Are You Smarter Than A Chimpanzee?

'Delightful … Ben Ambridge furthers our understanding of who we are by fleshing out our connections to other inhabitants of the animal kingdom.' Tom Gilovich, author of *The Wisest One in the Room*

PRAISE FOR *PSY-Q*

'Clever, broad-minded and fun' *Sunday Times*

'A fresh and often iconoclastic take on even the most celebrated experiments.' *Mail on Sunday*

'A playful insight into the world of the human mind.' *Irish Examiner*

'A clear and engaging explanation of many psychological phenomena you've vaguely heard of, and many more you'll be glad to learn about' Steven Pinker

'Both broad and deep, serious but lots of fun. Recommended.' Tim Harford

'A cornucopia of brain-teasers and other (psycho)logical delights that will challenge, surprise and amuse.' Guy Deutscher

Ben Ambridge is Professor of Psychology at the University of Liverpool and the ESRC International Centre for Language and Communicative Development (LuCiD). His first book, *Psy-Q: You Know Your IQ – Now Test Your Psychological Intelligence*, has been translated into fifteen languages worldwide, while his TED talk on *The Top 10 Myths of Psychology* has been viewed over 2 million times. Ben writes on Psychology for *The Guardian/Observer* and *The Big Issue*. He lives in Sale, Greater Manchester.

Are You Smarter Than A Chimpanzee?

Test yourself against the amazing minds of animals

BEN AMBRIDGE

PROFILE BOOKS

For my two favourite animals

First published in Great Britain in 2017 by
PROFILE BOOKS LTD
3 Holford Yard
Bevin Way
London WC1X 9HD
www.profilebooks.com

1 3 5 7 9 10 8 6 4 2

Typeset in 11.25/13.75 Chaparral Pro
Designed by Nicky Barneby @ Barneby Ltd
Printed and bound in Great Britain by Clays, Bungay, Suffolk

A CIP catalogue record for this book is available from the British Library.

ISBN 978 1 78125 573 5
eISBN 978 1 78283 216 4

FSC
Mixed Sources
Product group from well-managed forests and other controlled sources
Cert no. SGS-COC-2061
www.fsc.org
© 1996 Forest Stewardship Council

The paper this book is printed on is certified by the © 1996 Forest Stewardship Council A.C. (FSC). It is ancient-forest friendly. The printer holds FSC chain of custody SGS-COC-2061

Contents

Introduction: Relative Values

Are you smarter than a chimpanzee? Cleverer than a cat? Brainier than a bat? More perspicacious than a pigeon?

Well of course you are! After all, you are a *Homo sapiens* ('wise man'), while the cats, bats, rats, hogs, dogs, frogs and all of the rest of it are 'just animals', right?

The idea that human beings are somehow different from other animals has a long history. Take, for example, the Bible. It's right there on Page 1:

> And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth. (Genesis 1:26)

For most of our history, religious scholars have argued that, since man alone is made in God's own image, our species is unique in having thoughts, consciousness, even an immortal soul. In our secular modern world, this idea of *human exceptionalism* is no longer the sole preserve of the religious. As bioethicist Wesley J. Smith asks:

> What other species has been able to (at least partially) control nature instead of being controlled by it? What other species builds civilizations, records history, creates art, makes music, thinks abstractly, communicates in language, envisions and fabricates machinery, improves life through science and engineering, or explores the deeper truths found in philosophy and religion?

When you put it like that, human exceptionalism starts to sound like simple common sense. But my goal in this book – by having you compare yourself against our animal cousins on a range of psychological tests – is to encourage you to say, 'Hang on a minute! Are we *really* so different?'

While we may not choose to call them 'civilisations', many animals – from chimpanzees to chickens – live in groups with a clearly defined pecking order (in which we'll find your own position), and even ants and bees even get to vote (and, as a result of this democratic swarm-intelligence, will give you a good run for your money on tests of route-planning and puzzle-solving). Starlings 'make music' in that their songs are constructed around the same scales as most traditional Western compositions (which allows you to compete against one in a sing-off). 'Abstract thinking' is shown by crows, squirrels and box turtles (and *you*?) in tests that involve using patterns or rational inferences to figure out the location of a tasty treat. Whether or not other animals can learn language is a long-running debate (which we'll explore by trying to teach you Japanese), but many – dogs in particular – can learn an impressive number of words (a feat you'll attempt for Russian). And while it might be a stretch to call it 'science and engineering', chimpanzees certainly use tools, for example when *ant-dipping* (using a shoot as a spoon to pick up ants) and *termite-fishing* (using a thin twig as a rod to catch termites) – phenomena that hold the key to understanding human handedness (on which you'll compare yourself to your cat, as well as a northern tree shrew).

More generally, we'll see that almost all of our human abilities, activities and concerns – from choosing a good-looking partner and understanding their facial expressions (at which you'll compete against bees and chimpanzees . . .) to getting a bargain and learning to quit while you're ahead (. . . pigeons, guinea pigs and hairy armadillos) – boil down to one of what biologists call 'the four Fs': fighting, fleeing, feeding and – ahem – fornicating.

Of course, nobody is denying that humans – even you – can do plenty of things that other animals can't (so don't worry, you're not going to lose on *all* the tests). All I hope to persuade you is that, in the words of Charles Darwin (1809–1882), the difference is 'one of degree and not of kind': the same abilities that allow starlings to sing, parrots to count and fish to find their way home allow humans to write symphonies, do calculus and invent Google maps. We don't do anything *different* from other animals; we do the same things, only better.

While some of these tests might sound a little frivolous – and I certainly hope you'll find them a lot of fun – all have a firm scientific basis, and are based on peer-reviewed articles in reputable academic journals. But just *why* are respectable scientists in the business of comparing humans and animals on everything from susceptibility to visual illusions (baboons and baby chicks) to the likelihood of winning the star prize in a game-show finale (pigeons)?

The answer is that, by exploring the similarities and differences between humans and other animals, we can begin to understand when and how our abilities, our likes and dislikes, and even our foibles and mental blind spots arose in the course of evolution. It was this comparative method, most famously applied to finches, that led to Charles Darwin's theory of evolution by natural selection in the first place. Contrary to popular belief, the idea of evolution wasn't invented by Darwin. At least, not by *Charles* Darwin. His grandfather Erasmus asked in *Zoonomia* (1794):

> From thus meditating on the great similarity of the structure of the warm-blooded animals, and at the same time of the great changes they undergo both before and after their nativity; and by considering in how minute a portion of time many of the changes of animals [. . .] have been produced; would it be too bold to imagine, that in the great length of time, since the earth began to exist, perhaps millions of ages before the commencement of the history of mankind, would it be too bold to imagine, that all warm-blooded animals have arisen from one living filament?

What Charles Darwin did invent, or at least popularise,* was the idea of evolution *by natural selection*: that evolution is the result

* In fact, as Darwin later acknowledges, the idea was first mooted by Scottish fruit farmer Patrick Matthew, who buried it in an appendix to his 1831 smash hit *On Naval Timber and Arboriculture*.

of animals with favourable traits successfully reproducing, while those with less favourable traits die out. Before *On the Origin of Species*, the dominant idea – as discussed in *Zoonomia*, as well as in Jean-Baptiste Lamarck's *Philosophie Zoologique* (1809) and Robert Chambers's *Vestiges of the Natural History of Creation* (1844) – was 'use it or lose it': the body parts and mental abilities that animals use frequently become strengthened – and those they don't, weakened – with these changes passed on to subsequent generations. Indeed, this idea was not completely abandoned until natural selection was wedded to Mendelian genetics (the so-called *modern synthesis*) at the start of the twentieth century; *Origin* was merely the first nail in the coffin.

As you will soon see for yourself as you take these tests, and learn about the science behind them, twenty-first-century findings in evolutionary biology, psychology and genetics have confirmed the modern synthesis beyond reasonable doubt. Darwin was right: when it comes to the differences between humans and other animals, everything is relative and everything is *a* relative: we are all part of one big family.

An Expensive Cappuccino

What better place could there be to snuggle up with this book and begin your journey through the animal kingdom than in a cosy coffee house? But, oh no, you're in an unfamiliar town, which has somehow managed to resist the onslaught of the big chains. You're going to have to take your chances with an independent. And, what luck, here are three, right on the same street! They are all pretty interchangeable in terms of their décor and ambience, so all you have to go on is the price of your cappuccino:

£0.80 in Coffee House A
£1.80 in Coffee House B
£2.80 in Coffee House C

Which do you pick?

ANSWER

Have you ever seen a capuchin monkey? They live in South and Central America, and are brown all over, except for a light chest and face, topped off with a little brown hood. This distinctive appearance gives the monkey its name. Capuchins are named after an order of friars (*Ordo Fratrum Minorum Capuccinorum*) who wear distinctive brown robes with large hoods. So, when a type of coffee with almost exactly the same shade of brown came along, it was perhaps inevitable that it would be called a *cappuccino*, or 'little Capuchin' (after the monk, not the monkey).

All of which brings us nicely back to your cappuccino. Which one did you pick? Probably not the cheapest, right? In fact, when placed in scenarios of this type, most people – provided they can afford it – go for the most expensive option. Why? In the absence of any other information to go on, price is generally a fairly reliable indicator of quality.

Indeed, when a product is discounted – even for completely innocuous reasons – we just can't shake the feeling that it is somehow worse. One study found that participants who had paid $1.89 for an energy drink showed a greater mental boost on a set of puzzles than participants who had paid just $0.89 for the drink, even though they were given the brand name (*SoBe Adrenaline Rush*) and told that the discount was possible because the drinks had been bought using the university's institutional discount (and not, for example, because the drink is a below-par product that the manufacturer is trying to offload). The researchers also found that participants rated the same 'painkiller' (actually a placebo pill) as more effective if it had been purchased (in this case, by the researchers) at full price ($2.50) rather than at a hefty discount ($0.10).

Where do the capuchins come in? You guessed it: a group of researchers decided to investigate whether our primate relatives also show these pricing effects. First, the monkeys were given the opportunity to sample the goods on offer – differently flavoured orange and blue ice chunks – with any who showed a strong preference for one or the other removed from the study. Next, the monkeys were taught that orange chunks were 'cheap' and blue chunks 'expensive' (or vice versa for half of the monkeys): each time the monkey handed the experimenter a token, he received in exchange either three of the cheap chunks or one of the expensive chunks (determined by the experimenter). Finally, the monkeys were given free rein at an ice-chunk buffet. If they had come to associate price with quality, they should have gobbled up the fancy expensive ice, while turning their noses up at the cheap crap. Indeed, this is exactly what humans do if placed in a similar scenario (though with – usually – wine, rather than ice chunks).

The capuchins, on the other hand, showed no preference whatsoever for the more expensive product. In fact, whatever the experimenters tried – jelly shapes, identical cereal with different branding, an enforced waiting period for certain foods – the monkeys stubbornly refused to prefer the expensive goods. And it's not simply that they failed to learn about the different prices: if, instead of a free buffet, the monkeys were required to pay for their treats, they overwhelmingly chose the cheaper option, in order to maximise their limited budgets. Capuchins are perfectly capable of learning that one product is cheaper than another; they just don't consider the more expensive one to be in any way better.

That's all very well, but what – you may be asking – was the point of running this study with capuchins? Were the experimenters just having a laugh? Not at all. The researchers were following the method of *comparative psychology*. When we want to understand why humans show some particular phenomenon (in this case, associating price with quality, even when it makes little sense to do so), a useful approach is to compare humans with a species that is similar in relevant ways. In this case, capuchins fit the bill, because they are capable of learning about prices and using them to guide purchasing decisions. If, despite these similarities, the other species does not show the same pattern, we can conclude that the cause of the phenomenon in humans is probably something that is unique to our species.

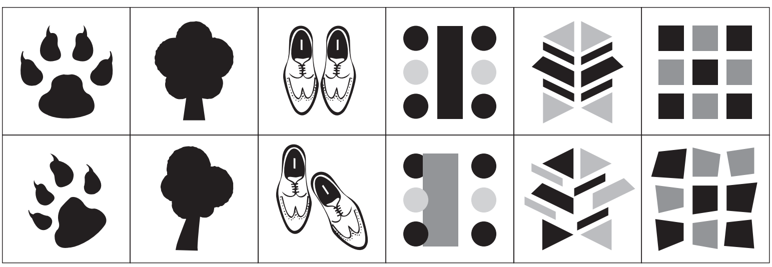
In this case, the best candidate for that something is experience with markets. We humans have learned that, due to the laws of supply and demand, if someone can get away with charging more for something, it just *must* be a better product than its rivals, even if we find it hard to tell the difference. (Just think of Apple, which became the world's most successful company, despite – or perhaps even *because of* – its high prices.) Having formed an expectation that high price equals high quality, we can't help applying it to situations in which we know it is not relevant (e.g., a university researcher buying an energy drink using an institutional discount).

So, if you're on a limited budget but find it hard to resist the premium brands when it comes to your morning cappuccino, perhaps you should delegate the coffee run . . .

. . . to a capuchin.

The Eye of the Beeholder

So, it's Monkey 1–0 Man in our battle of the species. But there's no shame in that; after all, capuchin monkeys are pretty close to us in evolutionary terms. So, now let's see how much you have in common with one of your lowliest, much more distant, relatives: the humble bumblebee. Below are six pairs of pictures. Your task is simple: for each pair, pick the one you prefer, based on your immediate gut reaction.



ANSWER

As you may have begun to guess as you worked your way through the pairs, this test is about symmetry. Overall, people generally show a small but reliable preference for symmetrical over asymmetrical figures – a preference that holds for both real objects (e.g., the three pairs on the left) and imaginary, abstract objects (the three pairs on the right).

But how did this come about? Did we 'learn' to prefer symmetrical objects, or were we born with this preference already built in? In principle, we could find out by raising a group of children, without ever letting them see anything symmetrical, and looking to see if they also showed this symmetry preference. In practice, of course, this would be impossible. Even if the study somehow got past a university ethics committee (which it wouldn't, as it would involve preventing babies from seeing any human faces), these poor children would be so unusual – in terms of both their visual and their psychological development – that they could tell us almost nothing about the origins of a symmetry preference in typical development.

When a human study is impossible, an animal study is usually the next best thing. It is neither particularly difficult nor particularly cruel to keep, for example, baby bumblebees away from symmetrical patterns until they are ready to start foraging. When they do so, it is a simple matter to offer them the choice of symmetrical or asymmetrical flowers (or, more usually, computer-generated patterns) and see which they pick. When this is done, it turns out that, just like adult humans (and also many bird and fish species), bees prefer symmetrical patterns, which suggests that the preference is hard-wired, rather than learned.

But why do we (and many other animals) prefer symmetrical patterns? One possibility is that they are somehow easier to process. If you look back at the pairs on the previous page, you'll find that, in every case, you can get an idea of what's going on (visually speaking) just by glancing at the top picture in each pair, while the bottom picture demands more deliberate inspection. Because the visual system, like most brain systems, is inherently 'lazy', we prefer symmetrical patterns because – so this theory goes – they require less work.

A second possibility is that our preference for symmetry is a consequence of evolution. For things that *should* be symmetrical, such as human faces and many pollen-producing flowers, any deviation from symmetry often indicates poor-quality genes and – as a result – a poor-quality individual. In humans, symmetry is associated with intelligence, athleticism and resistance to depression (and, in flowers, with greater pollen production). So, according to this theory, we have evolved a preference for symmetry because this maximises our chances of picking a mate with good genes, and therefore successfully reproducing; our preference for symmetrical abstract patterns (and a symmetrical drawing of a pair of shoes) is an evolutionary hangover from our preference for symmetrical faces.

So, which theory is correct: ease of processing or evolutionary preference? The jury is still out, but one piece of evidence from the original version of the study you just completed seems to favour the latter. When the researchers broke down the results by gender, they found that only men showed a reliable preference for the symmetrical over asymmetrical figures (63 per cent to 37 per cent), with women's choices almost exactly 50/50. This is bad news for the ease-of-processing theory, as it seems extremely unlikely that male and female brains differ in something as basic as visual processing (or, to give it its non-technical term, 'seeing'). Now, this gender difference isn't knock-down evidence for the evolutionary-preference theory either (in face-rating studies, both men and women show a symmetry preference), but it seems at least consistent with it: we know that, when it comes to choosing a mate, men of all cultures place greater importance on physical attractiveness than do women (a finding I explored in my last book, *Psy-Q*), so it's possible that only for men does one characteristic of physical attractiveness – facial symmetry – spill over into inanimate objects.

The Usual Waspects

Sticking with the subject of faces, let's move on from the honey-producing heroes of the insect world to the villainous *vespidae*. Many people say that, while they may be terrible with names, they never forget a face. But is that still true when the face in question belongs to a wasp?

Below is the face of a criminal wasp who was caught – ahem – in a police sting operation. Study his face carefully as, on the next page, you will be asked to pick him out of a line-up.

ANSWER

A B C D E

Did you spot him? I hope you didn't pick out Gao Gao the panda, who was just a stooge in this identity parade (but who we'll come back to later in the book). The answer is at the bottom of the page. If you need a hint, the key distinguishing feature in this line-up is the amount of black pigmentation in the area around the ocelli (eyes), ranging from least (Wasp A) to most (Wasp D).

Many very simple species, even cockroaches and amoebas, can distinguish kin (i.e., close genetic relatives) from non-kin. However, as late as the 1960s, it was generally thought that only vertebrates (species with a backbone) had the brainpower necessary to recognise individuals that they have met before. More recently, there has been some evidence to suggest that certain species of beetle, crayfish and hermit crab may also have this ability, although the issue remains controversial.

Wasps, on the other hand, are the individual-recognition champions of the invertebrate world. In addition to an odour shared by all members of the colony, many species of wasp can recognise familiar individuals by their faces. In fact, a recent study, which involved presenting nest-mates and outsiders to a colony, found that, if they can see the face, wasps ignore the odour cue altogether. That is, if an unfamiliar face approaches the nest, it is attacked, even if it has been artificially scented with the odour of that colony.

Now, if this isn't too personal a question, which of the wasps above do you find most attractive (they're all males, by the way)? In a scientific paper with an unusually racy title – *Sexy Faces in A*

Wasp C is the guilty party

Male Paper Wasp – a group of Brazilian scientists found that female wasps went crazy for males with large black spots (D), but stung, bit or flew away from those who did not (A). In fact, the scientists found that they could easily improve a wasp's prospects with a dab of black paint (or just as easily destroy them with a dab of brown). This was big news because, while sexually selected traits are common in many animals – just think of the peacock's plumage – they have rarely been found in insects.

Speaking of sexy peacocks . . .