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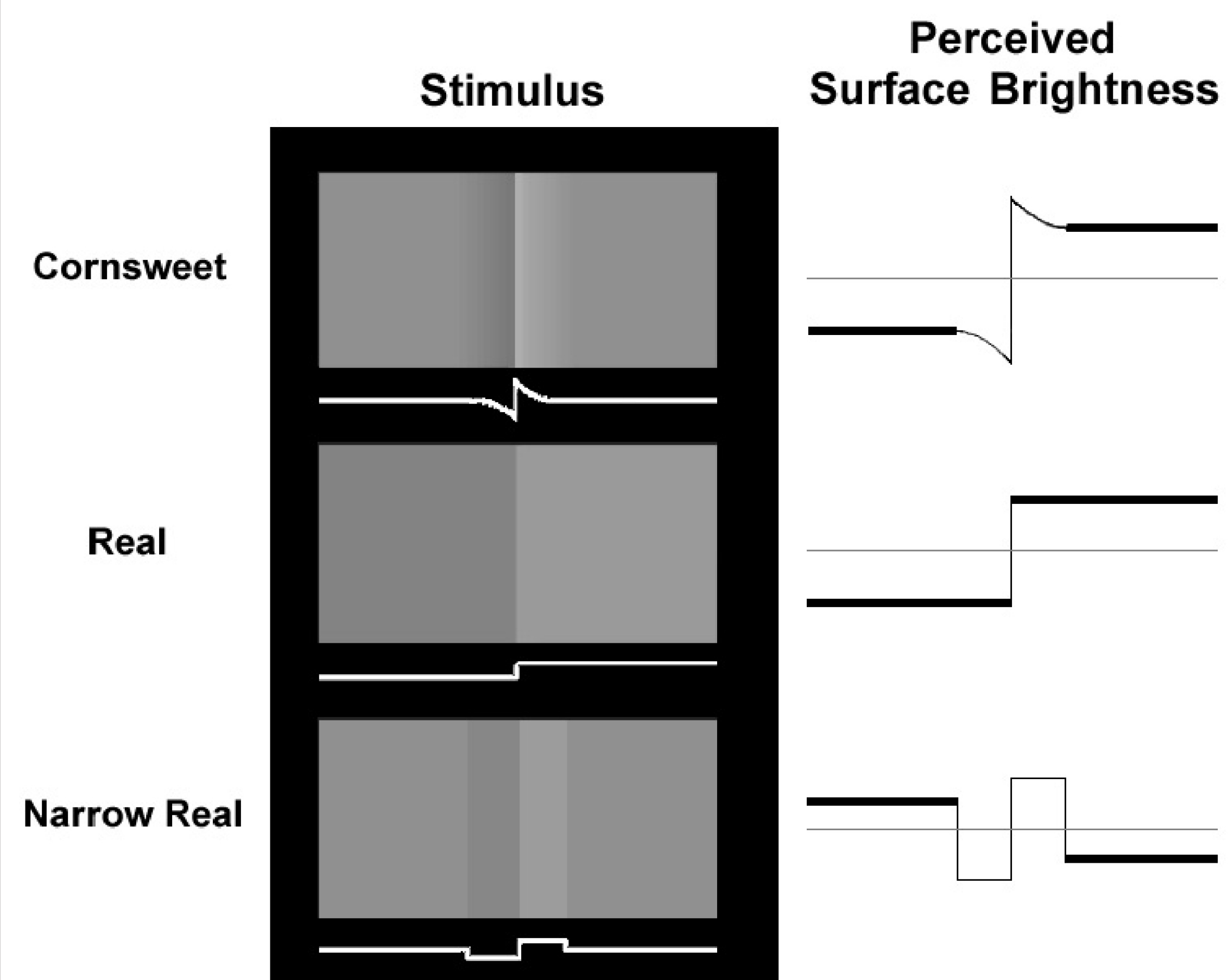
Optical Imaging and Single Unit Recording of Real and Illusory Brightness Response in V1 and V2 of the Macaque Monkey

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Introduction

Borders affect our perception of surface brightness. Where are Real (true contrast) and Illusory (Cornsweet contrast) brightness percepts encoded in the brain?

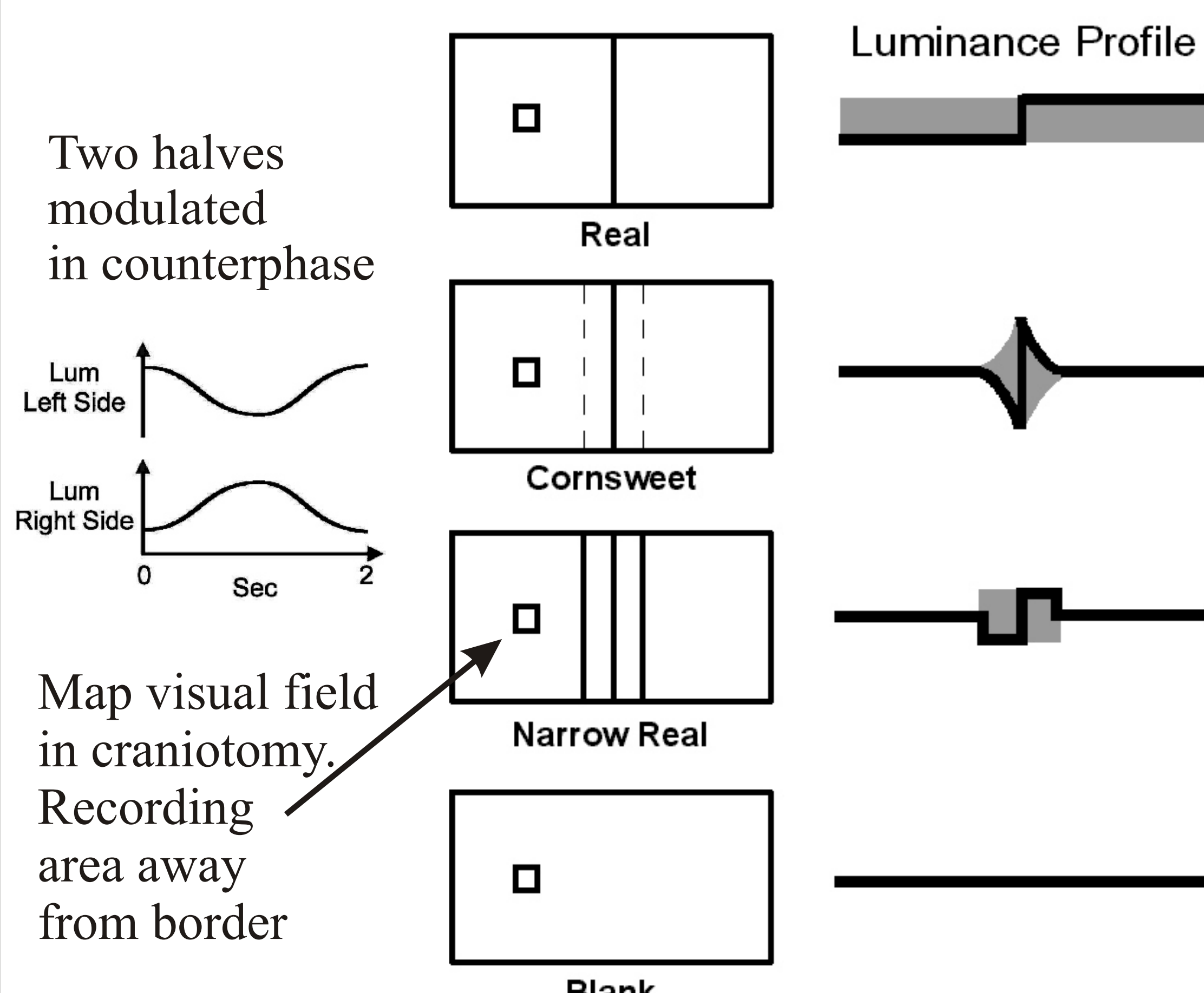


Methods

Animals: Areas V1/V2 of 3 adult monkeys (*Macaca mulatta* and *Macaca fascicularis*) under anesthesia and paralysis.

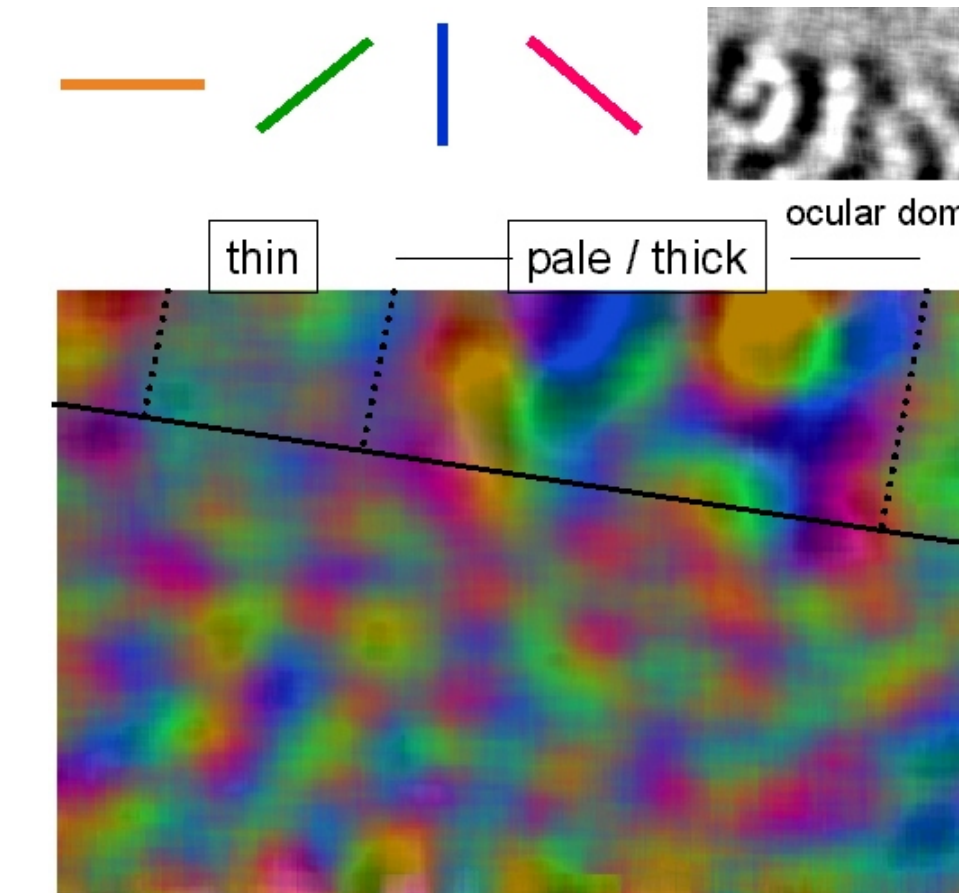
Surface Brightness Modulation

Stimuli: Screen divided by a stationary contrast border, counterphased sinusoidally in brightness at 0.5Hz. **Real:** entire surface modulates in luminance. **Cornsweet** and **Narrow Real:** contrast modulated only at border. Regions of modulation are indicated in gray. The resulting percept of Real and Cornsweet is that of left/right counterphasing in brightness. Narrow Real appears weakly modulate in opposite phase.

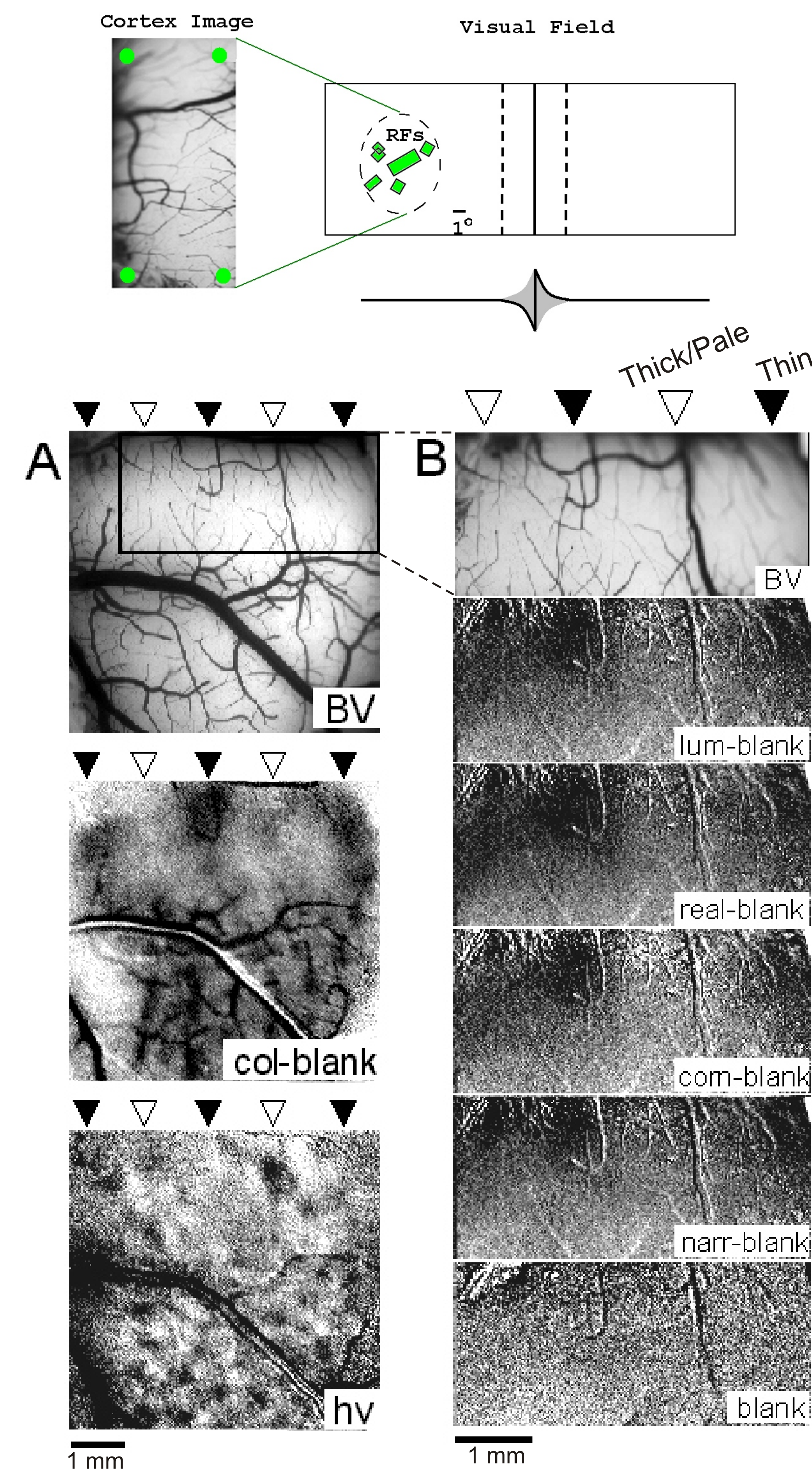


Intrinsic Signal Imaging

1 Mapping:
V1: orientation and color blobs
V2: pale, thick, and thin stripes

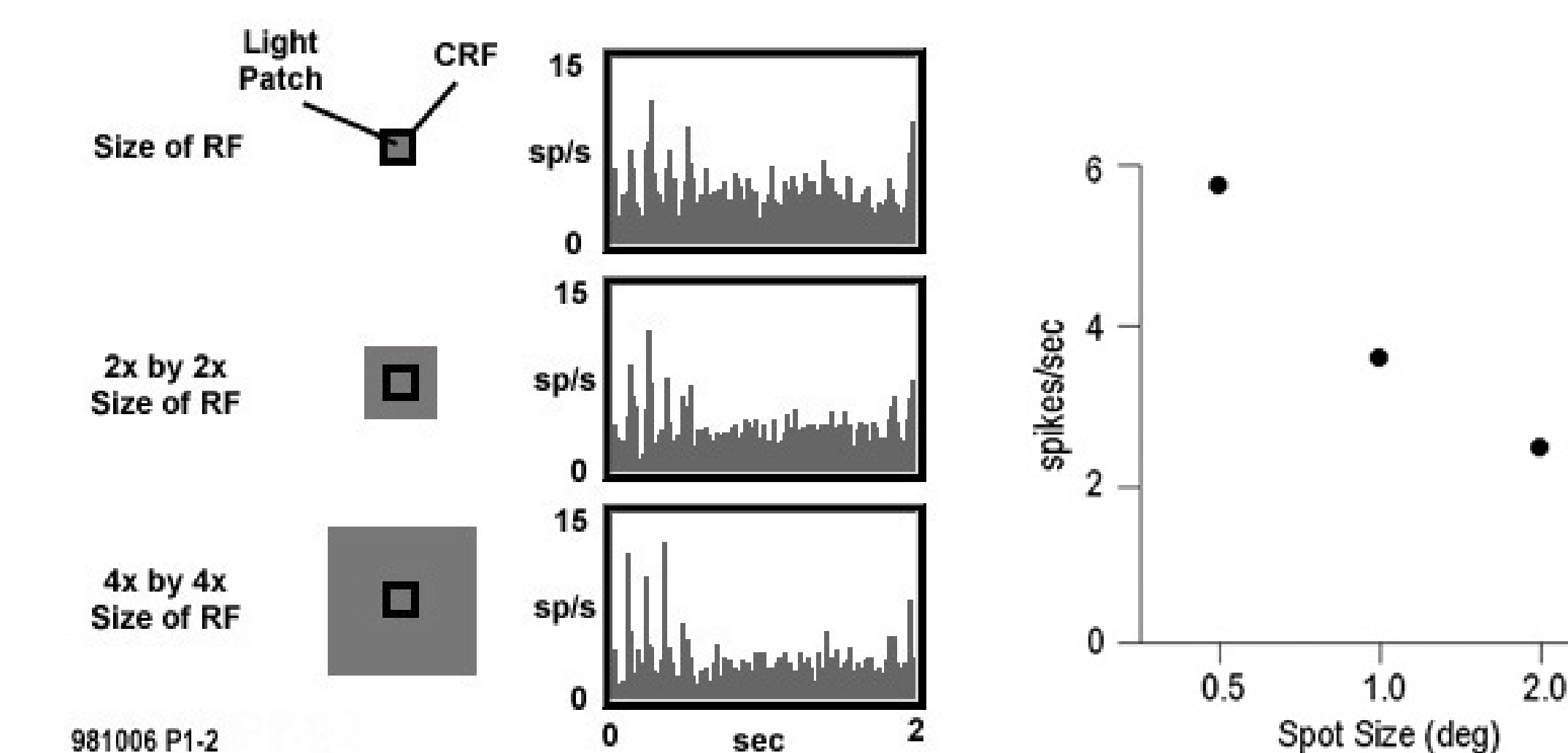


2 Imaging real and illusory brightness response

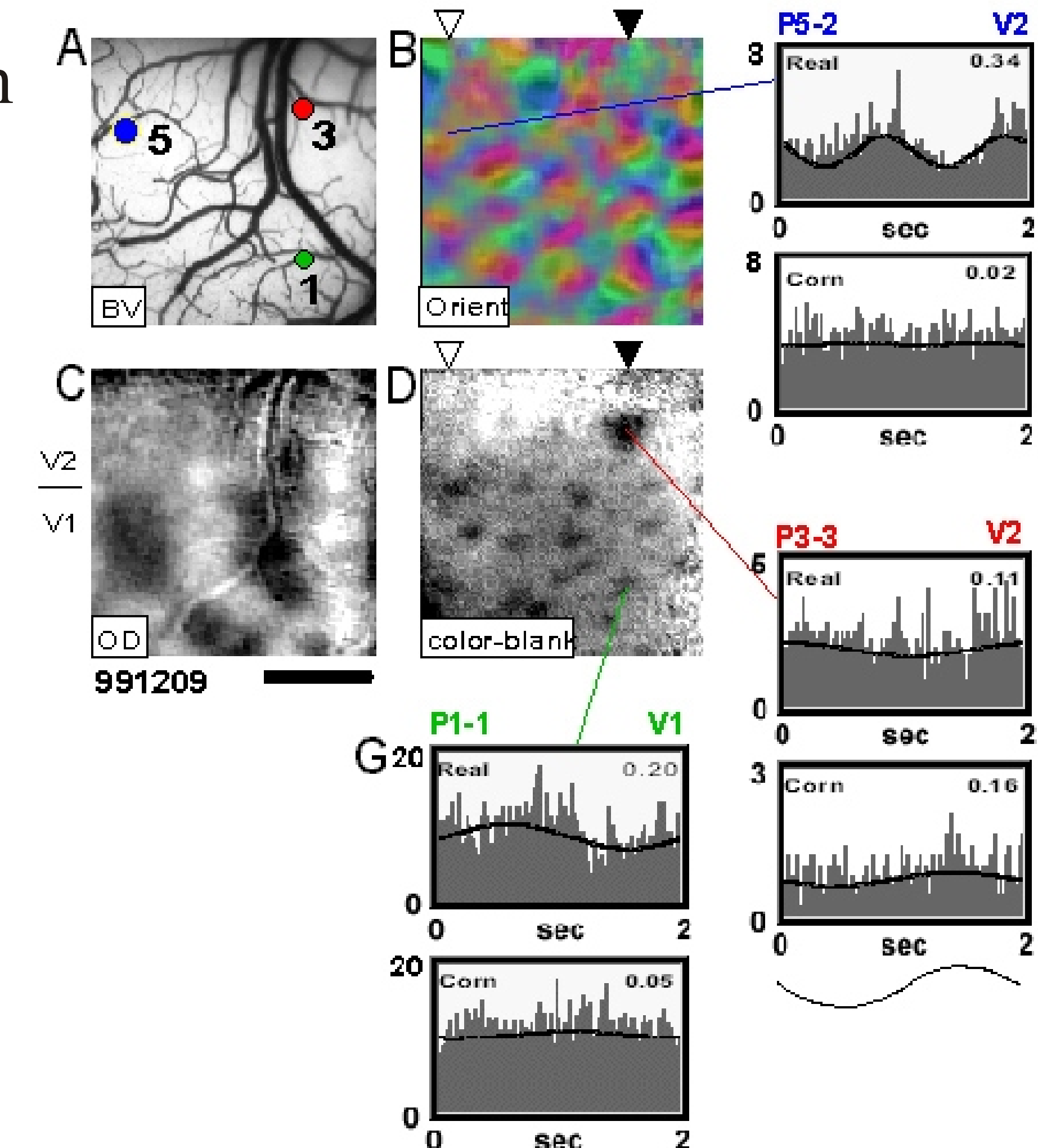


Single-unit recording

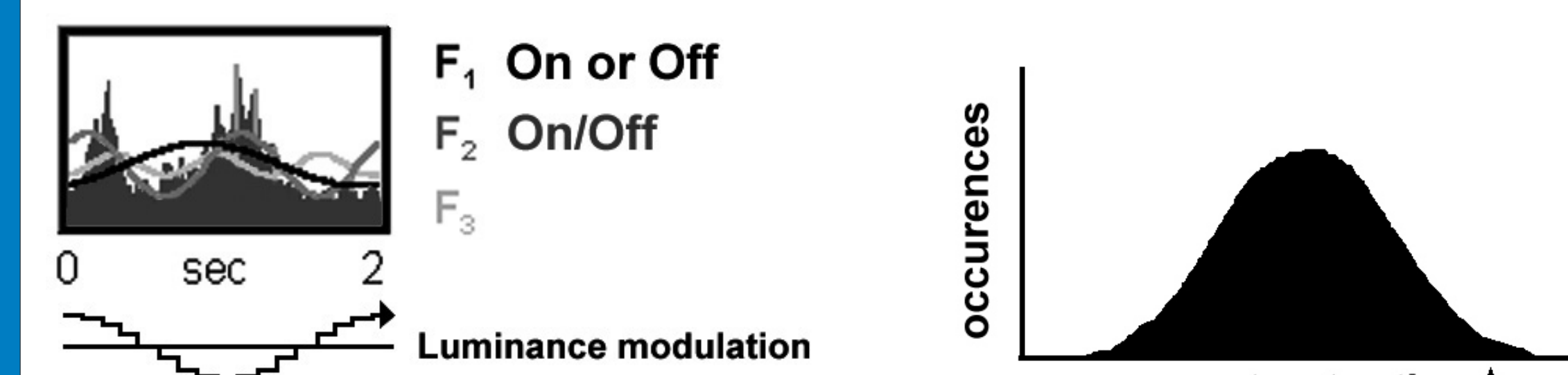
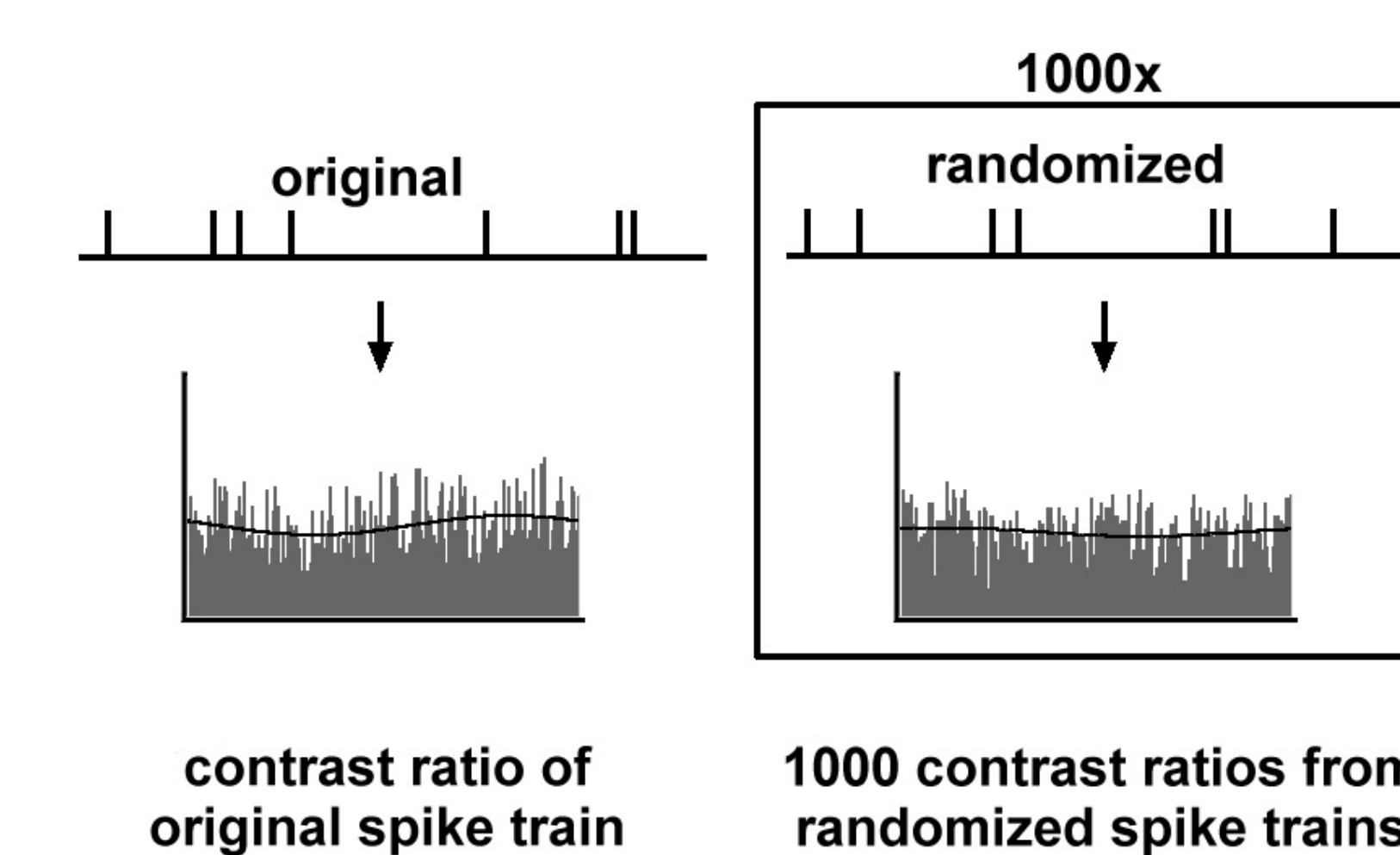
3 Isolate cells that respond to large surfaces, quantitatively determine receptive field size



4 Record from imaged functional domains

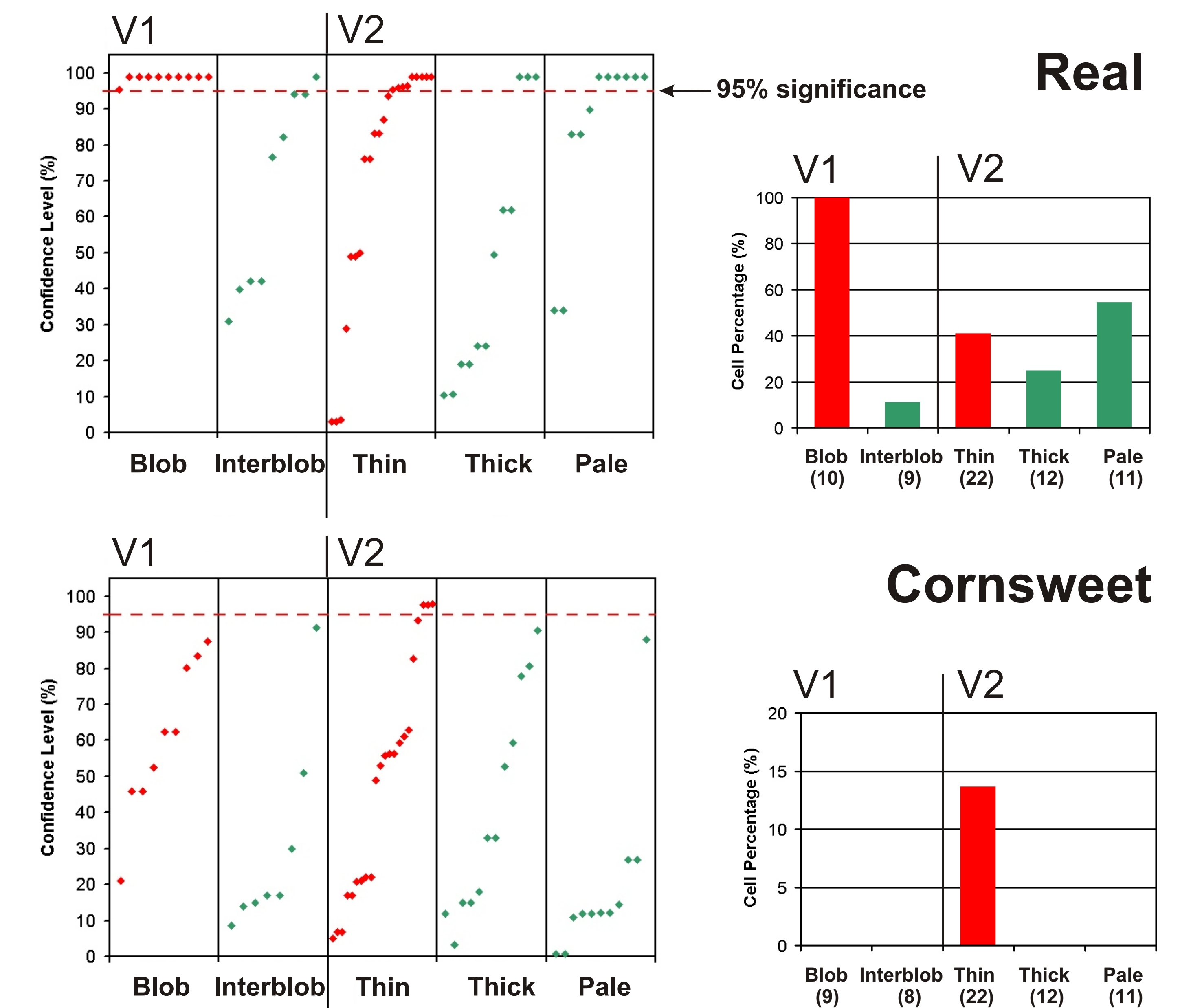


5 Response significance:
• Fit w/sinusoid
• Contrast ratio
• Bootstrapped confidence level



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Confidence level of cell responses to Real and Cornsweet stimuli. 95% significance criterion



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Conclusions

1. ILLUSORY BRIGHTNESS RESPONSE EXISTS!!! Both imaging and single-unit data show Cornsweet responses are located primarily in V2 thin stripes.
2. Cornsweet response is weaker than Real.
3. Real response is more prominent in V1 blobs than interblobs.
4. Real response also present in all V2 stripes, though preferentially in thin and pale stripes.
5. Given relative Real and Cornsweet response in V2, we suggest V2 thin stripes are locus for higher order brightness processing.

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References/Acknowledgements

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