

# NO LONGER A MIND OF OUR OWN

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**Are laughing rats, empathetic sheep and vengeful elephants an oxymoron? Or do animals and humans share a psyche? New research is blurring the species boundary, forcing us to rethink what it is to be human. By G.A. Bradshaw**

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**P**icture a psychiatrist at her desk reviewing a case file. The report describes a young, teenaged male who, with several others his age, killed nearly a hundred victims. The case is astounding—not only because of the intensity and magnitude of the violence, but because nothing remotely like it has ever happened in the community before. Not even a single murder. As the psychiatrist turns the pages and reads on, the pieces of the puzzle start to come together. A few years before, the young killers had witnessed the massacre of their families and been orphaned. Afterwards, although still very young, they were relocated to another community with few adults to raise them; importantly, it was absent of older, mentoring males.

Resignedly, the psychiatrist writes her opinion: post-traumatic stress disorder (PTSD). She recommends intensive counselling and psychotherapy. Trauma and social breakdown—in this case, loss

of a mother and community—compromise normal brain and behavior development, often resulting in hyper-aggression, violence and other asocial behaviors. Although treatment is called for, such developmental trauma, in the absence of family and friends who can psychologically, emotionally and physically support recovery, often leads to a pattern of psychobiological disorders. Trauma becomes neurobiologically etched and may be transmitted across generations. Unfortunately, the teenagers' story echoes those of many others, each unpleasantly familiar in their association with a string of wars and genocide in Uganda, Rwanda, Iraq and Sudan. However, there is something different and perhaps more disturbing about this account.

These teenagers are young male African elephants. At a South African park, in the 1990's, three young males attacked and killed 58 white and five black rhinoceroses; at a second park, young male elephants killed 40 white rhinoceroses. While these

events have by far been the most dramatic, elsewhere in Africa and Asia, reports of elephant aggression are appearing more frequently. Moreover, violence is not just directed at other species. In yet another African park, male-on-male intraspecific mortality is responsible for 70% to 90% of adult male elephant deaths.

Until recently, these types of behavior have been almost unheard of, leaving conservation biologists searching for an explanation. Habitat destruction, starvation, social breakdown from poaching and culls, and the loss of herd coherence are factors known to severely threaten elephant survival. But the levels and types of atypical behavior being observed suggest an added dimension to the problem. Some biologists think that increased elephant aggression might comprise, in part, revenge against humans for accidental or deliberate elephant deaths. Could it be that elephants, like humans, also suffer psychological trauma as a result of violence?

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IDEAS FROM THE EDGE

Until a few years ago, making such inference and diagnosing elephants with PTSD would have been dismissed as anthropomorphism. But no longer. Elephant psychopathology, chimpanzee infanticide and other un-animal-like behaviors are part of a growing body of research that suggests science is building toward a radical paradigm shift. Streams of new data and theories, critically from neuroscience, are converging into a new, trans-species model of the psyche. Humans are being reinstated back into the species continuum that Darwin articulated, a continuum that includes laughing rats, octopuses with personalities, sheep who read emotions from the faces of their family members and tool-wielding crows.

We now understand that all vertebrates, and it is argued even some invertebrates, share many biological structures and processes that underlie attributes once considered uniquely human: empathy, personality, culture, emotion, language, intention, tool-use and violence. Furthermore, we are able to see beyond species differences in ways we have never been able to before. Neuroimaging advances such as PET and fMRI can help map more elusive subjective qualities—such as emotion, states of consciousness and sense of self—to specific regions of the brain. In conjunction with a rich legacy of observational data and theories on animal behavior and human psychology, neuroscience is bridging long-standing conceptual and perceptual gaps.

Whether or not this paradigm shift conforms precisely to science philosopher Thomas Kuhn's definition, its potential effects on science and society are revolutionary. The idea that humans share a psyche with other animals is enormously challenging. First, it alters the basic model around which biomedical and other disciplines have organized theory and terminology. Concepts like sense of self, empathy and intention have largely been considered exclusive to humans, and have therefore defined what animals are not. Such perceived dissimilarities have shaped theory, practice, law and custom for centuries. The human-animal gap influences how we live, how we formulate scientific questions, how we practice science and even what we eat. Today, in contrast, models of species' similarity are replacing models of difference, and the lines between species have

become increasingly blurred—blurred to the extent that many insist on limits to stem cell-chimera research to avoid mixing the neuronal and psychological capacities of humans and other species.

In itself, similarity among species is not new. Animal models that employ diverse species as surrogate humans have long been a staple of scientific research. Together, rats, mice, cats, dogs, apes and even invertebrates form the backbone of the biomedical and anthropological research that shapes the theories, practices and policies of human health and well-being. It is this understanding of relatedness that grounds scientific inference and makes studies on animals translatable to humans. Consequently, violent elephants and rats with a sense of humor are not remarkable because of the similarities they expose, per se, but because of the specific *nature* of the similarities.

For instance, the notion of "at-risk elephants" conflicts with our sense of what defines an elephant as well as what defines a human being. Because so

measured. Accordingly then, today's theory, practice, law and customs in science and society, which have been shaped by human-animal dissimilarities, must be revised. Clearly, ethical considerations may be compelled to change, but science itself is also affected. For example, consider how intraspecific violence and infanticide in multiple species might now be assessed. Diverse explanations have been put forward, largely depending on the species. From the perspective of evolutionary psychology, primate infanticide can be seen as an adaptive reproductive strategy. On the other hand, in our society, these behaviors are regarded as abnormal and dealt with by the law and psychiatry. A trans-species model of vertebrate brain and behavior requires resolving whether this atypical behavior observed in chimpanzees and elephants is a disorder caused by trauma or an adaptive strategy. How might one or the other conclusion affect science's current theories and practice, conservation and even law?

Neuroscience has made it possible to make in-

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much of human identity—who, how and what we are—has been based on what other species appear to lack, the possibility of a shared, trans-species model of brain and psyche simultaneously prompts us to reflect on what it means to be human.

Nonetheless, similarity does not confer identity—and species' differences do exist. The task before us is to understand the significance and meaning of these differences, under a paradigm of similarity. An apple and an orange are both fruits and therefore the same if we are comparing fruits with doughnuts. But their differences become important when we are trying to decide which one to eat. The same holds true for the species we study. Since so much of science has been built on, and references, the assumption of human-animal difference, shifting to a model of human-animal similarity recalibrates the scale by which differences are

ferences about animals from humans, in much the same way as animal models have been long used to infer human behavior from animals. Inference, then, is no longer unidirectional—and, it seems, models of the psyche are no longer limited to humans. Future historians of science may very well look back and consider the violent young elephants as symbols of a dramatic epistemic turning point in science and culture. For now, they have helped us realize that neuroscience has brought us much more understanding about what it means to be—no matter the species.

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