Why cows hate yellow

Simon Baron-Cohen applauds Temple Grandin and Catherine Johnson's unusual approach to autism, Animals in Translation

This magisterial book on animal behaviour is unique and, for me, is gripping reading. It is written by Temple Grandin, perhaps the best-known woman with autism on the planet, and co-authored by Catherine Johnson, a mother of two children with autism.

Grandin is famous because she lectures tirelessly on what it is like to have autism. She is unusual because she is a woman with autism (most people with autism are male). She was one of the first people with considerable professional qualifications (she is an associate professor of animal science at Colorado State University) to go public about her diagnosis of autism. She also has an international reputation in the meat-packing industry, for her ground-breaking designs of humane cattle-handling equipment, techniques, and setting standards of good practice in handling animals.

In this fascinating book, Grandin attempts two ambitious projects. First, to explain animal behaviour. Linked to this, she aims to show how problems in animal behaviour can be easily remedied if you understand the causes of the behaviour. To this end, she has analysed animal behaviour down to its smallest details, so that she can predict what an animal will do. She has vast experience in being called in to trouble-shoot difficult behaviour in domestic and agricultural animals, from cattle to dogs to horses, and has synthesised the knowledge of animal breeders, animal trainers and zoologists into a wealth of practical advice on how to manage difficult animals.

Her second big focus is a new theory of autism. She argues that the autistic mind is closer to the animal mind than it is to the typical human mind when it comes to perception of detail. This last thesis will be most controversial, but it opens up a whole new way of understanding autism.

Some readers may wonder why a person with autism, who readily recognises she has difficulties understanding the social lives of people, can have such an intuitive and accurate understanding of other animals. Surely a person with autism would be more likely to choose an inanimate domain, such as mathematics, or music, or computers? Aren't animals and their social lives just as confusing as other humans to a person with autism?

We know there are autistic "savants" who can identify a prime number with lightning speed, or can perform calculations such as multiplying two six-digit numbers together faster than a hand-calculator, or can listen to a piece of music just once and then reproduce it, or can tell you on what day of the week any date will fall. In all of these instances, the individual has systemised an inanimate system. They have analysed how the calender works, as a system.

Or they have analysed how music works, as a system. Or how numbers work, as a system.

When we systemise, we try to identify the rules that govern the system so that we can predict the system. And to identify the system's laws you have to analyse the system down to its smallest details, to spot regularities of the kind "If A, then B" or "If I do X, then Y occurs". Put formally, systemising involves piecing together "input-operation-output". According to the theory I advanced in The Essential Difference (Penguin/Basic Books), people with autism are hyper-systemisers.

Grandin has successfully systemised animal behaviour. She notes that the behaviourist psychologist BF Skinner tried to do this in the 1950s (and describes an interesting meeting between herself and the great man). In my opinion Grandin has done a better job than Skinner did. This is because Skinner did not spend all his waking life trying to imagine how animals see, how they feel and how they think. Indeed, he famously argued that one should not speculate about an animal's emotions, thoughts, perceptions and drives, and instead recommended an exclusive focus on the environmental factors that either reward the animal's behaviour (leading to it being repeated) or punish it (leading to it not being repeated).

Grandin, in contrast, starts from inside the animal's mind: what kinds of stimuli might make an animal frightened? What kinds of stimuli might make an animal angry? What do we know about the neuroscience of animal drives that might help us predict its behaviour? Grandin's incredibly patient, thorough, fine-grained analysis of animal behaviour results in her understanding it to the point of being able to predict it, fix it, control it and explain it. Her book almost stands as a manual for animal behaviour.

Here are some examples of laws that Grandin has uncovered: if an animal has to walk through a tunnel (to be vaccinated, for example) there are factors that will determine if it goes forward or refuses to enter. If there is a yellow object near the entrance, the animal won't enter. If that same object is painted grey, it will. If there is a moving object (a coat hung on a fence, flapping in the wind), the animal won't enter. If that same object is held still, it will enter. If the light contrast is too severe, going from light to dark, the animal won't enter. If indirect lighting is used, the animal will enter. If a moving light overhead is reflecting on the floor, the animal won't walk over that part of the floor. If there are unexpected noises (for example from the plumbing) near the entrance, the animal won't enter. If the noise is eliminated, the animal will enter.

She has also systemised the causes of aggression in domestic animals such as horses or dogs, down to a set of laws: for example, if a stallion is kept locked up and deprived of the opportunity to learn to socialise, it will not learn courtship rituals and will turn into an aggressive rapist. If a dog is not taught that it is the "beta" male in a household (with its owner being the "alpha" male), then it will behave like a dictator in a hierarchy and bite those whom it sees as its "inferiors". If a cat is reared indoors, it will treat a red dot from a laser pen as a mouse and chase it incessantly as you move the dot up the walls, over the floor and on to furniture.

Finally, she has systemised animal breeding. If you cross a fast-growing rooster with a fast-growing hen, you get fast-growing chickens. But she identifies that such single-characteristic genetic breeding programmes always come with a down-side. The fast-growing offspring also have weak hearts, for example. If you cross fast-growing chickens with those selected for their strength, you get long-living, fast-growing chickens - but they are monstrously aggressive.

The laws of animal behaviour that Grandin has uncovered are not just from her acute observation, but also from her knowledge of neuroscience. The yellow object panics the cows as they approach a tunnel because most mammals have dichromatic vision: they see just blue and green. This means that a yellow object is very clear to them - it has the highest contrast. Humans have trichromatic vision - we see blue, green and red - while birds see four basic colours (blue, green, red and ultraviolet).

She readily recognises that human behaviour is much harder to systemise than is animal behaviour, not least because animal emotions are few in number. She estimates there are four primal emotions in animals (rage, prey-chase, fear and curiosity) and four primary social emotions in animals (sexual attraction, separation distress, attachment and playfulness). In contrast, our recent count of discrete human emotions listed 412 (see www.jkp.com/mindreading). The non-autistic person effortlessly makes sense of other people's behaviour despite this complexity not by trying to systemise people, but by using a different approach (empathising).

What of Grandin's theory of autism: that people with autism are closer to animals than they are to humans? Such a theory could be taken as offensive (suggesting people with autism are somehow sub-human). In fact, Grandin's claim is that animals have superior perception of detail, and so do people with autism, and she backs up these claims with evidence. So, far from offending people with autism, she is if anything suggesting that non-autistic people have less sharp perception. We are, if you like, sub-autistic.

She links the two themes of her book by arguing that a person with autism will have a greater affinity for animals than will a person without autism, because the same sorts of unexpected flickering lights or sudden small movements or sounds that might startle an animal might also startle a person with autism. She goes further to argue that understanding animal perception might help us understand autistic perception.

If you are intrigued by animal behaviour, then this book will be a pleasurable read, as the intricacies of different species are laid bare. I was delighted to learn that elephants use infrasonic and possibly even seismic communication to send messages to their family members across distances as great as 25 miles. And I was distressed to read that male chimpanzees wage territorial wars in just the same way as humans do, resulting in many deaths. Or that the stereotypically friendly dolphin has been observed to engage in gang-rape of an isolated female.

Grandin is the modern day Doctor Dolittle who does not have any mystical telepathy with animals - she is simply an extremely experienced, sharp

observer and careful scientist who has isolated the principles that govern animal behaviour. We owe her a huge debt for having used her autistic obsession (into animals) and her autistic perception (for accurate details) to teach us so much.