Did You Ever Hear the One About the Horse That Could Count?

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Did you ever hear the one about the horse that could count?

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“Those who don’t know history are destined to repeat it.”

(Edmund Burke)

It has become increasingly, and sometimes frustratingly, clear that in the past few years some researchers working with non-human animals either have forgotten (or were never taught) the perils of inadvertent cuing. I wrote this article after completing another journal review in which the methodology involved an experimenter presenting two or more choices to an animal. The experimenter prepared the trial, presented it, watched the animal as it made its response, and then recorded that response. In this case, as in some others in our field, the test itself was creative, unique, and exciting, and the performance by the animals tested was adequate to suggest they might be doing something interesting and perhaps reflective of cognitive processing. But, the possibility that cuing might have occurred dampened my enthusiasm for the project, and dampened my spirits about the state and future of the field in general because too many papers get through the peer review process without having proper controls for cuing.

In the interests of full disclosure, I cannot say I have always been perfect in preventing any chance of cuing in the tests I have done. Of course, test boxes of other kinds (e.g., Skinner boxes) used with pigeons, rats, and other animals eliminated this concern. Furthermore, several other apparatus used in comparative psychology – Harlow’s Wisconsin General Test Apparatus (WGTA; Harlow and Bromer, 1938; Harlow, 1949). One point of the WGTA (and of even earlier apparatus that were precursors to the WGTA) was to make sure that the animal could not see the experimenter at all during the set-up of trials and during its own response. Instead, the experimenter viewed the animal in a one-directional manner, preventing any possible cues from occurring. Subsequent use of versions of the WGTA occurred in many animal laboratories, and the development of computerized testing with non-human primates (e.g., Rumbaugh et al., 1989) and other species also was at least partly due to the desire to eliminate the potential for cuing of subjects. And, of course, test boxes of other kinds (e.g., Skinner boxes) used with pigeons, rats, and other animals eliminated this concern as well.
Note that this is not a concern only for animal researchers. It is a possibility with any test subject. All too often in developmental studies, for example, researchers act as if such cues are not possible with human children (or, for that matter, with adult human participants). And, in comparative psychology, especially in tests of comparative cognition, the methods are often adopted and adapted from developmental psychology. Hence, the problem compounds. Even worse is when research teams, when asked why they do not have adequate controls, respond by saying “this is how it is done with children, or by group X who did it before us with species Y.” This is an entirely inadequate and misguided justification. My contention is that any study that fails to control for cuing is flawed, and it should not be replicated, at least with regard to the methodological details that allowed for the potential cuing to occur.

One might ask whether the problem is really that worrisome, and the answer is a resounding yes. First, many empirical comparative studies looking at cognitive processes involve only a small number of subjects, and these studies are rarely replicated by other laboratories or with other subjects (see Agrillo and Miletto Petrazzini, 2012). So, the first report is often the only one, and a positive report of some new behavioral phenomenon is likely to be highly cited, and highly influential on theory and subsequent work in that topic area. But if the possibility of cuing exists, we are then stuck with equivocal data, and perhaps erroneous conclusions.

The problem of cuing can be even worse when the phenomenon of interest might have practical, real-world implications. One of the best examples of this comes from a recent paper by Lit et al. (2011). They tested whether the beliefs of human handlers could impact the behavior of scent dogs – dogs trained to provide critical services by finding drugs or explosives. When human handlers thought (incorrectly) that a site was baited with a relevant scent, they reported that the dogs more often alerted at those locations. In other words, Lit and colleagues showed that the handlers’ beliefs affected what the dogs did.

The solution is simple: remember Clever Hans! Teach students his story, and engrain in them the need to, at minimum, run control trials/sessions in which possible cuing is prevented, so that they can see whether responding remains the same as when such controls are not present. Even better, eliminate possible cuing totally, through the use of multiple experimenters who either see what the animal does (but do not know what it should do) or who prepare trials but then do not see what response the animal makes. This will let us increase our confidence that the animal sitting across from us is responding on the basis of its own learning, or its own “thinking,” rather than on the basis of adjusting its responses based on how we are reacting to what it is doing. By doing this, we will put the Clever Hans Effect back in the barn, and out of view, while keeping Clever Hans the reminder in full view.

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