

The effects of temporary monocular deprivation in a multisensory context

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Previous studies have demonstrated that a brief period of monocular deprivation (MD) induces short-term-plasticity effects within the visual system and alters the interocular excitability balance. In the present study we used MD to manipulate the visual system excitability and tested whether MD effects are confined within the visual system or also extend to the interaction between vision and audition.

A group of 18 young adults performed a visual task monocularly, with the Dominant eye (Deye) or the non-Deye, before (t0) and after (t1) 150 minutes of MD. Participants were asked to report the number of perceived flashes (0, 1 or 2) while task irrelevant beeps (0, 1 or 2) were presented. Flashes and beeps could be presented coupled or isolated. While the task was performed, electroencephalography (EEG) was recorded. In order to assess the MD effects on visual, auditory and audio-visual processing, we analysed oscillatory neural activity separately for visual, auditory and audio-visual trials, with a series of cluster-based permutation analyses. Comparisons of the differences between t0 and t1 sessions revealed a significant change of the oscillatory activity only in the unimodal visual condition, driven by the Deye and within a low-frequency range (5-15Hz). On the one hand, our results confirm that MD induces homeostatic plasticity in the visual system with an eye-specific impact. On the other hand, this short-term plasticity effect was not sufficient to alter the interactions between audio and visual processing. These electrophysiological data are in support of a relative independence between the levels of visual analyses affected by a short-term MD and basic audio-visual interactions.