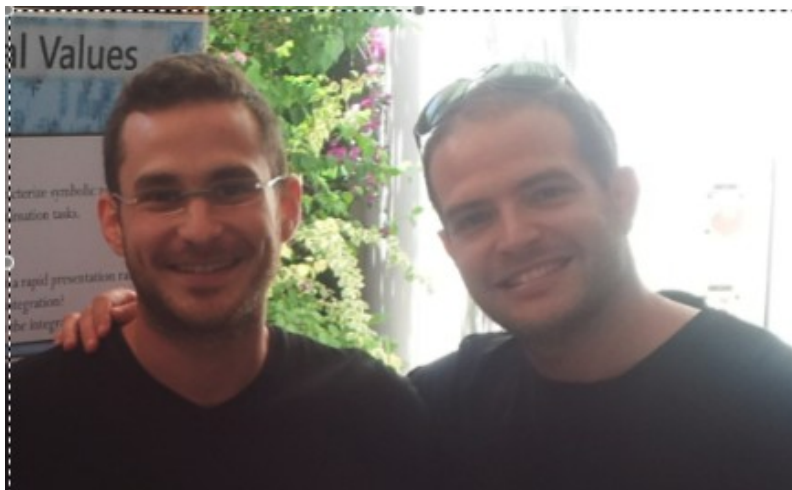


We see more than we can report: cost-free phenomenality of color-diversity outside focal attention

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Plan

- Objections to Overflow (Phillips, Stazicker, Fink): role of cues, unconscious representations & generic phenomenology
- The Landman experiment: and its generic phenomenology
- Summary statistics during a Sperling-like task
 - Generic phenomenal state of color-diversity
 - Neural correlates of consciousness: precision
- Ocam's razor and appeal to the simplest explanation

Objections to Overflow

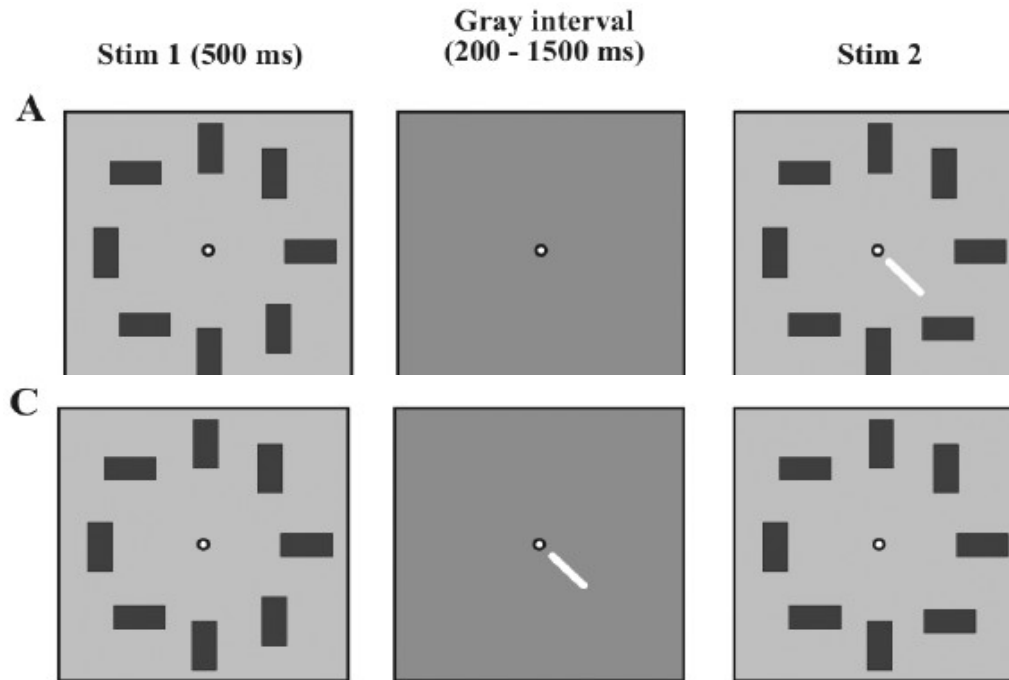
- Before cue: high resolution unconscious representation + conscious access (focal-attention/WM) + generic phenomenal states
- Cue makes visual item conscious
- Why trust introspection? Overflow makes more assumptions (less parsimony)

A X L K

M V 0 T

L T U P

The Landman experiment

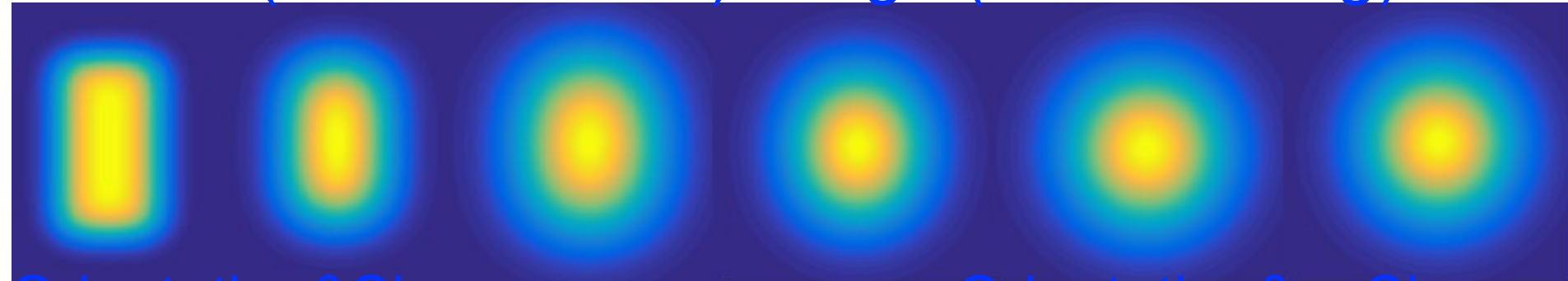


- Cue makes specific rectangle (orientation) conscious
- Before cue: generic phenomenology: “~8 rectangles”
- How does it look like?

How does this look like?

1. The determinable-determinate model

Blurred (low resolution) image (broad tuning)



Orientation&Shape

noOrientation&noShape

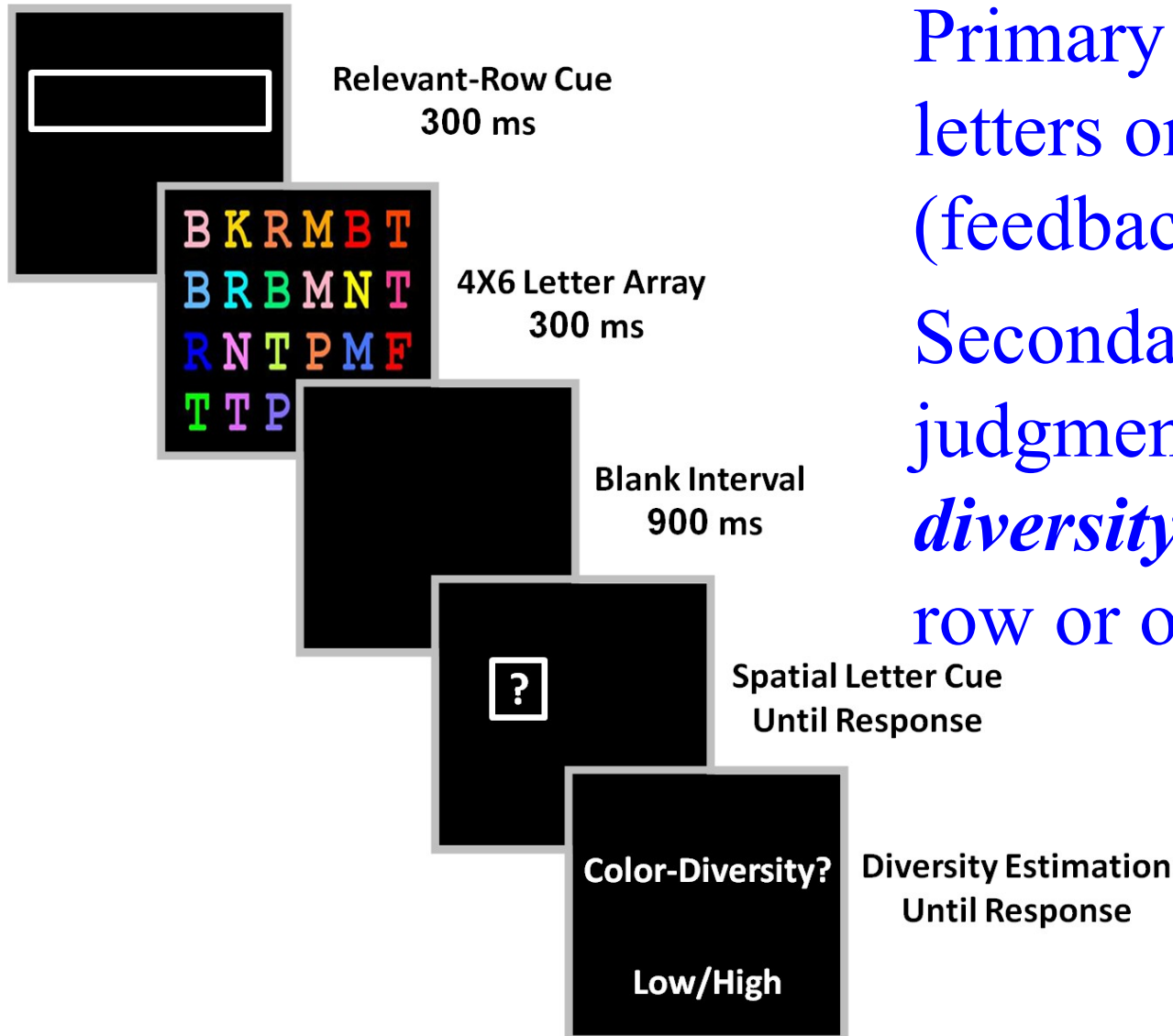
- Orientation \rightarrow constitutive property of visual rectangle

2: Verbal/symbolic representation: 8 rectangles

3. Visual rectangles but no binding to locations

Color phenomenology with arrays of colored letters during Sperling like task

Procedure (Bronfman et al., *Psych Sci.*, 2014)



Primary task: report the letters on the cued row (feedback given)

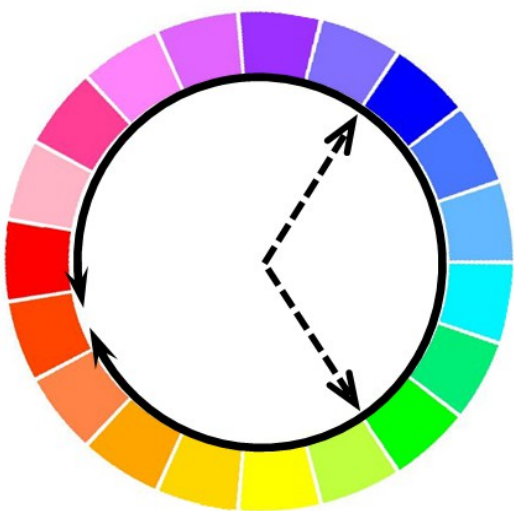
Secondary (no feedback): judgment of the *color-diversity* (CD) of the cued row or of **non-cued rows**

Can observers judge CD free of any letter-report cost?

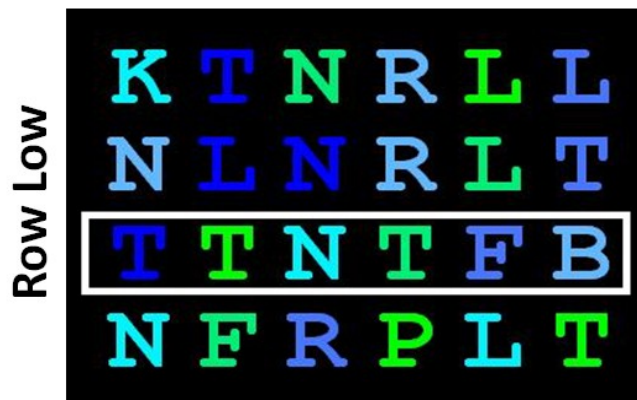
We see more than we can report

(Bronfman et al., *Psych Sci.*, 2014)

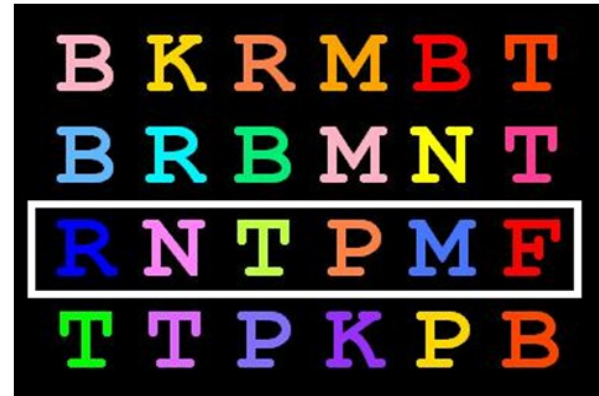
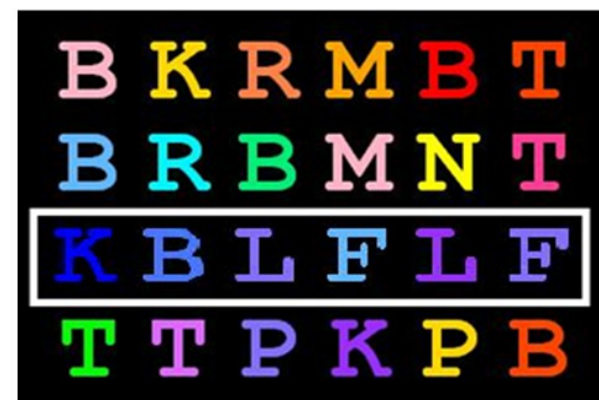
Color diversity manipulation



Periphery Low



Periphery High



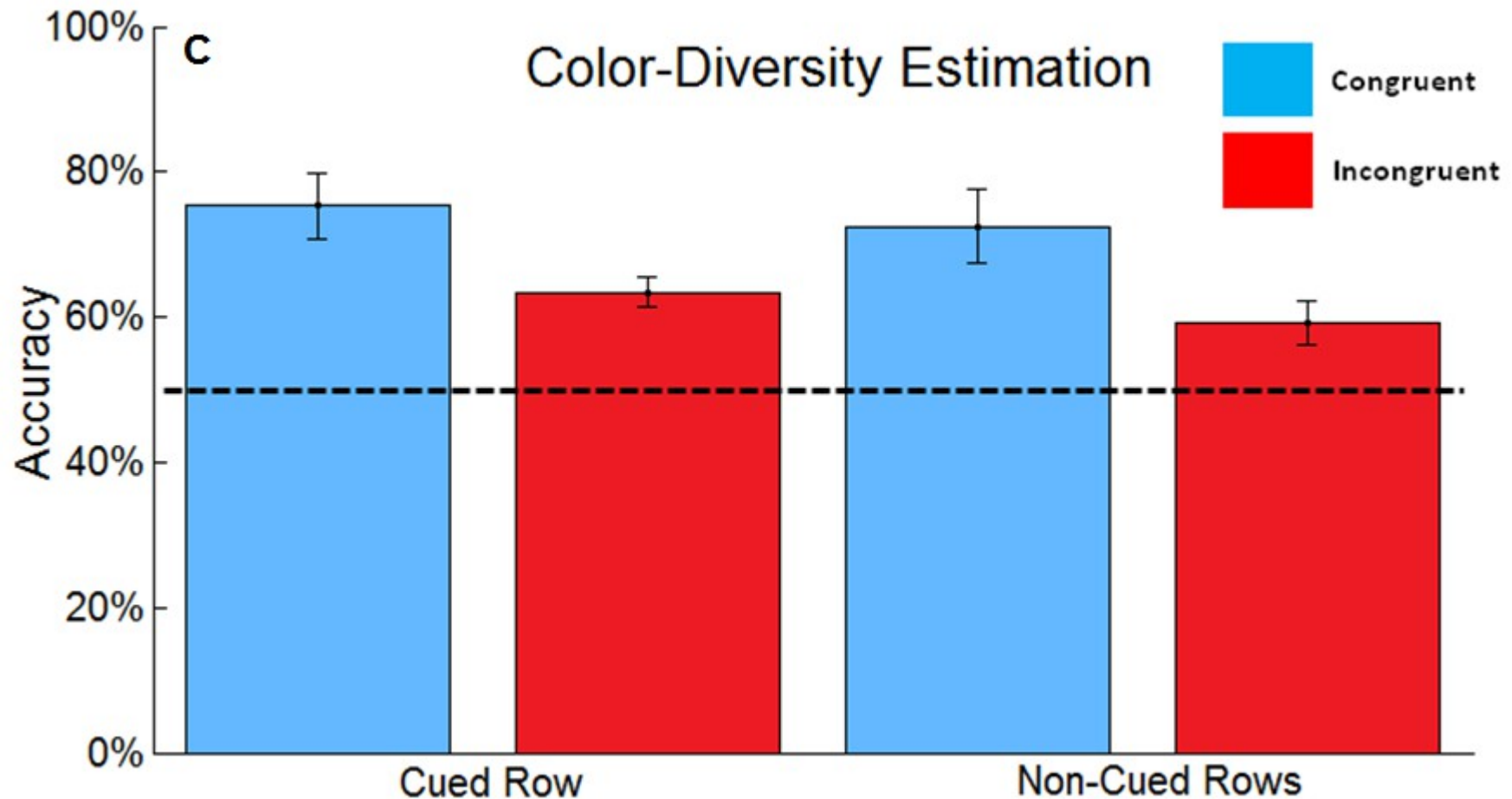
Results

- Observers report about 3 letters
(same for “letter only” task, and dual task)
- Can discriminate color-diversity of non-cued row at the same time
- Observers report seeing colors (can reject no-color lure trials)

Color diversity judgments (N=12)

CD for cued row
contaminated by CD of
surround

CD for non-cued > chance



Interpretations (Overflow)

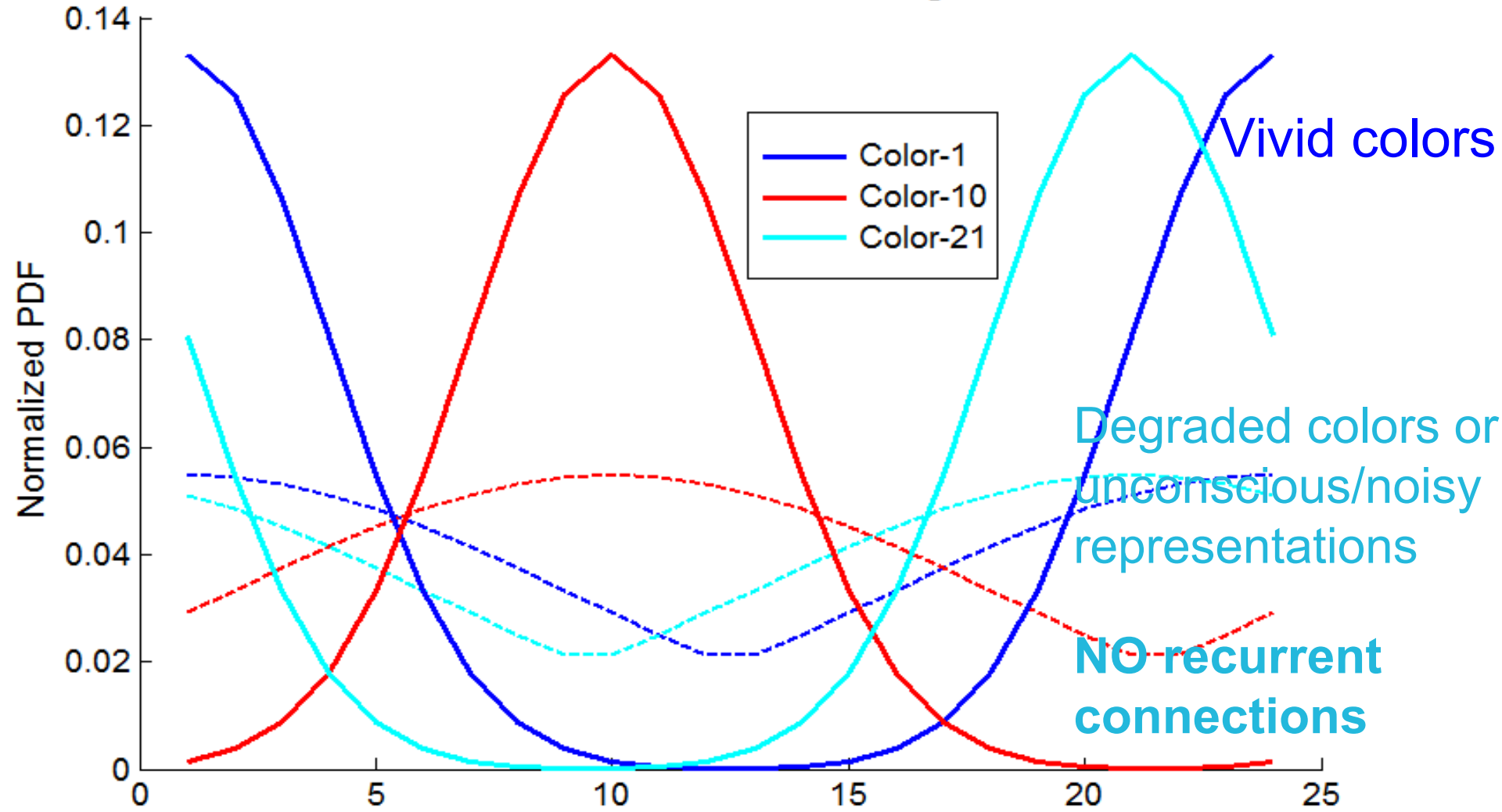
- While observers attend to cued-row to encode letters into VWM, they automatically (cost free) experience some of the colors (at enough resolution and briefly) outside focal attention
- This allows to extract CD-judgment (binary compression (1 bit) of high complexity information)

Argument: to estimate CD one needs differentiated representations of the colors outside attentional focus

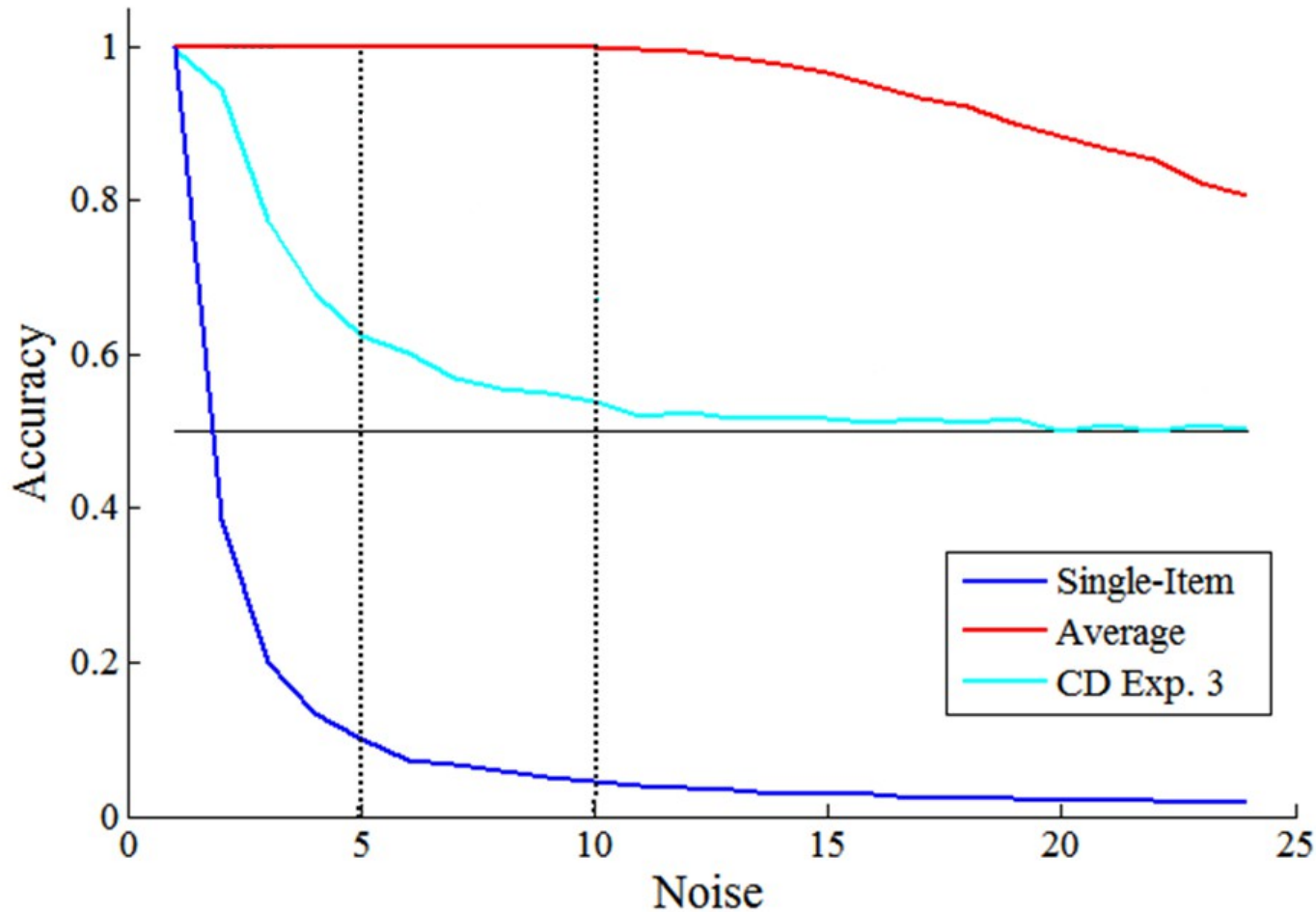
24 Cyclic color tuned detectors (Gaussian on a ring)

- Conscious perception → differentiated representations
- Unconscious perception → undifferentiated

Narrow and broad color-tuning-curves



Population averaging simulation-model: average (red) and variance (cyan) as function of noise (tuning)



- Unlike average, variance difficult to recover from pop-averaging
- To account for exp-accuracy, resolution better than 1/3 of range

No-Overflow account

- High precision representation of items at attended locations (conscious-specific)
- Medium/high precision representation at unattended location (unconscious)
- Generic phenomenology of CD (variance) outside focal attention without any accompanied experience of individual colors

I. Understand Generic Color Diversity

1. Based on undeterminate (blurred) specific colors (play no functional role; more precision is required to account for performance)
2. Devoid of any consciousness of specific colors

What is the experience like:

I see that these 2 letters have **same/different** colors, but I **have no idea what the colors are**

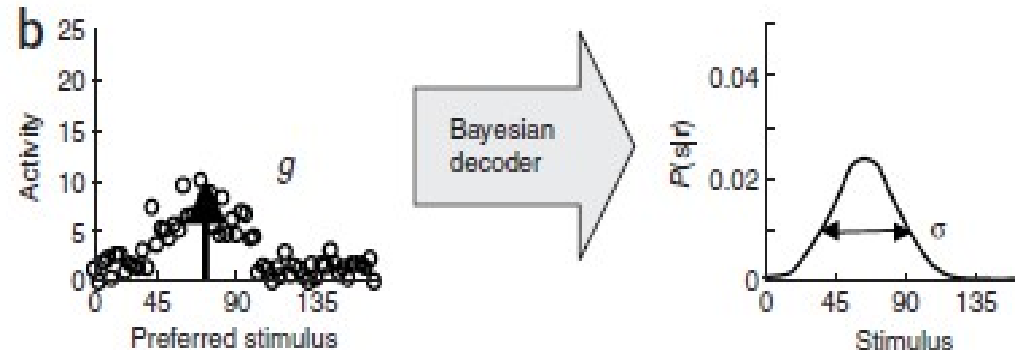
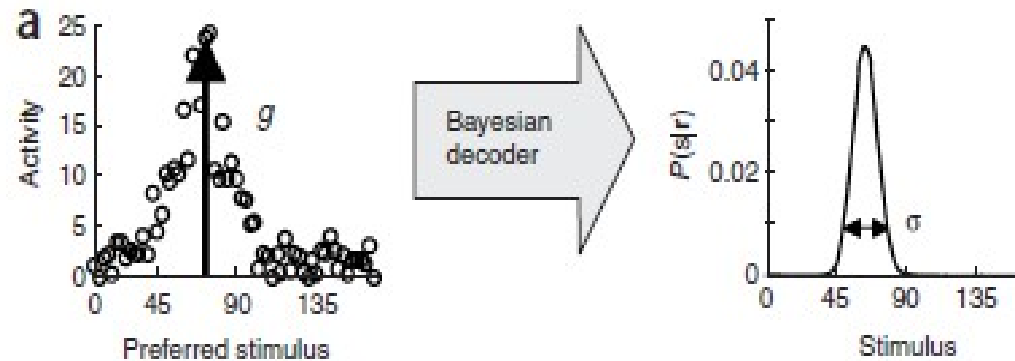
In virtue of what is this a visual experience of colors? (as opposed to a belief/disposition or just a mere *guess*) as in blindsight

II. Are color representations unconscious?

discussion of neural correlates of consciousness(NCC)

- Level of activation can distinguish conscious from unconscious representations
- Increased activation \rightarrow higher precision/resolution

Bayesian model of neural coding (Ma et al., 2006; Brezis et al., 2015)



Precision and consciousness

- a) High level of activation in visual areas is sufficient indication for visual consciousness.
- b) High level of activation in visual areas is necessary indication for precision in visual discrimination.

From a) and b) it follows that precise representations are likely to be conscious

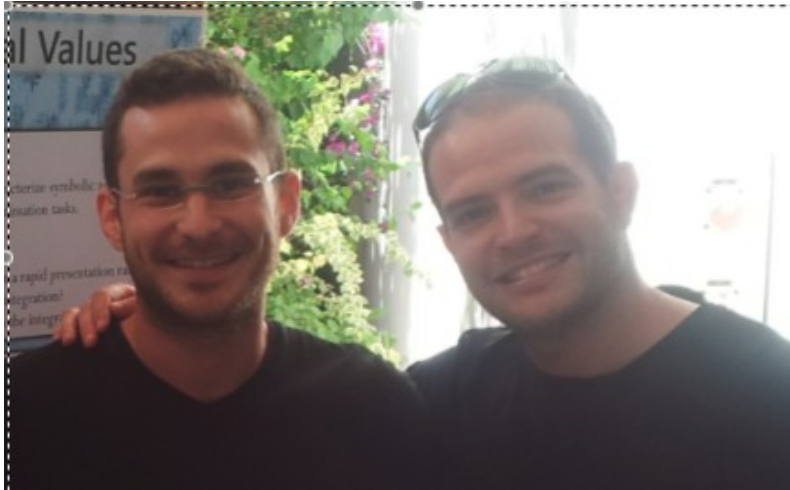
- We also argued that observers have differentiated representations of colours at unattended locations
- Accuracy in CD is at chance under reduced precision (just below threshold) due to masking

Back to the overflow debate

A modest Overflow view

- Outside focal attention we have visual experiences at lower spatial resolution (and transient) at least for simple visual elements (colors)
- These ground the experience of summary statistics
- Provides answer to what qualifies CD-judgments to reflect visual/colour experiences (rather than guesses)
- Consistent with NCC research

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