Comment

# Similarity of Structure and the Profile of Visual Recognition Defects: A Comment on Gaffan and Heywood

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In a paper published in the 5:1 issue of *JCN*, Gaffan and Heywood use data from normal human and nonhuman primates to argue that previous findings regarding category-related recognition defects are largely or wholly spurious. Gaffan and Heywood conclude that the "category-specific impairment of knowledge of living things in patients with visual agnosia can . . . be explained as arising directly from the visual properties of living things, namely, their visual similarity to each other as members of a visually crowded category" (p. 126). They go on to suggest that their explanation is "simpler and more direct" than those offered by previous authors, including Warrington and Shallice (1984), Farah and McClelland (1991), and ourselves (Damasio, Damasio, & Tranel, 1990). Naturally, we will not comment on the other authors; however, we can say with certainty that Gaffan and Heywood's statement is incorrect as far as we are concerned.

For more than a decade, we have been pointing out precisely the conclusion that Gaffan and Heywood are now offering as an "alternative" explanation of category-related recognition impairments. In 1982, we wrote that "the chance of an item being incorrectly identified depends on the existence of other items with a relative visuostructural similiarity," and that "recognition . . . is made more difficult or precluded when the stimulus belongs to a visually ambiguous category" (Damasio, Damasio, & Van Hoesen, 1982, p. 339). Furthermore, we defined *visual ambiguity* as a property of "a group of stimuli in which numerous *different* members are structurally *similar*."

We have reiterated this explanation on numerous occasions over the years (Damasio, 1990; Damasio, Damasio, & Tranel, 1990; Damasio, Damasio, Tranel, & Brandt, 1990; Damasio, Tranel, & Damasio, 1990), including in the very source that Gaffan and Heywood quote as being in opposition to their explanation (Damasio, Damasio, & Tranel, 1990). In that paper, in fact, we noted that a primary factor that distinguishes faces and other nature-made stimuli (e.g., mammals, birds, fruits, flowers) is the small degree of physical structure variation among different exemplars of the category. We noted that these "visually ambiguous physical structure groups" posed special challenges to the visual recognition capabilities of the brain. Another factor we have emphasized repeatedly in this context is the numerosity of members in categories. The category of human faces is the prime example, being comprised by stimuli that are both numerous and visually ambiguous.

The findings reported by Gaffan and Heywood are entirely consistent with those we have reported for subjects with lesions and acquired recognition impairments, and with the interpretation we have offered for our data. The conclusion advanced by Gaffan and Heywood is, in essence, a restatement of arguments we have elaborated previously in regard to so-called category-related recognition impairments. Commenting on our own findings and those of other investigators, we noted that "the evidence does not support the notion that there are systems solely dedicated to the knowledge of conceptual categories and, in particular, that there are systems linked to natural and living things versus man-made and inanimate things" (Damasio, Damasio, Tranel, & Brandt, 1990, p. 1046). Much of our work over the past several years, in fact, has been aimed at flushing out the factors that might account for the different recognition profiles (shown by both normal and brain-damaged subjects) associated with different conceptual categories, and in particular, with categories that are "natural" versus those that are "man-made." Our data have repeatedly pointed to the importance of the factor we have called *visual ambiguity*, and the findings of Gaffan and Heywood provide further support.

The finding that recognition of entities belonging to conceptual categories comprised of living things is more vulnerable to brain damage (and is more difficult for normals) than recognition of nonliving entities is reliable and well-replicated. It is the interpretation of this finding that is open to debate. We believe the claim by Gaffan and Heywood that there *are* inherent differences between living and nonliving things is correct, although we would not choose to label the finding as "spurious." Not surprisingly, we also concur with the explanation offered by Gaffan and Heywood, inasmuch as it does not differ from the one we have offered for more than a decade. What is surprising is that neither of the authors seemed

to know about ideas that have been in peer review print and in major book collections for so long.

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## REFERENCES

Damasio, A. R. (1990). Category-related recognition defects as a clue to the neural substrates of knowledge. *Trends in Neuroscience, 13,* 95–98.

Damasio, A. R., Damasio, H., & Tranel, D. (1990). Impairments of visual recognition as clues to the processes of memory. In C. M. Edelman, W. E. Gall, & W. M. Cowan (Eds.), *Signal and sense: Local and global order in perceptual maps* (pp. 451–473). New York: Wiley-Liss.

Damasio, A. R., Damasio, H., Tranel, D., & Brandt, J. P. (1990). Neural regionalization of knowledge access: Preliminary evidence. *Cold Spring Harbor Symposia on Quantitative Biology,* Vol. LV, pp. 1039–1047.

Damasio, A. R., Damasio, H., & Van Hoesen, G. W. (1982). Prosopagnosia: Anatomic basis and behavioral mechanisms. *Neurology, 32,* 331–341.

Damasio, A. R., Tranel, D., & Damasio, H. (1990). Face agnosia and the neural substrates of memory. *Annual Review of Neuroscience, 13,* 89–109.

Farah, M. J., & McClelland, J. L. (1991). A computational model of semantic memory impairment: Modality specificity and emergent category specificity. *Journal of Experimental Psychology: General, 120,* 339–357.

Gaffan, D., & Heywood, C. A. (1993). A spurious category-specific visual agnosia for living things in normal human and nonhuman primates. *Journal of Cognitive Neuroscience, 5*(1), 118–128.

Warrington, E. K., & Shallice, T. (1984). Category specific semantic impairments. *Brain, 107,* 829–854.