Psychology 390: Introduction to Personality Psychology

The biological perspective 2:

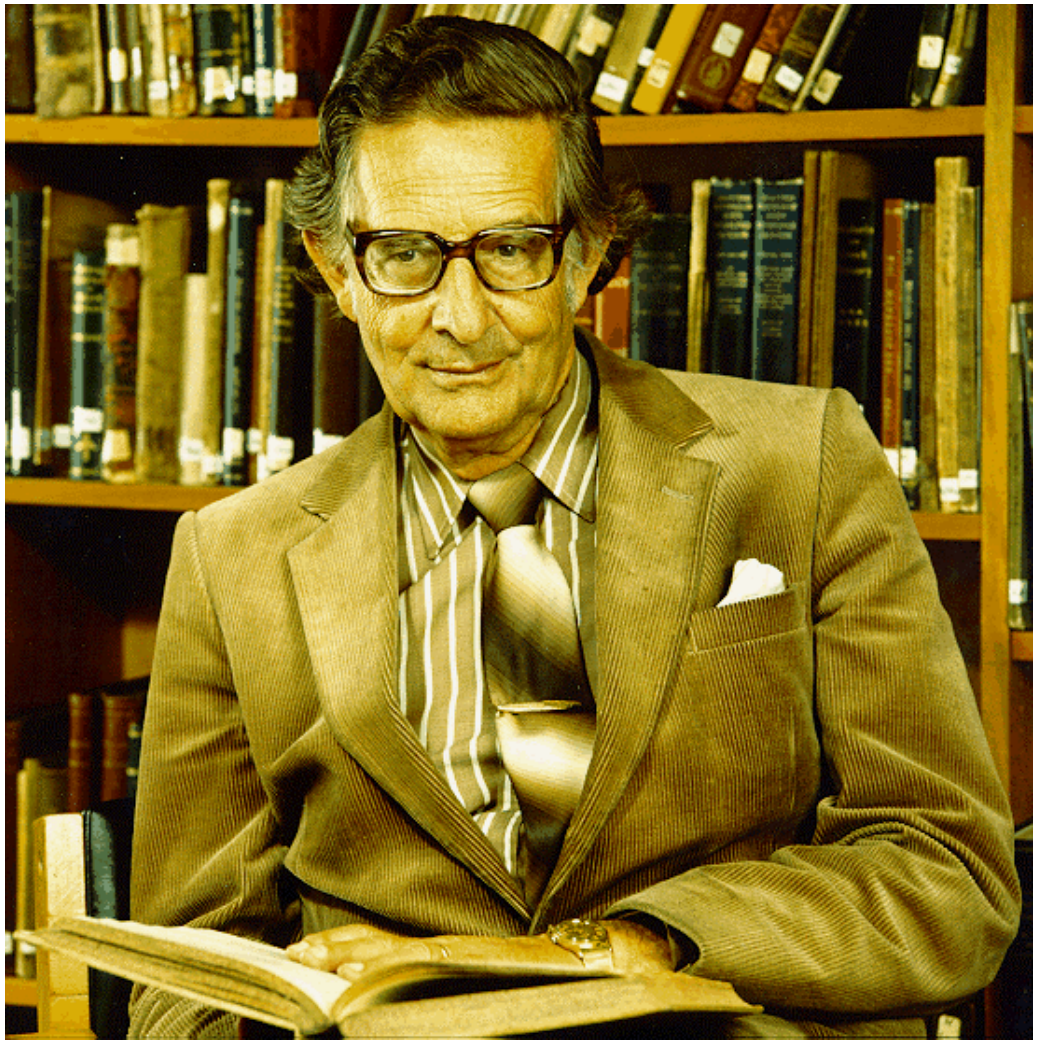
Biological processes and personality

Overview of Today's Lecture

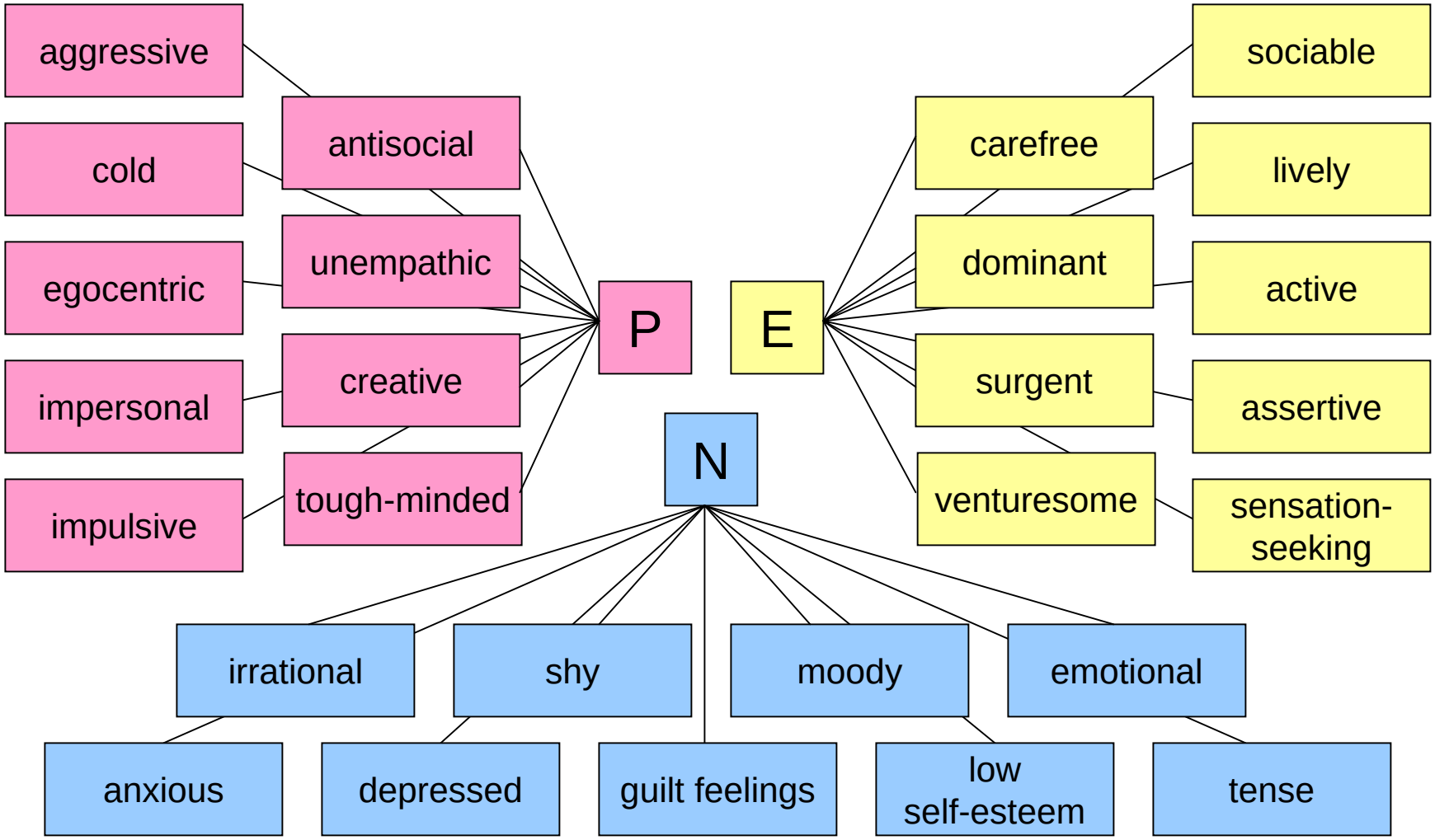
1. Eysenck's arousal theory of extraversion
2. Gray's behavioral activation theory of extraversion
3. What may be the neurobiological basis of extraversion?

Eysenck's Sensory Arousal Theory of Extraversion

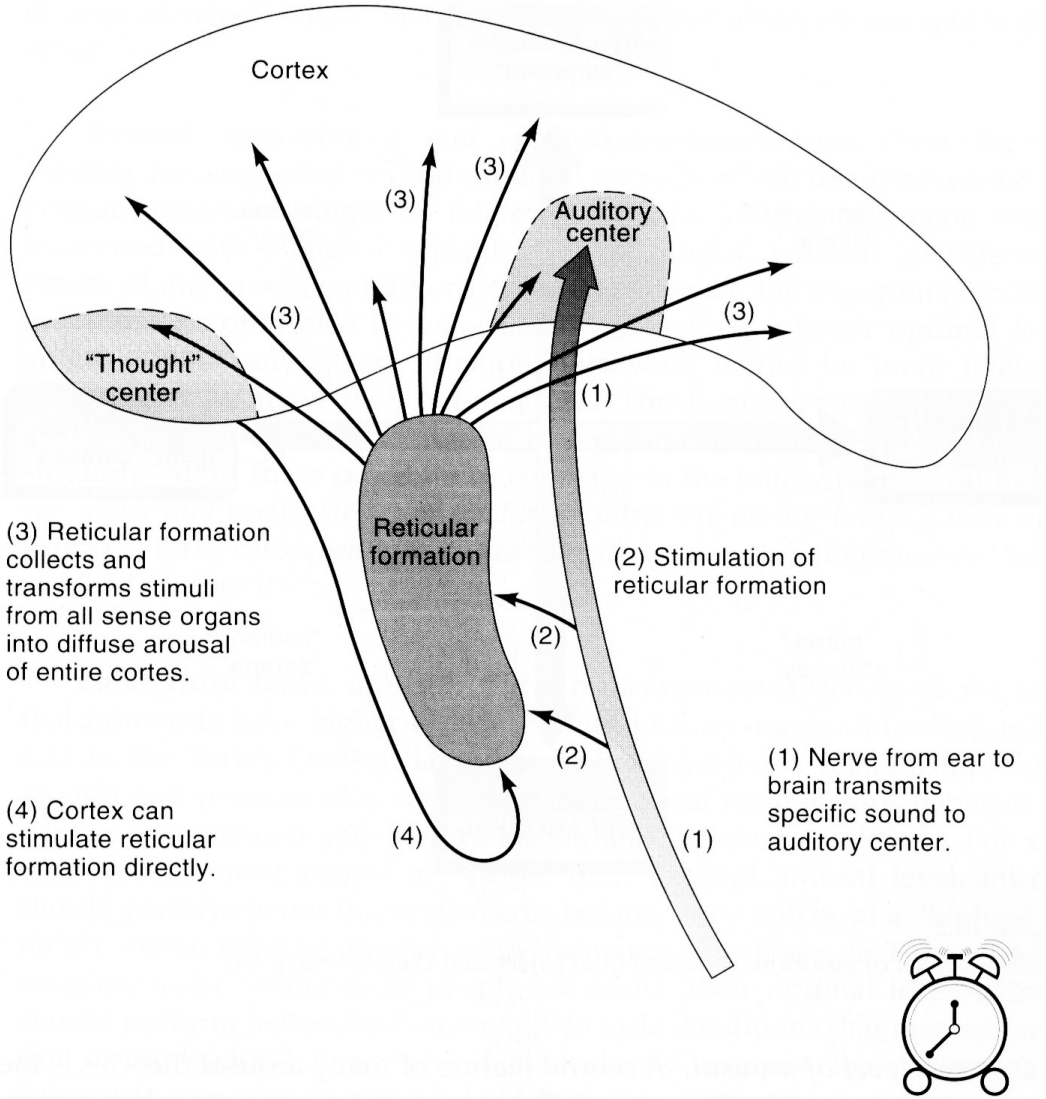
The Father of the Big Three: Hans Jürgen Eysenck (1916-1997)



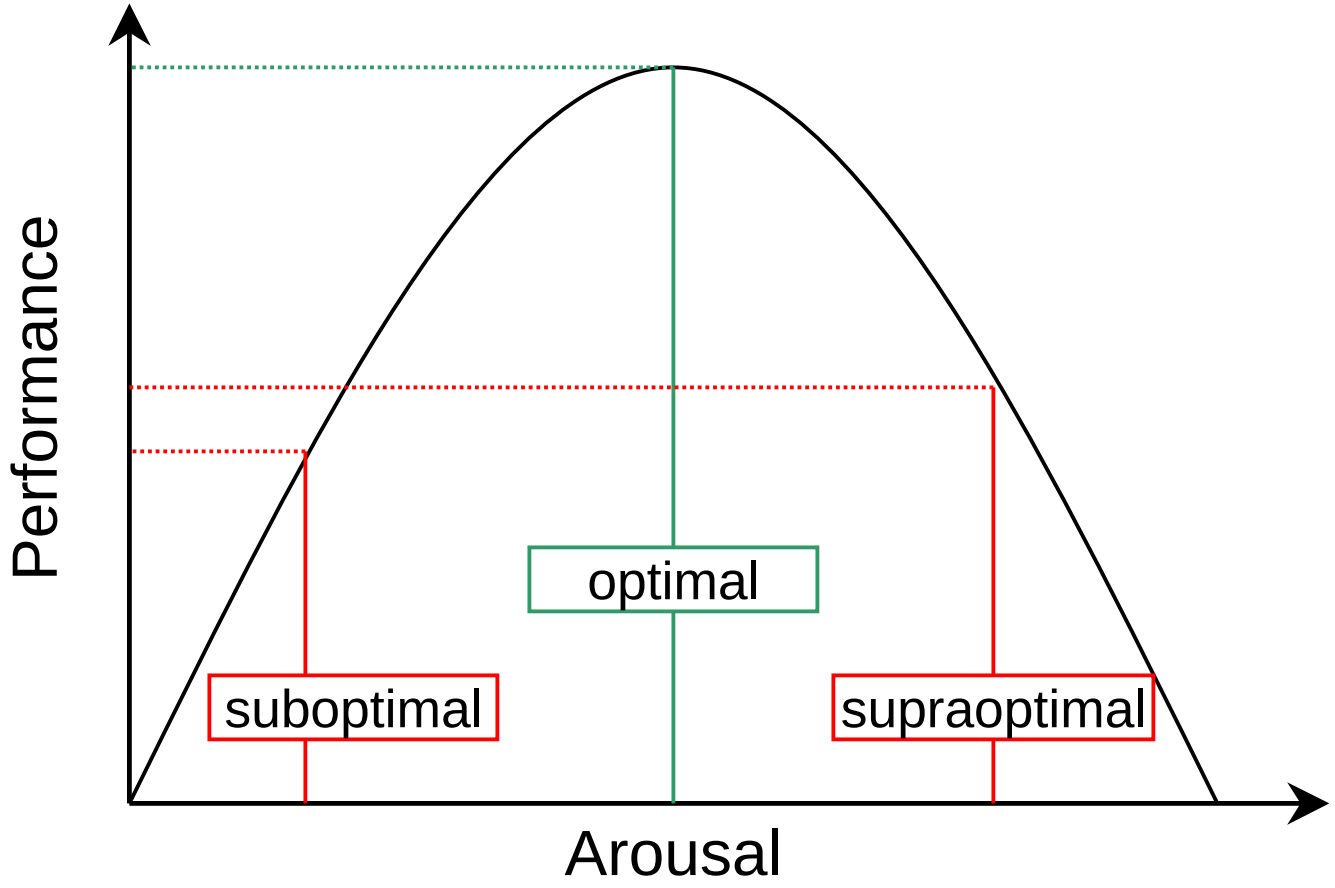
The PEN Model of Personality



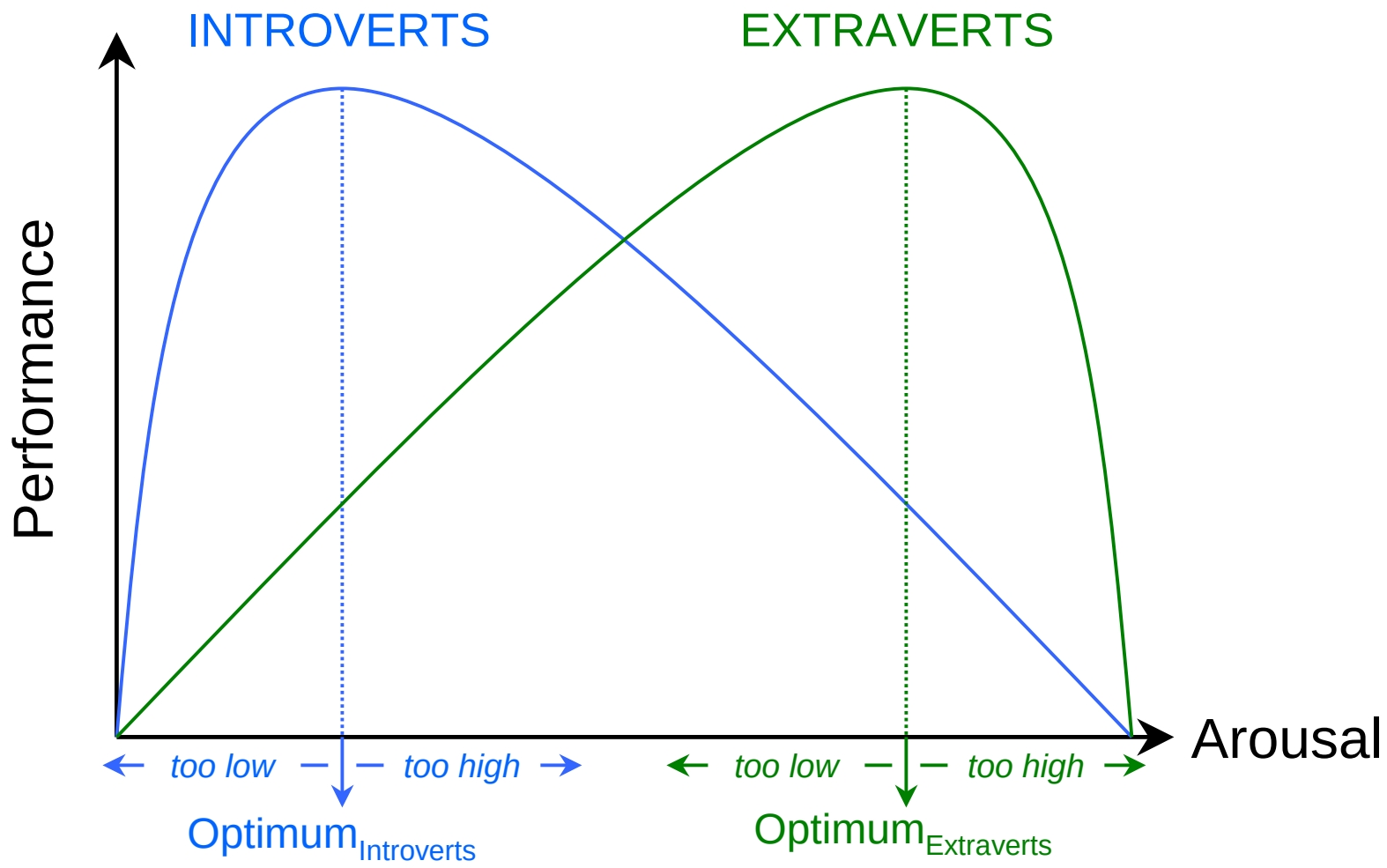
The Arousal Theory of Extraversion-Introversion



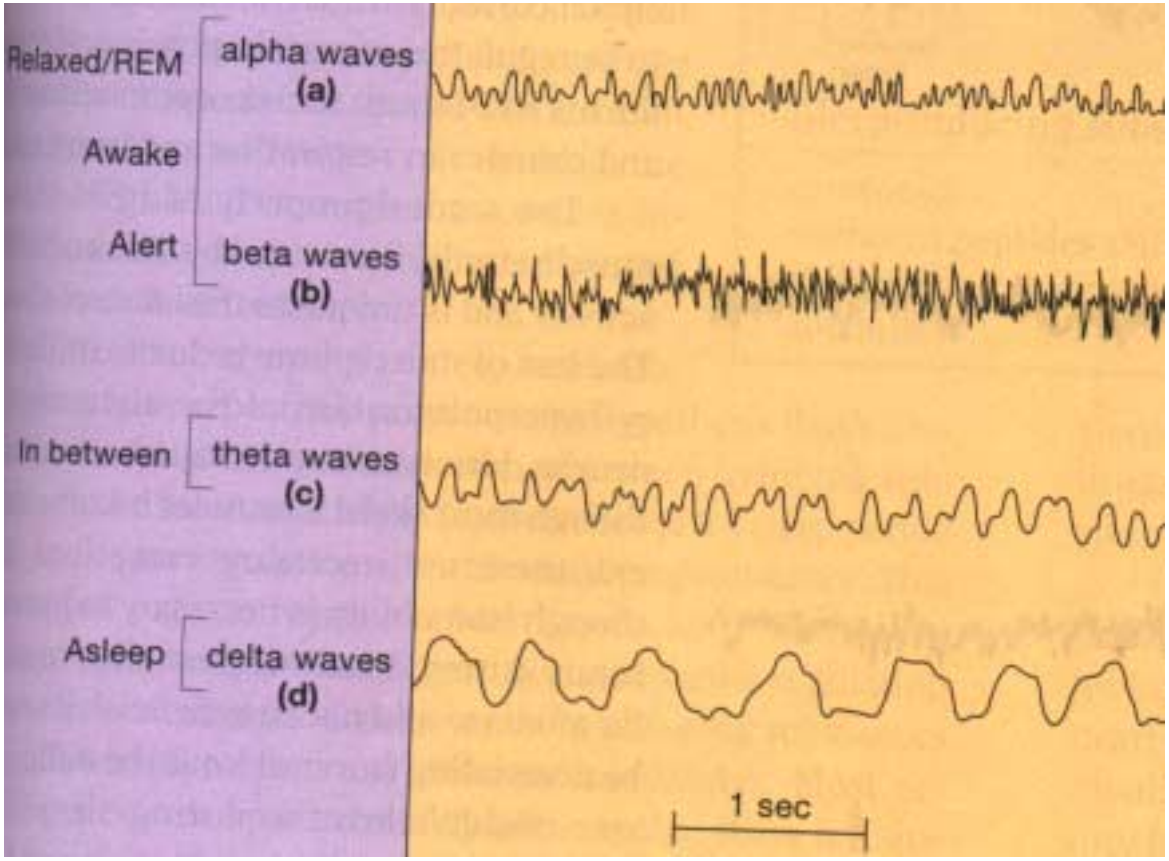
The Yerkes-Dodson Law of Arousal and Performance



Optimum Levels of Arousal Differ Between Introverts and Extraverts



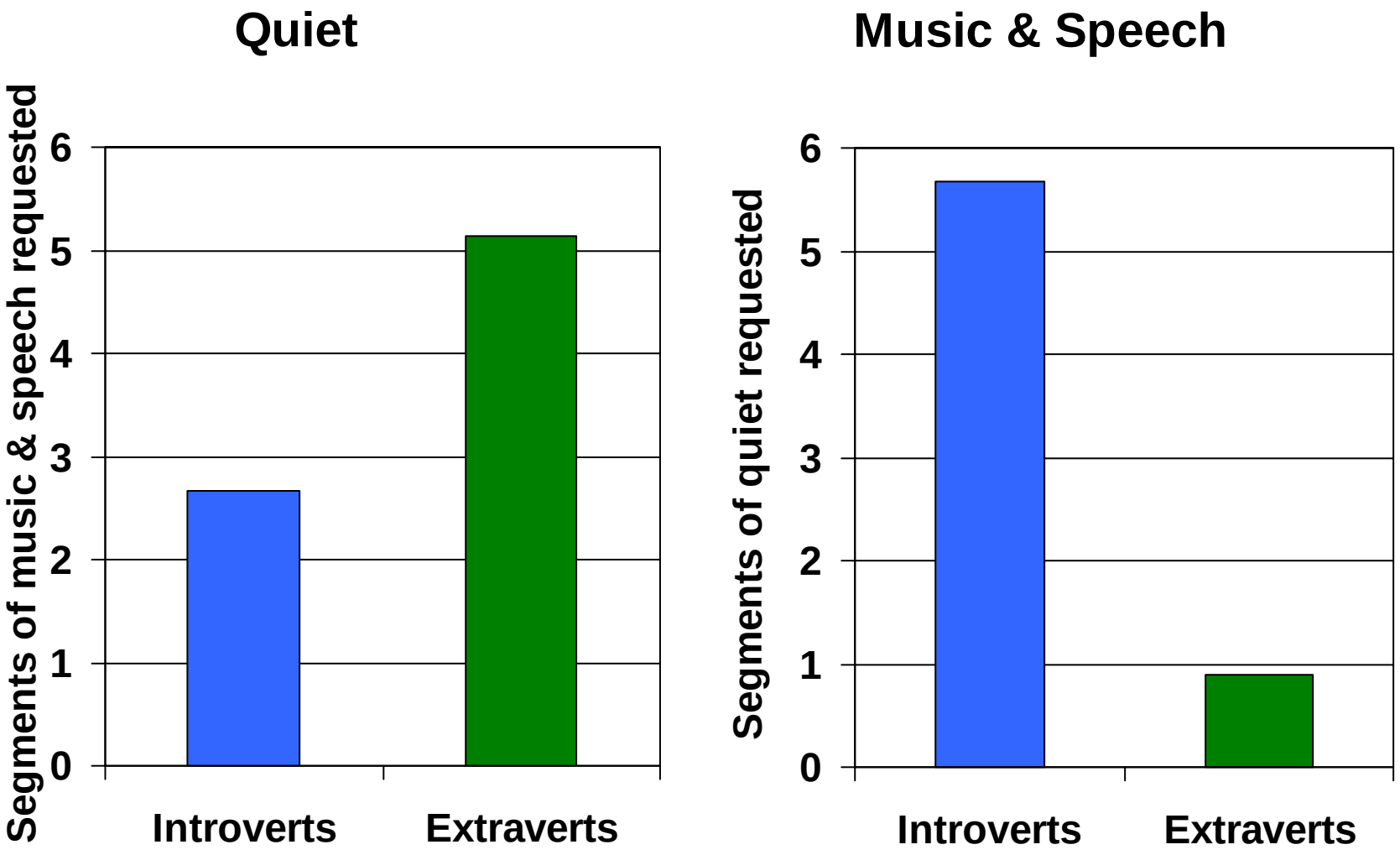
Extraversion and Cortical Activity



Extraverts have ***less alpha activity*** than introverts, because less sensory stimulation is passed on from the reticular formation.

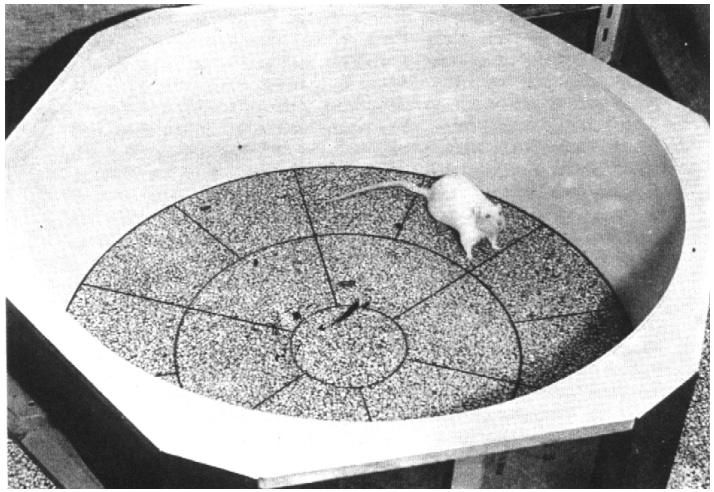
EEG waves involved in waking and sleeping

Arousal and Extraversion in a Vigilance Task (Davies et al., 1969)



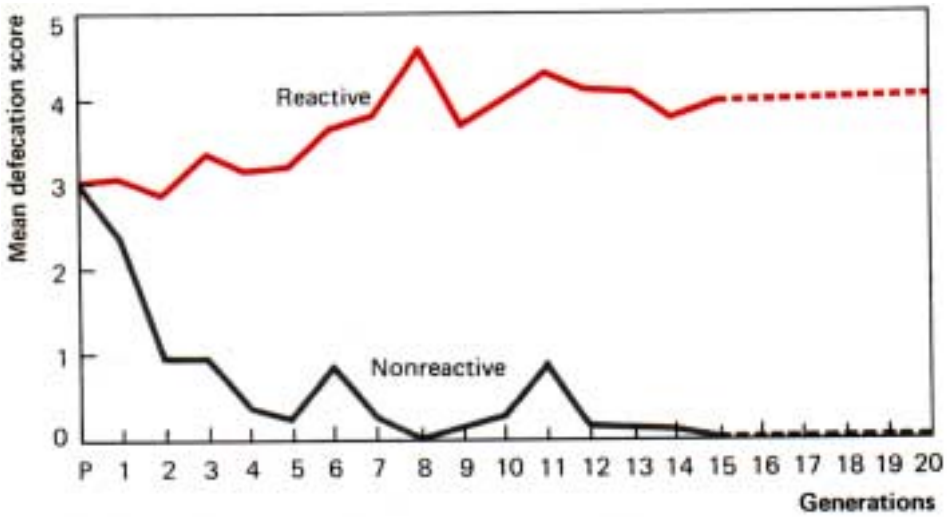
Gray's Behavioral Activation Theory of Extraversion

Gray: "Animals Differ in Their Reactions to Reward and Punishment"



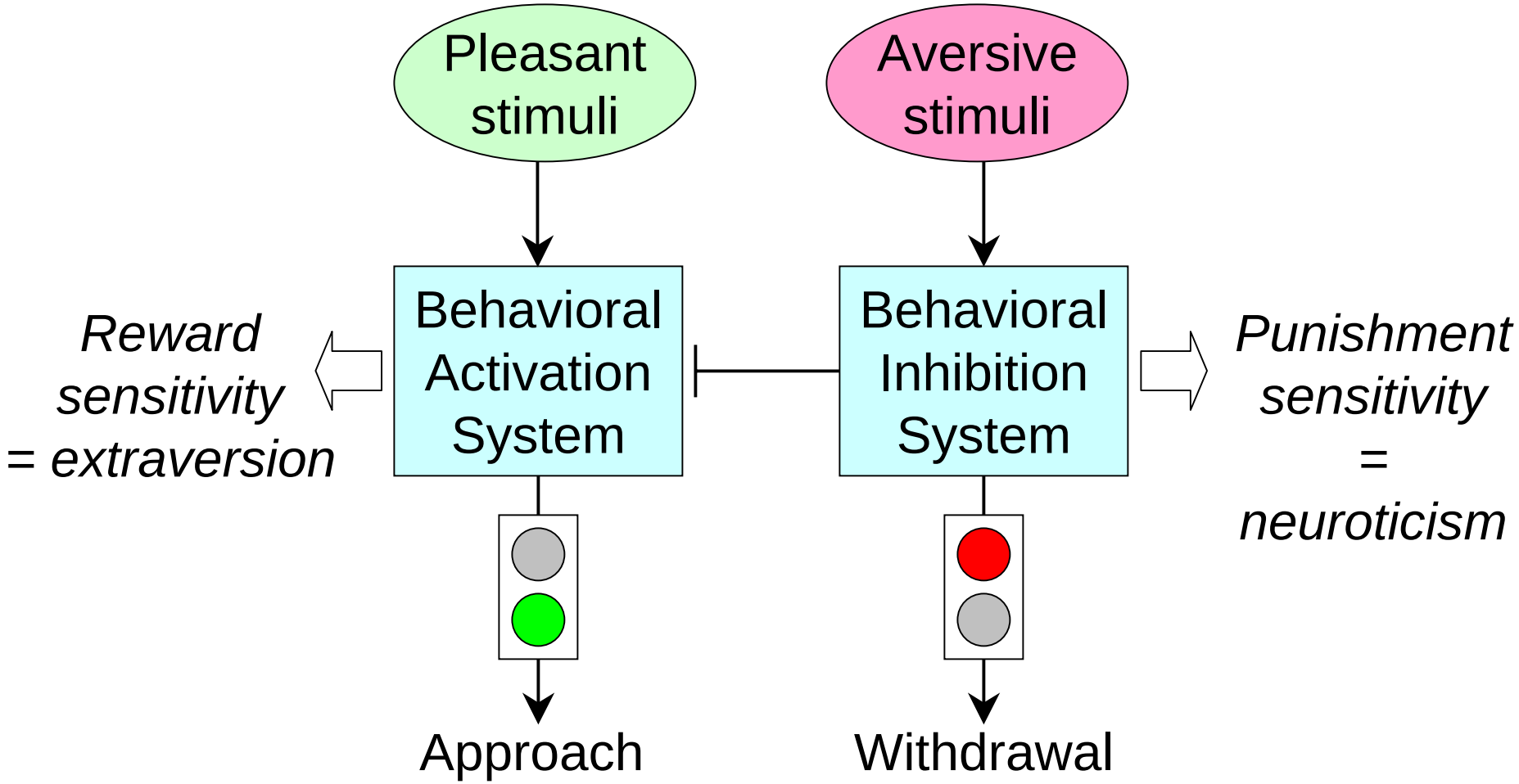
"…and not in 'extraversion' or 'neuroticism'!"

For instance, rats are afraid of open spaces and will show signs of anxiety (e.g., increased defecation) when placed into an open compartment.



But they also show individual differences in anxiety levels. Selective breeding for low and high levels of anxiety can create low-anxiety (= nonreactive) and high-anxiety (= reactive) strains of rats in just a couple of breeding generations. Reactive rats learn better on tasks that involve punishment than non-reactive rats.

Gray's Model of BIS/BAS Responsiveness



Two Extremes of Dopamine Release in the Brain

Encephalitis lethargica:
Damage of dopamine neurons leads to inability to initiate any behavior

…a case of extreme introversion?

ADHD:
Excessive activation of dopamine neurons leads to "too much behavior"

…a case of extreme extraversion?

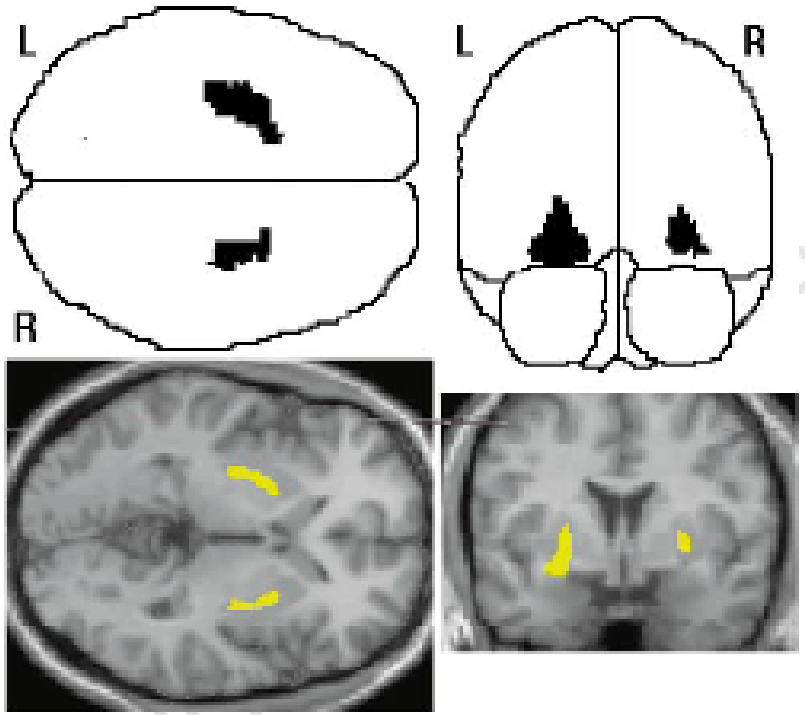
Blasting Enemy Tanks Increases Brain Dopamine: The Koepp et al. (1998) Study

Method:

Participants played a videogame in which they had to shoot at enemy tanks and collect flags while their brains were PET-scanned for dopamine activity.

Results:

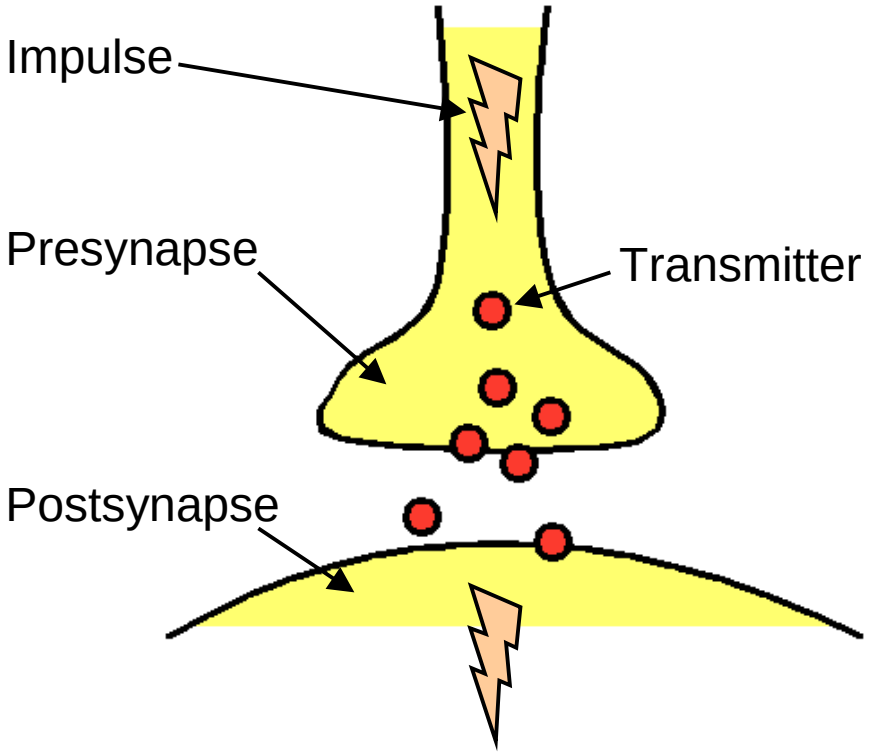
During the video game, participants showed dopamine increases in the striatum (part of which is the nucleus accumbens). These increases were more pronounced (a) in the left hemisphere and (b) in participants who attained higher game levels.



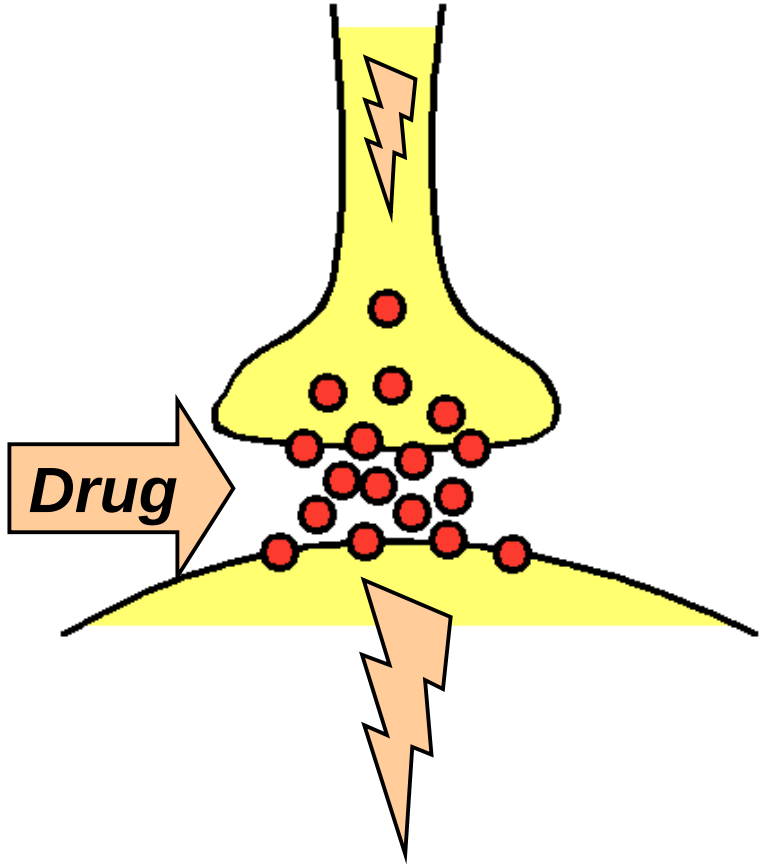
Regions of the brain in which a significant increase of dopamine over baseline levels was observed.

Effects of Drugs and Agonists On Synaptic Signal Transmission

Normal synaptic signal transmission:



Effect of drug or agonist:



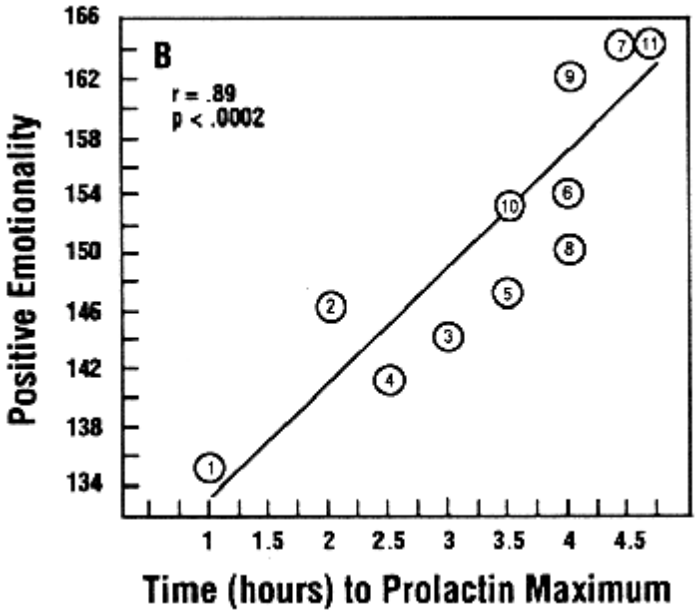
Relating Dopamine to Extraversion: Depue et al's (1994) Challenge Study

Method:

Participants filled out Tellegen's MPQ and were administered either a dopamine agonist or a placebo. Central dopaminergic activation was assessed by its effects on prolactin suppression and eyeblink rate increase.

Results:

Participants' overall scores on the MPQ extraversion scale (called Positive Emotionality) were strongly and positively related to all measures of central dopaminergic activation. Thus, extraverted individuals seem to be equipped with more responsive or extensive dopamine systems.



High-PEM individuals took longer for the maximal suppressive effect of DA on prolactin (PRL) to occur. Why? They also showed the strongest PRL suppression (*r* = .75) and it took them proportionally longer to descend to the lowest PRL levels than individuals with less PRL suppression.

So Who's Right? Eysenck or Gray?

Eysenck's sensory arousal theory

Strengths:

- explains effects of sensory stimulation on introverts & extraverts very well
- explains EEG findings very well

Weaknesses:

- bad at explaining findings from learning studies
- bad at explaining subjective affect findings

Gray's behavioral activation theory

Strengths:

- explains effects of personality on conditioning very well
- explains effects of personality on subjective affect very well
- compatible with animal learning literature

Weaknesses:

- bad at explaining sensory stimulation and EEG findings