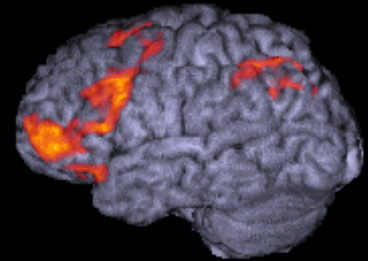


# Giftedness and the brain

## Session 3: 1430-1600

- **Neuromyths and fads**
  - The 10% myth
  - The dolphin myth
  - The L & R Thinking myth
  - The MI myth
  - The VAK myth
  - **The brain gym myth**
- Neural basis of emotion
  - Phineas Gage
  - Love vs fear
  - Attitudes in education research

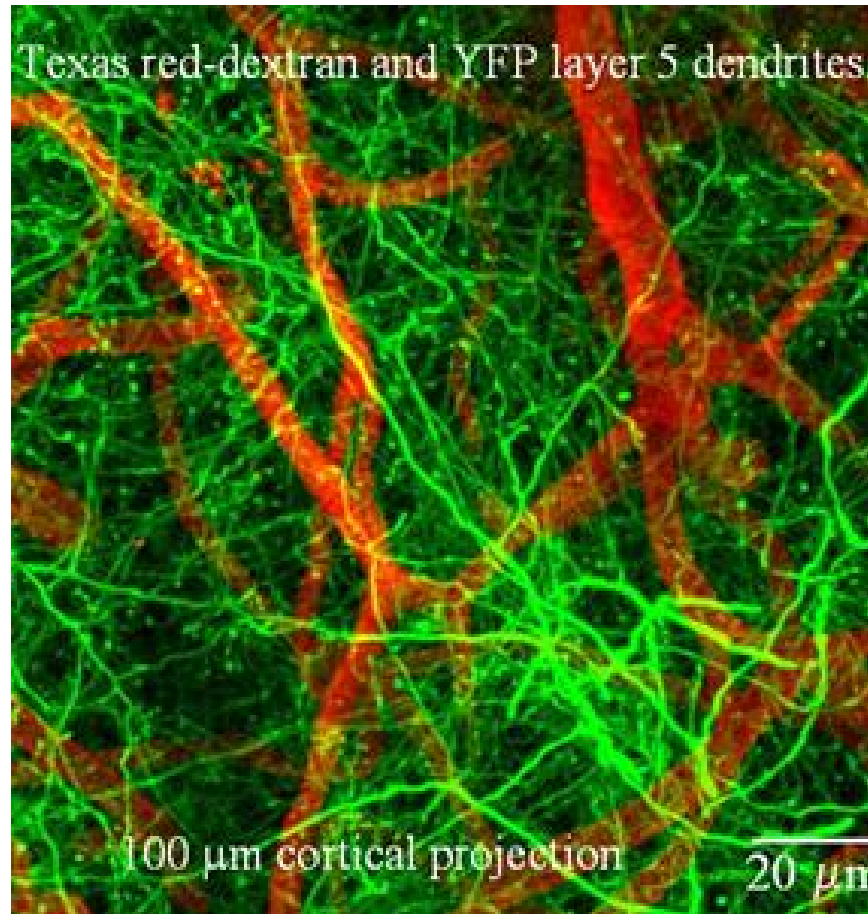


# Popular nonsense about the brain

## 6

“Brain gym activates specific brain areas”

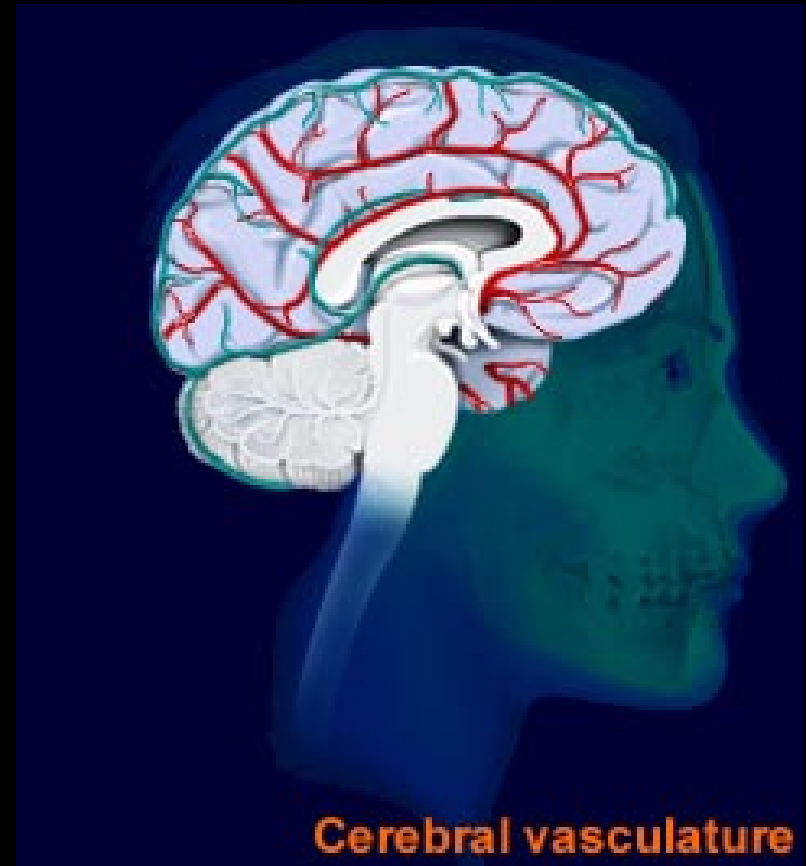
# Cerebral vasculature permeates dendritic arborisation



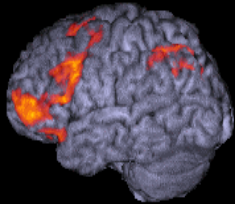
Murphy, 2002

# Brain vasculature is bilateral and fractal

Exercise that increases  
blood flow anywhere,  
  
increases blood flow  
everywhere.



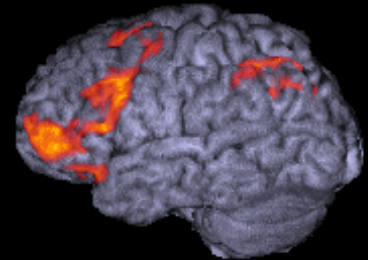
If someone wants to sell you a brain-based learning scheme, ask them what neuroscience laboratory they work with.



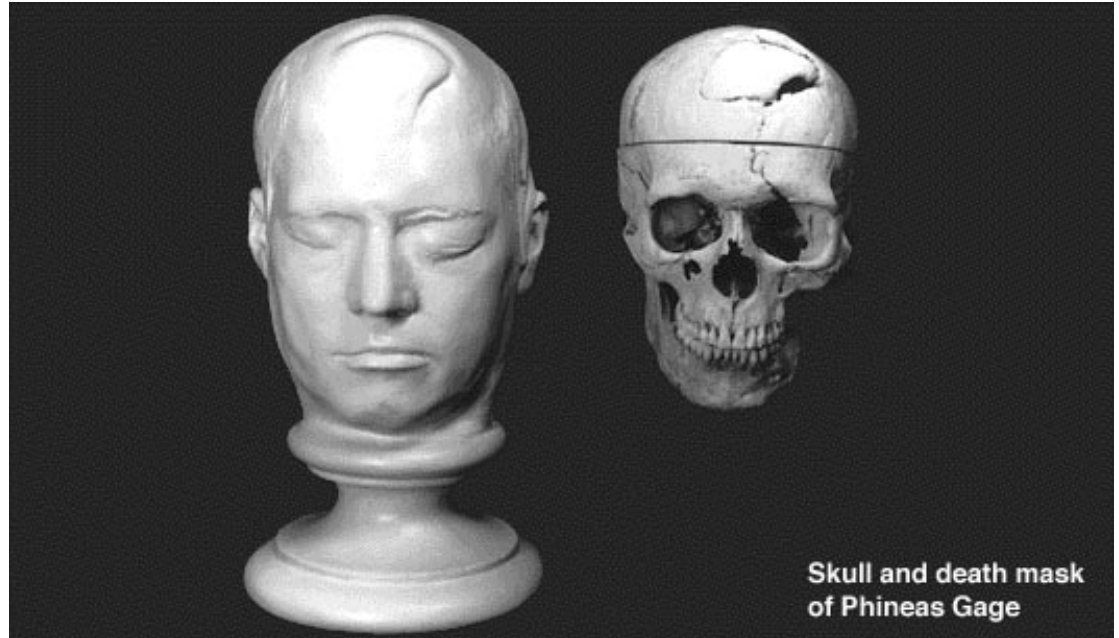
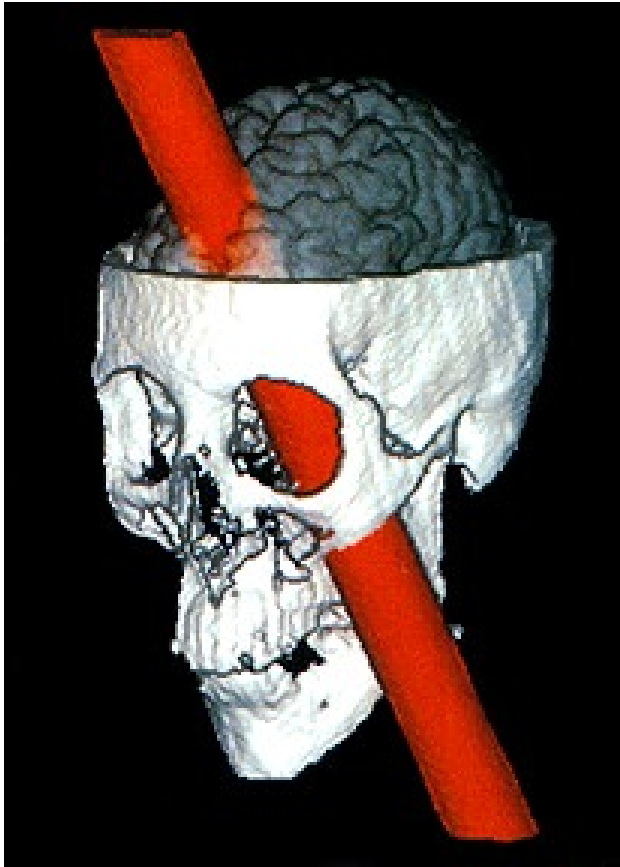
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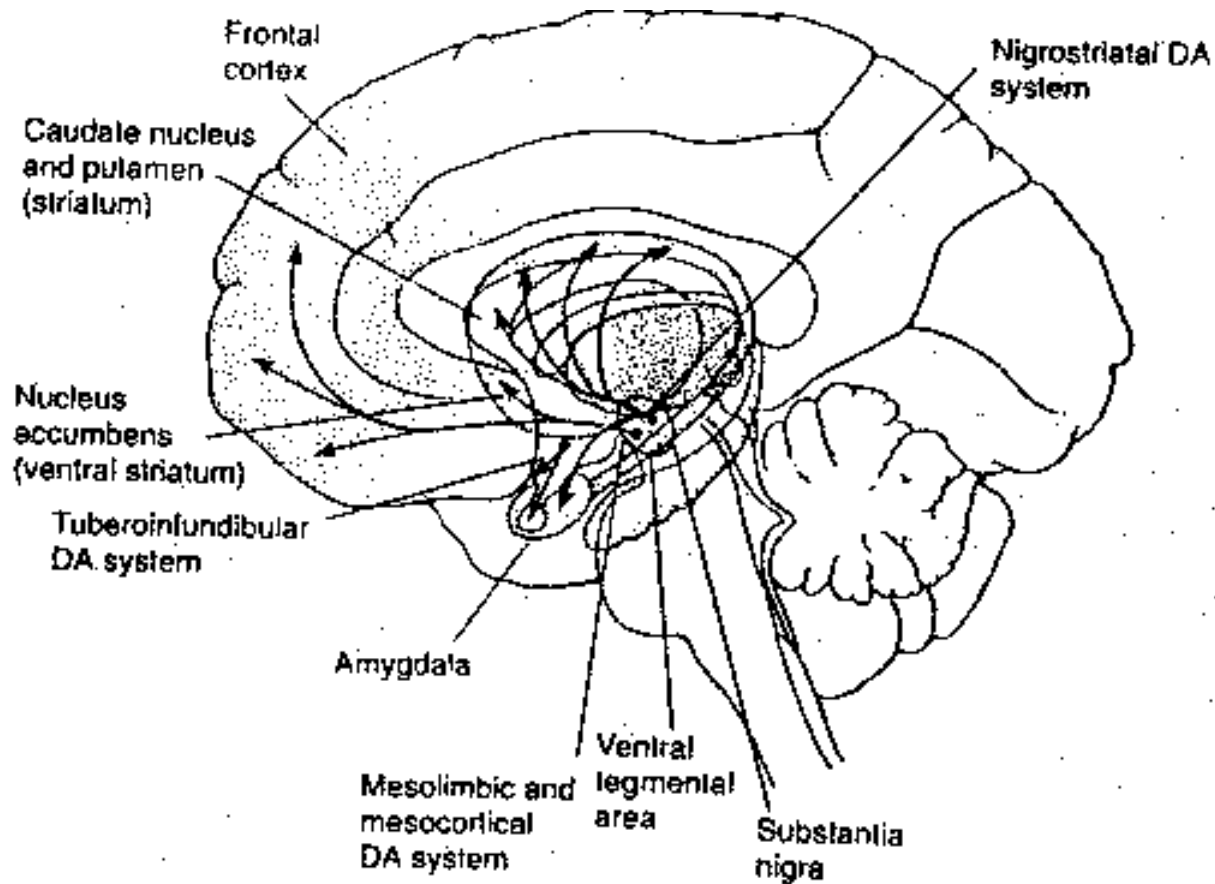


# The strange tale of Phineas Gage



Shreeve, 1995

# Dopaminergic pathways



Best, 1990

# Reward seeking

The release of dopamine can even be triggered by the environment associated with the reward, without the reward itself even having to be present!

Dopamine would then be responsible for a whole set of behaviours designed to obtain the reward.

# Genetic basis of reward

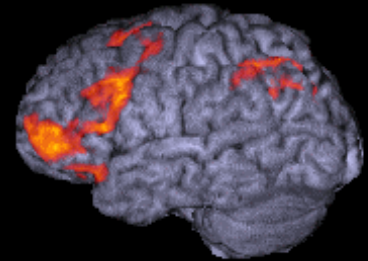
Blocking the effects of gene D2 in monkeys cuts the link between motivation and perceived reward.

Humans have the same gene.

# Giftedness and the brain

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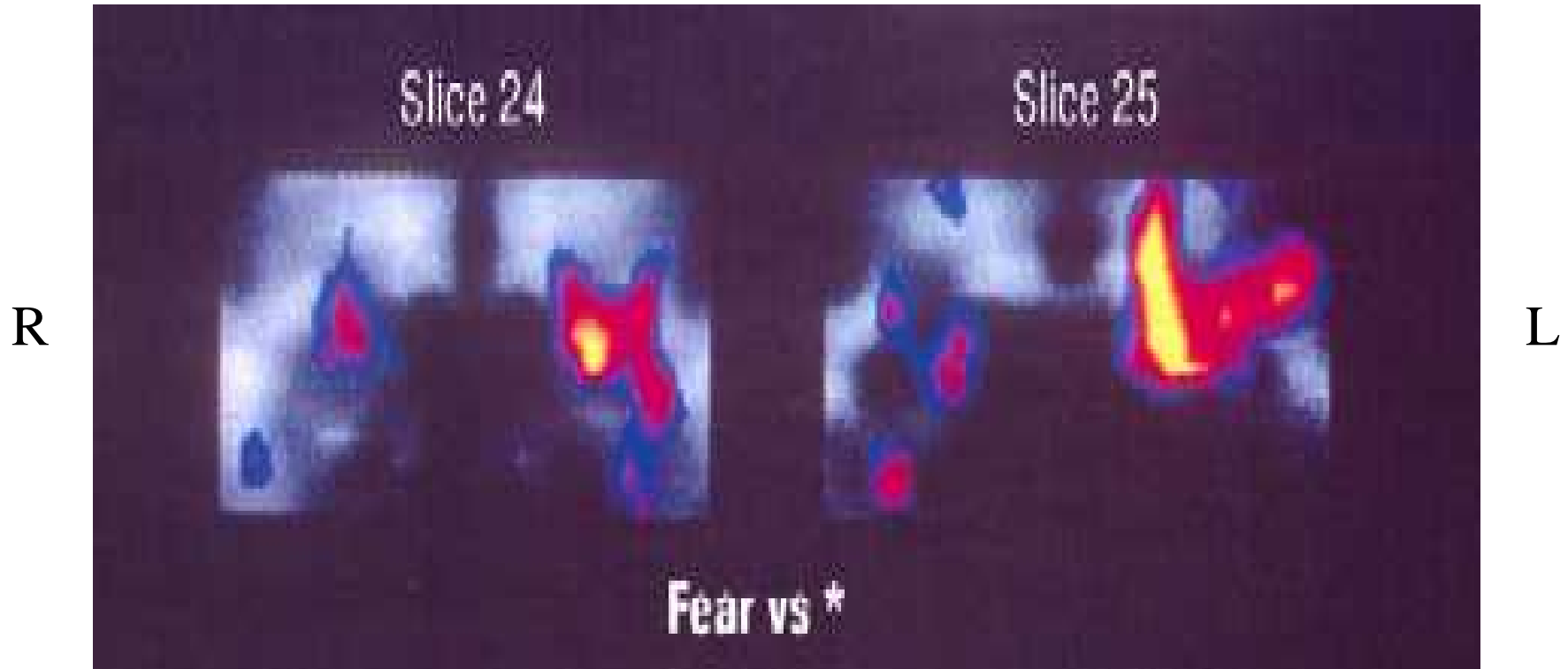


# The science of emotion 1

*Joseph LeDoux*

- *Consciousness and cognition.* Cognition is our ability to process and store information about the world. We are not necessarily conscious of those activities as they occur.
- *Emotion and cognition.* We also must distinguish between cognition and emotion, recognizing that many aspects of emotion rely on cognition and cognition similarly depends on emotion.
- *Implicit and explicit memory.* The emotional system of the brain is one of the most powerful learning systems that we have, but it is an implicit learning system. It can contribute to explicit memory, so that we have memories about emotional situations that are explicit and consciously available.
- *Nature and nurture.* We come into the world capable of being afraid and capable of being happy, but we must learn which things make us afraid and which make us happy.

# Amygdala activation seeing fearful faces



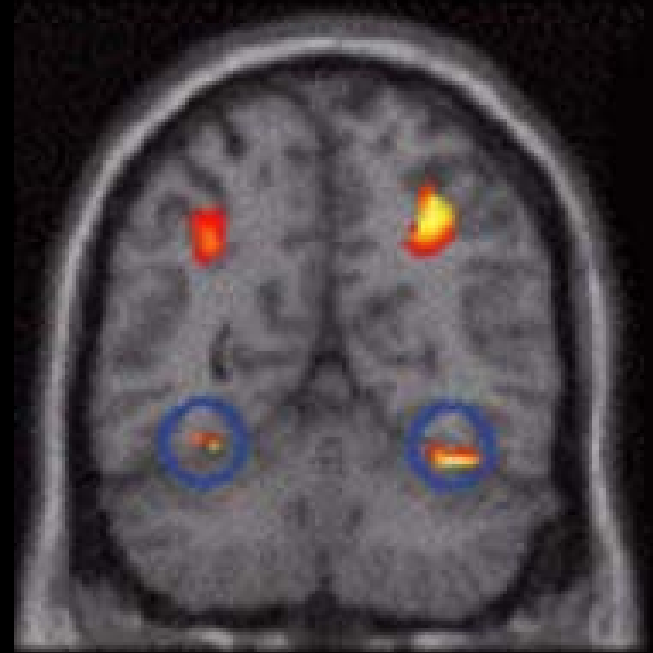
Morris J, Frith C, Perrett D, et al, 1996

# The science of emotion 2

*Joseph LeDoux*

- Fear is the emotion most responsible for reinvigorating the study of emotion. The amygdala is the key, no matter how the stimulus comes into the brain: through the eyes, the nose, the ears.
- The amygdala is programmed to react without benefit of input from the thinking part of the brain, the cortex. Eventually the cortex gets involved, but this processing takes longer.
- We also know that the amygdala's input to the cortex is much stronger than communication the other way. An emotional reaction like fear can more easily gain control over the cortex and influence cortical processes than the cortex can gain control over the amygdala.
- Thus, it is possible for emotions to be triggered in us without the cortex knowing exactly what is going on. For many of us, this happens all the time.

# Angry vs happy face: medial vs lateral frontal cortex



Kringelbach & Rolls, 2003

# The self-esteem causality myth

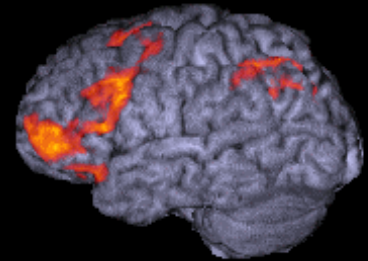
- Raising self-esteem does not improve grades
- Improving grades can raise self-esteem

Baumeister et al, Scientific American, January 2005

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# There are multiple emotion systems in the brain

Joy is not mediated by the fear system

Agreeing and disagreeing use separate brain systems

Likert 'scales' (*Agree – Disagree*) are not unitary

Much Likert scale research is bunkum