Commentary

Of Faces and Words: On Domain-Specific and Domain-General Accounts

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Abstract

In 2019, we published a paper in the *Journal of Expertise* (Ventura et al., 2019) showing that visual words show holistic processing, deemed a characteristic of faces, when the visual stimuli are within the limits of expertise of the Visual Word Form System (Cohen et al., 2008) and thus when there is fast parallel reading. In this commentary, we discuss this evidence considering the perspective of shared processing across both faces and words vs. the perspective of domain specificity for the processing of each domain. Considering the most recent evidence of mutual interference of holistic processing of words and faces (Ventura et al., 2023), we conclude for the first perspective; i.e., shared processing across both faces and words.

Keywords

functional specificity, domain generality, holistic processing, faces, words

Face and word recognition share several properties and whether word and face recognition rely on shared or distinct neural resources and cognitive processes is the subject of intense debate (for recent reviews, see Burns & Bukach, 2021, 2022; Rossion & Lochy, 2022). According to domain-specific accounts, object categories like words and faces are processed by largely independent mechanisms. Other accounts assume that face and word recognition share or even compete for the same cortical resources depending on the type of visual processing that the task requires (Sigurdardottir et al., 2021).

Though many authors argue for holistic processing as exclusive to faces and objects of visual expertise, there are several demonstrations of holistic processing in visual word recognition. The composite task has been recently adopted to examine holistic processing of visual words in alphabetic and logographic scripts (Chen et al., 2013; Ventura et al., 2017; Wong et al., 2011, 2012). Participants are asked to perform a perceptual same-different judgment on a word part (e.g., first syllable) of two sequential words while ignoring another (e.g., second syllable). The word-composite effect shows that all parts of a visual word are fully processed even if the task requires a decision on only one part. Ventura et al. (2019) showed that visual words show holistic processing, deemed specific to faces, in the composite task when the visual stimuli are within the limits of expertise of the Visual Word Form System (Cohen et al., 2008) and thus when there is fast parallel reading. We recently showed that holistic processing of visual words is related to higher efficiency in visual word recognition by skilled readers (Ventura et al., 2020). Indeed, we observed a direct relation between holistic processing and fast access to the orthographic lexicon by visual word experts (i.e., fluent adult

readers). Thus, holistic perception seems to be a key process that is domain general between faces and words.

These results seem to confirm theories that defend domain-generality of word and face processing. However, human neuroimaging studies that report category-selective regions (e.g., faces, bodies, places, and words) in the human ventral temporal cortex (Cohen & Dehaene, 2004; Kanwisher et al., 1997) provide evidence for a dissociable mechanism, suggesting a modular view of the functional architecture of the mind (Burns et al., 2017; Rubino et al., 2016; Saygin et al., 2015; Starrfelt et al., 2018; Susilo & Duchaine, 2013; Susilo et al., 2015). Taken together, such studies support functional specificity for the identification of different object categories.

Considering domain generality, the many-to-many hypothesis (Behrmann & Plaut, 2013, 2014, 2015, 2020; Plaut & Behrmann, 2011) suggests that during literacy acquisition, competition between word and face representations emerges (Behrmann & Plaut, 2015; Dehaene et al., 2015; Liu et al., 2018), resulting in reductions in holistic/integrated face processing (Ventura et al. 2013), but see also van Paridon et al. (2021) who found evidence that neuronal recycling improves face-recognition abilities rather than weakening them. According to the distributed account with the systems supporting face and word recognition exhibiting graded and overlapping functional specialization both within and, especially, between hemispheres (Behrmann & Plaut, 2013, 2014, 2015, 2020; Plaut & Behrmann, 2011), in addition to the possible overlap of neural regions, the behavioral signatures typically associated with either holistic or part-based processing may apply to both faces and words. Lateralization is incomplete and developed to increase processing efficiency, but both fusiform gyri are involved in word and face perception.

Regarding the question of shared versus independent cognitive processes, behavioral evidence suggests that word and face recognition may rely, at least in part, on similar and shared cognitive processes. In a recent study

(Ventura et al., 2023) we directly showed a reciprocal interference between the holistic processing of word and face stimuli. We presented words (aligned or misaligned) superimposed on faces (aligned or misaligned) and tested the interference from the unattended stimulus category on holistic processing of the attended category. Faces were processed less holistically when an aligned word (processed holistically) was superimposed, while words were processed less holistically when an aligned face (processed holistically) was superimposed. This finding evidenced a trade-off in holistic processing of the two stimuli, suggesting that faces and word stimuli rely, at least in part, on similar holistic processing mechanisms. Indeed, if faces and words were processed independently, holistic processing of both would not have produced the interference effects we found. Instead, the interference between holistic processing of faces and words is in line with the view that word and face recognition rely on partly shared cognitive resources.

However, other evidence regarding inversion effects on efficiency (Albonico et al., 2018) suggests that, despite these similar properties, there might be some key differences in the quality of face and word processing, cf. also Brady et al. (2021). Also, it is possible that not every aspect of word recognition may overlap with face processing (Duchaine et al., 2007; Hills et al., 2016; Sigurdardottir et al., 2021). For example, Plaut and Behrmann (2013) underline that their claims concern the representations that support visual recognition of faces and words; they do not claim that there are no mechanisms of any sort that are relevant to the processing of words, but not of faces (or vice versa). Thus, depending on the nature of the testing, performance on faces and words might dissociate for reasons outside the scope of their theory.

Even if word and face recognition do exhibit similar holistic effects, this could be due to a domain general module that contributes to word and face holistic recognition, but that independent face specific and word specific modules exist which do not contribute to the other domain.

In conclusion, we recently found a trade-off between the holistic processing of faces and words, which is difficult to explain by the modular position. That is, if faces and words were processed independently, holistic processing of both would not have produced the interference effects we found. Instead, the interference between holistic processing of faces and words is in line with the view that word and face recognition rely on partly shared cortical resources. These findings have important implications for our understanding of a hypothetical shared holistic mechanism between face and word processing.

Authors' Declaration

The authors declare that there are no personal or financial conflicts of interest regarding the research in this article.

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