LETTER

Clever crows or unbalanced birds?

Taylor et al. (1) claimed that New Caledonian crows are capable of reasoning about "hidden causal agents." Their recorded increases in hide inspections and abandoned trials in the unknown causal agent (UCA) condition relative to the human causal agent (HCA) condition, which were used to infer the presence of "causal reasoning" ability, are, however, confounded by a fundamental methodological limitation.

Test trials of the two experimental conditions were administered in a fixed order: The HCA trials always preceded the UCA trials. To overcome the likely impact of order effects, it is customary for researchers to experimentally cross the manipulation of interest with the order of testing, a practice called counterbalancing. Thus, although it is unclear why counterbalancing was not employed, it is plausible that performance on UCA trials was influenced by prior exposure to HCA trials. This being the case, the findings of Taylor et al. (1) are uninterpretable.

The authors were surely aware of this confound because they contrasted their "causal reasoning" account with an account based on habituation and predicted that habituation should result in fewer inspections across trials. It is questionable, however, whether the effect of repeated exposure to the stick (or indeed the passage of time) would necessarily result in habituation. Repeated exposure to a stimulus can result in sensitization, an increase in responsiveness with repeated stimulation (2); thus, the observed pattern of behavior could have been obtained irrespective of the specific details of the experimental conditions. Repeated stimulus pairings can also result in the acquisition of conditioned responding through associative learning (e.g., ref. 3). Thus, crows had the opportunity to observe repeated pairings of the hide and the aversive probing of the stick, permitting the acquisition of an aversion to the hide regardless of condition.

Taylor et al.'s study (1) raised many interesting questions, particularly the question of which features of HCA and UCA exposure might contribute to differences in the crows' behavior. In the HCA condition, two humans entered the aviary; one disappeared from sight, and the stick was moved from within the hide. One human reappeared and exited, and was then followed by the second human. In the UCA condition, one human entered the aviary, the stick was moved from outside the hide, and the human left. These two conditions therefore differ in several ways (e.g., number of people observed, time courses and spatial locations of these people, manner in which the stick was moved). However, these interesting questions can only be addressed once it is unambiguously demonstrated that the observed data were a consequence of the two conditions, and this can only be achieved, within subjects, using a counterbalanced experimental design. Until then, it remains unclear whether crows reason about hidden causal agents.

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