CROSS-MODAL ASSOCIATIONS ACHIEVED WITHOUT CONSCIOUS PERCEPTION: IMPLICATIONS FOR THEORIES OF CONSCIOUSNESS

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[3] Department of Psychology, University of Wisconsin, Madison
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Seeking a Test of Global Workspace Theory

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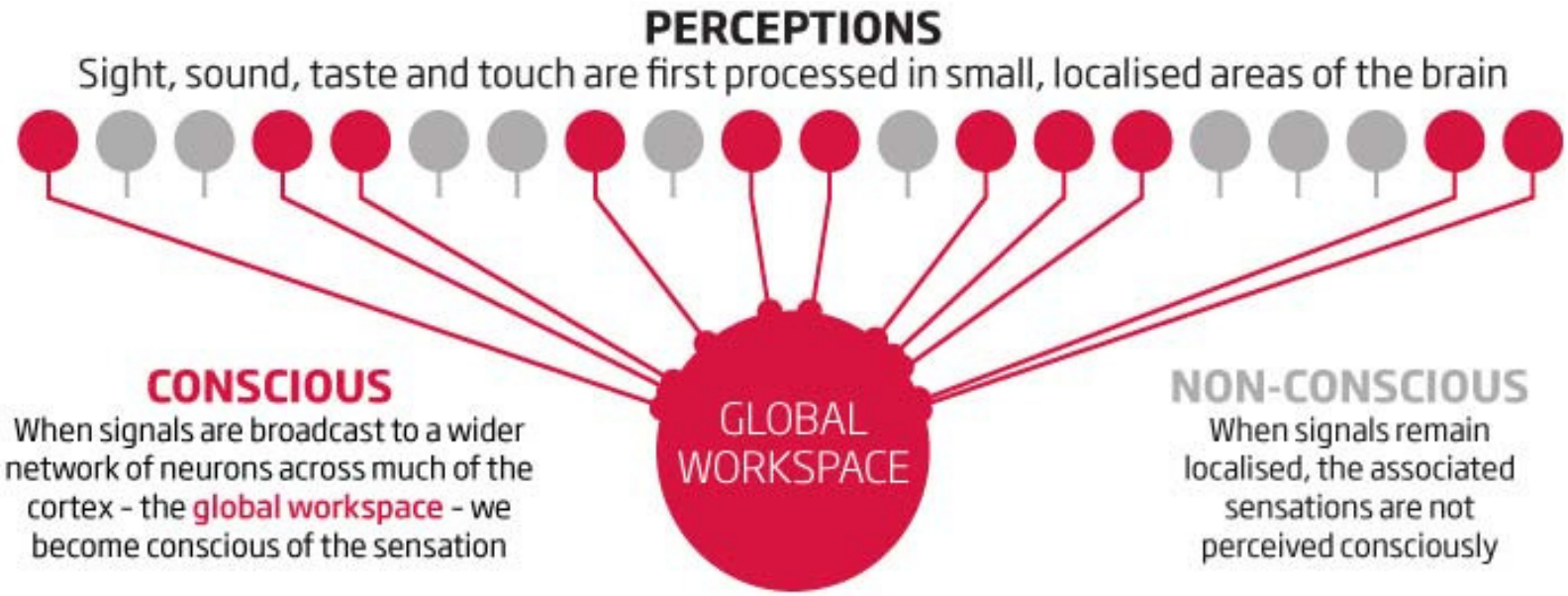

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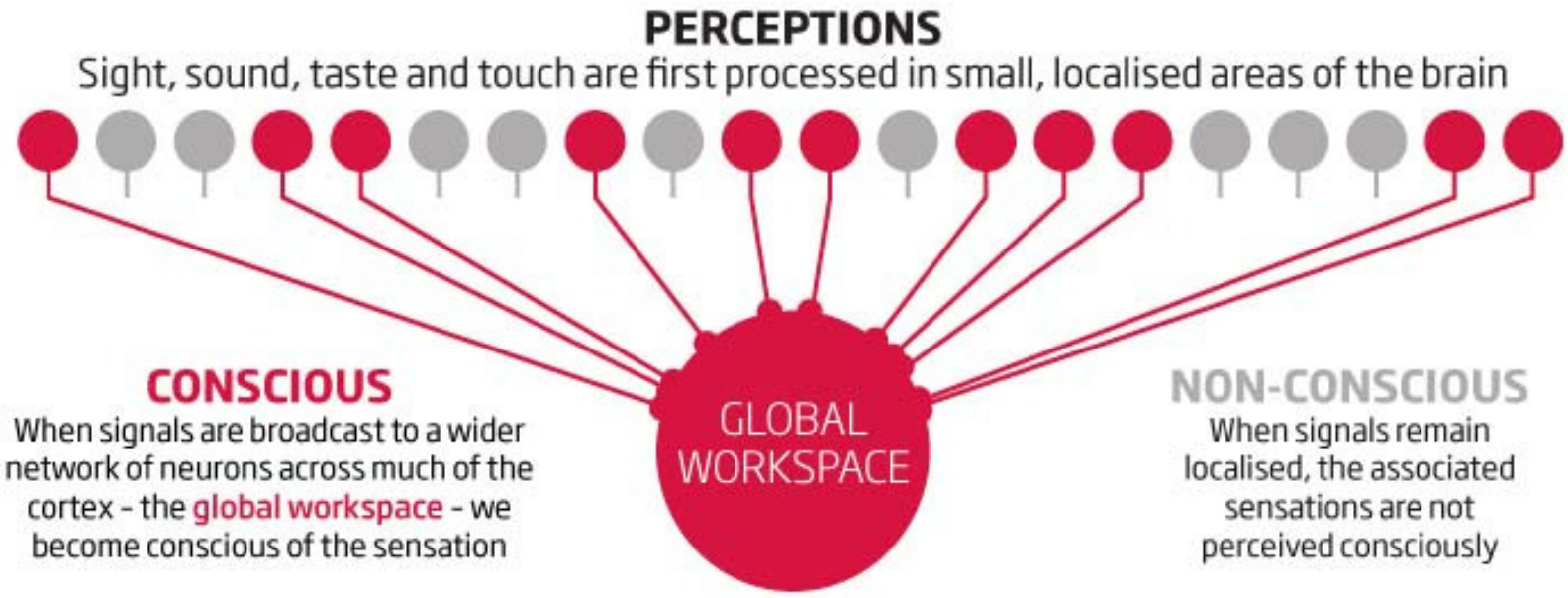

- An implication - learning dependent on the broadcast to a wider network should not occur without conscious awareness
- For example, we should not form unconscious associations between stimuli in different perceptual modalities
- Unconscious ‘cross-modal binding’ should not be possible

Background

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Unconscious Associations within a Single Modality

- Pessiglione et al., (2008) – Subliminal Instrumental Conditioning
- Duss et al., (2011) – Subliminal Face-Profession Pairs
- Reber & Henke, (2012) – Subliminal Word Pairs
- Atas et al., (2012) – Subliminal Sequence Learning

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Unconscious Cross-modal Associative Learning

- Arzi et al. (2012) – Cross-modal associative learning during sleep

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Adopted a Three Study Sequence

- Auditory modality, visual modality, cross-modal
- Informative irrespective of cross-modal success.

Experiment 1: Auditory Modality

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Pre-test stages

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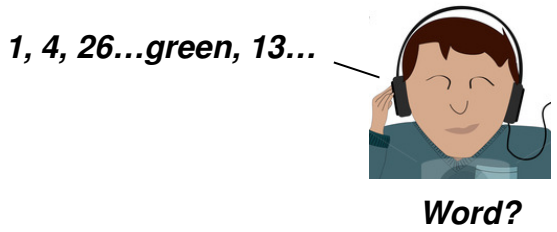
- Find auditory threshold in right ear (Report the non-number word)



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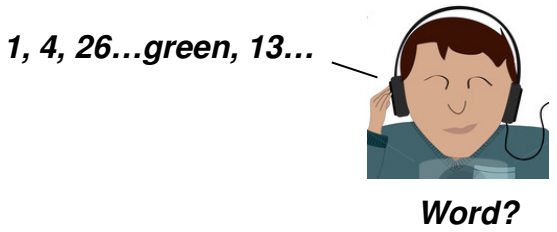
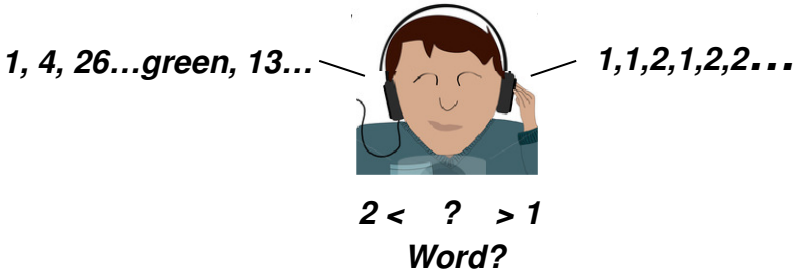


- Introduce attentional task in left ear (Press left for 1, and right for 2)



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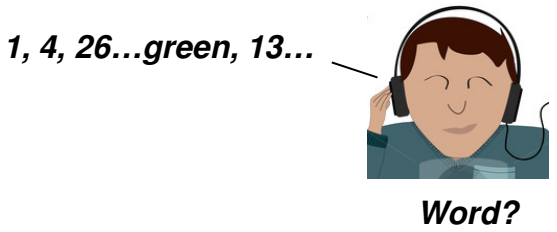

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Delay (>200 ms) after prime predicts negative priming (Eimer, 2006)

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Pre-processing and exclusions (Identical for all 3 experiments)

- RTs transformed using a reciprocal transformation to improve normality
- Participants making > 25% classification errors ($N = 1$)
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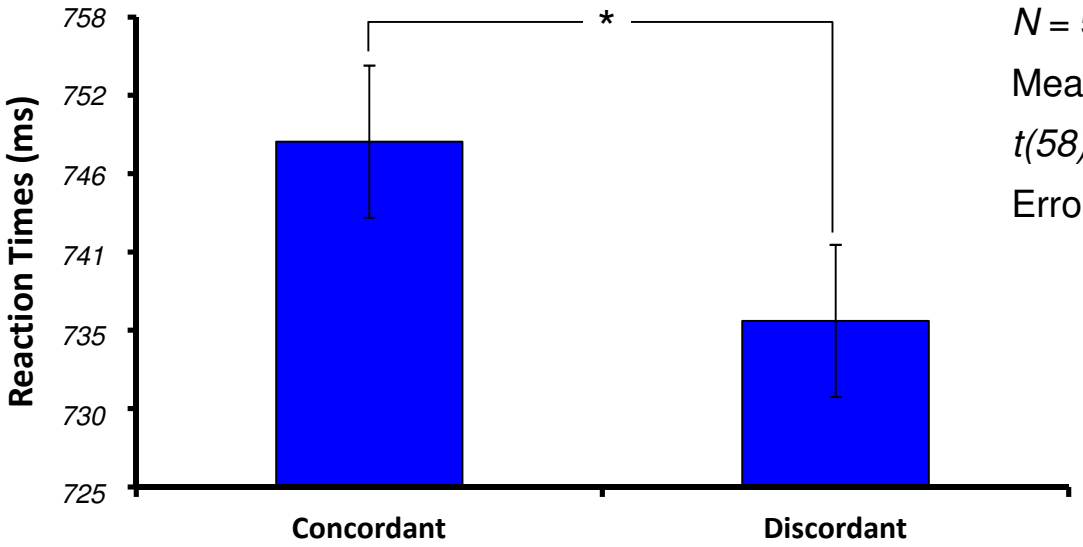

N = 59

Mean Difference = 13 ms

t(58) = 2.35, p = .022, dz = 0.31

Error bars = +/- 1 SEM diff.

Experiment 2: Visual Modality

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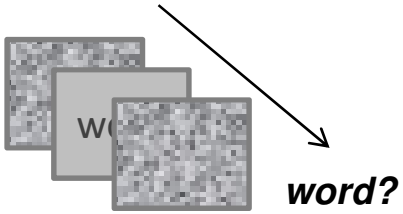

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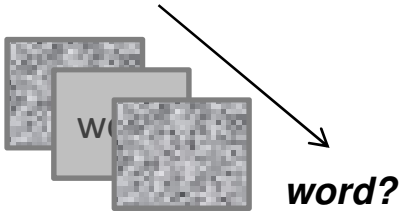
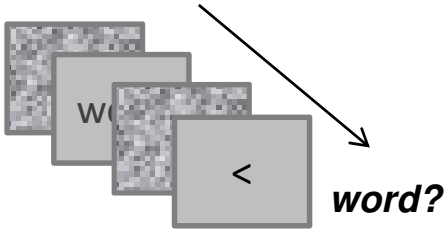


- Introduce attentional task)
  (Press left arrow or right arrow as seen)



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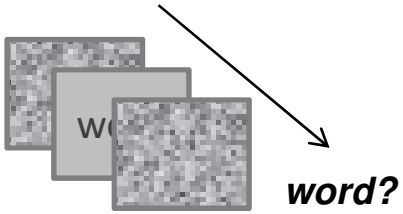

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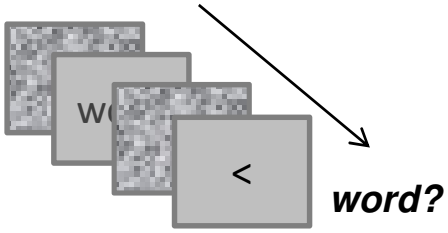
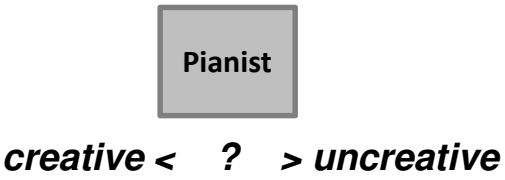


- Train the classification of professions
  (Press left for uncreative, right creative)



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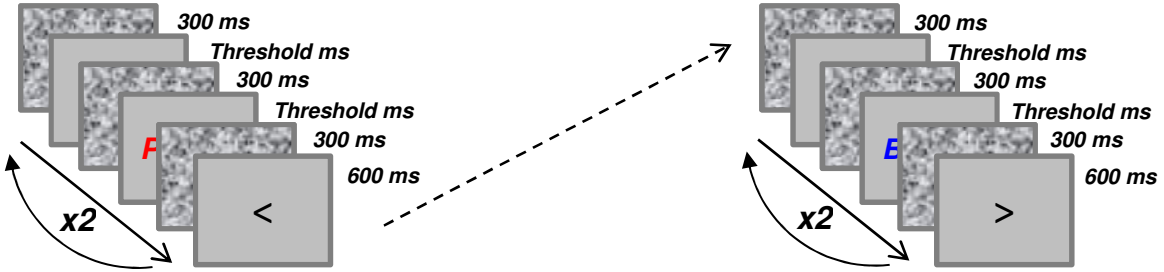

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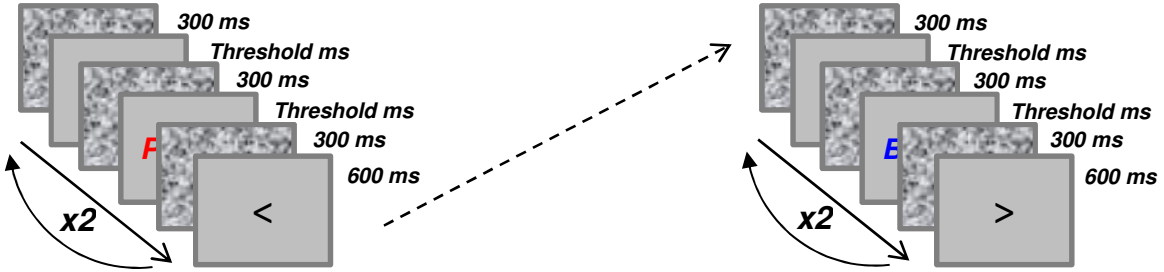

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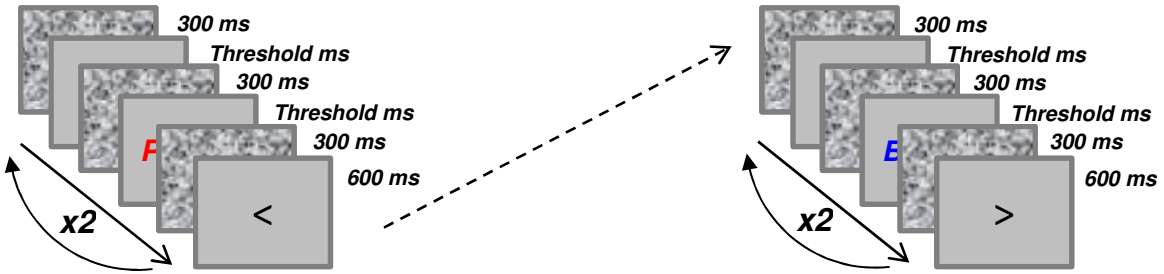

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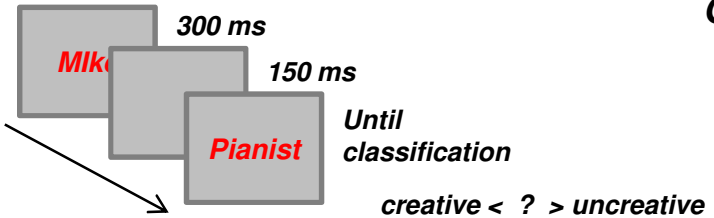
- Perform timed classification of profession – primed by a name

Concordant with subliminal



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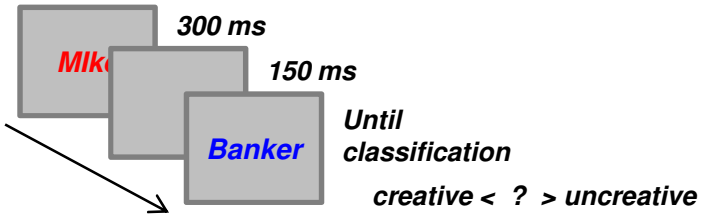

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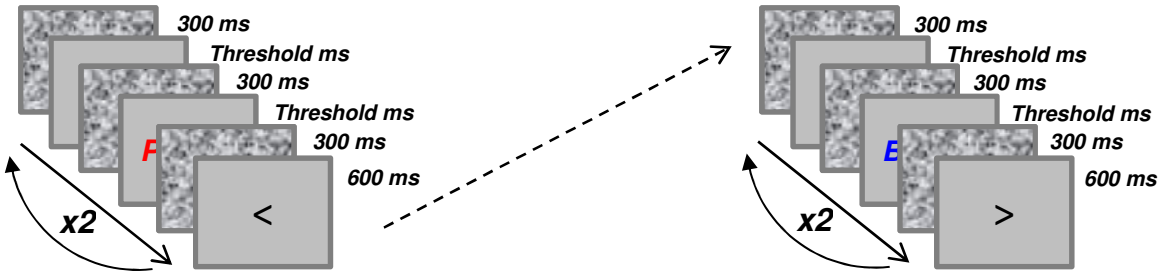

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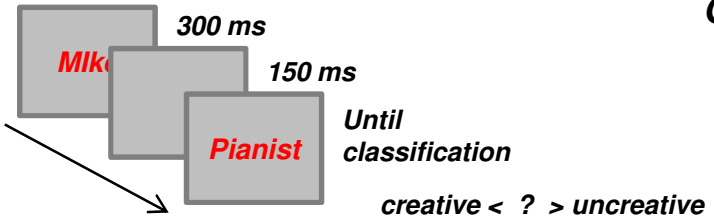

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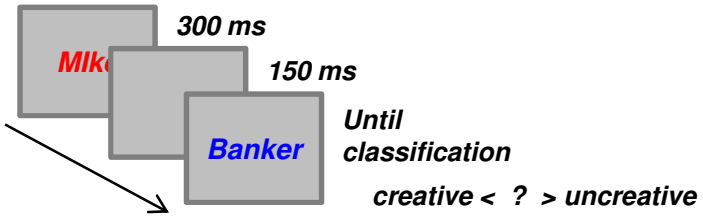

Delay (150 ms) after prime predicts negative priming (Eimer, 2006)

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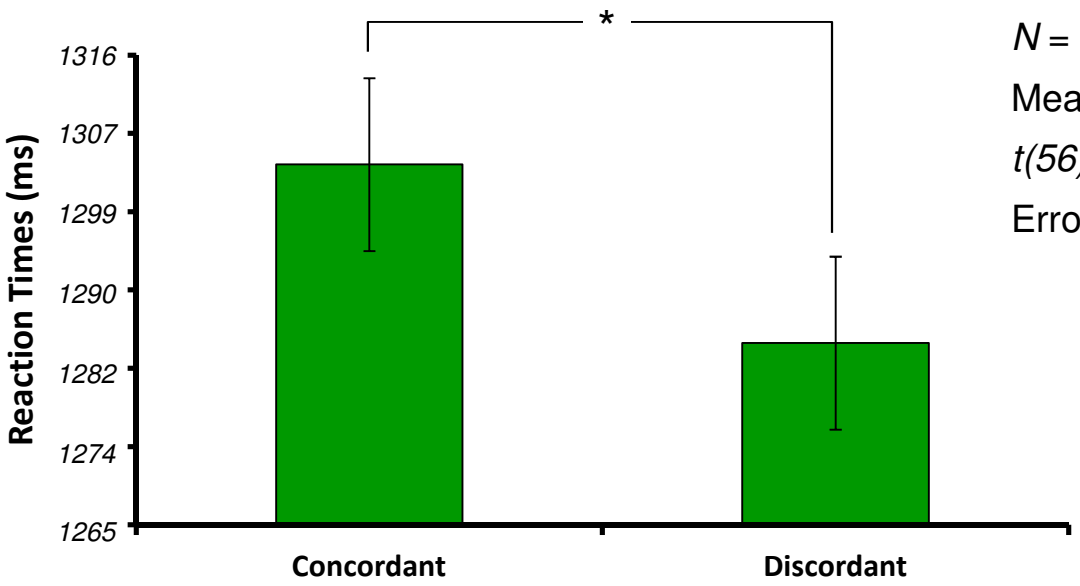

N = 57

Mean Difference = 19 ms

t(56) = 2.07, p = .044, dz = .27

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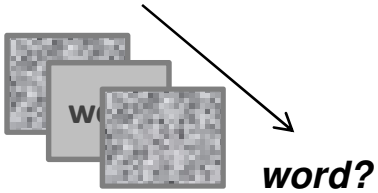

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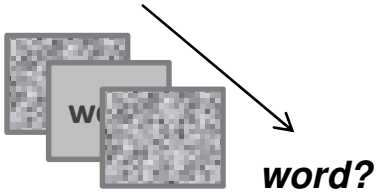

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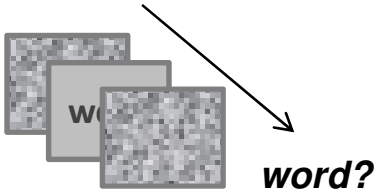

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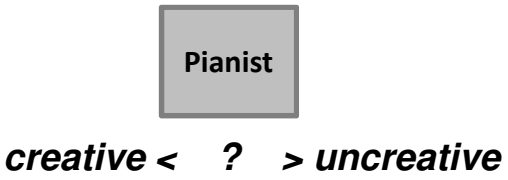

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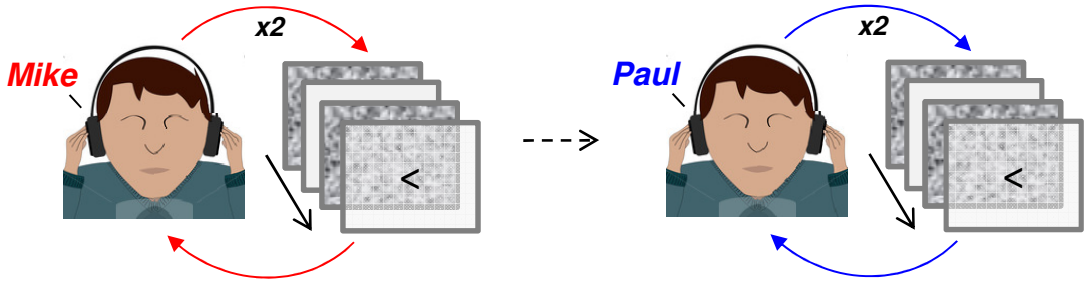

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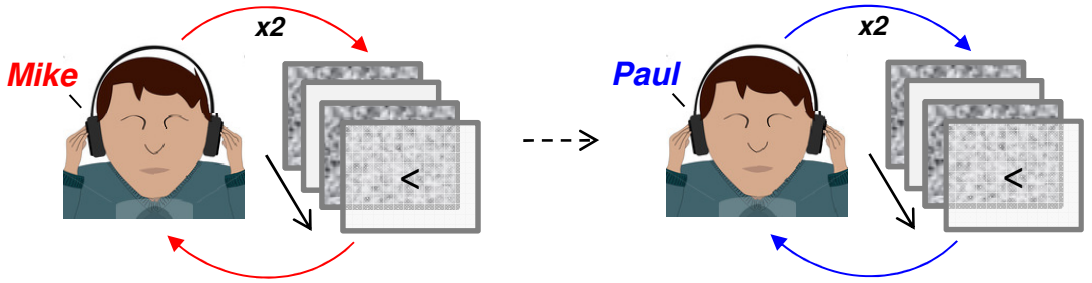

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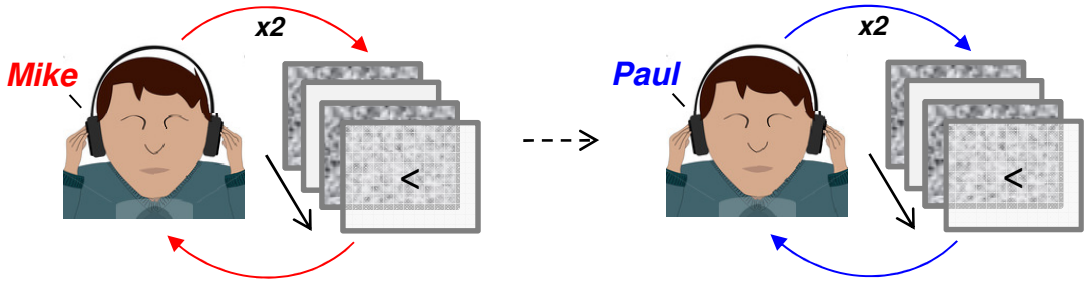

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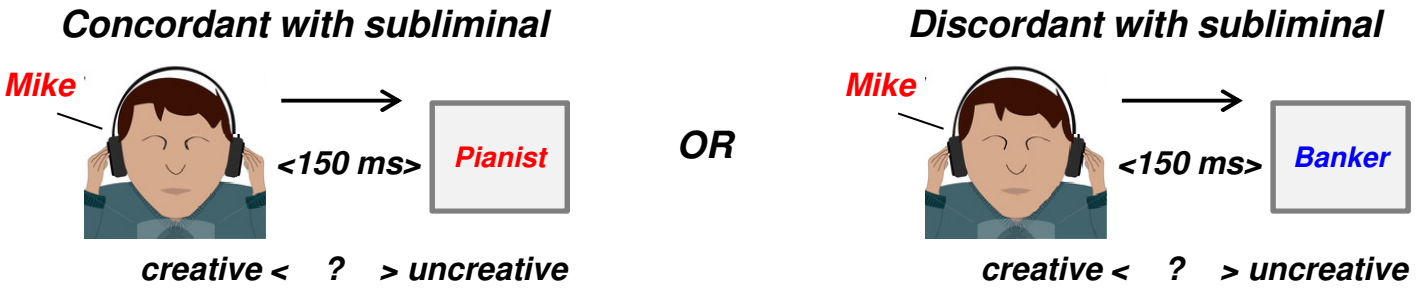

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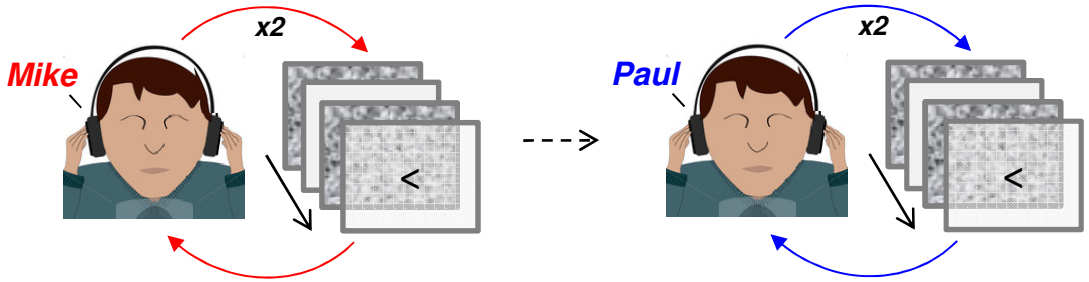

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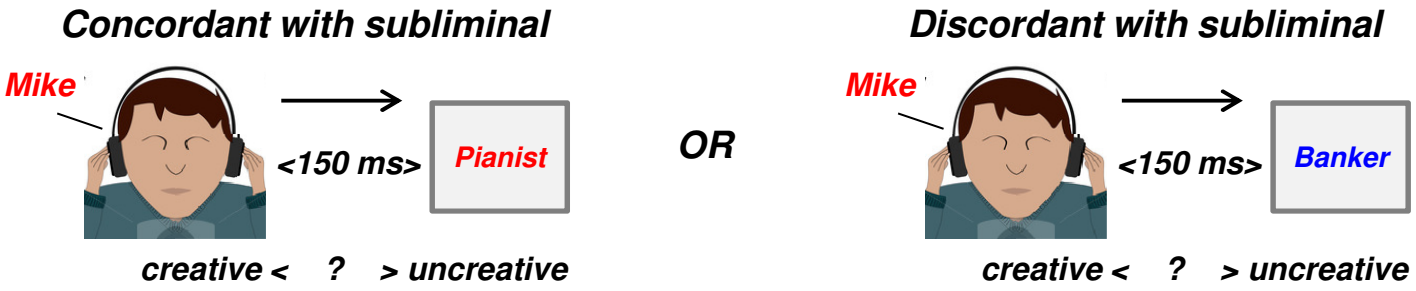

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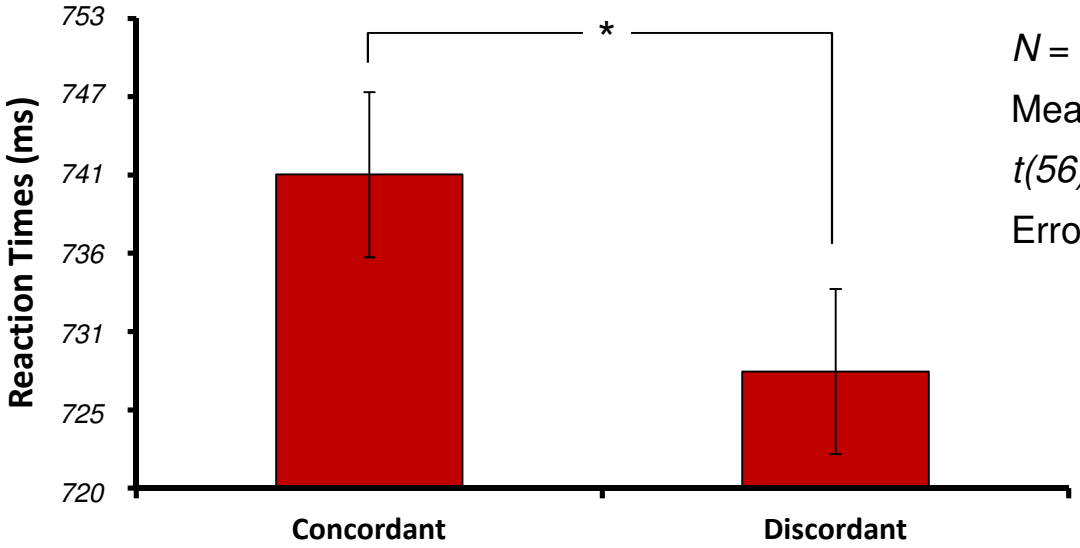

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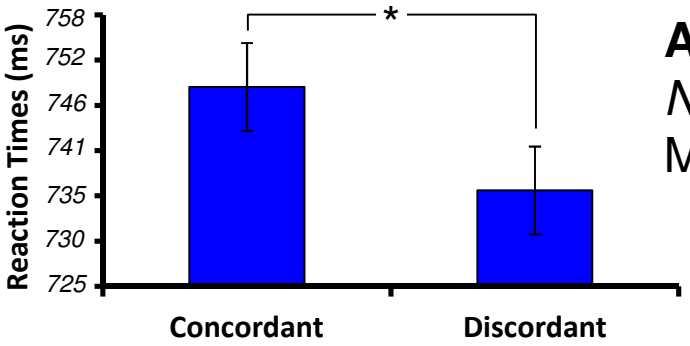
Results Summary



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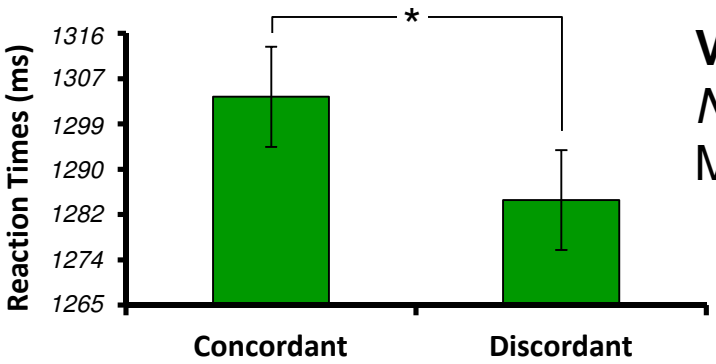

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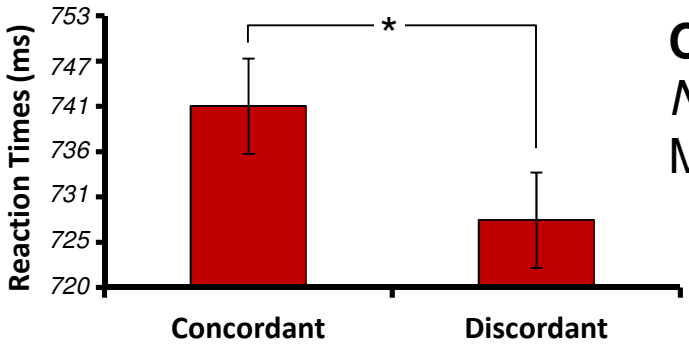
N = 57
Mean Difference 19 ms



Cross-Modal
N = 59
Mean Difference 14 ms

CONCLUSIONS AND FUTURE STUDIES

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- However, a limitation of this linguistic paradigm is that visual words automatically activate phonetic representations.
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- **A second study is planned that will replicate the cross-modal linguistic paradigm with stimuli above threshold permitting a comparison of conscious with unconscious performance**

THANK YOU

Collaborators

Zoltan Dienes

Jason Samaha

Ron Chrisley

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

University of Sussex
Sackler Centre for Consciousness Science