How Neuroscience Can Illuminate the Nature of the Human Emotional Feelings:
To understand key psychiatric Issues we need a cross-species neuroscientific understanding of
neglected topics such as Sadness and Joy

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Why study Emotional Feelings?

1. We are all curious about our own powerful feelings.

2. Most animal lovers are convinced animals have feelings

3. Most scientists are skeptical that animal feelings can be studied: (LeDoux, 2012: “We will never know what an animal feels.”)

4. But Feelings (Affects) Evolved. They are a natural part of all our minds, and we are animals.

5. Affective feelings always feel “good” or “bad” to humans

6. And animals can tell us whether certain brain systems are “rewarding” or “punishing”—namely “good” or “bad”

7. If we understand their basic feelings we will finally begin to understand our own.

So What are we Waiting for?
Early Ethological Perspective
“Because subjective phenomena cannot be observed objectively in animals, it is idle to claim or deny their existence” Tinbergen, 1951, p. 4

Marian Dawkins (June 2012).
“there is nothing to say that the emotion of fear has to be consciously experienced.”
Different Forms of BrainMind Hierarchies

Non-Nested Hierarchies

Thoughts

Learning & Memory

Top-Down Control

Bottom-Up Differentiation

Top-Down Control

Bottom-Up Modulation

Top-Down Control

Bottom-Up Differentiation

Raw Emotions

UCS’s & UCRs
Jim Olds & Milner (1954)

Reward, Pleasure, Reinforcement System

‘wanting’ SEEKING System

Reward Prediction Error

Sniffing Exploration Foraging Predation
Two-Way or “Circular” Causation

Reward Prediction Error

Tertiary-Process Cognitions
Largely Neocortical

‘Wanting’

Secondary-Process Learning
Largely Upper Limbic

SEEKING

Primary-Process Emotions
Affects Deeply Subcortical

Nested BrainMind Hierarchies (Ancestral Origins of Mind)
Cross-species affective functions of the medial forebrain bundle—Implications for the treatment of affective pain and depression in humans

Volker A. Coenen\textsuperscript{a}, Thomas E. Schlaepfer\textsuperscript{b,c,\ast}, Burkhard Maedler\textsuperscript{a}, Jaak Panksepp\textsuperscript{d} (2011)

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Rat “Laughter” 50 KHz Chirps

Playful Behavior reflects Joyful Feelings

Rough & Tumble Social PLAY

DORSAL CONTACTS

PINS
Review

Frequency-modulated 50 kHz ultrasonic vocalizations a tool for uncovering the molecular substrates of positive affect

Jeffrey Burgdorf\textsuperscript{a,}\textsuperscript{*}, Jaak Panksepp\textsuperscript{a,}\textsuperscript{b}, Joseph R. Moskal\textsuperscript{a}  \textbf{(2011)}

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\textit{J. Burgdorf et al. / Neuroscience and Biobehavioral Reviews xxx (2010) xxx–xxx}
A conceptual framework for studying play in the rat and summary of last 30 years of work.

Genotype

- strain differences
- selective breeding
- individual differences

Current situation

- prior isolation
- hunger
- novelty
- habitat
- social familiarity
- fear / anxiety
- prenatal factors
- early handling / separation
- other maternal factors

Early experiences

Relevant Neural circuitry

PLAY
Brain Gene Expression Micro-arrays
Following PLAY
(1,200 genes)

1 Hour Time Point

Frontal Cortex
120
86
38%
(IGF-1)

Posterior Cortex
187

6 Hour Time Point

Frontal Cortex
33
17
14%
(IGF-1)

Posterior Cortex
73

120
86
(IGF-1)