

IN SEARCH OF AMBIENT VISION

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Litton/TASC

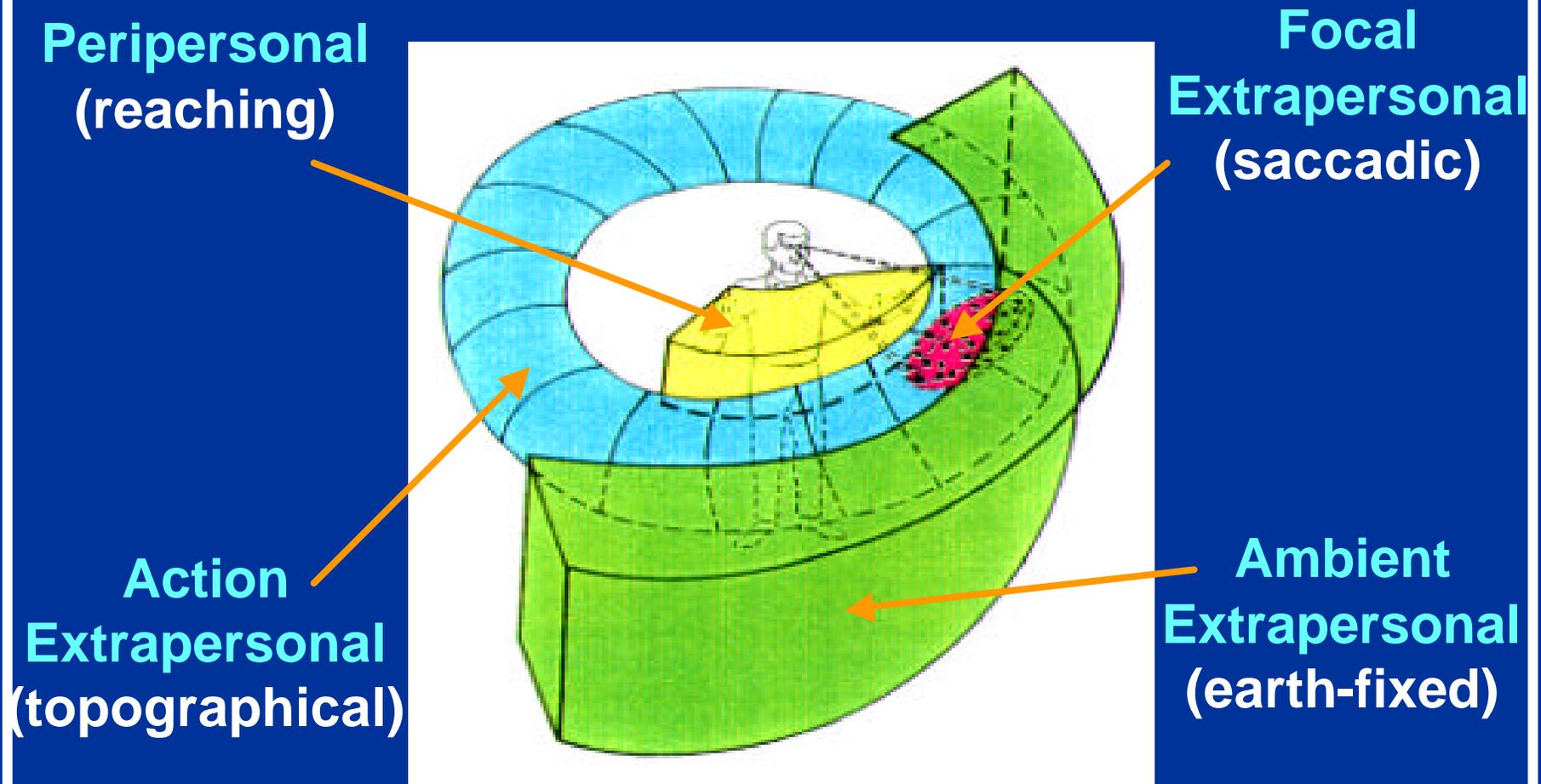
Recent Trends in SD Research
San Antonio TX
15 Nov 00



AMBIENT VISION: Background

- Term first coined in 1968
- “ ... Subserves spatial localization and [spatial] orientation”
- Known as “where” system
- Contrasted with “focal” vision

AMBIENT VISION: Location



Previc (1998)

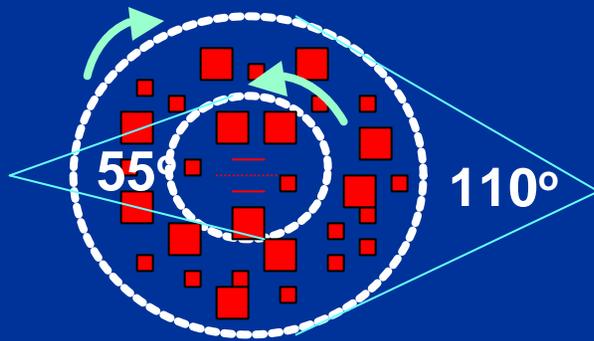
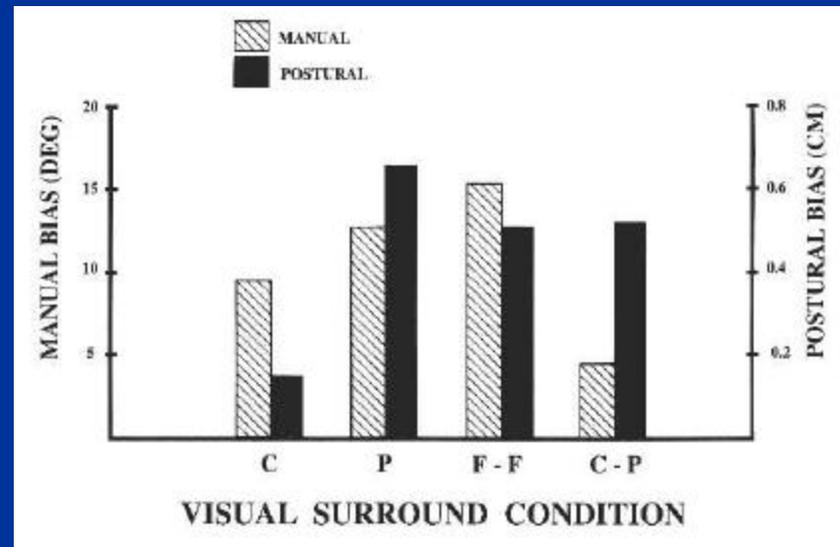
AMBIENT VISION: General Features

- **Area-dependent (biased toward peripheral eccentricities)**

AMBIENT VISION: Peripheral Dependence



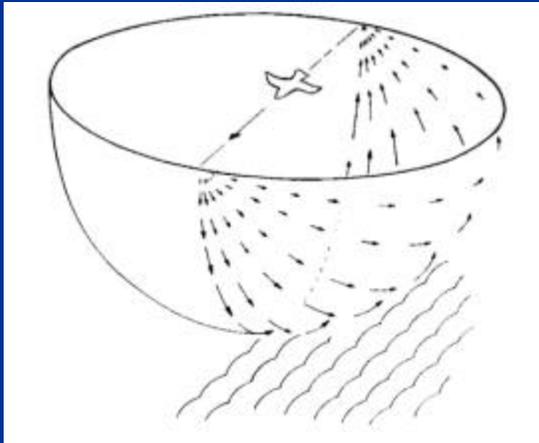
Previc & Neel (1995)



AMBIENT VISION: General Features

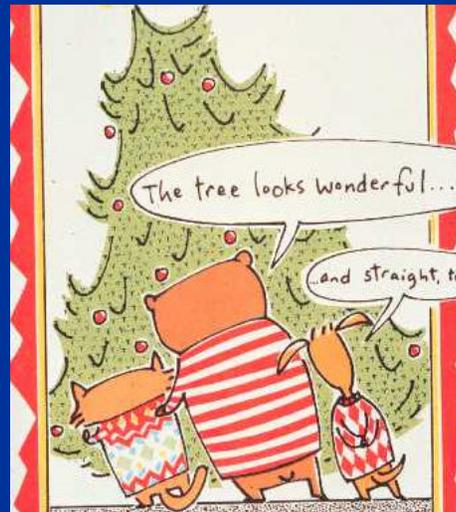
- **Area-dependent (biased toward peripheral eccentricities)**
- **Dominated by visual background**
- **Prefers relatively sluggish inputs (<0.2 Hz)**
- **Contributes to self-motion, sense of upright, slant perception**

AMBIENT VISION: Functions



Self-motion perception

Sense of upright



Slant perception



AMBIENT VISION: General Features

- **Area-dependent (biased toward peripheral eccentricities)**
- **Most dependent on background**
- **Prefers relatively sluggish inputs (<0.2 Hz)**
- **Contributes to self-motion, sense of upright, slant perception**
- **Mainly preconscious system**

AMBIENT VISION: Problems in its Recreation



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ASDD visual system
(114°, nearly collimated)

AMBIENT VISION: Problems in its Recreation



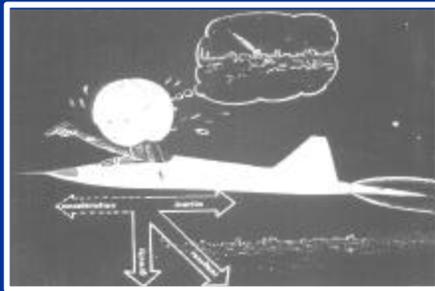
ASDD visual system
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Failure to achieve
“visual dominance”



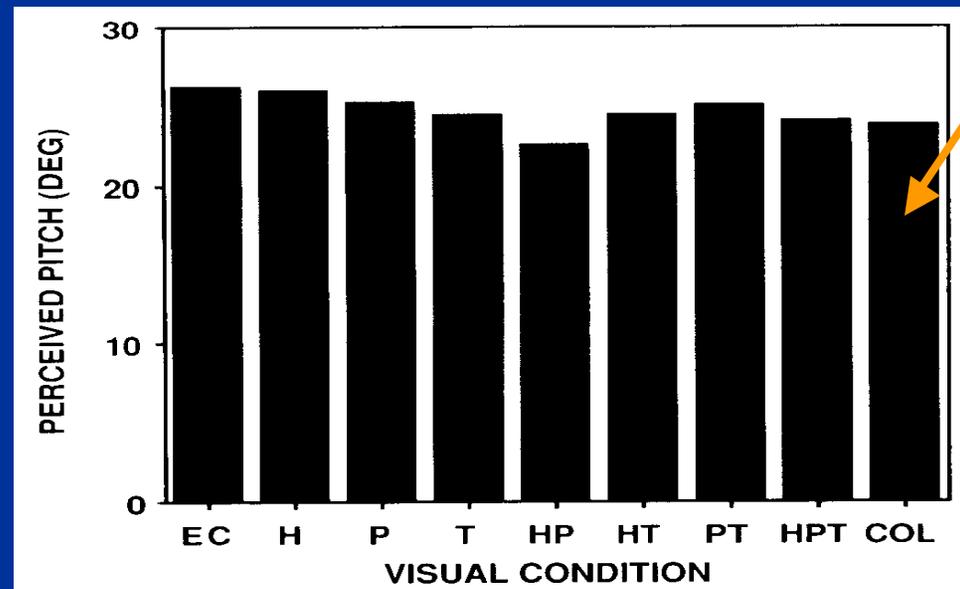
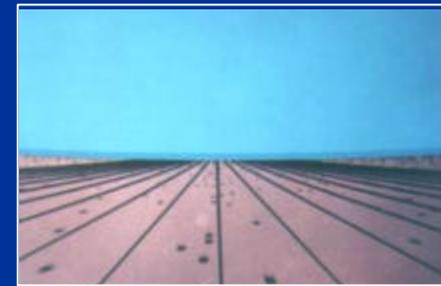
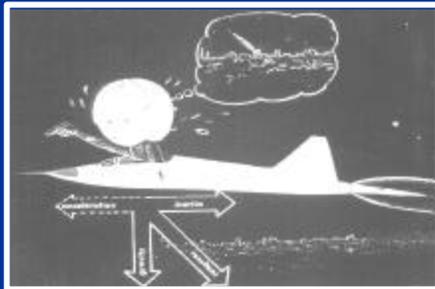
AMBIENT VISION: Problems in its Recreation

Previc et al. (1992)



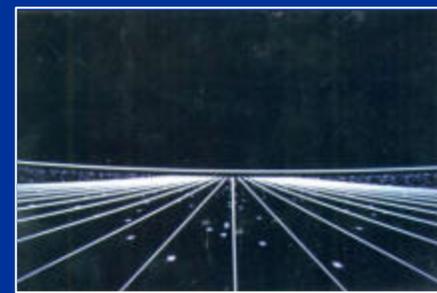
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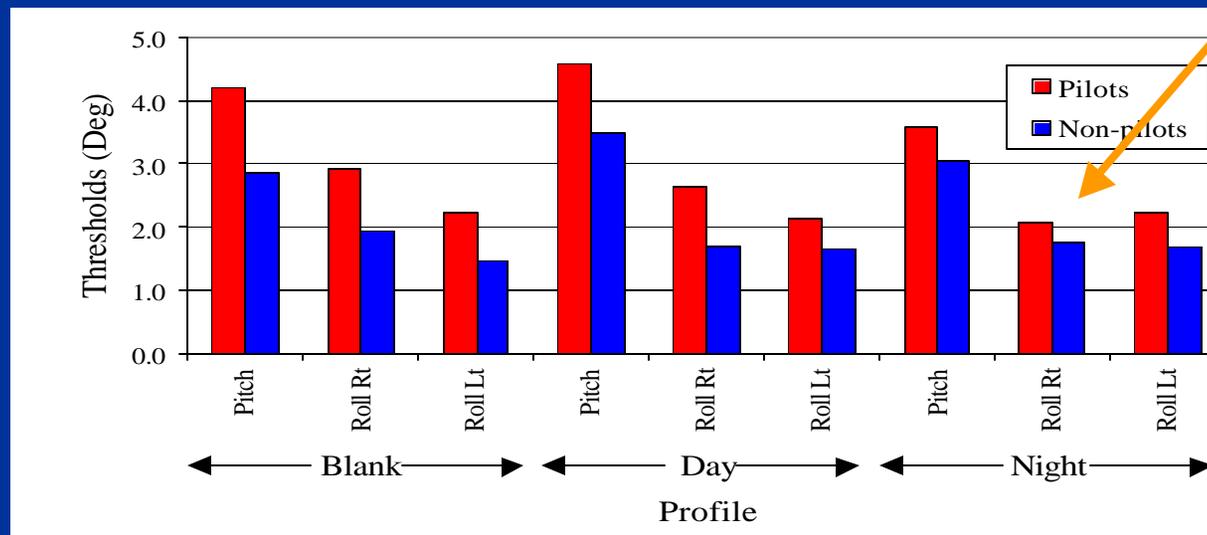
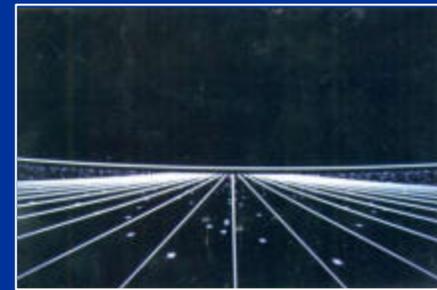
AMBIENT VISION: Problems in its Recreation

Otakeo et al. (in preparation)



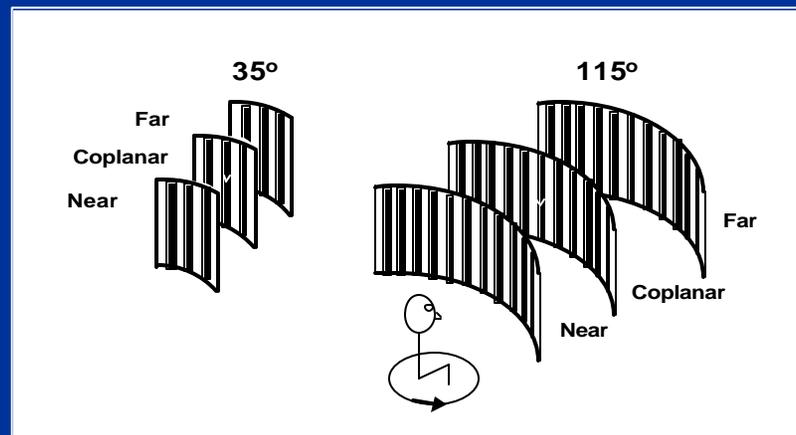
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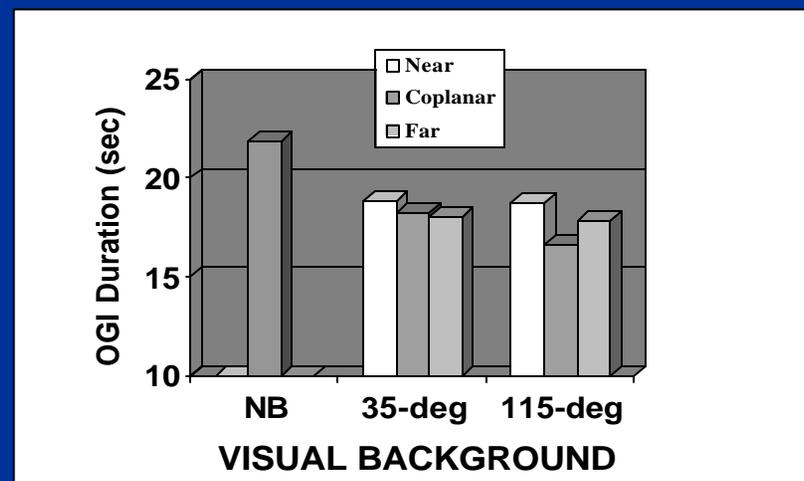
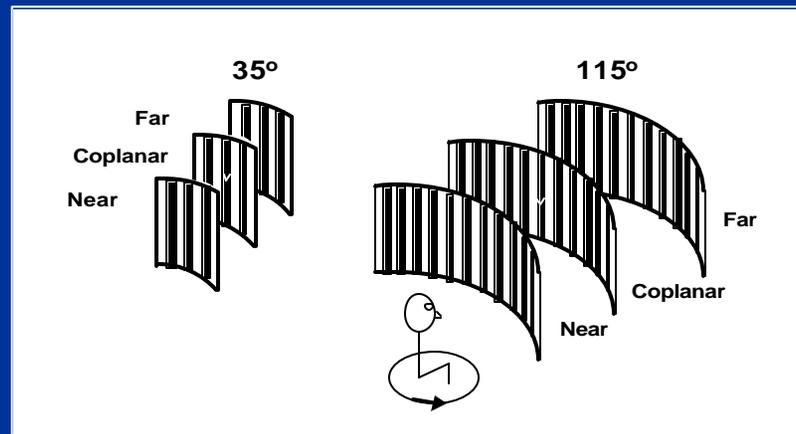
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AMBIENT VISION: What Recreates It?

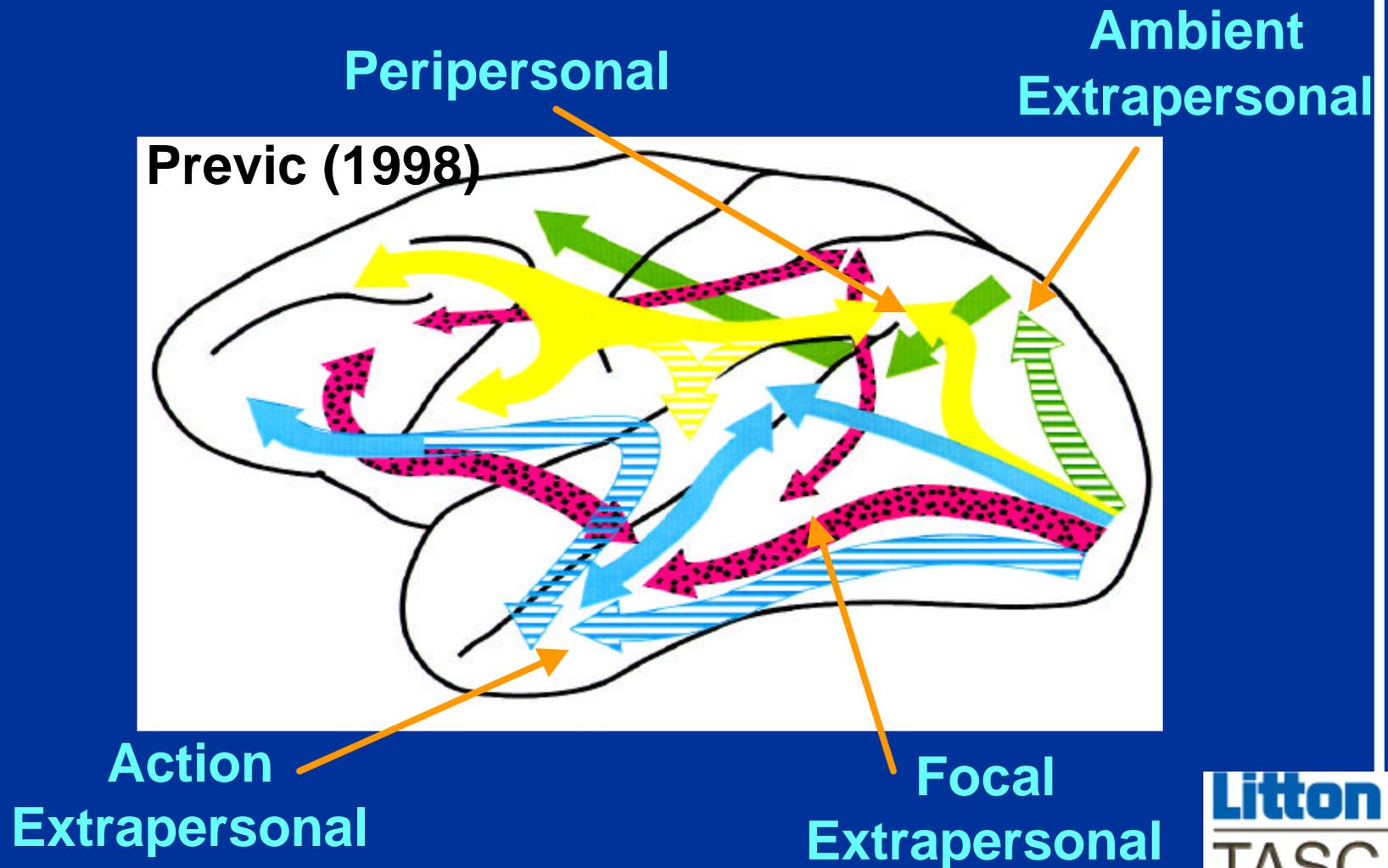
- Relatively greater distance, FOV (“beyond frame-of-motion”)
- “Believability”
 - Sufficient temporal resolution (>100 Hz?),
 - Spatial resolution (1 min of arc resolution?)
 - Realistic scene content
 - No conflicting depth cues or lags

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Painted surrounds (e.g., optokinetic chamber, room, or tilt-translation device) work better than computer displays!

AMBIENT VISION: Brain Mechanisms



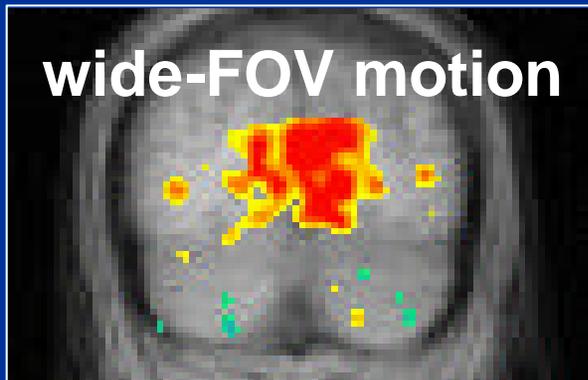
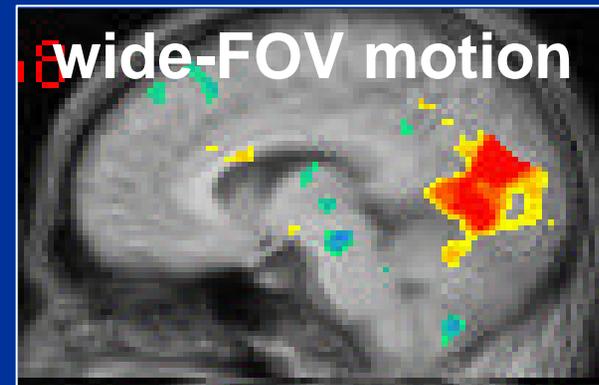
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Previc et al. (2000)



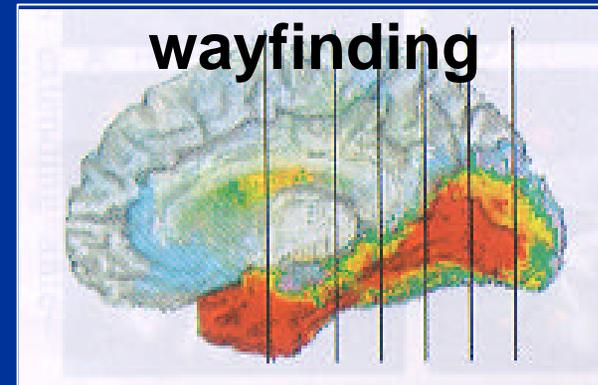
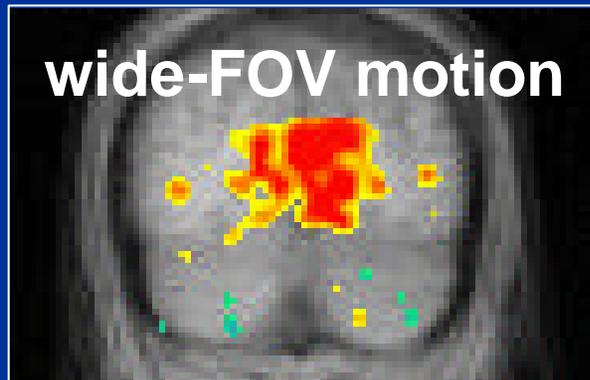
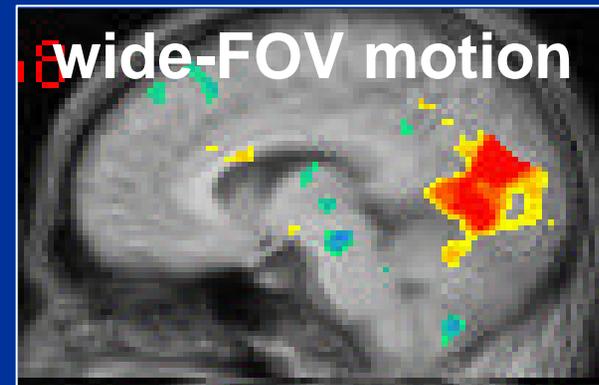
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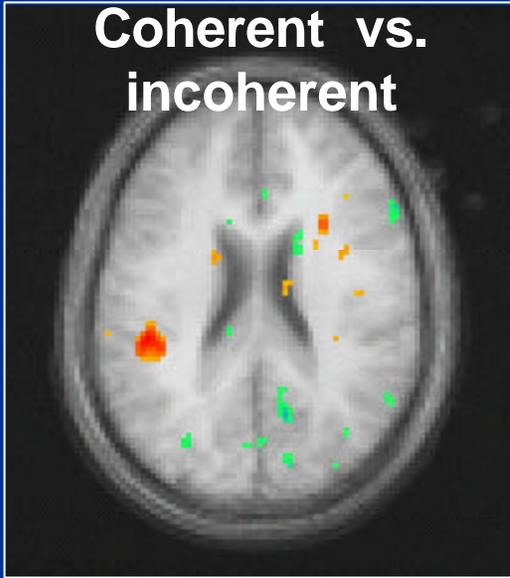
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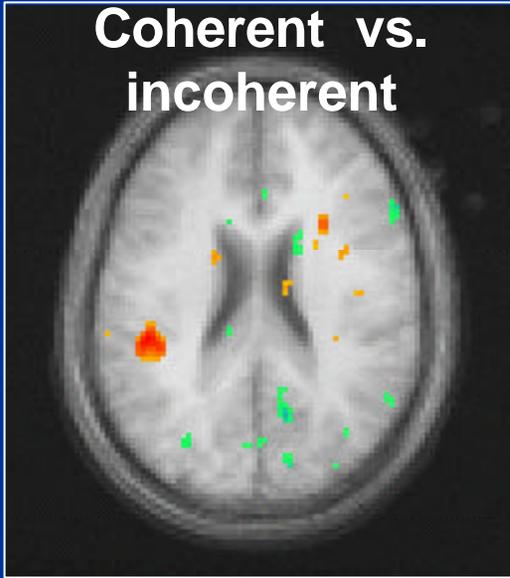
AMBIENT VISION: Brain Mechanisms

Coherent vs.
incoherent

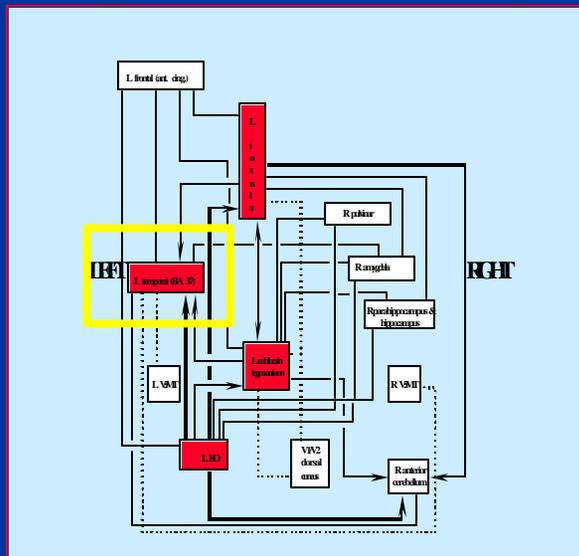


AMBIENT VISION: Brain Mechanisms

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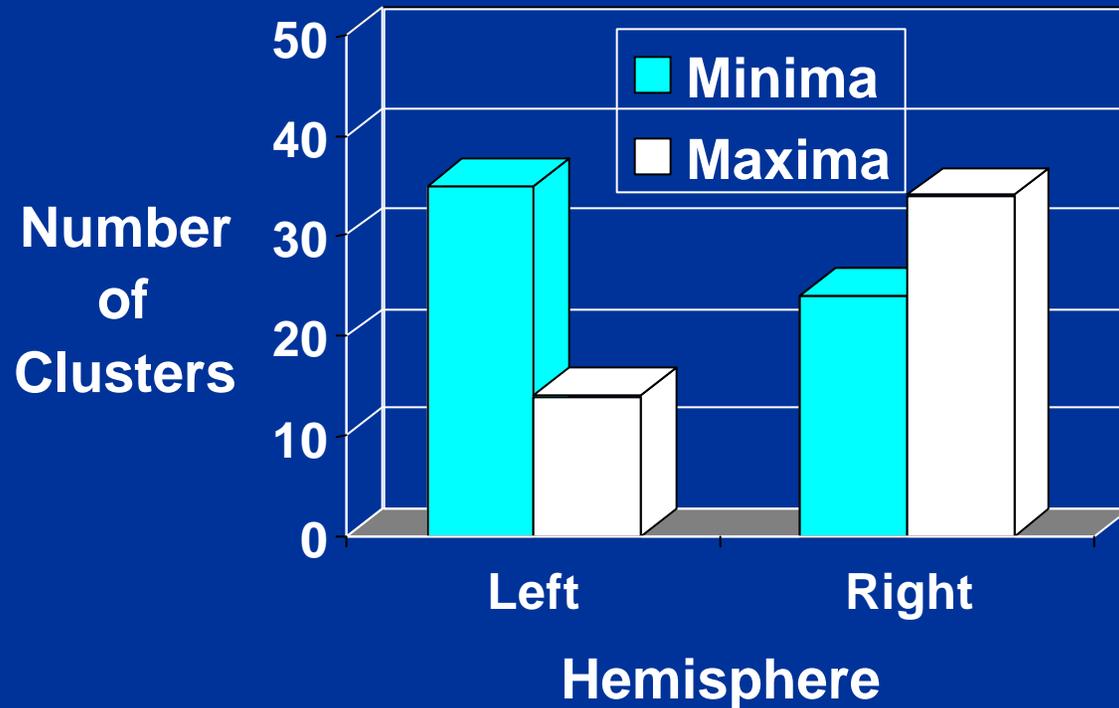


Coherent vs. incoherent
(Beer et al., 2000)

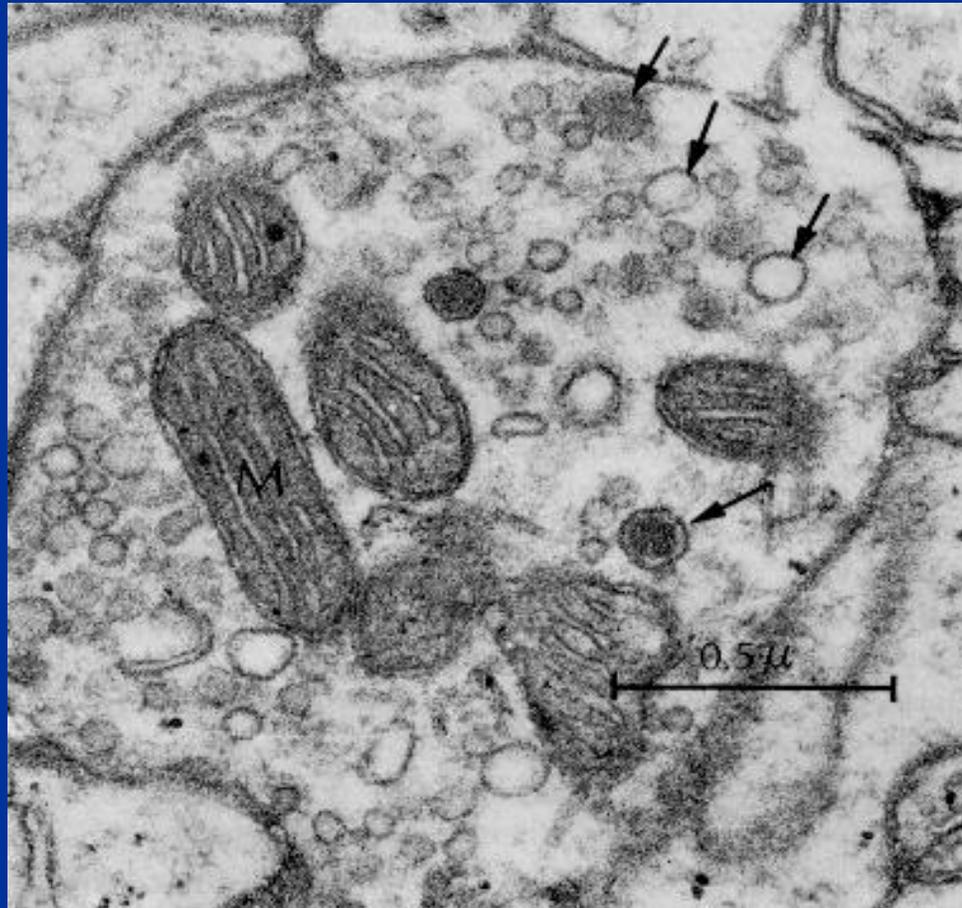


AMBIENT VISION: Brain Mechanisms

Right - Left Visual Yaw
(Previc et al., in press)



AMBIENT VISION: Its Footprints?



AMBIENT VISION: Summary

- **Ambient vision mostly relies on wide-FOV, distant inputs**
- **Ambient vision dependent on preconscious inferences**
- **Current computer-generated displays can only partially duplicate ambient vision**
- **Ambient vision uses separate visual pathways; may ultimately prove to be a highly distributed system**