More evidence of complex cognition in nonhuman species

Commentary on **Chapman & Huffman** on *Human Difference*

Lesley J. Rogers
School of Science and Technology
University of New England

Abstract: Chapman & Huffman have highlighted observations of animals performing, in nature, complex behaviour once thought to be unique to humans. Just as relevant to their argument are examples of cognition shown by domesticated species tested in controlled conditions. These strengthen the case for human/nonhuman similarities in behaviour and cognition. Recent research has brought to our attention the ability of nonhuman species to perform many tasks previously considered to be the hallmark of humans. Even though different species may use different ways of solving these tasks, the very fact that they can do it undermines the notion of human superiority.

Lesley J. Rogers is Professor Emeritus at the University of New England, Australia, and a Fellow of the Australian Academy of Science. She has studied animal behaviour for many years and is well-known for her research on development and lateralized behaviour in the chicken. She has also published on welfare in domestic chickens and other species. **Website**

Chapman & Huffman (2018) (C & H) discuss evidence for the similarity of humans to other animal species by highlighting behaviour once considered to be unique to humans and hence used in support of our presumed superiority; viz., tool using, use of medicinal plants and the building of complex constructions. These important examples are now known to be part of the behavioural repertoire of some non-human species in their natural habitats. Other evidence from testing animals in controlled laboratory settings could have been added since it is just as relevant to discussions about the cognitive similarities between humans and other species. Moreover, research on the cognition of domesticated species should not be dismissed as irrelevant to this discussion or of less importance than the evidence reported for animals in the wild (see Marino, 2017).

Let me begin with the research on cognition in chickens at the universities of Trento and Padua, conducted under controlled conditions on behaviour considered to indicate complex cognitive ability such as concept formation. Daisley et al. (2010) developed a paradigm to test whether chicks are able to perform transitive inference, through which an animal can judge its own social rank by observing interactions between other members of its species. Such inferences allow an individual to predict the outcome of competitive interactions: by observing the interactions between others, the chicken can deduce her own social position in the group. This requires complex cognition. Transitive inference in chicks was tested by presenting four pairs of different coloured and shaped stimuli. Only one of each pair was rewarded. To simplify things, let us say they were presented with A+B-, which means A was rewarded and B was not,

then with the pair B+C-, followed by C+D- and D+E-. At test they were presented with novel pairs A-E- and B-D-, neither of them rewarded. AE was a control because A had always been rewarded, whereas E had not: the chicks pecked A. The pair BD tested their ability to perform transitive inference by choosing to peck B over D. Since both B and D had been rewarded in one pairing and not in another, a chick's choice to peck B would have to depend on establishing a hierarchy of A>B>C>D>E (see Daisley et al., 2009). The chicks were able to do this.

Chickens have also proved capable of other complex cognitive abilities, including causal agency (Mascalzoni et al., 2010), attention to animacy (Di Giorgio et al., 2016a), geometry and number cognition (Vallortigara, 2017a), statistical learning (Santolini et al., 2016) and response to rhythmic patterns (De Tommaso et al., 2018). Many of these cognitive abilities, as well as others, have also been shown in other species (discussed by Rogers and Kaplan, 2006; Vallortigara, 2017b), including some of the very interesting and relevant research on cognition in dogs (Siniscalchi et al., 2018; Gácsi et al., 2004). These sophisticated patterns of behaviour are not unique to humans. Some have argued that primates, especially the great apes, have cognitive abilities superior to those of non-primate species, but evidence shows this is not true either (Rogers and Kaplan, 2004). To mention just one example: New Caledonian crows not only use a variety of tools but they manufacture them and store them for use again (Hunt and Gray, 2004; Hunt et al., 2007). Their tool using matches and even surpasses that of chimpanzees.

Now what does this evidence tell us about the blurring of the distinction between humans and other animals? As Vallortigara (2017b) has pointed out, although it does not necessarily prove that a species is sentient, the ability to perform complex cognitive tasks does demonstrate that the superiority of humans is no longer a tenable position. As C & H note, recognising the overlaps between the abilities of humans and other species should at the very least increase our respect for species other than our own.

I generally agree with the points and conclusions of C & H. However, as scientists we do need to be cautious about drawing global conclusions and being prescriptive about our behaviour.

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