

UC Merced

Proceedings of the Annual Meeting of the Cognitive Science Society

Title

The human visual system spontaneously computes approximate number

Permalink

<https://escholarship.org/uc/item/7pt6147z>

Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 43(43)

Authors

Lucero, Che

Quirk, Colin T

Goldin-Meadow, Susan

et al.

Publication Date

2021

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

The human visual system spontaneously computes approximate number

Che Lucero

Cornell University, Ithaca, New York, United States

Colin Quirk

The University of Chicago, Chicago, Illinois, United States

Susan Goldin-Meadow

University of Chicago, Chicago, Illinois, United States

Edward Vogel

University of Chicago, Chicago, Illinois, United States

Daniel Casasanto

Cornell University, Ithaca, New York, United States

Abstract

Is numerosity an abstraction that arises downstream of basic perceptual processing, or does the brain process numerosity like a primary perceptual feature such as color or motion? Here, we tested whether visual cortex computes number automatically, even when number is task-irrelevant and is being processed unconsciously. We recorded electroencephalography while subjects watched dotcloud stimuli that alternated in numerical content at 15 Hz, under one of three conditions: judging numerosity, judging convex hull, or making no judgments. Under all three conditions, we observed oscillatory activity at 15 Hz in early visual cortex. The strength of this signal depended on the numerical content of the stimuli in all three conditions and did not differ significantly across the conditions. Results show that number can be computed spontaneously by visual cortex, even when participants are attending to non-numerical information, consistent with the proposal that number is a primary perceptual attribute of visual stimuli.