Regular views at a regular world

Response to Kaiser and Haselhuhn Journal Club

Benjamin de Haas, D. Samuel Schwarzkopf and Geraint Rees

University College London

In their Journal Club review of our recent paper (de Haas et al., 2016), Kaiser and Haselhuhn propose an interesting hypothesis. They suggest that the results of our study transcend face perception and point to a general principle of visual processing in a regular world. Here, we identify research questions arising from this hypothesis.

First, Kaiser and Haselhuhn propose that feature-location interactions arise from lower level tuning biases for 'visual features that are characteristic for a specific face part'. They point out that posterior face patch neurons in macaque show a very early advantage for eyes presented in the contralateral upper visual field, which presumably is feed forward in nature (Issa and DiCarlo, 2012). However, even characteristic visual features are rarely *specific* to a particular object. Eyes may have a characteristic outline, but it is nevertheless similar to that of e.g. avocado halves. If tuning biases arise from low-level features, they should be common across stimuli sharing these features. Are we better at discriminating avocado halves in the upper visual field?

Second, Kaiser and Haselhuhn suggest that feature-location interactions arise from repeated visual experience. This suggestion is linked to previous work on processing advantages for typical object configurations (Kaiser et al., 2014) and natural scenes (e.g. Geisler, 2008; Girshick et al., 2011; Peelen and Kastner, 2014). However, regular arrangements in the world do not in themselves lead to regular visual input. Stereotypical object arrangements need to be met by stereotypical eye movements to result in retinotopic biases. We have shown this link for face perception and Kaiser and Haselhuhn point out stereotypical gaze behaviour in reading. However, it is unclear to what degree this generalises to other types of stimuli. Presumably shoes, grass and hands appear more often in the lower visual field, while clouds, hats and traffic signs appear more frequently in the upper one. But such biases have yet to be systematically tested and quantified (ideally using mobile eyetrackers in real world settings; c.f. Peterson et al., 2016)

Finally, biases in gaze behaviour may not simply lead to biases in tuning. Alternatively, both types of biases could re-enforce each other. This developmental distinction is probably hard to test, but has far reaching relevance. Infants who are later diagnosed with autism spectrum disorders show aberrant gaze behaviour towards faces before six months of age (Jones and Klin, 2013). If feature-location interactions play a part in the development of typical gaze behaviour, they might help to shed light on the aetiology of such symptoms.

We are grateful for Kaiser and Haselhuhn's interest in our findings and hope that future research will bring answers to the questions we outlined.

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