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RECEIVED 01 November 2023
ACCEPTED 07 November 2023
PUBLISHED 22 November 2023

CITATION
Proverbio AM (2023) Editorial: Insights in
Perception: 2022. *Front. Cognit.* 2:1331839.
doi: 10.3389/fcogn.2023.1331839

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Editorial: Insights in Perception: 2022

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KEYWORDS

visual perception, cognitive psychology, individual differences, digital environment, amodal completion, sex differences, audiovisual stimulation, emotional development

Editorial on the Research Topic [Insights in Perception: 2022](#)

This editorial summarizes the contributions to the Frontiers Research Topic “*Insights in Perception: 2022*”, appearing in the inaugural issue of *Frontiers in Cognition: Perception* journal. As described in Proverbio’s specialty grand-challenge paper, this Research Topic aimed to explore recent developments in the cognitive psychology and cognitive neuroscience fields with a focus on research perspectives, criticalities and the importance of maintaining a critical approach and not automatically endorsing prevailing knowledge or views, in order to encourage the development of new ideas and theories.

In particular, Proverbio’s introductory paper highlights some challenging issues that deserve greater attention in future research, and provides some examples of current beliefs that tend to be uncritically accepted despite the existence of solid data to the contrary. These include the notion that perceptual and sensory processes are invariant, when in fact they are strongly influenced by learning, familiarity and the development of new skills. Again, sensory analysis is not automatic, but modulated by higher-order factors (attention, arousal, emotion) from the earliest stage of processing (e.g., 40–70 ms), as shown by several studies (e.g. Proverbio et al., 2021; Qin et al., 2023). It is also discussed that not only neuroanatomical abnormalities may be the cause of a neurological deficit, but that culturally determined habits may lead to insufficient brain activation (e.g., insufficient reading practice leads to hypo-stimulation of V5 magnocellular neurons, and insufficient face scanning in autism leads to hypo-stimulation of the FFA). Finally, the presence of several sex differences in brain functions is discussed, the most relevant of which concerns hemispheric lateralization in face processing. It is a mystery why fMRI researchers do not observe the consistent effects of sex on brain activation (Proverbio, 2021).

One other study in the special topics, Gauthier et al. explored a novel approach to understanding visual perception by focusing on the ability to recognize curved animated symmetrical “greeble” objects. The results highlight individual differences in object recognition mechanisms that are usually taken for granted but not operationalized. The authors introduce the concept of Ensemble Perception (EP), which is the ability that underpins performance in judgments about the statistical summaries of a feature for a group of objects, whereas Holistic Processing (HP) refers to a variety of effects whereby a whole object is processed better than parts of the object (Gauthier, 2020). It is concluded that individual differences may reflect interactions between domain-general mechanisms such as attention, rather than coherent abilities.

A third study, [Proverbio and Pischedda](#) focused on the development of an effective library of stimuli (Pictionary) for the systematic induction of category-specific imagery from a brain-computer interface perspective. This set of stimuli, known as the PAIN set, uses colored cartoons to visually depict 12 different motivational states, including primary needs like hunger, thirst, and sleep; somatosensory sensations such as cold, hot, and pain; affective states such as fear, sadness, and cheerfulness; and secondary needs or desires like listening to music, moving about, and playing with friends. Each state is represented by five distinct examples. The Pictionary has been tested on a group of 50 participants and demonstrated strong communicative effectiveness, with a rating of 2.7 on a 0–3 scale. It also achieved a recognition accuracy of 98.4%. The PAIN set has recently been employed for ERP and LORETA modeling in the context of *Brain-Computer-Interface* (BCI) systems ([Della Vedova and Proverbio, 2023](#); [Proverbio and Pischedda, 2023](#)).

Another study, [Vuong and Geangu](#) focused on how emotional processing of body expressions develops, particularly during the critical first 2 years of life and into early childhood. They provide empirical evidence that infants and children can process the emotional content of body expressions using static (e.g., body posture) and dynamic (e.g., body movements) cues. Furthermore, they show that emotion processing abilities do not vary with age (as indicated by a meta-regression involving six emotion pairs), which is surprising given the changes in brain development and maturation of the visual system that infants experience.

Another study of this Research Topic, [Getz](#) presents work on audiovisual correspondence, which refers to an observer's consistent matching of sensory features across auditory and visual modalities. This empirical study, conducted on a large group of participants, investigates competition effects between the visual dimensions of height, size, brightness, sharpness and spatial frequency and the auditory dimension of pitch. As predicted, participants responded faster when pitch was congruent with height (and incongruent with size, sharpness, spatial frequency, or brightness) and slower when pitch was congruent with size, sharpness, spatial frequency, or brightness (and incongruent with height). Taken together, these results reinforce the superiority of the pitch-height correspondence; however, it will be important to investigate developmental changes in these effects in the future, as other work has shown an increase in associations across the lifespan ([Speed et al., 2021](#)).

A further study on visual perception (which is somewhat the common denominator of this Research Topic), [Dissegna et al.](#) deals with the Gerbino illusion, a fascinating perceptual phenomenon in which a distortion is perceived when an angle of a regular hexagon is accidentally occluded. They tested the hypothesis that at least part of this shape distortion involves the misrepresentation of side orientation, i.e. a loss of veridicality, possibly associated with the generation of smooth monotonic amodal contours. The empirical data provided evidence that the concatenation of local distortions induced by the randomly occluding triangles determines the perception of a globally misoriented shape, in line with the visual approximation framework and previous findings ([Gerbino, 2020](#)).

The last study, [Kirjakovski](#) summarizes a number of recent findings on the impact of digital technology on our cognitive and perceptual processes. The digital environment is both qualitatively and quantitatively different from other natural and social environments, and this may have significant implications for human cognition and perception. For example, digital technologies have created a hyper-connected world that effectively renders physical and temporal distances trivial, and it is unknown whether the neocortex will adapt in the future to the multiple social encounters in the vast digital networks. Again, automated systems may reduce the need for vigilance and sustained attention, leading to multiple forms of attentional inefficiency. Constant photographing of objects reduces memory for this information (objects and their locations) by about 14%. Multitasking is associated with poor performance and distractibility; electronic reading may impair text learning. Identifying and understanding the adaptive and selective pressures created by the digital environment should be a major goal of future cognitive science.

Author contributions

AP: Writing—original draft, Writing—review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

We thank the authors of the papers published in this Research Topic for their valuable contributions and the referees for their rigorous review. We also thank the editorial board of Perception Section, and the Frontiers Specialists for their support.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

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