An English language test and a battery of imagery measures were also administered. In all trials, the vividness of imagery was higher in L1 than in L2; however, the English test scores also predicted vividness in L2, suggesting that L2 proficiency affects the vividness of visual imagery in L2. The ratings of object imagery characteristics were higher in the object trials, whereas the ratings of spatial imagery characteristics were higher in the spatial trials, indicating the importance of evaluating object and spatial imagery separately.

Measuring detailed memory for visual scenes

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The amount of information our memory stores about photographs is a subject of current debate. If we study only a few photographs for a longer time, how many details can our memory store? In current studies, researchers ask only once about each memorized item. We developed a novel paradigm (denoted as intensive memory) to quantify the fidelity in a single memorized image. We compared performance in a typical scene memory study (denoted as extensive memory) and our novel paradigm (in counterbalanced order). In the intensive-memory condition, 33 participants saw 3 scenes, each for 3 minutes. In a subsequent 2AFC recognition test, only a small patch was visible within each image (2.7% to 11.1% of area) and the rest was desaturated and blurred to reduce the effect of relearning (21 pairs for each of 3 photographs). In extensive-memory condition, participants saw 104 scenes and were later tested with 52 pairs of scenes. The accuracy was high in extensive-memory condition (accuracy = .89, SD = .08). In intensive-memory condition, the ability to correctly distinguish individual changes was lower but still above the chance level (accuracy = .64 SD = .08). The response pattern cannot be explained by perceptual difficulty or by sensitivity to image manipulations, as explored in separate rating study. We observed medium correlation between extensive and intensive memory measures (r = .39). Our results show that higher capacity to memorize many photographs is associated with more detailed memory representations if only several photographs are memorized and sufficient time is provided. [The research has been supported by Czech Science Foundation (GA20-06894S).]

Functional modulation of targeted perceptual decision-making networks causally dissociates response accuracy and confidence

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The relationship between accuracy and confidence does not seem to be as linear as previously thought, and appears to be mediated by different neural mechanisms. Current findings suggest that a highly interconnected functional hierarchy may exist, where sensory discrimination and perceptual certainty are not based on the same cortical representation, and this would explain the discrepancy that is often found between the correctness of the report and the confidence about it. We have recently reported that, in a motion discrimination task, boosting feedback connectivity from V5-to-V1 is critical in improving motion sensitivity, and also causes an overall increase in confidence regardless of correctness. Most importantly, by affecting the IPS-to-V1 network, we showed that confidence can be selectively increased without affecting accuracy. Here, we aimed to concurrently induce plastic changes on the network responsible for sensory discrimination, V5-to-V1, and crucially inhibit the substrate of confidence in intraparietal sulcus (IPS) in the same individuals, in order to causally disentangle these components. As expected, facilitation of V5-to-V1 by means of cortico-cortical paired associative stimulation (ccPAS) leads to improved motion discrimination performance. On the other hand, the general higher perceptual confidence accompanying V5-to-V1 ccPAS ceases as soon as inhibitory continuous theta bursts stimulation (cTBS), but not SHAM cTBS is administered to IPS. Our findings provide causal support to the notion of a double-dissociation between V5-to-V1 network, responsible for perceptual sensitivity to motion, and IPS function causally shaping response confidence.

On speed overestimation effects in both mechanical and psychological causal events

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Recent research has investigated a new illusory speed effect in visual events derived from the ones developed by Michotte to explore causal perception, in which there is spatiotemporal contiguity between two moving objects A and B (Vicovaro et al, 2020). We reported and discuss here from a theoretical perspective the results of three experiments exploring the relationship between the speed of A and the speed of B in different causal events. In one Experiment we presented the participants with stimuli that elicited a launching impression, and tested how the judged speed of B varied with variations of the pre-collision speed of A. In a second Experiment, we adopted stimuli in which object A could move with uniform positive or negative acceleration, to test whether the apparent speed of B depended on the speed of A at the moment of collision, as Newtonian laws of collision predict, or whether it depended on the overall motion pattern of A. Finally, we compared these results with similar findings (Parovel & Guidi, 2020) showing an overestimation of the motion of B in a psychological action-reaction sequence, where a moving object B is seen intentionally escaping from another object A, and we discuss this common effect according to the property transmission hypothesis. Moreover, this speed overestimation effect could be added to the list of functional effects of causality – both mechanical and psychological - on the low-level properties of the scene.

Task-Irrelevant Biological Motion Recruits Motion-Sensitive Occipito-Temporal Cortex Under Attentional Load

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Perception of biological motion (BM) under attention is supported by a network of regions in the occipito-temporal cortex including superior temporal sulcus (STS), and pre-motor cortex (PMC). Yet, how BM is processed when attention is directed away lacks thorough examination. Behavioral experiments show that when presented as a task-irrelevant distractor at the periphery, BM impairs performance on a task at the fovea (Thornton & Vuong, 2004). In the present study we investigated whether the brain regions that process BM are recruited when attention is directed away from BM, and how attentional load at the center modulates this processing. Participants (N=17) underwent a functional MRI study in which they performed an attentionally demanding task at the fovea while BM in the form of point-light displays were presented at the periphery. We manipulated the attentional load at the center. Univariate analysis and MVPA show that fronto-parietal attentional regions were more active when attentional load was high than when it was low. More importantly, we found that motion-sensitive areas in the occipito-temporal cortex were activated in the presence of task-irrelevant BM stimulus even when attention was directed away from it. Furthermore, during low attentional load condition, BM related activation was stronger compared to that of in high attentional load condition. Thus, our results show that BM can be processed in the periphery even when it is not at the focus of attention, and it is modulated by attentional load.

Bottom-up perception of biological motion is influenced by perceptual load and eccentricity

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Biological motion (BM) is a crucial stimulus with social and survival value that can be processed incidentally. However, no study has examined the factors that would affect bottom-up processing of BM in depth. Therefore, we investigated the effect of perceptual load and eccentricity on BM perception in two experiments. In experiment 1 (n=17), biological and scrambled motion (which lacks global form and motion information) were used as task-irrelevant distractors while participants performed visual search tasks with low or high perceptual load. We found that both distractors interfered with task performance under load, but scrambled motion affected performance more than biological motion in both tasks. These results support the findings that search performance is better if the distractors are familiar and meaningful, as in BM, compared to if they are not, as in scrambled motion. In experiment 2 (n=16), we used only BM stimulus as a distractor and manipulated the eccentricity of the distractor. Our results show that, in line with the results of the first experiment, BM interfered with task performance in both perceptual load conditions. Moreover, we also found an effect of eccentricity: when the perceptual load is low, people are distracted more by BM at near eccentricities, whereas when the load is high, the position of the distractor does not have any effect on distractor interference. In sum, these results suggest that bottom-up perception of biological motion is influenced by perceptual load and eccentricity.