The *what* as well as the *why* of animal fun

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Fun is functional: play is evolution's way of making sure animals acquire and perfect valuable skills in circumstances of relative safety. Yet precisely what animals find fun has seldom been examined, for what it can potentially reveal about how they represent and think about the world.

Time was, when suggesting animals might enjoy themselves was seen as anathema to science; even when I read natural sciences in the early 70s the idea was kept in a darkened room, though by then the discovery by Olds and Milner [1] that rats would work endlessly to electrically stimulate certain areas of their brain – and the fact that they called these brain areas 'pleasure centres'– must have opened the door a little. Now, at a time when taking a Darwinian view of animal minds is normal, it seems obvious that feeling pleasure is simply part of the mechanism for ensuring animals maximize their fitness: a more flexible mechanism than hardwired specific responses, which were seen by the early ethologists as the main way evolution controlled behaviour. Eating when hungry, drinking when thirsty, sleeping when tired, sex when possible – these things are pleasurable, and they increase Darwinian fitness, QED. By extension, asking 'Why is it fun for them?' is now seen as a sensible question when applied to other activities to which individuals choose to allocate their valuable time and effort; and studies of animal play have come up with some good answers to it.

Martin & Caro [2] proposed to test theories about why animals play against the kill-joy explanation, that 'it passes the time', which would have passed in any case. They showed that in many cases real costs were involved, so more than time-filling must be involved. Play may continue even when animals are food-stressed, and sometimes animals risk death by playing. Functional explanations start with the simple idea that playing allows practice of real-world skills in a relatively safe environment. Baby ibex that play by leaping about sheer cliffs are taking risks, but the agility and skill they develop is later critical to survival when attacked by predators: the cost-balance equation favours playful risk-taking. Beyond practising existing abilities, thus honing nervous system and musculature, playing may help build a repertoire of action patterns greatly in excess of anything available by genetical hardwiring. A kitten may be acquiring novel approaches to the 'escape behaviour' of a rolling ball of wool, when it attacks the ball. The object-play of a young chimpanzee allows the full potential of an ape's prehensile hands and independent motor control of each finger to be explored, so that when as an adult it comes to tackle the food processing challenges of its species – some of them involving tool use – it already has an enhanced repertoire of actions to deploy, some of them 'smart' ones. This 'learning in a safe(ish) context' explanation can also apply to social play. Developing social sophistication and discovering the limits of what you can get away with are likely to pay in later life for any social animal. Of course, there may also be more direct benefits to social play. Young male baboons play roughly with male peers, thus developing motor skills and perhaps friendships with males who may one day help them transfer to the same, new social group; but young females prefer to play with the babies of high-rank females – babies who may one day be ideal allies for the youngsters, since they would be expected to acquire the (high) rank of their mother [3]. The 'playfulness' of much of science has encouraged a further tier of explanation, in

which instead of just exploring risky things safely, we might benefit from playing about with things which could never be experienced: 'what would it be like to travel on a beam of light…' At least for humans, the development of creativity may be another important functional explanation for why play is fun [4]: building an enhanced mental repertoire, by exploring and linking concepts that might never occur together in real-life situations. In short, we are now well-provided with reasonable hypotheses of biological functions that may have led to the evolution of play, and some of these have already been tested.

We can also ask a different, though related question: 'What is fun for them?' In some cases, the answer would be no different from asking the Why question. For a cursorial predator, for instance, running about and pouncing on things is fun, because that's what they will need to do (for real) as an adult. But if we examine the specific objects that a young ape finds it fun to play around with, that may reveal something of how the ape represents the world of objects. The logic here is rather like that of the method of expectancy violation, originally developed in developmental psychology. A strong reaction, which we can gloss as surprise, can show what an individual can distinguish and what it expected. For instance, when it was artificially arranged that an elephant detected a deposit of urine from an individual who was actually travelling well behind them [5], the elephant's surprise reaction showed that it did not expect that particular individual to be ahead of them – which means it had an idea of where that individual should be, now – as well as showing that elephants can distinguish individuals by scent. Here, the elephant's 'motivation' was curiosity [6], but what things an animal finds interesting enough to play with can give clues as to how those things are distinguished and categorized. (Analogously, jokes are not funny if the audience does not see the world in the way the joke-teller anticipates. We've all had the unfunny experience of not getting the punch-line, because of what we happened not to know or understand.)

As yet, the 'what?' question has not been explored systematically, but anecdotes of play suggest that some species may have cognitive abilities beyond those we credit them with. Baboons have been observed teasing cattle, pulling their tails when the cow was safely behind a wire fence and could not hurt the baboon (personal communication B Smuts). Teasing is fun for us because we realize how the victim feels [7]: does this mean that baboons have some as-yet-unrecognized theory of mind ability? Young elephants regularly chase other animals, not just predators like jackals that might present some small threat to them, but also totally harmless species like wildebeest and egrets (personal observation). It would surely be a stretch to claim that elephants need such games to perfect their chasing skills or develop their chasing repertoire; so why is this fun for an elephant? Chimpanzees use objects as tools in many different ways, and it is therefore no surprise to find that they often play with objects. But when an adult chimpanzee, slowly consuming the brain of a monkey it has helped hunt, carefully places small pieces of skull onto a nearby liana, one-by-one in a neat row just like we might place plum stones on the edge of a plate, it raises a question: how does a chimpanzee think about objects, such that this neat pattern is fun to make? In the future, the analysis of the specific *content* of animal fun, in addition to its distribution and functionality, may have the power to help us understand much more about how animals see their world.

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