

Emotion in Psychology and Machine Learning

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1 Introduction

Let's begin by the conclusions: (1) after decades of debate, researchers in the psychology and the neuroscience of emotion, do not agree on what emotions are and how ought to be studied; (2) machine learning researchers have taken a notoriously practical approach to the task of emotion recognition and generation, where data availability is the main factor determining how emotions are conceptualized.

2 Theories of emotion: the emotion wars

Controversy has dominated the psychological and neuroscientific landscape of emotion theory in the last decades (XXXX). Several of the disagreement among emotion researchers are deep, as deep as the disagreements on other controversial subjects, like nature versus nurture (XXX), and distributed versus symbolic representations (XXXX). Our reading of the literature indicates that the main cleavages dividing the field are around the following issues:

- Are emotions natural kinds? Another way to put this is: Are emotions "discovered" or "constructed"?

- Do emotions have an evolutionary crafted function? For instance: Does "anger" have an predefined evolutionary function like removing obstacles or facing predators?
- Do emotions have objectively identifiable markers? For instance: Are there universally shared facial expressions that serve as objective markers of happiness or sadness?
- How are emotions represented in the human mind?

These cleavages are not mutually exclusive. For instance, researchers that favor the idea of emotions as natural kinds, also favor the idea of emotions as having evolutionary predetermined functions. Yet, we hope having this questions in mind may serve as a compass to understand the diversity of views in the literature. In our review we identified at least four main traditions in emotion theory: (1) basic emotion theory; (2) the circumplex or dimensional theory of emotion; (3) the constructionist theory of emotion; (4) the functionalist theory of emotion. In what follows, we examine these perspectives and how they relate to the above mentioned issues.

TLDR Table

theory	natural kind	evolutionary	objective markers	representation
Basic Emotion Theory	Yes	Yes	Yes	Discrete

2.1 Basic emotion theory

In the opening scene of the American crime television drama *Lie to me**, we see the encounter between a man accused of a crime and Dr. Cal Lightman, a renowned expert in the science of interpreting micro-expression and body language. In the scene, the camera carefully traces every microscopic body movement of the accused: the quivers of his eyebrow, the pressing of his lips, the twitching of his finger, the heavy breathing in his chest. For Dr. Lightman, every micro-expression reveals the thoughts and emotions of the man in front of him, knowledge that Dr. Lightman will weaponize to carve out the truth about the accused past actions.

The science behind Dr. Lightman skills on *Lie to me**, is based on the work of Paul Ekman (XXXX). Actually, not only the science, but Dr. Lightman itself is loosely based on Paul Ekman persona (XXXX). Of course, this show is not a literal recreation of Ekman work, but the *core idea* behind Ekman work is what serves as inspiration: emotions are discrete mental states, that can be cataloged into a finite set of classes, and that can be recognized by stereotypical, universally shared, body gestures and facial expressions (XXXX). The exact number of basic emotion classes has changed over time, but today is common to see authors referring the following (CITE: Ekman 2011): (1) anger, (2) fear, (3) surprise, (4) sadness, (5) disgust, (6) contempt, (7) happiness. This view is what is refereed in the literature as basic emotion theory, with Ekman and his colleagues being its main proponents (XXXX).

2.2 The circumplex theory

Dimensions

2.3 The theory of constructed emotion

Feldman

2.4 The functionalist theory of emotion

3 The measure of emotion