

MAX PLANCK UCL CENTRE

COMP2 PSYCH

International Max Planck Research School

Symposium and Advanced Course on Computational Psychiatry and Ageing Research

International Max Planck Research School COMP2PSYCH

How Arousal Influences Decision Making Under Perceptual Uncertainty

Liliana Polyanska

Background & Concepts

An imminent threat produces *arousal* response

- Stress hormones → state of physiological readiness
- Noradrenaline promotes the function of the sensory cortices, amygdala, and basal ganglia, but impedes firing in the PFC

Perceptual uncertainty results from a combination of internal sensory noise and stimulus noise.

Yerkes-Dodson law

- The relationship between arousal and performance depends on the task difficulty

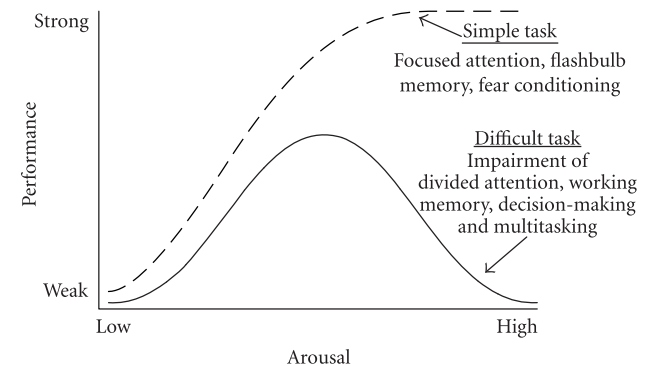
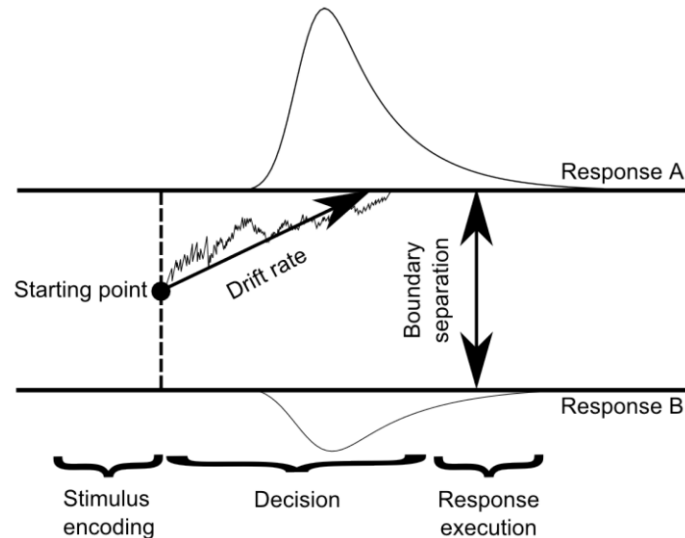


Image: Diamond et al, 2007

Hypothesis

High arousal will modulate decision making under uncertainty by improving performance in condition(s) with relative stimulus certainty and obstructing performance in condition(s) with higher stimulus uncertainty.

Drift Diffusion Model



Experiment & Analysis

Experimental Design:

Multiple options exist

Options for inducing arousal:

Auditory stimulus

Electroshock

Pharmacology

Physiological measures:

Heart rate

SCR

Breathing

Pupil dilation

Potentiation of auditory startle (?)

Questionnaires:

STAI

Beck Anxiety Inventory

Intolerance of uncertainty Scale

Neuroimaging:

fMRI

EEG

Analysis:

Drift Diffusion Model

Brain signal variability

Possible further questions:

Fear generalization

Open Questions

Conceptual difficulties:

- Psychological constructs are intertwined.

Apply other models and analysis techniques:

- Nonlinear models (e.g. attractor model)
- Complex systems, dynamical systems
- Machine learning, deep learning

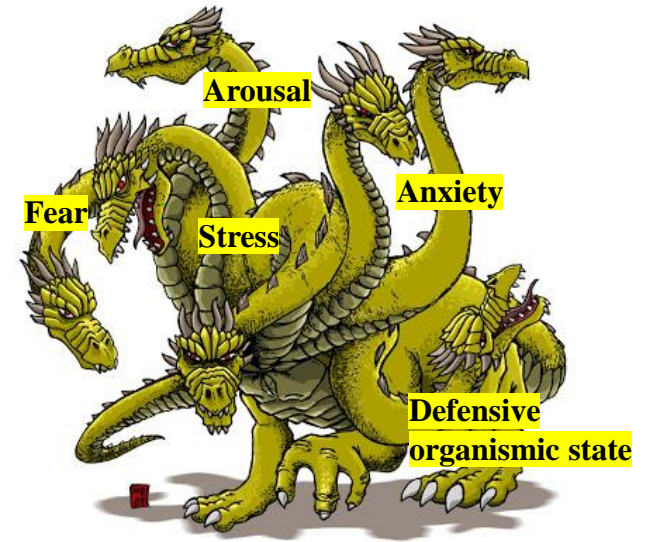


Image: <http://www.freaksmutantsandmonsters.com>

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