LSD PROLONGS VISUAL ERPS AND DEGRADES NEURAL DISCRIMINABILITY OF CONSCIOUS PERCEPTS

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Background: LSD is a prototypical serotonergic psychedelic that induces characteristic alterations in perception, self-experience, and brain dynamics.

Aims: Here we set out to investigate how these changes relate to the neural vectors that encode conscious percepts.

Methods: Event-related potentials (ERPs) were recorded from 16 healthy participants during two sessions lasting up to 8 hours, with data acquired on two different days, one with 50 µg of d-LSD and one with placebo, in double blind randomized order. The visual stimuli comprised 4 categories (faces; houses, fractals; and 3-letter-words), with or without motion or noise.

Results: LSD did not change early visual ERPs <150 ms but produced a marked prolongation of the responses, with a plateau around 200 ms, and a further rebound near 400 ms. Despite the global amplification of visual ERPs across stimulus categories, stimulus discriminability was degraded by LSD, as reflected by reduced decoding accuracy. There was also a decrease in connectivity strength between channels in low frequencies and long connections.

Conclusions: These changes may be driven by increased thalamocortical connectivity, dendritic gain saturation in layer V pyramidal neurons, amplification of recurrent cortical activity, and reduced sensory precision due to altered excitation–inhibition balance. The putative collapse of neural vector separability at very high doses may underlie the classic psychedelic experience of “oneness”.

Keywords: Psychedelics, 5-HT2A, Neural vectors, Perception, EEG

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