Emotions and social cognition

Weighting: 1/17

Adolphs, R., Russell, J. A., & Tranel, D. (1999). A role for the human amygdala in recognizing emotional arousal from unpleasant stimuli. *Psychological Science*, *10*(2), 167–171. https://doi.org/10.1111/1467-9280.00126

# Agenda

* What is emotions and social cognition?
* The article: A role for the human amygdala in recognizing emotional arousal from unpleasant stimuli
* Motivation and hypothesis
* Method
* Results
* Authors’ conclusion
* Criticism
* Greater perspective™

## What is emotions and social cognition?

Emotion: A set of physiological responses, action tendencies, and subjective feelings that adaptively engage humans and other animals to react to events of biological and/or individual significance.

Social referencing: The use of emotions expressed by another individual to guide one’s own behavior.

## The article: A Role for the Human Amygdala in Recognizing Emotional Arousal from Unpleasant Stimuli

* Examines assessments of emotional valence and arousal in a patient with complete bilateral amygdala lesions

## Hypothesis

* They human brain contains neural systems specialized to recognize emotional arousal in negatively valenced simuli
* The amygdala is part of this system

## Method

* A rare subject (31 y/o woman, SM046) rates emotional sentences and faces on scales of valence and arousal
* Compares to control (*N* = 24 for rating faces, *N* = 18 for rating sentences)
* SM046 goes through the experiment 3 times

Scales: valence and arousal

* Valence and arousal scales are taken from a previously developed “affect grid” which had demonstrated construct validity and reliability
* Scales go 1-9, higher than 5 is more pleasant than neutral or more aroused than neutral
* Valence and arousal scales are taken from the previously developed “affect grid” which had proven reliability and construct validity

Pictures: 39 total

* 6 each for happiness, surprise, fear, anger, disgust and sadness + 3 neutral. Shown in random order without time limit

Sentences: 30 total

* 5 for each basic emotion
* Describes either persons or acts
* Presented in neutral tone of voice
* Subjects asked how they would feel when experiencing the emotion denoted by the label or experiencing the situation
* SM046 had no visual impairments and could distinguish faint emotional expressions from neutral faces in all 6 basic emotions

Labels: words denoting each basic emotion: happy, surprised, afraid, angry, disgusted, and sad

## Results

### Figure 1: ratings of valence and arousal for facial expressions

* White: control, Black: SM046
* SM046 rated valence within 2 standard deviations from the control mean for all 6 basic emotions

### Figure 2: Ratings of arousal were impaired for negatively valenced emotions

* Figure shows difference from mean control arousal rating
* SM046 follow control ratings of arousal for most emotions
* But especially for afraid and angry and somewhat for disgusted and sad she rates stimuli at much lower arousal
* The grey line represents average expected deviation from mean within the control group. If SM046 is significantly different from this line, her answers can be assumed non-random.

### Figure 3: Ratings of valence and arousal for sentences and labels

* Black dots: SM046’s results for all three runs of the experiment
* Severe impairment in ability to recognize arousal in sentences and labels
* Rated sentences for fear and anger as relaxing, typically more than 5 standard deviations below control mean
* Normal ratings of valence to all emotions

## Authors’ conclusions: emotional knowledge

* Amygdala damage leaves SM046 unable to recognize emotional arousal though she could correctly identify valence
* One explanation for the findings is that SM046 never acquired normal conceptual knowledge concerning the arousal of unpleasant emotions and therefore cannot retrieve it
* Authors therefore posit a role of the amygdala in declarative knowledge similar to the hippocampus: acquiring but not necessarily retrieving knowledge
* Taken together with **other findings where SM** (same patient???) with amygdala damage did not experience conditioned fear but could explain the relationship between stimuli, the theory that amygdala may be mostly relevant to **acquiring** knowledge about emotional arousal rather than experiencing it (SM shows normal skin conductance response to auditory startling)
* Additional investigations will be needed to determine whether the impairment we report is due primarily to impaired acquisition or to impaired retrieval of knowledge.

## Criticism

* The experiment was done three times ONLY on SM046, did this foster learning?
  + Her responses might be altered due to social ques from earlier experiments
  + The effects of repetition for controls is unknown
* Are sentences read ‘live’ or recorded? Social cues and biases from researcher expectations
* Valence/arousal grid: subjects asked to rate them separately rather than using grid. Does it maintain its reliability and construct validity?

## Grand perspective™

* Knowlton: double dissociation between implicit and declarative learning, examined via patients with damaged hippocampus and Parkinson’s disease respectively, weather prediction from cards (Patient: HM)
* Theories of emotion, e.g. James-Lange (especially interesting since SM046’s body does show arousal even though she does not experience/know of this arousal), Cannon-Bard
  + **Cannon-Bard**: According to the Cannon-Bard theory of emotion, we react to a stimulus and experience the associated emotion at the same time.
  + **James-Lange:** Suggested that people first experience a physiological reaction in response to a stimulus in the environment. People then experience some sort of physiological reaction to this stimulus which is then labeled as an emotion.
  + **The Schacter-Singer**: Proposing that physiological arousal occurs first but that such reactions are often similar for different emotions. The theory suggests that the physiological reactions must be cognitively labeled and interpreted as a particular emotion. The theory emphasizes the role that cognition and elements of the situation play in the experience of emotion.
* Phobias, conditioning, etc.
* Binocular rivalry/subliminal perception: activity in amygdala as reaction to subconsciously perceived scary faces