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EDITORIAL

Face perception: a window into the social mind

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This editorial introduces a broad Collection of works highlighting the central role of faces, the richest and most complex of social stimuli, in human behaviour. The Collection covers work from various areas of psychology, psychiatry, and neuroscience on different aspects of face perception: The development of face perception, the underlying cognitive and neural mechanisms of face perception, the role of faces in social interaction, how neurological or psychiatric conditions can affect face perception, as well as face perception in human–machine interactions involving artificial agents with face-like features. This body of work underscores the profound impact of faces on social interaction, aiming to promote dialogue among different disciplines and inspire future research in this vibrant research domain.

Faces are central to human social life and represent a highly relevant social stimulus, both complex and uniquely rich in critical information that can be inferred from them. For instance, faces convey emotional states, as well as intentions and attentional focus, guiding us in countless interactions from infancy into adulthood. Indeed, extensive research highlights faces as a primary source of social information[1,2]. Our ability to detect, recognise, interpret and react to facial cues shapes our social experiences, facilitating cooperation and communication that is crucial for navigating a complex social environment[3,4].

The study of face perception has consistently revealed its multifaceted nature, from basic sensory processing to more sophisticated interpretations influenced by social, emotional, and cultural contexts. The richness of information communicated by faces is mirrored by the wealth of contributions in this Collection, covering different characteristics of face perception approached through various methodologies. Bringing together cutting-edge research from psychology, psychiatry, and neuroscience, this Collection covers recent work on how we process faces and why this class of stimuli matters for our social experiences. The articles in this Collection present several interconnected perspectives, as illustrated by some examples briefly reported below.

Firstly, the developmental aspects of face perception are addressed by examining how these abilities emerge and mature over time. For instance, Rigato and colleagues[5] assessed the visual preferences of infants and their longitudinal associations with emotional reactivity, emphasising the significance of face perception in emotional development. Lesinger and colleagues[6] focused on the neurodevelopmental trajectory of face-processing abilities, documenting the right-hemispheric lateralisation of face network connectivity from infancy to adulthood. Gilad-Gutnik and colleagues[7] conducted a study on children treated later in life for congenital cataract and proposed a new hypothesis based on visual acuity in newborns that might determine the development of congenital prosopagnosia. These contributions illustrate how behavioural and neural indices of face perception emerge early and jointly contribute to developing social and emotional competencies.

Secondly, clinical and neurological perspectives enrich our knowledge of face perception by examining impairments in face-processing mechanisms in different populations. Halder and colleagues[8] investigated congenital prosopagnosia using a binocular rivalry paradigm, revealing atypical focus on local rather than holistic cues during face processing. Metternich and colleagues[9] examined patients with temporal lobe epilepsy, highlighting subtle but meaningful deficits in dynamic facial emotion recognition, which are often missed by standard assessments. Furthermore, research on individuals with varying levels of autistic traits[10], as well as individuals with Williams syndrome[11], shows how neurodevelopmental and individual differences shape face processing and the perception of gaze direction, offering valuable insights for both theoretical models and potential interventions. In this regard, Williams and colleagues[12] showed that individuals with higher autistic

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traits, when judging gaze direction, were more affected by the presence of a face mask, which reduced the availability of spatial cues such as the nose and mouth.

Thirdly, research on emotional and affective processing offers fresh insights into how humans recognise complex affective states from faces and respond to them. Montalti and colleagues[13], using a multi-face flanker-go/no-go task, showed that emotional faces influence behaviour only when relevant to the task. Tessier and colleagues[14] investigated facial representations combining pain and negative emotions, revealing sophisticated perceptual integration mechanisms that guide social responses and empathy. This line of research emphasises the complex interplay between perceptual sensitivity, emotional relevance, and individual/contextual factors, highlighting the fundamental role of facial stimuli in emotional communication.

Further contributions examined the cognitive and perceptual mechanisms underlying face recognition and identity discrimination. Leong and colleagues[15] assessed the relative contributions of holistic versus featural processing, advancing theoretical debates on how facial identities are encoded and retrieved from memory. Kasahara and colleagues[16] investigated the boundaries of self-face recognition using real-time morphing techniques, offering new insights into the dynamic nature of self-awareness. Together, these studies expand our understanding of the processes critical for social identification and personal interaction.

And again, social-cognitive dimensions have been further investigated through studies examining, for example, implicit biases, dominance perception, and interactions with artificial agents. Cheung and colleagues[17] explored implicit biases in trustworthiness judgments across groups of different ethnicities, underscoring key implications for social cognition and intergroup dynamics. From a developmental perspective, Galusca and colleagues[18] investigated the sensitivity of toddlers to dominance traits from facial cues, highlighting the evolutionary and experiential roots of face perception and person impression. Momen and colleagues[19] showed that beliefs about the mental states of robots modulate social perception, with consequences for human–robot interaction. Lorenzoni and colleagues[20] examined how linguistic identity shapes gaze-mediated orienting, demonstrating the interplay between social categorisation and social attention. Overall, these studies reflect the multifaceted nature of face perception and how it can be influenced by implicit attitudes, developmental factors, perceived agency, and group membership.

Finally, methodological innovations and technological applications are also well represented in this Collection, offering powerful new tools to advance face perception research. Accordingly, Mayrand and colleagues[21] demonstrated the potential of using dual mobile eye-tracking to study mutual gaze during live, naturalistic interactions, an approach that bridges lab-based and real-world contexts. Yan and colleagues[22] employed fast periodic visual stimulation EEG to uncover a robust neural marker of face identity familiarity, with potential applications in both cognitive neuroscience and clinical assessment.

In sum, the abovementioned examples highlight the importance of interdisciplinary collaboration, bringing together various perspectives to create a comprehensive understanding of face perception. By integrating developmental, cognitive, social, affective, and methodological contributions, this Collection underlines the primary role of facial stimuli, which can be considered essential 'tools' for interpreting and navigating the complexities of social life. Future research could explore how face perception works in environments that are increasingly present in modern societies, such as virtual settings shaped by artificial intelligence technologies and cross-cultural contexts. To conclude, as editors, we are optimistic that this Collection will foster fruitful dialogue within and across disciplines by informing both pure and applied research, contributing to developing novel theoretical frameworks, methodological tools, and practical interventions, and more broadly, expanding our understanding of human social cognition through the lens of face perception.

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References

1. Bruce, V. & Young, A. Understanding face recognition. *Br. J. Psychol.* **77**, 305–327 (1986).
2. Todorov, A., Olivola, C. Y., Dotsch, R. & Mende-Siedlecki, P. Social attributions from faces: Determinants, consequences, accuracy, and functional significance. *Annu. Rev. Psychol.* **66**, 519–545 (2015).
3. Frith, C. Role of facial expressions in social interactions. *Philos. Trans. R. Soc. B Biol. Sci.* **364**, 3453–3458 (2009).
4. Jack, R. E. & Schyns, P. G. The human face as a dynamic tool for social communication. *Curr. Biol.* **25**, R621–R634 (2015).
5. Rigato, S., Stets, M., Charalambous, S., Dvergsdal, H. & Holmboe, K. Infant visual preference for the mother's face and longitudinal associations with emotional reactivity in the first year of life. *Sci. Rep.* **13**, 10263 (2023).
6. Lesinger, K. et al. Functional connectivity of the human face network exhibits right hemispheric lateralization from infancy to adulthood. *Sci. Rep.* **13**, 20831 (2023).
7. Gilad-Gutnick, S. et al. Face-specific identification impairments following sight-providing treatment may be alleviated by an initial period of low visual acuity. *Sci. Rep.* **14**, 17374 (2024).
8. Halder, T., Ludwig, K. & Schenk, T. Binocular rivalry reveals differential face processing in congenital prosopagnosia. *Sci. Rep.* **14**, 6687 (2024).
9. Metternich, B. et al. Dynamic facial emotion recognition and affective prosody recognition are associated in patients with temporal lobe epilepsy. *Sci. Rep.* **14**, 3935 (2024).
10. Folz, J., Akdağ, R., Nikolić, M., Van Steenbergen, H. & Kret, M. E. Facial mimicry and metacognitive judgments in emotion recognition are distinctly modulated by social anxiety and autistic traits. *Sci. Rep.* **13**, 9730 (2023).
11. Garvey, M. H. et al. Contrasting neurofunctional correlates of face- and visuospatial-processing in children and adolescents with Williams syndrome: Convergent results from four fMRI paradigms. *Sci. Rep.* **14**, 10304 (2024).
12. Williams, E. H., Thompson, N. M., McCray, G. & Chakrabarti, B. Autistic traits modulate the influence of face masks on gaze perception. *Sci. Rep.* **13**, 14921 (2023).
13. Montalti, M. & Mirabella, G. Unveiling the influence of task-relevance of emotional faces on behavioral reactions in a multi-face context using a novel Flanker-Go/No-go task. *Sci. Rep.* **13**, 20183 (2023).
14. Tessier, M.-H., Mazet, J.-P., Gagner, E., Marcoux, A. & Jackson, P. L. Facial representations of complex affective states combining pain and a negative emotion. *Sci. Rep.* **14**, 11686 (2024).
15. Leong, B. Q. Z., Estudillo, A. J. & Hussain Ismail, A. M. Holistic and featural processing's link to face recognition varies by individual and task. *Sci. Rep.* **13**, 16869 (2023).

16. Kasahara, S., Kumasaki, N. & Shimizu, K. Investigating the impact of motion visual synchrony on self face recognition using real time morphing. *Sci. Rep.* **14**, 13090 (2024).
17. Cheung, O. S., Quimpo, N. J. & Smoley, J. Implicit bias and experience influence overall but not relative trustworthiness judgment of other-race faces. *Sci. Rep.* **14**, 16068 (2024).
18. Galusca, C.-I., Mermillod, M., Dreher, J.-C., Van Der Henst, J.-B. & Pascalis, O. Toddlers' sensitivity to dominance traits from faces. *Sci. Rep.* **13**, 22292 (2023).
19. Momen, A., Hugenberg, K. & Wiese, E. Social perception of robots is shaped by beliefs about their minds. *Sci. Rep.* **14**, 5459 (2024).
20. Lorenzoni, A., Calignano, G., Dalmaso, M. & Navarrete, E. Linguistic identity as a modulator of gaze cueing of attention. *Sci. Rep.* **13**, 10829 (2023).
21. Mayrand, F., Capozzi, F. & Ristic, J. A dual mobile eye tracking study on natural eye contact during live interactions. *Sci. Rep.* **13**, 11385 (2023).
22. Yan, X., Volfart, A. & Rossion, B. A neural marker of the human face identity familiarity effect. *Sci. Rep.* **13**, 16294 (2023).

Author contributions

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Competing interests

The authors declare no competing interests.

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