To what extent can humans be considered to be distinct from other animals?

by Patricia Karsten

From an evolutionary perspective, humans and other animals have developed through selection mechanisms which resulted in characteristics conveying adaptational advantages for the environmental niche of the species in question. As humans share a long common evolutionary history with other primates, there may be many similarities, but also very distinct features. The discussion will focus on similarities and differences with respect to cognitive and social characteristics, specifically language, theory of mind abilities, sexual behaviour and infant attachment and will use evidence from ethological studies, primate research as well as laboratory experiments. It will be shown that in these areas, truly qualitative differences between humans and other animals are difficult to spot out.

With their language, humans dispose of a very flexible means of communication, which is considered to be unique due to four important characteristics (Aitchinson, 1983, as cited in Cooper and Kaye, 2007): The words as components symbolize specific meanings (semanticity); they are grouped into larger units whose meaning is governed by grammatical rules (structure dependency); the meanings are not restricted to 'here and now' but can include objects distant in place and time (displacement); and the meanings that can be expressed are potentially unlimited, although the system consists of a limited set of components (creativity). But do these characteristics apply only to the human communication system?

There is research evidence, for example from ethological studies, that the communication systems of other animals can be quite sophisticated and share these features to a certain extent. Vervet monkeys warn their companions with predator-specific calls (Seyfarth et al.), indicating a semantic communication system. Honey bees inform the other bees in their hive about the location of food by performing a dance, where individual body movements have different meanings, dependent on the type of dance (Karl von Frisch 1950). This suggests semanticity as well as structure dependency, and even displacement and creativity to a certain degree, in that the bees can communicate about objects 'far away' and 'never seen before'. It would be interesting to know whether their communication is restricted to food location or may as well include other important environmental aspects.

In her laboratory studies of Kanzi, a Bonobo ape, Savage-Rumbaugh has shed further light on the language abilities of higher primates (Savage-Rumbaugh and Lewin, 1994; Savage-Rumbaugh et al., 1998; both as cited in Cooper and Kaye, 2007). Kanzi had learned 256 words represented by symbols on a keyboard, as well as several gestures with specific meanings. When tested, Kanzi responded correctly to about 72 per cent of instructions containing semantic and structural information, for example "pour the Coke in the lemonade". Kanzi was reported to have expressed his wish to repeat a game he previously played by using semantically related keyboard symbols, where exact matches were missing – in summary indicating semanticity, structural understanding, displacement and creativity features in his use of language.

Besides their possible lack of ecological validity due to the laboratory settings, the findings from primate research have been questioned because of the difficulty to distinguish with certainty between responses based on mental representations and understanding, and those based on stimulus-response conditioning (Cooper and Kaye, 2007). It seems evident that human language is distinct from the communication system of other animals as a speech-based system which relies on a specifically adapted throat anatomy (ibid.). But with respect to Aitchinson's above cited criteria, the evidence suggests that the communication systems of humans and other animals share important qualities, and that human language differs mainly in its higher degree of sophistication, flexibility and creativity.

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According to Sperber (2000, as cited in Cooper and Kaye, 2007), the development of language was a consequence of the human ability to reflect on their own and others' thinking, thus understanding other's intentions, which conveyed a huge adaptational advantage. But also in this respect, humans do not seem to be unique, as there is evidence for these so-called 'theory of mind' abilities in other animals, specifically in our closest genetic relatives, the apes. Ethological observations found that apes in the wild are able to misinform their companions about the presence of food with behaviour that draws them off (Whiten, 1997, as cited in Clegg 2007) and when tested in experimental laboratory studies, chimpanzees demonstrated several aspects of theory of mind abilities (Clegg 2007). While it is again difficult to exclude stimulus-response conditioning as explanation for theory of mind abilities in higher primates, the findings nevertheless point to further similarities in cognitive abilities, where humans again seem to differ mainly in their degree of sophistication.

Consistent with the idea of a common evolutionary history, it can therefore be assumed that other similarities between humans and higher primates exist, specifically concerning individual survival chances and reproductive success. For example, it was due to their relatively large parental investment, related to a long gestation period and high infant dependency, that primate females were able to bring up only few offspring, whereas males had to compete for female fertile mates. This implied an adaptive advantage for stronger, larger and more aggressive males, and consistent with this idea male chimpanzees are on average 1.13 times larger than females. And indeed, human males are on average about 1.15 times taller than females, suggesting similarity in the competitive pressures they are subjected to (Hollway, Cooper, Johnston and Stevens, 2007).

On the other hand, there is less evidence for a biological basis of sex-related behavioural differences in humans than is the case for other animals. Experimental studies have found differences in the brain structures of male and female rats. These differences are the result of the balance of male and female hormones at a critical time in development, and correspond consistently to later differences between the sexes in copulation behaviour (Young, 1964; Beach, 1938; both as cited in Hollway, Cooper, Johnston and Stevens, 2007). For humans, sex-related differences in male and female brains were found, for example in the corpus callosum which connects the two brain halves, and fMRI studies indicate differences in the way men and women make use of both brain halves, but these research findings are more difficult to interpret. Consistent with the difficulty to establish unambiguous sex-dependent behavioural differences between men and women, a plausible explanation is that the human brain develops in a process where genetic predispositions, hormonal influences and environment interact, and due to the brain's plasticity, structural differences may result. Consequently, differences in brain structures between the sexes may be the result of social processes rather than representing the biological reason for perceived differences between male and female behaviour (Hollway, Cooper, Johnston and Stevens, 2007), in line with the complementary explanations from evolutionary, biological and social constructionist perspectives on human development.

It should therefore be interesting to reconsider the question with respect to higher primates, whose cognitive abilities have more resemblance to those of humans, and find out in how far behavioural and brain differences between the sexes in primates might be explained by social processes, in interaction with genetic and hormonal dispositions. As is known from primate research, there are developmental aspects that point to great similarities between human and primate infants, as young monkeys build up an emotional bond to their mothers which is comparable to the attachment human infants show towards their primary caregiver (Wood, Littleton and Oates, 2007). It is therefore conceivable that not only humans, but also higher primates build on attachment security when they approach their peers later in life, and that their reproductive success also depends partly on having acquired certain social abilities. It is equally conceivable that like humans, higher primates are able to overcome the consequences of early attachment deprivation to a certain degree with the help of other attachment figures later in life, in line

with the concept of earned attachment security in human lifespan development, as presented by Wood, Littleton and Oates (2007). Chances are that the brains of higher primates resemble human brains with respect to the plasticity which helps to adapt to environmental influences.

To summarize, the discussion considered similarities and differences between humans and other animals in cognitive and social aspects, specifically in the areas of language, theory of mind abilities, sexual behaviour and attachment. The evidence suggest that there are many similarities between humans and other animals, especially in comparison with our closest genetic relatives, the apes. There also seem to be many open questions with respect to cognitive and social abilities of other higher primates, which make it difficult to draw conclusions regarding human distinctiveness. However, besides the truly unique use of speech for communication and other biological differences, human distinctiveness seems to lie predominantly in the degree of sophistication of mental abilities, which enables humans to reflect on themselves and their environment in a way beyond of what is possible for other animals.

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