

How many psychologists does it take...

...to explain a joke? Christian Jarrett investigates the psychology of humour and comedy

A joke shared can unite a room of strangers. Successful comics can entrance an entire stadium: a sea of faces revelling in the ecstasy of a mind tickle. What's going on? Deconstructing humour is like explaining a joke; for an experience that has such an inscrutable, subjective quality, to ask how it works suggests you don't get it. But psychologists can't ignore humour – it's

fundamental to our mental and social lives – and so, with philosophers and anthropologists, they've taken on the challenge of explaining the inexplicable.

The theories

Many have tried to capture what all funny material and experiences have in common. An idea championed since Aristotle and

endorsed by Thomas Hobbes is that humour is a way of expressing one's superiority over another person or group. This chimes with the content of many stand-up acts, and it received support recently from the observations of a retired unicycling dermatologist. Wherever he's practised his hobby (and other unicyclists from Scandinavia to New Zealand have documented the same), Sam Shuster reports that he's attracted attempts at derisive humour, particularly from other men. 'Lost a wheel?' is their favoured put-down.

Humour as a derogatory device is also acknowledged in a 32-item scale developed by psychologists about a decade ago. 'The Humor Styles Questionnaire' distinguishes between two positive types of humour (affiliative and self-enhancing) and two negative (aggressive and self-defeating). The aggressive or sexual nature of jokes also caught Freud's attention and it was his

contention that humour acts as a release of nervous energy.

Evolutionary biologists, meanwhile, have noted the universality of laughter and humour across human cultures, as well as the links between adult humour and play, and between laughter and tickling. Darwin called mirth the 'tickling of the mind'.

Today the most popular theories highlight that humour, whether derived from puns, anecdotes or beyond, always involves the recognition of an incongruity, followed by its resolution (see box, 'A typical joke dissected'), which produces a pleasurable feeling of funniness – sometimes, but not always, accompanied by laughter. The roots of the incongruity-resolution models actually date back at least as far as Kant, who described the 'sudden transformation of a strained expectation into nothing.'



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All the aforementioned theories have their strengths and weaknesses, the most glaring of which is that they tend to describe, rather than explain. In 2011 Matthew Hurley at Indiana University and his co-authors, the philosopher Daniel Dennett and Penn State University psychologist Reginald Adams Jr, attempted to combine the best bits of previous models whilst adding a much-needed dose of explanatory insight.

Writing in *Inside Jokes, Using Humor to Reverse-Engineer The Mind* (MIT Press), the authors describe the way our minds endlessly anticipate what's going to happen next, creating a multiplying spread of mental spaces in which we make assumptions about other people's intentions and perspectives. The drawback to this arrangement is that it creates a Sisyphean task – to patrol these spaces and correct any misapprehensions. Hurley and his co-authors propose that humour evolved as a way to ensure this correction process is carried out. Mirth is the reward we get any time a presumption is debunked. Jokes are 'super-normal stimuli' that target a system that evolved to ensure the mind fact-checks its predictions.

'Unlike other theories,' says Hurley, 'ours not only describes which types of events have the capacity to be funny but it also answers what the cognitive and survival benefits to having a trait like humour are.'

Of course some topics make us laugh more than others; and for many jokes or sketches to work, the recipient needs a certain amount of background knowledge about the world, or in some cases to recognise and share the beliefs and prejudices of the comic (reflected in the anticipatory and representational processes of the Hurley model). In fact, laughter can act as a signal of shared understanding, helping tighten ingroup bonds.

Consistent with this, a study by Robert Lynch confirmed the popular



A typical joke dissected

There are two cupcakes in the oven. One cupcake says, 'Boy, it's hot in here!' And the other cupcake says: 'OH MY GOD! A talking cupcake!'

The joke throws us early because we don't expect cupcakes to talk or have feelings. So we correct this misconstrual and set up a representation of a fictional world in which cupcakes talk; we might even start to empathise with the cake's perilous situation. But this new perspective is shattered abruptly by the incredulous response of the second cupcake, forcing us to return to our initial parsing of the situation – a correction that comes with a rewarding shot of mirth. An extra wave of pleasurable absurdity derives from our detection of the paradoxical fact that the second cupcake talks whilst being simultaneously shocked by the verbosity of its neighbour.

belief that we find things funny that we think are true – the foundation of much observational and risqué humour. Undergrads from diverse backgrounds completed tests of their implicit beliefs on race and gender, and they were videoed watching a 30-minute tape of the stand-up comic Bill Burr. The students laughed more at those sections of the performance that reflected their implicit beliefs. 'Laughter may serve as a signal that we share the joke teller's beliefs, biases or preferences,' Lynch wrote.

A mental erogenous zone

As soon as the sense of humour evolved, it became a central feature of our social and emotional lives – a mental erogenous zone, ever vulnerable to titillation and manipulation. Wit, in turn, became a signal. According to a 2001 paper, we make assumptions about funny people, inferring that they are also interesting, friendly and intelligent. It's no surprise that evolutionary psychologists studying humour in everyday life have also uncovered consistent evidence that it has become part of the mating game. Men and women both value a sense of humour in

potential partners, research has found, but they differ in how they like that trait to manifest.

Consider a survey of over one hundred undergrads by Eric Bressler at Westfield State College in the USA and his colleagues. The women said they wanted a male partner who would be both receptive to humour and funny. Men, by contrast, were only concerned that potential partners would laugh at their jokes. Christopher Wilbur and Lorne Campbell at the University of Western Ontario added to this by analysing hundreds of online dating profiles, discovering that men were more likely than women to boast about being funny, whilst women were more likely to say that they were looking for a witty date. A follow-up showed that women were more attracted to a man's dating profile when his introductory joke amused them; male attraction to a woman, by contrast, was unrelated to whether or not they found the joke in her profile funny.

These observations are complemented by Robert Provine's analysis of real-life laughing episodes in public places, which he conducted in the 1990s. Among his

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humour

findings – women tended to laugh a lot more than men, especially in mix-sex groups. In France, meanwhile, Nicholas Guéguen found that women were three times more likely to share their phone number with a male suitor who they'd just heard tell a funny joke to friends.

Taking these results all together many experts conclude that women have evolved to be humour appreciators and men humour producers – their wit like the mating song of a canary. This makes sense in terms of wider evolutionary theory, whereby the female of our species is the more selective partner, with men having to compete. By this view, women use men's humour to judge their genetic fitness, in terms of intelligence, creativity and other advantageous traits.

Supporting this, Gil Greengross and Geoffrey Miller assessed 200 male and 200 female undergrads and found that intelligence was related to the ability to be funny (as measured by the challenge of writing witty cartoon captions), and to

number of sexual partners, and that men tended to be funnier than women. Moreover, in a cross-cultural study of married couples, Glenn Weisfeld and his team found that men in the UK, China and Turkey (but not Russia) made their wives laugh more often than the reverse, and that perceived spousal wit was associated with other perceived favourable traits, such as kindness and dependability.

Not surprisingly, the invidious suggestion that men are funnier than women hasn't been accepted without challenge. Last year Laura Mickes and her team at the University of California, San Diego invited 16 men and 16 women to write humorous cartoon captions, and then asked them to rate each others' efforts. Both genders, but men particularly, found the male-penned captions slightly funnier. However, in a memory test, it was shown that both genders tended to misattribute funnier captions to male authors, thus showing the influence of cultural bias and expectation.

'The jury is still out about an innate superior ability for males to produce humour,' says Mickes. She believes the picture is complicated by the ways boys and girls are encouraged to behave, and the fact that males may up end practising humour a lot more than women. Men tend to dominate the stand-up circuit (see box, 'The psychology of stand-up') and that too may influence people's beliefs about gender and humour.

The laughing brain

The challenge of explaining humour is fraught with such philosophical and cultural complexity, so it's understandable that many researchers have taken refuge with the more concrete task of mapping out the neural correlates of humour processing. These studies have

uncovered activation that reflects the twin aspects of humour – the intellectual job of resolving an ambiguity or reframing a situation, followed by reward. That was the basic pattern reported by Joseph Moran and his colleagues at Dartmouth after they used fMRI to scan the brains of people watching episodes of *The Simpsons* and *Seinfeld*. Time locking brain activity with the funny moments in the sitcoms revealed increased activity in left inferior frontal and posterior temporal cortices before and during a joke (i.e. humour detection), followed by increases in insular cortex and the amygdala afterwards (i.e. mirth).

Psychologists have also used brain scanners to tackle the vexed issue of gender differences. In one typical study, Eiman Azim and his co-workers at Stanford University School of Medicine scanned the brains of 10 men and 10 women whilst they rated verbal and non-verbal cartoons. More activity was observed in the left prefrontal cortex of the female participants, indicative of executive processing, and there was more activity in the reward-related regions of female brains, such as the nucleus accumbens. This was despite the fact that men and women rated the cartoons as equally funny and responded to them with equal speed.

Another study, conducted by Nils Kohn at RWTH Aachen University, scanned men and women whilst they viewed cartoons, but these researchers looked specifically at brain activation differences when the participants found the cartoons funny. This showed that in women, humour appreciation was associated more strongly with activity in emotion-related regions than it was in men. At first blush this seems consistent with the idea of women as humour appreciators, but Kohn is sceptical. He thinks it may have more to do with cultural influences. 'There is ample evidence to support the claim that men tend to automatically regulate their emotions, while women "listen" to their feelings,' he says.

Brain imaging has also been linked



In France women were three times more likely to share their phone number with a male suitor who they'd just heard tell a funny joke to friends

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Samson, A.C. & Hegenloh, M. (2010). Stimulus characteristics affect humor processing in individuals with Asperger syndrome. *Journal of Autism*

recently with the question of whether and how sense of humour varies with personality. Andrea Samson and her colleagues compared the brain activation of their participants as they viewed two types of cartoon joke: resolvable, and nonsense cartoons that can't ever be fully resolved. This showed that people who scored highly in 'experience seeking' (they agreed with statements like 'people should dress in individual ways even if the effects are sometimes strange') showed greater brain activation in response to nonsense cartoons compared with other participants, consistent with past research showing that experience-seekers prefer nonsense humour. Other research on personality has uncovered intuitive patterns: that people with extravert, open personalities tend to favour affiliative styles of humour; that self-defeating humour correlates with neuroticism; and aggressive humour with low agreeableness.

When humour fails

Humour appreciation depends on multiple complex cognitive processes, and in yet another line of enquiry psychologists are using tests of sense of humour as a way to cast new light on neurological and psychological conditions. Given that humour often involves understanding other people's perspectives, an obvious target for this kind of research is the autism spectrum disorders (ASD), which are associated with difficulties with perspective-taking.

In a study typical of the genre, Andrea Samson and Michael Hegenloh asked 19 people with Asperger's syndrome and 108 controls to rate the funniness of different types of cartoon, including some that were deliberately unfunny. The Asperger's group were just as proficient at distinguishing the funny from unfunny cartoons, and both groups derived the same amount of enjoyment from visual puns. However, differences emerged for cartoons involving perspective-taking or social cues – the control group enjoyed

The psychology of stand-up

Most of us only manage fleeting moments of wit, if that. To stand before an audience of strangers who expect you to be non-stop funny must be terrifying. When Zarinah Agnew of UCL's Institute of Cognitive Neuroscience strode out on stage for the Bright Club – an initiative that challenges academics to be a stand-up for the night – she says it was the 'unfunniest feeling' she's ever experienced (see Big Picture, December 2011): 'An immediate concern is that the amount of adrenaline howling round your body is going to cause you to actually fall on your face,' she recalls. 'Then suddenly, like a toddler on a bicycle with recently removed stabilisers finding themselves accelerating down a hill – there's no stopping you now! Would I do it again? Not on your nelly.'

So what kind of a person travels incessantly from one city to another, baring their sense of humour to rooms full of strangers night after night? Back in the 70s and 80s researchers used psychoanalytic methods of dubious scientific validity, such as the Thematic Apperception Test, finding evidence supporting the myth of the sad clown. Samuel Janus, for example, found that 80 per cent of the top comedians he assessed had had psychotherapy; that they were sad, angry, depressed people who used humour as a coping strategy.

More recently, Gil Greengross and colleagues used modern personality tests to compare professional stand-up comics (nearly all men) with undergrad students and comedy writers. They uncovered evidence that comics' private selves are quite distinct from their public personas, with the comedians scoring higher on introversion than either the students or writers. 'Perhaps comedians use their performance to disguise who they are in their daily life,' the researchers said. The comedians also scored high in openness, but relatively low in conscientiousness, agreeableness and neuroticism.

What about the secret to their funniness? Barry Kuhle at the University of Scranton recently analysed the content of the jokes told by Chris Rock – one of the most popular comedians of the modern era. Rock's material covers issues that speak across time and culture – mate preferences, conflict between romantic partners, mate attraction tactics, parenting, infidelity and more. 'Intentionally or not,' Kuhle concluded, 'his comedy is based on a sophisticated appreciation and invocation of humans' evolved psychology.'



Chris Rock

these more than visual puns, but the Asperger's group didn't share this heightened appreciation. In their explanations of the cartoon humour, the Asperger's group also tended to focus on irrelevant details (although these details might well have been a source of humour for them).

'We were able to show that not all humour is impaired in individuals on the autism spectrum' says Samson, who's now based at the Department of Psychology, Stanford University, 'however, difficulties in mentalising and a pronounced focus in

detail-oriented processing affected sense of humour in individuals with ASD.'

Problems understanding jokes that involve perspective taking have also been documented in patients with schizophrenia (Corcoran et al., 1997) and in patients with major depression (Uekermann et al., 2008). But not all psychiatric conditions are associated with sense-of-humour effects. For instance, based on their appraisal of non-captioned cartoons, Vasilis Bozidak and colleagues at the Aristotle University of Thessaloniki found no humour appreciation

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humour

differences between 25 patients with OCD and controls.

Other humour research is focused on neurological conditions and brain damage. To highlight just a few examples: children with focal epilepsy tended to find jokes less funny than controls, and they more often rated jokes either completely unfunny or very funny (Suits et al., 2012); patients born with a missing or malformed corpus callosum (the bundle of nerves that links the two hemispheres) struggled with narrative jokes but responded normally to cartoons (Brown et al., 2005); and a study of 21 patients with focal brain damage showed it was right-hemisphere lesions, more than other lesion sites, that were most often associated with a loss of humour appreciation (Shammi & Stuss, 1999).

Conclusion

Humour is as fundamental to our social and mental lives as breathing to our bodies, it may be able to help and heal (see box), and yet it continues to defy simple explanation. Countless theories have been proposed over the centuries, all of them lacking in some way. Matthew Hurley and his co-authors believe theirs is the most convincing account to date, offering dozens of testable hypotheses to inspire new research. 'At the least, I hope researchers begin to think of mirth primarily as an emotional event which helps to control cognitive events,' says Hurley. 'That alone will change how humour researchers see their topic so that instead of looking at when humour happens – such as during disparagement, or during surprise, or after incongruity – they will look at why it happens, and at what behaviours it motivates.'

Meanwhile the controversy over gender differences in humour ability and appreciation is likely to rumble on. In as yet unpublished work Mickes is looking into the possibility that men try harder

signals intelligence? A cross-cultural test. *Humor: International Journal of Humor Research*, 24, 435–462.

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Can humour help and heal?

Although much research has concentrated on the ways wit is used in romantic situations, other studies have explored its applications in schooling, business and health. Consider a study of maths teaching materials by a team at Northern Illinois University. Kristina Matarazzo and her colleagues found that humour boosted interest in a new task for those who started out with little maths enthusiasm, but actually dented task interest for those students who were keen on maths from the outset.

In the world of business, research shows humour is an essential part of negotiations. In 2005 Taina Vuorela at the Helsinki School of Economics sat in on sales meetings held by a company that manufactures and sells engines for use in power plants. She observed the role played by power – of the chief buyer, for example, she noted 'the quality of his quips did not deserve the level of laughter they received... the sellers seemed to be showing their respect.' Vuorela also saw how humour was used strategically, as a way to express frustration without causing offence. Humour is also used by advertisers to encourage positive associations with their brands. In a paper published last year, Madelijn Strick and her team at Radboud University, Nijmegen showed that humour has a distracting effect, reducing people's natural resistance to aggressive marketing.

The area where the use of humour has been investigated more than any other is surely health. Studies have shown variously that laughter can help lower blood pressure (Fry & Savin, 1988), increase pain tolerance (Dunbar et al., 2012), and boost the immune response (Bennett et al., 2003). There's also evidence for humour's psychological benefits – reducing depression symptoms (Morgan & Jorm, 2008), lowering psychopathology and aiding social competence in psychotic patients (Gelkopf et al., 2006), and fostering self-esteem and memory improvements for dementia patients (Stevens, 2011).

However, many of these sorts of findings need to be treated with caution – sample sizes are often small with inadequate controls. In a critique of the field published in 2002 Rod Martin at the University of Western Ontario said there was a need to distinguish between types of laughter and different humour styles, and that more research was needed on the mechanisms underlying humour benefits. In a more recent review published in 2010, Ramon Mora-Ripoll, (medical scientific director at Organización Mundial de la Risa, Barcelona) wrote 'there are not enough research findings to conclude that laughter is an all-around healing agent, but there is sufficient evidence to suggest that laughter has some positive, quantifiable effects on certain aspects of health.'



Laughter has some positive effects on certain aspects of health

than women to be funny, with initial results backing this idea. 'We're also investigating whether males have a lower threshold for saying and doing humorous things,' she says. 'While the same humorous things may spring to the minds of both males and females, the females may inhibit the very thoughts that males may express.'

And researchers investigating conditions like autism show us that humour research isn't only an end itself, but also offers new paths to understanding long-standing mysteries. Andrea Samson, who's coordinating a journal special issue on humour in ASD (forthcoming in *Humor: The International Journal of Humor Research*), says that studying humour in ASD will help us to better understand positive emotions and their associated cognitive processes in ASD. 'It will also allow us to use ASD as a model to learn more about humour,' she

says. 'If we understand which affective, cognitive, and social impairments in individuals with ASD are associated with particular difficulties in appreciating and producing humour, we might understand better the components and abilities that contribute to a good sense of humour in general.'

One last thing... I can't let you leave this article on the psychology of humour without a joke about psychologists. So here goes... Did you hear about the two behaviourists who were lying in bed after making love? One of them said to the other, 'That was good for you, how was it for me?' We'd love to hear your psychologist jokes, e-mail psychologist@bps.org.uk or Tweet [@psychmag](https://twitter.com/psychmag).

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