

## PATTERN RECOGNITION INVARIANCE IN PIGEONS

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One and the same object can yield very different retinal images depending on its orientation and distance relative to the observer and on the light conditions. The capacity enabling organisms to identify an object as the same in spite of this variability is known as perceptual invariance. We examined some of the pigeon's capacities in this respect (1). The testing procedure involved an oddity-from-sample discrimination paradigm. In a three-key Skinner box the animals were presented with a sample pattern on the middle key and then with two comparison patterns on the side keys. If they pecked the non-matching comparison pattern they were reinforced with food, if they chose the matching pattern they were punished with a 3 sec period of darkness. To begin with we examined whether pigeons are capable of conceptualizing the "same-different" principle underlying this task. We trained the pigeons using between 40 and 180 different three-stimulus configurations. When they performed well on these (more than 90% correct choices), we interspersed transfer trials with novel stimulus configurations under extinction conditions. The pigeons performed above chance level on two such test series (2). Using the same pigeons we then tested the effect of various invariance conditions on visual pattern recognition. Contrast reversal of the comparison patterns considerably affected the performance. Only four of nine animals achieved above-chance performance. Tests in which the animals had to decide about the equivalence of silhouette and outline patterns gave nearly perfect discrimination. Thus, the visual system of the pigeon, like the human one, seems to extract information equivalent to a drawing at some stage of processing. Size invariance tests yielded uneven results. When the comparison stimuli were small relative to the sample the pigeons did quite well, but when they were large, their performance was poor though above chance. Unexpectedly, irrelevant colouring of the patterns did not impair the oddity performance: perhaps as in humans, pattern recognition in pigeons is mediated by achromatic visual mechanisms.

1. Hollard, V.D. and Delius, J.D. (1982) *Science*, 218, 804-806.
2. Lombardi, C.M. Fachinelli, C.C. and Delius, J.D. *Anim. Learn. Behav.* (in press).