

A new 'tracking' version of Continuous Flash Suppression to quantify suppression strength: constant CFS suppression for all image types & two times the suppression strength of binocular rivalry

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Abstract

A dynamic stimulus presented to one eye can suppress a static target in the other for long periods (continuous flash suppression: CFS). The suppressed target eventually becomes visible and this duration (bCFS) is often used to index unconscious processing. Controversially, faster breakthroughs are considered evidence of visual processing without awareness while opponents claim breakthrough times simply vary with low-level stimulus properties. bCFS times alone cannot solve this: suppression thresholds are needed as a baseline to compare with breakthrough thresholds. Our new 'CFS tracking' paradigm (tCFS) quickly measures contrast thresholds for breakthrough and suppression so that suppression strength can be calculated for any image. Participants simply track their changing perceptual states as a suppressed image steadily increases in contrast until visibility (i.e., breakthrough) and then decreases until re-suppression is reported, then increases again (and so on, in a continuing cycle). Using tCFS we confirm that: (i) there are some differences in breakthrough thresholds across target types (e.g., grating vs face), as bCFS has shown, but (ii) suppression thresholds show a parallel pattern of differences, thus (iii) suppression strength is the same for all images (~14-15 dB for gratings, noise, objects, food, faces, biological motion). Uniform CFS suppression strength indicates a single mechanism of CFS suppression, likely early in visual cortex where left and right eyes combine, and prior to processing of objects and image identity. Using the tracking paradigm with binocular rivalry reveals half as much suppression: ~7-8 dB.

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