Sex differences – not as universal as previously thought

In capuchin monkeys, as in many species, males are larger than females. Are males also more bold, more exploratory and less anxious than females? Far from it. A new study revealed that capuchin monkeys show hardly any sex differences in their individual behaviours. These findings shed new light on an age-old question.

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Capuchins are known for their remarkable cognitive abilities. Now an international research team led by Jana Uher (Primate Personality Net & Free University Berlin), Elsa Addessi and Elisabetta Visalberghi (ISTC-CNR, Cognitive Primatology, Rome, Italy) comprehensively explored individual differences in the capuchins' behaviours for the first time.

In the Centro Primati in Rome, 26 adult tufted capuchin monkeys were studied in 15 different behavioural tests in which, for example, the monkey individuals could explore novel objects, manipulate various apparati or interact with humans or conspecifics. In addition, the monkeys were observed prior to their main feeding and during their daily activities in their groups. The behavioural tests were captured on video and coded later using a special coding software; the observations were recorded using computerised methods. Overall, 146 behavioural variables were obtained. This meticulous and comprehensive recording of the monkeys' individual behaviours in various situations enabled detailed and illuminative analyses.

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Importantly, all behavioural tests and observations were conducted repeatedly and in two nonoverlapping periods of 10 days each. Overall, the behaviours of a single monkey were recorded for 31.2 hours. These comprehensive data sets allowed the researchers to analyse whether individual differences occurred only by chance—after all, like us, monkeys can have a good day or a bad one—or if the monkeys, in fact, show stable individual differences; that is, behavioural patterns that are specific to them as individuals. This proof of stability over some time is essential because only individual-specific patterns are referred to as "personality".

So far, "personality" differences have largely been studied via the use of human's everyday language—the majority of research on human individual differences is based on the person-descriptive words that are catalogued in our lexica and, in particular, in "personality" questionnaires. These methods can explore what people think about and how they describe themselves and other human individuals or individuals of other species—but these methods cannot explore how individuals actually behave.

The capuchin monkey study was therefore based on a new research paradigm developed by Jana Uher to explore and categorise “personality differences” independent of human’s everyday language. The paradigm also comprises novel methodologies and approaches that are needed to systematically explore and categorise individual-specific behaviours not only in humans but in nonhuman species as well. The study explains and demonstrates the application of this novel paradigm and the behavioural research methodologies.

The results were intriguing. They showed that capuchin monkeys indeed show stable individual differences across a broad range of behaviours. The monkeys differed from one another not only in their overall behavioural tendencies but also in the particular situations in which they showed a particular behaviour in particularly pronounced ways.

There were some individuals who, of their own initiative, greeted their human observers in their capuchin-specific manners and tried to contact these humans, whereas other capuchin individuals did so only if the human observers themselves tried to establish contact with them. Other capuchin monkeys, in turn, approached their human observers only when they were given food. This situation-specificity of individual behaviour is well documented in humans and also in great apes. It constitutes an important component of the enormous diversity in which individuality becomes apparent.

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Stunning and unexpected was the finding that, although males are larger and heavier than females, as is the case in many other species, capuchins did not exhibit sex differences in their behaviours except in aggressiveness and dominance. Instead, there were pronounced individual differences in both sexes. Between both the males and the females, there were individuals who closely inspected a large bed sheet that was about 20 times larger than these monkeys and hanging between two horizontal poles, one much higher than the other.

The male Sandokan quickly started to explore the sheet in detail and even used it as a slide many times. By contrast, Vispo, another male of his group, tried all possible ways to avoid any contact with the sheet; in fact, he started walking bipedally when he moved over the poles! As is the case for humans, there were all possible intermediate variations of behaviour between these two extremes in both males and females. These new results question assumptions about the universality of sex differences. They show that in group-living species led by a dominant male typically male and typically female tendencies in individual behaviours do not necessarily have to occur despite pronounced sex differences in body size.

Sex differences in central “personality” characteristics play an important role in many theories of human evolution, especially with regard to living together and the partition of labour between men and women in social communities. However, “personality” differences in humans have been studied thus far almost exclusively with assessments that have employed standardised questionnaires. But our everyday language is shaped by sociocultural perspectives that unintentionally influence our judgements of individual behaviours.

In everyday life, we judge the same behaviours differently depending on whether they are displayed by a male or a female. Therefore, questionnaire assessments are not suitable for studying differences in individual behaviours between men and women. Questionnaire

methods are frequently applied because they are efficient and easy to use, but they very likely constitute an important source of error that has been greatly underestimated so far.

It is well-known that cultural beliefs about typically male and female behaviours—that is, sex and gender stereotypes—influence and change individuals' behaviours in socio-culturally desirable ways. Many studies have shown that children learn to adopt the particular beliefs of their specific sociocultural community and to behave accordingly only over the course of their development. It may well be possible that differences between males and females are much less rooted in human biology than previously thought. The new study on capuchin monkeys at least shows that pronounced sex differences in body size need not in general go along with many differences in males' and females' behaviours as often assumed so far.

Interestingly, there were hardly any age differences in the many behaviours studied either; older capuchin monkeys behaved only a bit less impulsively than younger ones. Although all the monkeys were adults, their age range from 8 and 33 years is quite substantial. The analyses also showed that older capuchin monkeys were not more stable in their individual behaviours than younger ones. Rather, there were pronounced individual differences.

Amongst both the younger and the older capuchins, some individuals showed very stable individual behavioural tendencies, thus rendering their behaviours more predictable for human observers than was possible for the behaviours of individuals who behaved very differently from day-to-day. Such differences in the degree of consistency in individual behaviours are also well-known in humans and in the great apes. They constitute a further component of the diversity in which individuality can become apparent.

Finally, the researchers explored the impact of the capuchins' early life experiences on their individual behaviour as adults. Monkeys who had to be taken care of by humans in their first year of life were less aggressive toward human observers, more distractible by humans, and spent less time close to their conspecifics than mother-reared monkeys. These results are remarkable because all monkeys were frequently brought in contact with their conspecifics during their first years of life and could already be successfully introduced into a group at the age of one year. This means that all of the capuchin monkeys had been living together with conspecifics continuously for at least 7 years, some even for 32 years. But still, their early life experiences had a significant impact on their behaviours as adults. These results show how long-lasting the effects of the hand rearing of primate babies in zoological institutions can be on both the individuals' social behaviours towards humans and towards their conspecifics.

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Scientific publications:

Uher, J., Addessi, E., & Visalberghi, E. (2013). Contextualised behavioural measurements of personality differences obtained in behavioural tests and social observations in adult capuchin monkeys (*Cebus apella*). *Journal of Research in Personality, 47,* 427–444. (Download article) DOI: 10.1016/j.jrp.2013.01.013

Uher, J. (2013). Personality psychology: Lexical approaches, assessment methods, and trait concepts reveal only half of the story. Why it is time for a paradigm shift. *Integrative Psychological and Behavioral Science, 47,* 1-55. (Download article) DOI: 10.1007/s12124-013-9230-6

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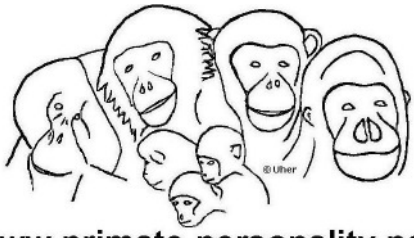

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