)
- “fear of flying” objection: even if you know that flying is safe, you may fear it.
- **Non-propositional cognitivism:** emotions cannot be reduced to beliefs-desire (De Sousa, 1987).
- Emotions help to solve the "Frame Problem"
- Constraint and direct attention: define the parameters of decision and can render salient relevant alternative (Faucher & Tappolet, 2002)
- Emotional empathy: simulation of other people’s mental state(Goldman & Sripada, 2005)
- **Evaluative cognitivism**
- Act as perception of moral values (Tappolet, 2000)
- Emotions as evaluative judgments (Solomon, 2003)
- Important source of motivation(Elster, 1994)

## **1.9 Empiricism, hedonism, (‘feelings theory’)**

- James-Lange theory: emotions are the perception of bodily states

*My thesis (...) is that the bodily changes follow directly the PERCEPTION of the exciting fact, and that our feeling of the same changes as they occur IS the emotion. Common sense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike, The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble, because we are sorry, angry, or fearful, as the case may be. Without the bodily states following on the perception, the latter would be purely*

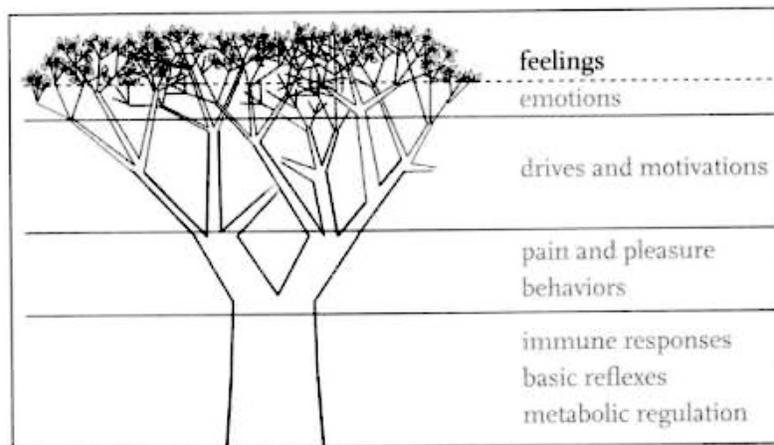
*cognitive in form, pale, colourless, destitute of emotional warmth. We might then see the bear, and judge it best to run, receive the insult and deem it right to strike, but we could not actually feel afraid or angry. (189-190) (James, 1884, pp. 189-190)*

- Criticisms: (Cannon, 1920): fear and anger elicit the same bodily reactions, but have a different subjective feel.
- Recent research showed however that some emotions do have different bodily profile (Damasio, 1994; LeDoux, 1996; Panksepp, 1998)

## 1.10 Neo-empiricism

### 1.10.1 Damasio

- Emotions and affective feelings as homeostatic regulation mechanisms:



(Damasio, 2003, p. 37)

### 1.11 Prinz's gut feeling

- Emotions as embodied appraisal, perceptions of changes in the body. (Prinz, 2004)

### 1.12 Dual approaches: emotions as aid in reasoning and deciding

- emotions cannot be understood without grasping their reasons, which give a basis for evaluation (De Sousa, 1987; Greenspan, 2004; Greenspan, 1988)
- 2 systems approach of moral judgment: emotions + reasoning
- *"the way our brains are wired up, needy people who are 'up close and personal' push our emotional buttons, whereas those who are out of sight languish out of mind. (Greene, 2003, p. 849)*

### 1.13 Social intuitionism

- (Haidt, 2001) emotions are moral judgment mechanisms
- Without emotional appraisal, subjects tend to be more 'utilitarian' in moral dilemma (Koenigs *et al.*, 2007)

## 1.14 Evolutionary approaches

### 1.14.1 Darwin

- Emotions as means of expression (Darwin, 1896). Emotional expressions had a function, but now accompany emotions because they allow communication of emotions.

## 1.15 Ekman's affect program

- Basic emotions (happiness, sadness, fear, anger, surprise, and disgust) are universal adaptations have a survival function (Ekman, 1972)

### 1.15.1 Evolutionary psychology

- *a superordinate program whose function is to direct the activities and interactions of the subprograms governing perception; attention; inference; learning; memory; goal choice; motivational priorities; categorization and conceptual frameworks; physiological reactions (such as heart rate, endocrine function, immune function, gamete release); reflexes; behavioral decision rules; motor systems; communication processes; energy level and effort allocation; affective coloration of events and stimuli; recalibration of probability estimates, situation assessments, values, and regulatory variables (e.g., self-esteem, estimations of relative formidability, relative value of alternative goal states, efficacy discount rate); and so on.* (Cosmides & Tooby, 2000, p. 93)
- Involved in cooperation

### 1.15.2 Griffiths

- Theories of emotions should move from linguistic analysis to *natural kinds* ('carving nature at its joints').
- Basic emotions such as Ekman's affect program are 'natural kinds', homological structures. (Griffiths, 1997)
- Distinction between simpler emotions (affect programs) from more cognitively penetrable, i.e. domain-specific biases in motivation vs. socially sustained pretenses. Example: joy vs. *Schandenfreude*.

### 1.15.3 Comparison between approaches

- What is the difference between shame and anger?
- *Behaviorism*: we tend to behave differently when we are angry and when we are ashamed (psychological), a difference in the descriptions of two different kinds of awkward situations (analytic).
- *Existentialism*: two solutions to two problems.
- *Cognitivism*: Difference in content: in shame one feels responsible, while in anger one expresses an aversive reaction. (Solomon, 1998)
- *Non-propositional cognitivism*: anger and shame direct attention to different features (e.g. problems vs. social context)
- *Evaluative*: shame, but not anger, "track" social values and norms
- *Empiricism*: difference in our sensations, feelings; (Solomon, 1998)
- *Social-constructionism*: two different transitory roles: the 'angry agent' and the 'ashamed agent'
- *Dual account*: similar affective feeling, different cognitive content
- *Social-intuitionism*: different intuitions triggered by different situations

- *Evolutionary approaches*: adaptations to individual vs. collective problem-solving; or affect programs (natural kind) vs. social emotions (normative kinds)
- *Neo-empiricism*: different neural structures, different processing of bodily states, different integrations of affective and cognitive information.

## 2 Emotions and rationality

### 2.1 Brain, body and decision-making

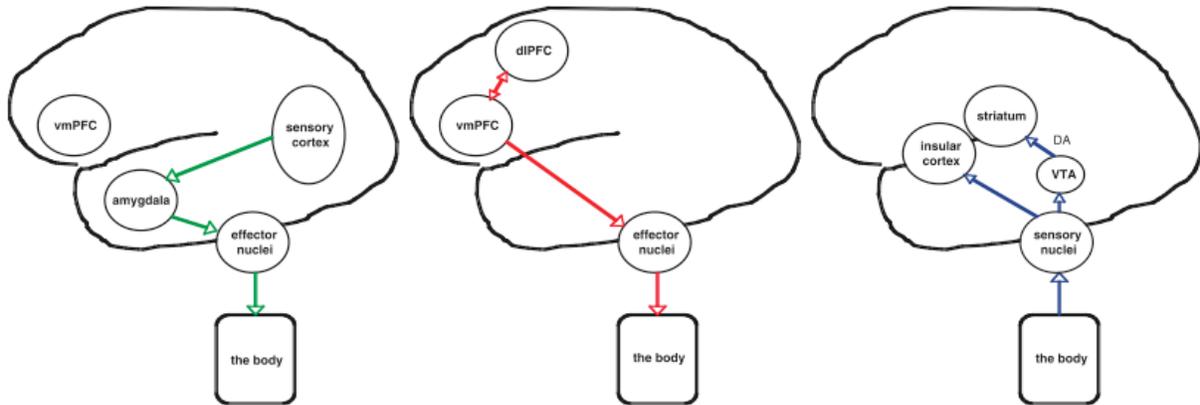
- Patient with damage in the ventromedial prefrontal cortex (vmPFC) behave irrationally
- Financial losses, losses in social standing, and losses of family and friends
- Unable to learn from previous mistakes in Iowa Gambling Task
- Intellect and problem-solving abilities were largely normal
- No affect, and no reaction to emotional situations

### 2.2 Somatic-marker hypothesis

- Bodily states 'mark' options as advantageous/disadvantageous (Bechara & Damasio, 2005; Damasio, 1994)
- Ex: skin-conductance response (SCR)
- Patients with vmPFC damage have no SCR in anticipatory situations, only in experienced reward/punishment
- Patients with amygdala damage have same symptoms + impaired SCR in experienced reward/punishment
- vmPFC: anticipation of emotional impact
- Amygdala: registering emotional impact see
- Two consequences: 1) the picture of rational decision as cold-hearted calculation is challenged: rationality needs emotions; 2) the ancient idea of emotions as irrational passions had to be reassessed. The cognitive and the affective are no longer independent.
- Somatic markers can be induced by primary (sex/food) inducers or secondary (thoughts, memory, etc.)

### 2.3 4 stages

- 1- Registration: Brain areas triggers emotional/bodily states in response to reward and punishment
- 2- Learning: Through learning, these bodily states become linked to mental representation of the behaviors that brought these states
- 3- Reenactment: When deciding, the vmPFC reactivate either i) the bodily states associated with the mental representations of possible options ('body loop'), or ii) a simulation ('as if body loop') of these states
- 4- Sensory mapping: The bodily states are represented in the brain, either at the cortical level ('gut feeling'), or in subcortical areas (dopaminergic system), without the subjective feeling (Berridge noncognitive 'wanting' or cue-triggered incentive salience).



(Naqvi *et al.*, 2006)

## 2.4 Emotions in economics

- Emotions may be involved in predicted, decision, experienced and remembered utility.
- Regrets theory (Loomes & Sugden, 1982). Agents try to minimize their future emotional experience of regrets.
- *Visceral factors* (Loewenstein, 2000): decision-making is influenced by hot/cold states, i.e., in the “hot” state, decisions are driven more by affect, and in the “cold” state, decisions are driven more by cognition
- ‘warm glow’ of cooperation, the ‘sweet taste’ of revenge or the ‘moral disgust’ of unfairness (de Quervain *et al.*, 2004; Rilling *et al.*, 2002; Sanfey *et al.*, 2003)
- Social norms: cultural norms specify what emotions one should feel (Elster, 1994)

## 2.5 A framework for emotions and rationality (Elster, 1994)

- Emotions are actions, thus rational emotions are rational actions
- Emotions are rational when appropriate in kind
- Emotions are rational when appropriate in degree
- Emotions are rational when based on rational beliefs
- Emotions are rational when based on rational desires

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