Not a HOT Dream

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Outline

1. Introduction
   - Phenomenal Consciousness
   - Higher-Order Thought Theories
2. The neural correlate of visual HOTs: dlPFC
   - The Experiment
   - The Interpretation
3. Dreams
   - Sleep and Dreams
   - Neurophysiology of REM sleep phase
4. The Argument
5. Objections
   - HOTs have a different neural correlate during dreams
   - Dreams are not phenomenally conscious experiences.
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Access vs. Phenomenal Consciousness

- Access Consciousness
- Phenomenal Consciousness

- Some form of access seems to be essential to phenomenology: when one has a phenomenally conscious experience, one is in some way aware of it.
- Phenomenal Consciousness requires *Awareness.*

- Target: Theories that maintain that *Awareness* requires cognitive accessibility, the same cognitive accessibility that underlies reports.

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Higher-Order Thought Theories

- A mental state M is conscious if and only if there is another mental state (*of the right kind*) to the effect that one is in M.
- Awareness is explained as being the target of the appropriate HOT.
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Higher-Order Thought Theories

[G]iven that a creature has suitable communicative ability, it will be able to report being in a particular mental state just in case that state is, intuitively, a conscious mental state. If the state is not a conscious state, it will be unavailable to one as the topic of a sincere report about the current content of one's mind. And if the mental state is conscious one will be aware of it and hence able to report that one is in it. The ability to report being in a particular mental state therefore corresponds to what we intuitively think of as that state's being in our stream of consciousness. (Thinking that one thinks)

Two Different Views

Higher Order:

A. Consciousness requires Awareness;

B. Awareness depends on the cognitive accessibility that underlies reporting.

First-Order:

A'. Consciousness requires Awareness;

B'. Awareness does not depend on the cognitive accessibility that underlies reporting.

There can be cases of phenomenal consciousness on which the subject cannot report.

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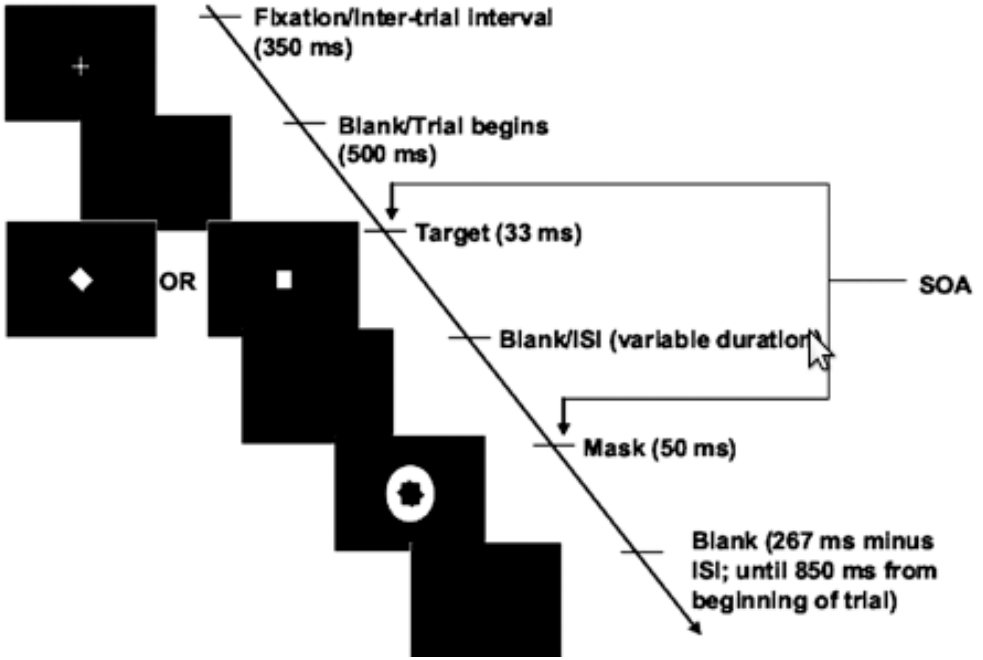
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Lau and Passingham's Experiment



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1. Decide whether a diamond or a square was presented. (Performance capacity)
2. Indicate whether they actually saw the target or simply guessed the answer. (Perceptual certainty)

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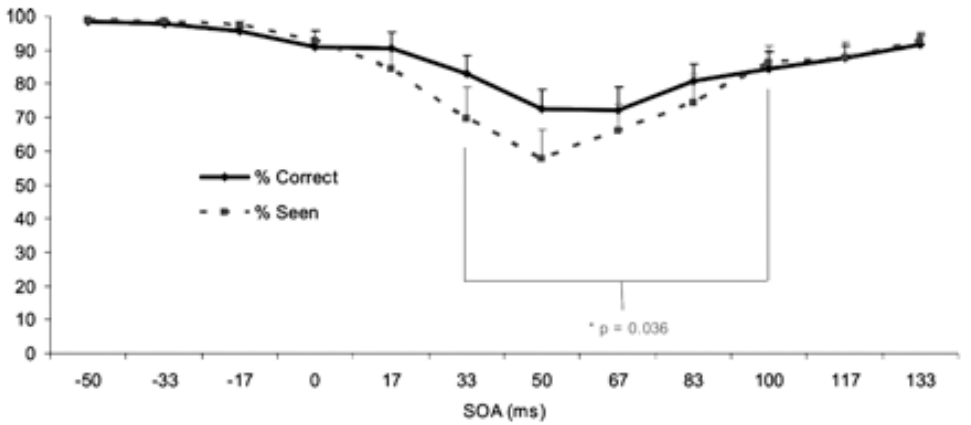
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fMRI Comparison

- Lau and Passingham performed a fMRI study on the subjects of the experiment.
- The study revealed that the long SOA condition was associated with a significant increase in activity in the left mid-dorsolateral prefrontal cortex (mid-dlPFC, Brodmann's area 46).
- The cognitive ability underlying reporting in the case of visual experiences depends on the dlPFC.
- dlPFC is the neural correlate of HOTs, at least in the case of visual experiences.

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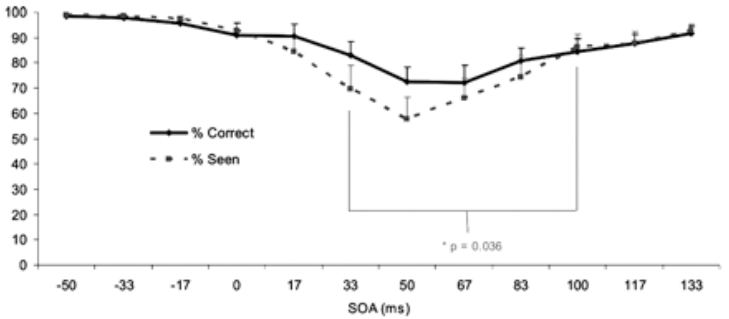
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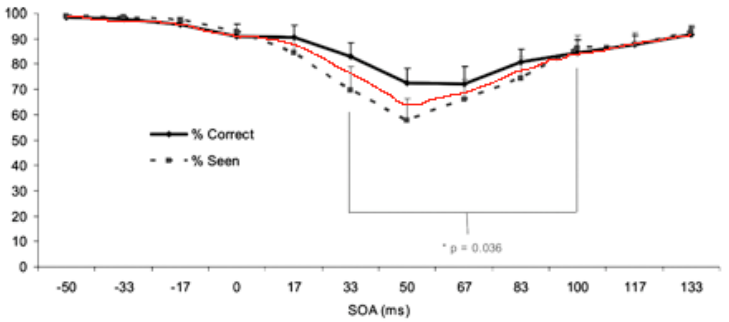
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- First-Order:
  - dlPFC is the correlate of the cognitive accesibility underlying reports.
  - The curve that corresponds to phenomenal consciousness lies somewhere between the 'correct' curve and the 'seen' curve.

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Sleep and Dreams

- Dreams as '...a subjective experience during sleep, consisting of complex and organized images that show temporal progression'. (Revonsuo 2000)
- Our dreams are highly visual, with rich colors, shapes and movements, and include sounds, smells, tastes, tactile sensations, and emotions, as well as pain and pleasure (Hobson et al 2000).
- Sleep is traditionally divided in two phases: non-rapid eye movement (NREM) sleep and REM sleep.
- Dreams occur during (though probably not exclusively) REM phase of sleep.

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NREM and REM phase

- Global reduction in metabolic activity and blood flow up to 40%.
- Cortical level: reduced in the orbitofrontal, anterior cingulate ... and dlPFC –broadmann area 46!! (Braun et al. 1997, Maquet et al. 1996)
- Further decrease in the activity of the dlPFC during REM phase compared to NREM phase. (Braun et al.1997)
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The Argument

1. Phenomenal consciousness depends on the cognitive accessibility that underlies reporting.
2. The cognitive accessibility that underlies reporting in the case of visual experiences depends on the left dorsolateral prefrontal cortex (dlPFC).
3. dlPFC is necessary for visual phenomenal consciousness.
4. We have conscious visual experiences during the REM phase of sleep.
5. dlPFC is deactivated during the REM phase of sleep.
6. dlPFC is not necessary for conscious visual experiences.

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HOTs have a different neural correlate during dreams

- HOT's neural correlate during wakefulness: dlPFC.
- HOT's neural correlate during dreams: SNCHOT (anterior cingulate?)
- REM sleep seems to be exclusive to marsupial and placental mammals (Winson 1993).
- The plausibility of SNCHOT depends on the function of dreams.

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- Most theories of dremas yield them as epiphenomenal.
- Activation-Sythesis theory: dreams are the result of the forebrain responding to random activity. Dreams are noise activity (Hobson and McCarley 1997)
- Dreams have a function in memory processing (Crick and Mitchinson, Foulkes 1985, Hobson 1994)
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- As long as one cannot make the case for a distinctive role of HOTs during dreams we have no additional reason for defending the possibility of having an additional neural structure, SNCHOT, that differs from dlPFC.

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- The common sense position maintains that dreams are conscious experiences.
- Malcolm: we have no reason to believe the reports given by awakened subjects for there is no way to verify them; they could be cases of *false memory*.
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- The defender of HOT theory can embrace a skeptical position as to whether we have conscious dreams. This position, which runs against common sense, has been refuted by strong empirical evidence.

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- The position remaining for HOT theory is not a comfortable one, or so I have tried to argue. If dlPFC is activated during lucid dreams (there is no evidence in favor of this fact), HOT has to maintain an ontological dichotomy with regard to dreams (some dreams are phenomenologically conscious and others are not).