### <sup>1</sup> Cognition and Emotion

November 13-20, 2008

#### <sup>2</sup> What is emotion?

- · Communication mechanisms that maintain social order/structure
- · Behavior learned through operant or classical conditioning, not involving cognitive mediation
- · Appraisal of biopsychosocial situation
- · Complex physiological response
- · Integrated, three-response system construct

#### <sup>3</sup> Areas of Inquiry

- Effect of emotion on performance (e.g., memory, perception, attention)
- Information processing characteristics of emotional disorders (e.g., anxiety, depresion)
- · Emotion and social learning
- · Cognitive neuroscience of emotions
  - cognitive structure of emotion
  - neuropsychological studies
  - cognitive aspects of emotion (e.g., appraisal)



### 5 🔳 Introduction & History

- James-Lange theory
- · Cannon-Bard theory
- · Schacter & Singer studies (2-factor theory)
- Facial feedback hypothesis
- Neurobiological contributions (Davis, LeDoux)
- Neuropsychological perspectives
  - Somatic markers
  - Emotional signal processing
- · Information-processing theories



#### <sup>7</sup> James-Lange

"My theory ... 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, and angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect ... and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble ... Without the bodily states following on the perception, the latter would be purely cognitive in form, pale, colorless, 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 should not actually feel afraid or angry"

#### 8 Cannon-Bard

- We feel emotions first, and then feel physiological changes, such as muscular tension, sweating, etc.
- In neurobiological terms, the thalamus receives a signal and relays this both to the amygdala (a limbic structure) and the cortex. The body then gets signals via the autonomic nervous system to tense muscles, etc.

9	Two-Factor Theory  • When trying to understand what kind of person we are, we first watch what we do and feel and then deduce our nature from this. This means that the first step is to experience physiological arousal. We then try to find a label to explain our feelings, usually by looking at what we are doing and what else is happening at the time of the arousal. Thus we don't just feel angry, happy or whatever: we experience feelings and then decide what they mean.
10	<ul> <li>Cognitive Appraisal Theory</li> <li>In the absence of physiological arousal, we decide what to feel after interpreting or explaining what has just happened. Two things are important in this: whether we interpret the event as good or bad for us, and what we believe is the cause of the event.</li> <li>In primary appraisal, we consider how the situation affects our personal well-being. In secondary appraisal we consider how we might cope with the situation.</li> </ul>
11	Somatic Marker Theory
	Bodily states play a role in decision-making and reasoning
	<ul> <li>"Somatic markers" link memories of experience (cortex) with feelings (limbic)</li> <li>Attempts to account for 'automatic' or 'unconscious' biases</li> </ul>
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18	Fear Conditioning
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# <sup>24</sup> Preattentive Perception of Threat: Öhman

- Distinction between automatic v. controlled information processing
- Draws on animal work (LeDoux) direct thalamic-amygdala connection
- Threat: biological and 'derived'

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	• Data:
	- responses to masked stimuli
	<ul> <li>slowed RT to threat words in shadowing</li> </ul>
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27 🔲	Emotion and Memory
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29	<ul> <li>Flashbulb Memories</li> <li>Distinct, vivid, recollections of shocking events, and associated personal activities</li> <li>Long-lasting? Accurate? Special?         <ul> <li>Brown &amp; Kulick (1977): special encoding mechanism (NOW PRINT!)</li> <li>Niesser &amp; Harsh (1992) Challenger study</li> <li>Although FM appear to be different subjectively (they provide an intersection between personal history and "History"), they are not necessarily more accurate</li> <li>Confidence is not equivalent to accuracy</li> </ul> </li> </ul>
30	Flashbulb Memories of September 11, 2001
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36	Bower's Network Theory – a theory of emotional experience  • Emotions are nodes in a semantic network  • Emotions stored as propositions  • Emotion = activation of network  • Activation spreads in selective fashion to associated concepts  • When nodes activated above threshold level, conscious experience of emotion results
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39	Four Predictions from Bower's Theory  • Mood-state-dependent recall  • Mood congruity: learning best when congruity between learner's state and type of material (best supported)  • Thought congruity: thoughts, associations congruent with mood state

	Mood intensity: increases in intensity (arousal) lead to greater activation of network
40	<ul> <li>Mood Effects on Attention and Memory</li> <li>Negative memory bias         <ul> <li>found with depressed and anxious normals</li> <li>not consistently found with anxious patients (active avoidance?)</li> </ul> </li> <li>Mood vs. emotion</li> <li>Effects on processing capacity (resources allocated to self-talk)</li> </ul>
41	Emotion and Attention
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46	Basis of Dot Probe Results  • Selective attention to threat (McLeod)  • Failure to 'disengage' attention from threat (Koster, et al 2004)
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48 🔲	Weapon Focus  • Eyewitness' inability to identify a perpetrator when a weapon is used in a crime  • Easterbrook hypothesis: narrowing of attentional focus in emotional situations  • Arousal and central/peripheral detail
49	Basis of Weapon Focus  • Simple selective attention  • All items attended to equally, but weapon remembered better  • Cue-utilization (threat-arousal-narrowing)  • Unusualness/distinctiveness
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51	Attention/Memory in Anxiety and Depression
52	<ul> <li>Performance impaired by high levels of state anxiety</li> <li>Yerkes-Dodson Law</li> <li>performance is optimal with a 'medium' level of arousal</li> <li>'optimum' level lower for hard tasks</li> <li>Cognitive Interference theory (Sarason): worry and self-preoccupation interfere</li> <li>Processing Efficiency Theory (Eysenck): processing efficiency = effectiveness/effort; worry reduces efficiency</li> <li>Performance in depression</li> <li>impaired both by task-irrelevant information and poor effort/motivation</li> <li>most studies are of an anologue nature, though a few patient studies are available</li> </ul>

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54	<ul> <li>Anxiety and Attention</li> <li>Selective attention toward threat-related material (selective attentional bias; e.g. dot-probe, emotional Stroop)</li> <li>Distractibility (↓ attentional control)</li> <li>Effects on breadth of attention (more local spotlight)</li> <li>Interpretive bias: interpreting ambiguous materials as threatening (e.g., "The doctor examined little Emily's growth")</li> <li>Anxiety and preattentive processing</li> </ul>
55	<ul> <li>Depression</li> <li>Little evidence for attentional bias in depression</li> <li>Interpretive/recall biases in depression <ul> <li>Interpreting ambiguous situations as negative</li> <li>Reduced predictions of success on cognitive tasks</li> <li>Recall of past performance reduced</li> </ul> </li> </ul>
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58	Discrete v. Dimensional Theories of Emotion
59	<ul> <li>Discrete Emotions Theory</li> <li>Emotions are distinct and unique states (e.g., fear, anger, etc.)</li> <li>'Basic' or 'primary' emotions - Tomkins lists 8 (hap, sad, anger, fear disgust, surprise, interest, shame)</li> <li>Search for response patterning in emotions (Friesen, Ekman, etc.)</li> <li>Cross-cultural comparisons</li> </ul>
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69	Neuropsychological Findings  • Neuropsychological studies of affective competence (RHD)  • "Modular" organization of affective systems (?)  • Modality-independent affective lexicon  • Valence-related asymmetries
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73	Emotion and the Brain: Three General Hypotheses  • Right Hemisphere dominance for emotion  • Hemispheric laterality for mood  – Positive/approach: left hemisphere  – Negative/withdrawal: right hemisphere  • Automatic-controlled distinction (RH v. LH
74 🔲	
75	Localized "Damage" and Emotion  • Awakening from WADA  - Right Hemisphere: crying, anxiety  - Left Hemisphere: laughing, excitement  • Acute Structural Lesion (stroke)  - Right Hemisphere: indifference, ?secondary mania  - Left Hemisphere: depression (frontal)
76	Neuropsychiatric Disorders  • Depression  • Secondary Mania  • OCD  • Anxiety  • Aggression/disinhibition  • Psychopathy/APD
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83	<ul> <li>Ventromedial Prefrontal Cortex and Somatic Markers</li> <li>Somatic marker "biasing signals" are regulated by VM premotor cortex; these signals help regulate decision-making in uncertainty</li> <li>Support from IGT; anticipatory SCR's to selection of "unfavorable" decks         <ul> <li>Impaired in VMPFC</li> </ul> </li> </ul>
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87 🔲	Problems with SMT
	<ul> <li>Assertion that IGT preferences formed "implicitly" is untenable</li> <li>Meaning of psychophsyiological response is unclear (response to feedback, risk indicator, post-decision emotion reaction)</li> <li>Not all "normal controls" are normal</li> </ul>
88	Mirror Neuron System  Class of neurons in F5 and ventral premotor cortex that discharge:  - when animal performs object-directed action  - when animal observes OD action in others  Subset appear to be "communicative" motor neurons  Functions  - Imitation  - Action understanding  Potentially important for understanding social learning and imitation effects
89	Cortical-Subcortical Interactions in Emotion  • General concept of limbic system as "emotional effector"  • Regulatory interaction between cortex and subcortical structures  • Gating  • Selective engagement
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# 92 Orbitofrontal Loop

- Involved in social and emotional functioning
- Damage produces:
  - Disinhibition

  - HyperactivityEmotional lability

  - AggressivenessReduced self-awareness