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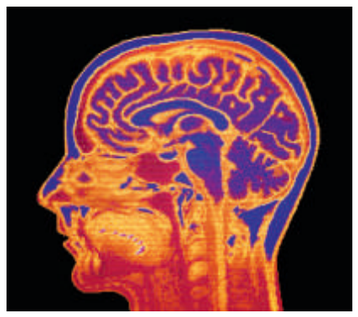
of behaviour and mental phenomena… to brain entities or processes", which "situates blame within the brain". Pictures of brain scans act as visual metaphors. They have "proliferated substantially in all forms of media", says Davi Johnson Thornton, a professor of communication studies and author of *Brain Culture: Neuroscience and Popular Media*, and tend to add scientific heft to a story. "Brain scans are just as likely to be false positives as blood tests," says Geraint Rees, a neuroscientist at UCL and a coauthor of the *Neuron* paper. "But people imbue these pictures with a truth they don't necessarily have."

The appeal of brain research has led to a market for pseudo-neuroscience. A *New York Times* article in September 2011 provoked scientists' wrath when a "neuromarketer" suggested that brain scans showed that people "loved" their iPhones.

One problem with folk neuropsychology is that it can present cultural and social categories as biologically explicable and therefore more rigid. "Neuroscience research is used in the media in symbolically layered and socially loaded" ways, according to the *Neuron* authors. Social groups were "essentialised and portrayed as wholly internally homogenous", and certain "types" of brains are "repeatedly contrasted with the brains of 'normal' and 'healthy' people, particularly when the pathological phenomenon had a moral dimension": paedophiles' brains are different from non sex-offenders', and so on.

"The debate becomes very determinist," says Helene Joffe, another coauthor of the *Neuron* paper and a researcher in psychology and language sciences at UCL. Joffe, with Cliodhna O'Connor, is interviewing 56 people to see how they fold brain research into their understanding of others, and in 2013 will publish a paper on the results. "There isn't a lot of empirical work on folk neuropsychology yet," Joffe says. "It's important, because it's how people live."

Tom Cheshire is WIRED*'s Play editor*



Brain-scan images such as this are often used to add scientific heft to lightweight stories

FLEXIBLE COMPENSATION

WHEN COMPANIES DEVISE SALARY SCHEMES THEY USE BLUNT INSTRUMENTS – BUT THEY SHOULD BE USING A SCALPEL. BY DAN ARIELY

One of the largest line items for most companies is employee compensation – in fact, I doubt that there is any company where this is not true. Given this, you would expect companies to pay attention, money and time to figuring out how to pay people in a way that will optimise their earnings and motivation. For example, companies should work out how much they should pay different people in different jobs. How much of the compensation should they give in a fixed salary vs bonuses? Should they give stocks or stock options? And what about gifts, or words of praise?

With all of these options for compensation, it is clear that there is a lot to be gained by better understanding the relationship between compensation amount and type, motivation and productivity. In 2013, companies will be drawing on social economics to get the right balance of reward and motivation. But they will have to slay two demons first: too much trust in their own intuition or overconfidence, and lawyers.

One of the most basic findings in social science is that we are all overconfident. Most of us think that we will live longer, won't get divorced and are less likely to crash our car. The same overconfidence persuades companies to set up a compensation plan without testing it, basing it on intuition and not on science, and without seeking to improve it over time. Companies will move away from the intuition of their boards and HR departments and start to use data to understand pay more. And in doing so they will realise that their system is faulty.

Human-resource laws are complex and demanding, and they make it very difficult to pay some people in one way and other people in others. Comparing the outcomes is also very difficult. But A/B testing yields significant results in other fields, so why not for pay? Lawyers working for a company have a lot to lose in terms of blame if they approve something that turns out badly, and they have nothing to gain from potential improvements to compensation plans. In this sense, the behaviour of the lawyers represents the most basic principle in behavioural economics – loss aversion: the idea that we focus on the downside to a much higher degree than on the positives.

With a mix of knowledge and humility, some companies are working hard to overcome their internal barriers for experimenting with compensation. Their names are confidential but at least one large hotel chain, one electronics manufacturer and one software company will be paying people differently next year. More will follow.

Dan Ariely is James B Duke professor of psychology and behavioural economics at Duke University, North Carolina, and author of The Honest Truth About Dishonesty *(HarperCollins)*

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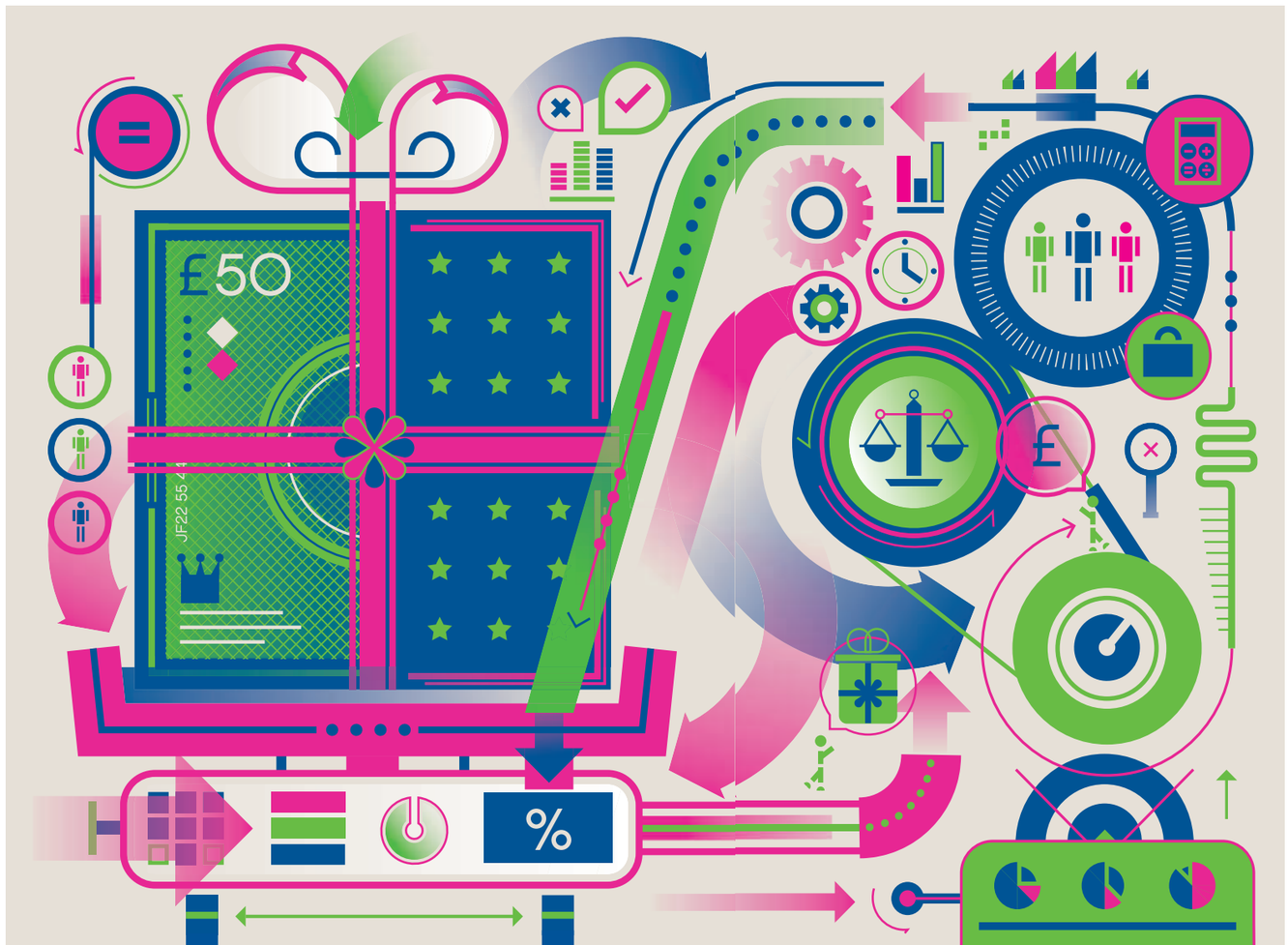

FOOD GEL

Added to smoothies, a new form of methyl cellulose forms a bulky gel in the stomach, reducing hunger pangs.

WEARABLE SMOKE ›

Aerogels will soon be in clothes, fridges and building materials, thanks to a manufacturing breakthrough.

Known as "solid smoke", aerogels are the lightest solids known and the best solid insulating material, but are too brittle to be used in everyday products. Now a team at Nasa's Glenn Research Center in Cleveland, Ohio, has changed their structure, using polymer internal supports to make them more flexible.

Aerogels are five to ten times more efficient than other insulators. A 10mm-thick sheet of aerogel insulates as well as 8cm of fibreglass.

SMALL IS GOOD WHEN IT COMES TO DATA CREATION. BY ALEXANDER PEYSAKHOVICH AND DAVID RAND

Data on human behaviour is important for many applications, but it's often hard to come by. Online crowdsourcing tools are changing that. We are on the cusp of a democratisation of understanding.

Using big, publicly available data sets for empirical analysis has taken off recently. But what happens when the data you actually need doesn't exist yet? The answer lies in online labour markets. Amazon's Mechanical Turk lets anyone recruit workers to complete short tasks that don't require special skills, but that computers can't do, typically paying less than $1 (60p) for a few minutes' work. These sites are powerful because they can create "small data" on demand. Just as smartphones made disagreements over facts obsolete, crowdsourced surveys can end arguments that even a Google search can't solve.

Even more importantly, online labour markets open up randomised experiments to the masses. Data can show an association between two things, but this doesn't mean one causes the other. Causation is proved by randomised experiment: take 100 people, pick half at random, expose them to one condition and the other half to another. Any differences you find must be driven by the difference in condition.

Large-scale random assignment has been exploited for clinical trials; Google's website design (AdWords includes tools for randomised experimentation); political campaigns; and work in developmental economics. Next time you have a question about human behaviour don't idly wonder – run a test!

Alexander Peysakhovich and David Rand are researchers in behavioural economics at the Department of Psychology, Harvard University