

Pandering to the pandas

The panda has had a remarkably quick rise to fame. The first scientific description of a panda didn't appear until 1869, when Armand David, a French priest and naturalist, caught a glimpse of a "most excellent black-and-white bear."

Henry Nicholls, author of a new book on the animal, explores the history of the creature which describes a considerable difference between the symbolic and actual animal. "They've been abstracted to such a degree, we're often not talking about 'real' pandas anymore," he writes.

By the 1930s they had quickly been exported to Western zoos as a star attraction, but it was not until the 1960s that they reached their zenith.

In China, the panda emerged both as a "national treasure" and political image, for the communists. As the animal had no links with imperial China it provided a potent symbol of a new China, Nicholls writes.

And in 1961, it was chosen as the symbol of the now Worldwide Fund for Nature. "It looks great, it's endangered, and prints well in black and white," he writes.

"China takes pandas incredibly seriously — they get the vast majority of conservation money," he writes. "They are unbelievably successful as a conservation symbol."

The Way of the Panda
Henry Nicholls
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Nigel Williams



Potent: Pandas have become a key conservation symbol. (Picture: J. Patrick Fischer.)

Quick guide

Animal personality

Mark Briffa¹ and Alexander Weiss²

What is personality? Human personality is something with which we are all intimately familiar, in that we 'know it when we see it'. In fact, there is good evidence that personality perception is an innate ability we all share. Defining personality scientifically, however, is far from intuitive or straightforward. In fact, psychologists have worked on this problem for a long time and there is an extensive literature on how to define, classify, and measure human personality traits. Increasingly, the concept of 'personality' is being applied to nonhuman animals. Investigating animal personalities is not restricted to animals closely related to humans, such as chimpanzees and other primates; other animals in which the presence of animal personalities have been claimed include dogs, birds, amphibians, fish, and even invertebrates such as ants, squid, spiders and crustaceans.

But doesn't 'personality', by definition, refer to a 'person'? Like many terms used in studies of animal behaviour, 'personality' is a sort of shorthand which has a meaning that is more specific than its everyday usage. The everyday concept of personality and the idea as applied to animal behaviour do, however, share a fundamental feature: this is that individuals consistently differ from one another in behaviour in such a way that these behaviours can be described as individual traits. This basic definition covers a range of phenomena. Individuals might differ in single behaviours or in correlated groups of behaviours that cluster into 'behavioural syndromes'.

These differences should be consistent across time, contexts or situations, and measures. A 'context' is the functional category in which behaviours occur, for example feeding, aggression, and courtship. A 'situation' is the environmental or social condition at a particular time, for example

the high and low predation risk experienced with movement through a habitat. And a 'measure' is a way of measuring personality, for example by behavioural tests, ratings by knowledgeable judges, or observations of naturally occurring behaviour. Measures also refer to different manifestations of behavioural traits assessed by the same approach, such as multiple questionnaire items related to the trait, multiple judges rating the trait, or a series of behavioural tests. Thus, the term does not necessarily suggest that personality in cats, spiders or crabs are homologues of human personality. It is merely less of a mouthful than our broad definition and yet it highlights the possibility that what we call personality in a wide range of species, including humans, may have similar underlying causes.

Why do animals have personalities?

This is the 'big question' that animal personality researchers are starting to turn to. Until recently it was thought that there was no particular reason for animals (including humans) to have personalities. Rather, individual differences in behaviour were assumed to be random variation around an optimal mean response. It is now recognised that consistent individual differences in behaviour could be adaptive. This recognition of personality's potential evolutionary importance has been prompted in part by theoretical work. Models suggest that the benefits of a given personality type might be 'frequency dependent', so the benefit of having a particular personality changes with the number of others that show the same personality.

Such frequency-dependent selection could maintain variation in the population if personality is heritable, and there is increasing evidence for a strong genetic contribution to personality. For example, variation in great tits' (*Parus major*) exploratory behaviour is heritable. Also, personality 'structure' or the covariation among traits might result from genetic correlations. For example, a human twin study showed that factor analysis of the genetic correlations among traits revealed the same five dimensions — Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness — as did

factor analysis of the phenotypic correlations. Thus, while it may be optimal for an individual to show infinite plasticity and a full range of possible responses from situation to situation, this may be constrained by genetic correlations.

Fitness consequences have now been directly studied in a range of species and a meta-analysis found that the personality trait 'boldness' correlates positively with reproductive success in many species. This result was not ubiquitous, however, and while it seems clear that there is a heritable genetic basis for personality, its functions and evolution remain obscure. A possible answer to the question "Why have a personality?", however, is that personality may arise from 'compromises' between different factors that influence Darwinian fitness.

So, there may be evolutionary reasons for personality's stability: does this mean it never changes?

Not necessarily. Like many aspects of phenotype, personality is subject to developmental plasticity, leading to age- or size-specific boldness and the possibility of similar genotypes giving rise to different behavioural phenotypes. Therefore, a further area of interest for animal personality researchers is one that mirrors the longstanding 'nature verses nurture debate' in studies of human personality. Furthermore, behavioural consistency does not preclude the possibility of 'behavioural plasticity' — the variation in behaviour that an individual might show between different situations. An individual may show greater amounts of avoidance behaviour in a high risk situation than in a low risk situation, but still be a consistently high responder relative to others in the sample. Indeed, in addition to consistent variation in mean responses, individuals may show different 'behavioural reaction norms'; that is, individuals may differ in their amount of behavioural plasticity.

How do we know that a species has personality? A key element in determining whether animal personalities are present is the degree of consistency or generalizability across time, contexts, situations or measures. We can measure consistency across time, contexts and

situations by indices of repeatability and re-test reliability. We can measure the generalizability across measures by indices of internal consistency (how tightly do different measures of a trait 'hang together') and inter-observer/inter-rater reliability (to what extent do observers observe and record the same behaviours/ do judges give similar ratings on a trait?). Moreover, given the assumed evolutionary significance, it is also desirable to demonstrate that personality traits show 'external validity', that is, that they predict real world outcomes such as how other individuals react to an individual, through to differences in survival and reproductive success.

So, now that we know what personality is and whether it is present, how do we investigate its causes and consequences?

These questions have been tackled from varied perspectives. Behavioural ecologists might study how individual differences in the exploratory behaviour of birds impact their fitness in different environments. Comparative psychologists have investigated how the clustering of ratings — for example, quitting, erratic or reckless — differ among nonhuman primates. Evolutionary biologists have tried to understand why aggression can be displayed in multiple contexts, even though it would seemingly be more adaptive for the animal to adjust its behaviour according to context. Behavioural geneticists have assessed the proportion of variance underlying a trait which can be explained by additive genetic, maternal, and permanent environment effects and whether there are any gene x environment interactions.

Can different species really be studied in the same way? While the concepts might be similar, behavioural measures can certainly vary between species, often out of necessity. When studying free-ranging animals that are difficult to observe over long periods, researchers may use behavioural tests that rapidly score a small number of traits or a single trait. On the other hand, if the same individuals are likely to be encountered multiple times, it may be possible to measure several traits by behavioural tests, long-term behavioural observations, ratings or a combination of all three. For example,

boldness in American red squirrels was assessed by the quick measure of trapability, whereas personality in a population of free-ranging Hanuman langurs was assessed more broadly, by a combination of behavioural observations and ratings.

Which traits are studied might be influenced by the ease with which they can be measured in the study species. As in humans, one can obtain reliable ratings of chimpanzees and other nonhuman primates on traits such as 'inventive,' which is not surprising given the behavioural and genetic similarities between humans and nonhuman primates. On the other hand, trying to assess the 'inventiveness' of hermit crabs does not make as much sense. However, hermit crabs hide inside their shells when threatened before re-emerging; the duration of these startle responses can be readily measured and easily studied across situations of high and low predation risk. In fact, measuring predator avoidance responses or response to novel stimuli (boldness) across different levels of risk is an approach that has been used to study personality in diverse groups of animals.

And how are data collected and analysed? Depending on how personality was measured, data can consist of the frequency of specific activities that occur during an observation period, the ratings made during or shortly after an observation period, or the ratings formed after long periods of informal observation. Although these data seem different, where multiple approaches have been used, there is often strong congruence among them. Statistical approaches can be straightforward. At the simplest level one can test for a correlation between the responses of individuals in a sample of animals, where the same behaviour is measured in each individual on two or more occasions. To test for behavioural syndromes, one needs to look for correlations between behavioural responses in different contexts. In cases where many traits, situations or contexts are examined, more complex approaches such as exploratory or confirmatory factor analysis, which model correlations among variables as arising from one or more common latent variables, may be used.

This seems straightforward but what's that noise I can hear? The range of perspectives from which personality is studied, not to mention the range of species studied, can complicate the interpretation of data and synthesis between studies. A crucial issue is the terminology used to describe traits. For example, what is referred to as 'boldness' in one study may also be called 'emotional stability', 'risk taking' or 'fast' by others. And one cannot assume that labels applied to measures of personality traits are more than hypothetical constructs. To do otherwise could lead to an 'ethological fallacy'. This is a variant of the well-known 'jingle and jangle' fallacies identified in human personality research where one assumes that two traits are similar because they have similar labels or assumes that two traits are different because they have dissimilar labels. To avoid this and truly determine whether traits in various species are similar or dissimilar requires showing that they do or do not, respectively, predict the same outcomes or have the same causes.

Shouldn't we be worried about anthropomorphism?

Anthropomorphism might pose a problem, especially when working with very human-like species and naive raters/observers. The possibility that anthropomorphism influences studies of animal personality has not been addressed in detail but, if anything, current data suggest that it does not. For example, the personality dimensions of Hanuman langurs obtained by detailed behavioural observations and ratings are highly similar. In another example, humans do not project their personalities onto their dogs (in fact they project their dog's personality onto themselves). What we should always appreciate, however, is that while it may be valid to assume that the personality dimensions found in one species might also be present in closely related species, such as humans and chimpanzees, when two species are more distantly related, this assumption is less tenable.

"To boldly go....." While personality is being demonstrated in an ever increasing array of taxa, we still are not clear why consistent individual differences are present. One direction for theory development and testing

is to incorporate the social context of personalities. A recent model has invoked the ideas of 'trust' and 'social awareness', and recent analysis of long-term data revealed consistent between-individual differences in the cooperative behaviour of meerkats. More effort will undoubtedly be focused on understanding the proximate mechanisms of personality. This might include analysis of the hormonal underpinnings of social structure (for example, dominance hierarchies) and between-individual differences and a better understanding of the developmental links between phenotypic plasticity, pleiotropy, and the constraints on behavioural plasticity. Finally, it will also be essential to develop and validate measures of personality for later within- and cross-species studies.

Where can I find out more?

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¹Marine Biology and Ecology Research Centre, The University of Plymouth, UK. ²School of Philosophy, Psychology and Language Sciences, Department of Psychology, The University of Edinburgh, UK.

E-mail: mark.briffa@plymouth.ac.uk; alex.weiss@ed.ac.uk