Visuo-tactile interplay in conscious and unconscious encoding of numerosity
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Introduction
Multisensory Integration

While the quest for consciousness has made tremendous progress in the visual domain, its extension to other sensory modalities remains limited. Here, we sought to extend the description of unconscious perception to the tactile modality. Based on previous work in the visual and auditory systems\(^1\), we developed a cross-modal procedure of numerosity priming\(^2,3\) in which participants received one to three simultaneous tactile taps on their finger-tips (the primes), followed by one to three simultaneous visual flashes on both eyes (the targets). We measured reaction times for enumerating the visual targets as a function of their numerical distance with the tactile primes.

Results

1. Measuring conscious access to tactile stimuli

Objective measures
Subjective measures

2. Visuo-tactile priming

Low Medium High

Prime types

Perceptual awareness scale

3. Integration of bimanual signals

prime blank target

Objective measures
Subjective measures

Conclusion

When tactile taps were consciously felt, we found a classical numerical distance effect, revealing that tactile and visual numerosity signals are encoded with a similar format. Using peri-threshold stimulations, we found no clear evidence for unconscious numerosity processing, neither when tactile stimulations were spread across one or two hands. Taken together, our results suggest that the encoding of supraliminal numerosity signals in the tactile domain shares some properties with the visual one. Yet, the encoding of subliminal numerosity signals, or the bi-manual integration of numerosity signals seem to be limited to lower levels of representations.

References