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Tom Simonite, online technology editor

Are happy kids dumb kids?

Did you live a coddled childhood filled with unbridled playtime and few reminders of the harsh real world? You might have been dumber as a result.

Children coaxed into a jovial mood performed worse on a simple test of geometric shape recognition than kids put in a dourer mood, report Simone Schnall, of the University of Plymouth, UK and colleagues in a recent issue of Developmental Science.

You may wonder whether these psychologists hate happy kids or just fun, but their conclusion is supported by other research. For instance, adults in good spirits do worse than sad adults on similar tests.

To uncover the same effect in children, the researchers, thankfully, didn't resort to insults or mind-altering drugs.

Instead they played one of two classical tunes to 10- and 11-year olds. Fifteen kids heard Mozart's jolly ditty Eine Kleine Nachtmusik, while the other 15 had to suffer through Mahler's doleful Adagietto. Previous research suggested these songs put kids in happy and sad moods, respectively, and Schnall's team confirmed that by surveying the kids.

While listening to the tunes the children played a game where they hunted for a specific geometric shape – a triangle joined to a rectangle, for instance – within a picture. The merry Mozart kids took noticeably longer finding the shapes than the children who were forced to listen to Mahler.

Not content with proving that happy pre-teens are daft, the researchers aimed their hypothesis at 61 six and seven-year olds. Instead of hearing classical music, the kids watched three movie scenes.

One, from Disney's Jungle Book, features the singing and dancing of an ebullient bear. A neutral scene from The Last Unicorn shows a knight reaching a castle. The sad scene comes from The Lion King, another Disney cartoon. Even this reporter, who watched the movie as a teen, shed a tear when Simba mourns his father's death.

In the same shape recognition test administered after the movie scene, the happy kids proved slower at picking out shapes than those who watched the neutral Last Unicorn or the lugubrious Lion King scenes.

Schnall's team offers several explanations for their results. Mood could directly alter cognitive thinking, and in a happy state people have little desire to question what they see, while "sadness indicates something is amiss, triggering detail-oriented analytical processing," they write.

Alternatively, happy people could be so caught up in their personal high that they ignore details or they distract themselves from the task at hand.

This could be hand-waving - it seems just as likely that Mozart and The Jungle Book are more distracting than Mahler and The Lion King. Because the kids tended to ignore the music played before the test, the researchers dismiss this possibility, but anyone who's taken a six-year old to a Disney film knows that the catchy songs don't vanish from their brains in just a few minutes.

But there's some encouraging news, at least, for cheerful kids and their parents. Children in a good mood perform better on tasks that demand creative and flexible thinking, previous studies show.

So the take-home message may be - contrary to popular opinion - that happy kids end up as artists and poets, while sad and angry children become accountants.

The paper's last sentence seems directed toward parents of these future artists: "Artificially inflating a child's mood may have unintended and possibly undesirable cognitive consequences."

Ewen Callaway, online reporter
(Image: Kaeli/Photobucket)

Keep creationism out of the science class

We know that a frightening proportion of US teachers teach creationism and intelligent design in science class. Now, to the dismay of many scientists in the UK, the director of education for the Royal Society, Michael Reiss, has called for creationism to be taught in biology classes in the UK.

Reiss, an evolutionary biologist but also an ordained Church of England priest, says that the increasing Muslim population, as well as growing numbers of Christian fundamentalists, in Britain mean that the issue should be "gently" tackled in science classes.

At the British Association Festival of Science in Liverpool, Reiss said "creationism is best seen by science teachers not as a misconception but as a world view."

In the US, Republican vice-president nominee Sarah Palin has similar views, arguing that both creationism and evolution should be taught.

How dismaying, as we approach the 150th anniversary of the publication of On the Origin of Species and the 200th anniversary of the birth of Charles Darwin, that we are still treating with kid gloves a religious view that is manifestly unscientific. Sure, talk about creationism in religious education classes, but keep it out of the science class.

It's been a fantastic week for science, with the start of the LHC at Cern allowing us to tackle some of the deepest questions in the universe. Likewise, a festival of science should be about celebrating the explanatory power of science, not making concessions to extreme forms of religion.

Update: the Royal Society has put out a statement affirming that it is opposed to creationism being taught as science.

In a statement Reiss has also clarified his comments. "When young people ask questions about creationism in science classes, teachers need to be able to explain to them why evolution and the Big Bang are scientific theories but they should also take the time to explain how science works and why creationism has no scientific basis."

Well, no-one would argue with that. But it's a bit different from implying that creationism should be taught alongside science, as he did when he said that "in certain classes, it can be appropriate to deal with the issue".

Rowan Hooper, online news editor

A temple for the worship of science

"Praise be to Darwin!

We are gathered here today to give thanks to those scientists who have given us something to sustain our spirits in this time of religious vacuity. Not that we believe there is such a thing as a spirit, or a soul, but you know what I mean."

This, I imagine, is the sort of thing that might kick off "science worship" sermons in the "Atheon" - a two-story downtown Berkeley building conceived "to provide a spiritual home for rational people in California".

Of course it's in California - where else? The Atheon is the brainchild of conceptual artist Jonathon Keats and will be hosted by the Judah L. Magnes museum.

Do rational people need "spiritual sustenance"? I think it's a moot point. Keats doesn't, claiming, apparently straight-faced, that "eventually there will be an Atheon in every town".

Until that happy day when Atheons are built for those of us who don't live in San Francisco, the Atheon website (due to go live later on Sept 10) will have to do. According to a press release, the website will glow with the cosmic microwave background radiation, "so that people everywhere will be able to turn off their lights and set up a miniature shrine to science on their home computer".

What should we sacrifice at such a shrine?

Update: Keats sent me an MP3 file of the canon he composed for the Atheon, "Why is There Something Rather Than Nothing". Click here to listen to it but be warned: Keats says the canon is best heard through headphones "as the universes sing very quietly".

I asked Keats whether he thought there was any demand among

scientists for an Atheon.

"Both the Brights movement and the Beyond Belief conference do seem to suggest as much," he says. "As an artist, I'm not one to judge the merits of making science a replacement for religion. I'm merely trying to provide a space in which it might happen."

Rowan Hooper, online news editor

LHC: Top 5 best and worst things that could happen

A few days ago I told you why the world is not going to end on September 10, when the LHC is switched on. So what is going to happen? Here's my list of best and worst things that could happen when the LHC finally starts smashing protons together:

The best

1. Time travellers from the future appear and say hello. Admittedly this isn't very likely, but theorists have shown that it is possible in principle. And it would be rather spectacular.
2. The smart money is on the LHC creating the famous Higgs boson, so we would finally know why things weigh what they do.
3. Special long-lived version of a particle called a gluino could be spat out. These could stick inside one the LHC's giant detectors and decay when the accelerator is switched off. If this happened it would tell us that our universe is just one of many, many universes.
4. The LHC might show that extra dimensions of space exist. Some physicists believe this would be the LHC's most profound discovery because it tells us string theory is on the right lines.
5. Nothing happens. If absolutely nothing new turns up at the LHC, it would shake fundamental physics to the core. It would tell us that all our understanding of forces and particles is wrong and we'd have to go back to the drawing board.

Worst things:

1. The lights go out in Geneva. The LHC consumes 120 megawatts of power, about the same as Geneva and its environs. CERN gets its electricity from both France and Switzerland, so a blackout is unlikely.
2. The proton beams become unstable and crash uncontrollably into a detector. At full pelt, each beam contains enough energy to melt 500 kilograms of copper. If a beam smashed directly into one the LHC's giant experiments, it would fry the detectors. Engineers have built several

safety systems to stop this happening.

3. Fewer party balloons. The LHC's superconducting magnets are cooled with 120 tonnes of superfluid helium. Top ups will be needed if there are power cuts or problems with the magnets.

4. Part of the ring breaks. The ring uses superconducting magnets that need temperatures colder than outer space to work. If there is a problem, it will take five weeks to warm the ring back up to room temperature and another five to cool it back down to 1.9 kelvin.

5. Nothing happens. It may be intellectual dynamite but if nothing new shows up at the LHC, there will be no more money for big physics.

Valerie Jamieson, deputy features editor

The closest thing to Jedi mind tricks

Though neuroscience will never peer inside of Luke Skywalker or Yoda's head to find the brain region responsible for feeling the Force, a new study comes close.

Trained Zen Buddhists return to a state of inner calm faster than people who don't practice meditation, according to neuroscientist Giuseppe Pagnoni and his colleagues at Emory University in Atlanta.

The researchers scanned the brains of 12 Buddhists, who were experienced in Zen meditation, and 12 controls, while the subjects focused on breathing. Unlike other forms of mediation that focus on withdrawal, Zen meditation calls for vigilance and attention.

At random intervals, a string of letters appeared on a computer screen inside the functional-MRI scanner, and each subject had to decide whether the string represented a real word or gibberish, and then press a button.

The control subjects proved as fast and accurate as the Buddhists at determining that "fiddle" and "moose" were real words, while "calake" and "mobbler" were fakes. When Pagnoni's team took snapshots of each subject's brain while meditating before each word appeared, Zen Buddhists returned to their meditative state noticeably faster than control subjects.

Since their test measured responses to words, most of the areas that changed during the task are related to language and located in the brain's left hemisphere.

These areas represent the internal chatter of an idle brain, Pagnoni speculates. A mentally demanding task snaps our brains to action and out of this state, which he called the default network. "If you are driving and there are a lot of cars coming, your mind cannot wander," he says.

With Zen meditation, "you may be able to interrupt this spontaneous brain chatter more effectively," says Pagnoni, whose team published their results online in a paper titled: "Thinking about Not-Thinking. Neural Correlates of Conceptual Processing during Zen Meditation".

Now it's just a matter of finding the neural correlate of Jedi mind tricks.

Ewen Callaway, online reporter

Eight cold facts

This week, New Scientist will be telling you all about the common cold: why researchers are treating it with new respect, and what the chances are that we will ever cure it (hint: humans could be walking on the moon again first). But in writing the article, I ran into a staggering amount of mis- (and myth-) information people swear to about colds. In fact some beliefs that had previously been dismissed may be true: for instance, "catching a chill" might make you more likely to succumb to a cold virus. Then again, some really are nonsense.

1. Colds are caused by a weakened immune system. NOT NORMALLY
Some people with perfectly robust immune systems get colds every winter. Others contract cold viruses but suffer nary a sniffle. Cold symptoms are caused by your immune reactions to viruses that infect your nose and throat - "stronger" reactions might even make you sicker. But really weak immunity can allow cold viruses to spread further, and kill.

2. Colds happen in winter because central heating dries out your nose.
NO
Experiments show that once a cold virus gets in your nose humidity makes little difference. Inhaling steam may or may not help, but warming your nose to 43°C might, and if you have a rhinovirus, spraying your nose with acid (pH4) might help. Some think rhinoviruses, which are related to the enteroviruses that cause diarrhoea, are gut bugs that lost their acid tolerance so can no longer get past the stomach. But some do both: hence, the combined misery of "stomach flu".

3. Stress causes colds. YES

If you get a cold virus in your nose, you will become infected and develop symptoms, or not, depending on your immune system, which is affected by stress and emotions. Colds are more likely if you recently had a big life event - job loss, death in the family, marriage - and if you were poor as a toddler, because your immune system triggers inflammation reactions more readily. If you are usually happy and calm you may be three times less likely to get sick than if you are anxious, hostile and depressed. And if you are the famous American composer Leonard Bernstein, the symptoms disappear when you're absorbed in

conducting Mahler's fifth symphony, only to return for the curtain call.

4. Feed a cold and starve a fever. MAYBE

Colds rarely give adults fevers. Other diseases that do, such as malaria, might get better faster if you stop eating minerals and vitamins that the germ needs even more than you do. But the muscle pain of even mild colds is caused by muscle wasting, as the body recycles proteins into defensive chemicals. Eating more protein instead could help, and hurt less. So between its warming effect on your upper respiratory tract (and your mood), and the protein, it's true: chicken soup should help.

5. Blowing your nose helps clear out the virus. NO

Opinion is divided as to whether a runny nose or indeed any cold symptoms actually eliminate viruses: relieving symptoms with painkillers, antihistamines and decongestants (not antibiotics!) doesn't seem to hurt and more of it could save lots of money in lost work and useless doctor's visits. But a blocked nose is usually down to dilated blood vessels, not snot, and blowing won't help. Blowing your nose forcefully however can drive viruses and inflammatory substances into your sinuses and spread the misery.

6. Green snot means you need antibiotics. NO

Mucus turns yellow or green whenever you have a bad respiratory infection, viral or bacterial. The colour comes from myeloperoxidase, an enzyme in white blood cells which uses an iron-containing haem molecule, which is green, to catalyse chemical reactions that kill germs.

7. Large doses of Vitamin C prevent colds. NOT UNLESS YOU RUN MARATHONS OR WORK OUT IN THE SNOW

This idea, first put about by Nobel laureate Linus Pauling in the 1970s, has been repeatedly disproved but refuses to die. Still, there may be a bit to it: last year a review of research to date, found vitamin C had little effect on most people, but it halved the risk of getting colds for marathon runners, skiers and soldiers on subarctic exercises. It does not cure colds. And while we're here, the herb Echinacea may shorten colds a bit but it has side effects and doesn't prevent colds. Zinc lozenges work better.

8. Red wine helps. YES

Finally, some good news. Contrary to some people's optimistic beliefs, red wine doesn't cure colds, though it may (initially) dull the pain. But a

study in Spain found that people who drank more than 14 glasses of red wine a week (but not spirits or beer) cut their risk of getting a cold by almost half. Salud!

Debra MacKenzie, Brussels correspondent

Hot moms and sexual imprinting

Guys: have you got a hot mom? Chances are your wife will be a looker, too. The same goes for daughters of hunky fathers.

Women tend to date guys that look like their fathers, and sons go for gals that look like their mothers, according to a new study of facial similarities between romantic partners and their parents. The paper is published this week in the Proceedings of the Royal Society B (DOI: [10.1098/rspb.2008.1021](https://doi.org/10.1098/rspb.2008.1021)).

Tamas Bereczkei, a biologist at the University of Pecs, Hungary, and his colleagues mapped the faces of 67 young, long-term couples at their university, as well as each parent, measuring facial proportions such as the ratios of face length to width, nose length to face height, and mouth width to height.

Based on these numbers, Bereczkei's team found that, overall, the face of a woman's boyfriend's more closely resembles her father's than the faces of other males in the study. The correlation was most striking for measurements of the centre of the face, such as the ratios between nose length to face height and eye width to face height.

Men also dated women whose faces more closely resembled their mothers than other women in the study. But here, men seemed to focus on the lower part of the face. The ratios between jaw and face width and lip fullness (height) and width of their mothers and girlfriends tended to match.

These findings hint at a process well documented in animals - and only beginning to emerge from studies of humans - called sexual imprinting. Exposure to adults can bias young animals to pick future mates that resemble their parents.

This could be evolution's way of maintaining adaptations to local environments. Mating with someone too different from you and your parents could compromise such adaptations.

On the other hand, the same process might also dissuade animals from picking mates that look too similar to their parents and even siblings to

hold onto a modicum genetic diversity, which could come in handy if environmental conditions change or disease erupts. This is called optimal inbreeding.

And while studies in animals have found the same kind of opposite sex imprinting, "we do not know the precise mechanism of imprinting-like phenomenon in humans," Berezkei says.

Ewen Callaway, online reporter

Obama talks science

Reading Barack Obama's responses to the top 14 questions addressing Science and Technology issues in America, as posed by ScienceDebate2008.com, I get the distinct feeling that he fears America is falling behind in the scientific rat race.

Although Obama asserts that America's "talent for innovation is still the envy of the world", it sometimes seems he doesn't really believe it. In around half of his responses he airs concerns over the lack of progress America is making in science. Stating how China is the world's leading technology exporter, he reckons the "competitive situation may only worsen over time". Why the negativity Obama?

However the senator's answers certainly suggest there could be a resurgence in American R&D. So what is Obama planning for science policy if he becomes president?

First up is science innovation and education. Obama wants to provide broadband internet connection for all Americans to boost science, technology, engineering and maths achievement in students. Hmm. I suppose there should be equal opportunity for all students to surf the internet in search of a model answer to those perplexing essay questions. After all, file sharing isn't restricted to films, games, music, software programs, videos...

But perhaps I'm being overly cynical. We should commend Obama for his strategies to combat global climate change with aims of reducing emissions to 1990 levels by 2020 and his proposal to "create a Technology Transfer Program dedicated to exporting climate-friendly technologies, including green buildings, clean coal and advanced automobiles, to developing countries to help them combat climate change." And he says he would be equally committed to applying the technology in the States first.

To complement the policy, he will also expand funding in research looking into energy resources that reduce greenhouse gas emission and avoid energy wastage. But let's not forget what America could do for the rest of the world: "I will also encourage communities around the nation to design and build sustainable communities that cut energy use."

Changes would appear in the life sciences and space technology as well, where he would lift the current ban on federal funding of embryonic stem cell research, support recommendations on genetic engineering as proposed by the Recombinant DNA Advisory Committee, and re-establish the National Aeronautics and Space Council to "expand our reach into the heavens and improve life here on Earth."

Overall, Obama has set himself some ambitious targets for American science and technology to address the fact that America is "reducing support for science at a time when many other nations are increasing it, a situation that already threatens our leadership in many critical areas of science."

But I can't help wondering what his motives are for the proposals: is it really to improve the world we live in or is it to catch up with other leading nations in science and technology? If the latter, I would be interested to see how other nations will respond should Obama become president. Before then, it would also be interesting to see what his rival for the White House, John McCain, proposes to do.

Gursharan Randhawa, New Scientist contributor

Why the world WON'T end on September 10

Hurray for the European Court of Human Rights. It has rejected an emergency injunction to block the Large Hadron Collider from turning on on 10 September. It's the latest legal case brought against the LHC by scientists who fear that the world's largest particle accelerator will produce fearsome entities that could destroy the Earth.

I'm thrilled that the ECHR has understood the science and has given the LHC the green light. Because let's get something straight: the world is not going to end on 10 September.

Here's why. Next week physicists will attempt to send a beam of protons all the way round the LHC's 27-kilometre ring for the very first time. What they won't do is accelerate the beam to its design energy of 7 teraelectronvolts (TeV). And unless the tests are very, very successful, they won't be smashing protons head on either.

Instead, a lone beam of protons will make its way round with just 450 gigelectronvolts of energy. The only collisions that could happen is if the beam smashes into one of the very few air molecules that haven't been sucked out of the ring, which has a vacuum 10 times better than on the moon.

Supposing this does happen, the collision energy will be a paltry 30 giga-electronvolts (30 GeV). That's a far cry from the 14 TeV collision energy that the LHC will produce when it is running at full speed. You simply can't make much in the way of heavy, exotic particles with just 30 GeV of energy. No top quarks, no W or Z particles, no Higgs bosons. And that's just the regular stuff: there certainly is not enough energy to make mini black holes, strangelets, magnetic monopoles or anything else exotic that critics purport could destroy the Earth.

OK, so we have a reprieve of a few months until physicists finish their tests and start creating collisions with 14 TeV of energy. What will happen then? This is uncharted territory for particle accelerators. And the trouble with venturing into the unknown is that you don't know what will be there. This is what excites physicists and, perhaps understandably, is grist for the mill for doom-mongers.

Theorists have speculated about all manner of things popping into existence, including the infamous mini black holes. Critics claim that these will grow uncontrollably as they suck in matter, eventually gobbling everything in their path. One such opponent is Otto Rossler, a theoretical chemist at the University of Tübingen in Germany, and one of the plaintiffs in the ECHR case. He claims that in the worst case, the Earth could be eaten by a mini black hole in 50 months.

Really, I don't think so. I admit I have a hard time believing theorists' usual line that Stephen Hawking will save us. Hawking's most famous research shows that black holes - the giant ones we see in space - slowly evaporate due to a process called Hawking radiation. Being much smaller, mini black holes should evaporate within microseconds. Trouble is, no one has seen Hawking radiation. So why should I put humanity's hopes in a theoretical physicist?

No, for me, there is a much more compelling argument why the LHC won't destroy the world. And it doesn't rely on theoretical flights of fancy. Whatever the LHC churns up out of all the collision energy, we've been there before. Cosmic rays from outer space are raining down on us all the time and they can reach truly staggering energies. You can get the same collision energy as the LHC from a 10^8 -GeV cosmic ray slamming into the atmosphere. And there are plenty of cosmic rays with such energies.

Cosmic ray experiments all over the world - experiments that have nothing to do with the CERN laboratory where the LHC is based - have found that about 10^{-14} rays with energy greater than the LHC strike each square centimetre of Earth every second. That might not sound like much. But over the Earth's 4.5 billion year lifetime, that makes 10^{22} collisions or 100,000 times more than the LHC will ever produce. Obviously, in that time no mini black holes, vacuum bubbles, killer strangelets or any other weird effects have eaten the planet.

Not convinced? Scale the cosmic ray sums up to cover the 100 billion stars in the Milky Way and the 100 billion galaxies in the visible universe and you find that nature has already made the equivalent of 10^{31} LHCs. Or if you like, 10 trillion LHCs are running every second. And we're still here.

Valerie Jamieson, deputy features editor

Do we need help making sensible decisions?

Every time I see a news report of a plane crash, wherever it is in the world, my mind races forward to any flight I might have to take in the coming months and whether I might just drive or take the train instead. Am I paranoid?

If I am, then a lot of other people are too. In the year after 9/11, many Americans chose to drive rather than take domestic flights. Understandable, but unfortunately it wasn't such a great decision: an extra 1600 people died in road accidents that year as a result - that's six times the number who died in the hijacked aircraft.

We might think we know what we're doing when we take these kinds of decisions, but we generally don't. At times of risk, when we feel threatened or fearful, emotion overrides reason and we end up making rather poor choices. Can we do anything about that?

A lot of researchers think we can - that we can be helped to counteract our instinctive reaction to a risky situation and reason our way to a better choice (see our How to keep your head in scary situations feature).

What do they have in mind? One idea is to present statistics about, say, health risks, in ways that don't leave people cold - for example, put them in the context of a narrative. "Feel the numbers", as one expert puts it, so we can connect with them more easily when emotions are running high.

That's all very well when you've grown up viewing numbers as abstract entities in a world of their own. Time to rethink the way we teach mathematics, then.

Another example of how people could be "helped" in their decisions about risks comes from some remarkable findings by a team at Yale Law School.

These show that the single most important factor in determining how we judge the risks of issues such as nuclear power, nanotechnology, vaccination and climate change is the degree to which we share the cultural world-view of the person giving us the information. If they have different values or political sympathies to us, we are predisposed to

reject their arguments, irrespective of what we thought previously. It's all about the messenger, in other words.

On the surface it sounds to me like a good idea to use insights like these in public policy to steer people towards wiser judgements.

This taps into something of a zeitgeist: both the Democratic presidential candidate Barack Obama and David Cameron, leader of the Conservative party in the UK, have recently sought the advice of two University of Chicago professors whose recent book, Nudge, describes ways governments might "nudge" people into doing things that are good for them, or for society. For example, introduce automatic enrolment in pension and organ donation schemes unless people opt out (inertia means most people stay in).

[You can give the Nudge authors your own suggestions [here](#)].

But this kind of "libertarian paternalism" is not to everyone's taste because it involves a degree of manipulation. It's one thing for a government to intervene to stop people harming others, quite another for it to intervene to stop them harming themselves, particularly if the nudging is undisclosed. Is that what government should be for?

It seems to me this is a debate we shall need to have, especially as we learn more about the way people respond to risks. Of course, there are some smart things societies could do without government intervention – such as demand that the media report shocking or traumatic news in a more balanced way. That includes us!

Psychologists have known for some time that we seriously overestimate our chances of dying in a knife attack or plane crash because the extensive use of graphic media coverage makes it so much easier for us to bring such events to mind, a phenomenon known as the "[availability rule](#)".

On the other hand, we tend to underestimate our chances of getting diseases because these are usually only reported as statistics. Many researchers claim this bias is the root of much of our poor decision-making. As one of them puts it, we aren't rational enough to be exposed to the modern press.

Until any of these changes happen, the best thing is to stop watching the TV and reading the newspapers. Not the science magazines, though – where else would you get such evidence-based advice as to stop reading the newspapers?

And a final thought, for those who are uncomfortable with any attempt to "nudge" us into better decision-making, remember that in this regard we are already seriously handicapped. If anything, translating good science into nudges could help us choose more wisely than ever before.

Michael Bond, New Scientist consultant

Why preschool is more than just child's play

I know what I enjoyed most about my days at preschool: the pet rabbits, snakes and ladders, and of course, the milk and biscuits.

But apparently, attending nursery wasn't just a way for me to make friends with a bunch of like-minded, toddling, two-foot-something's. Nor was it merely a convenient solution for working parents. I was actually being set up for a life of academic success.

Many parents will say: "Well, of course!" But do they really appreciate the influence preschools have on their child's academic development?

Edward Melhuish from Birkbeck, University of London, and colleagues have released some data in Science this week (DOI: 10.1126/science.1158808) as a part of one of the largest longitudinal studies in Europe, the Effective Pre-school and Primary Education (EPPE) project.

They say sending all three- and four-year olds to preschool, not just disadvantaged groups, prepares them for primary and secondary school education, helping them "make the grade" in maths, English and literacy when they turn 10.

So why then do Robert Siegler and Yan Mu from Carnegie Mellon University, Pittsburgh, say Chinese kids who go to preschool are better in maths than American kids who go to prekindergarten? Especially considering the Chinese preschool wasn't as good as the American one.

It seems what happen at home is equally, if not more, important, and the cultural divide across the globe has provided evidence for the fact. Yes, Chinese parents do spend a lot of time with their kids teaching them basic arithmetic, but the difference between Chinese and American kids isn't just down to rote learning of what you get when you add two apples to the three already in your bag.

Parents who engage with their children and encourage activities at home that develop their learning skills will give them the best head start.

Take a game like snakes and ladders. Siegler reports how bigger boards with more squares helped develop a child's numerical skills. This is

because they had to count more, think more, move their pieces further, and generally take longer to play the game, than children given smaller boards.

Melhuish says the "most effective preschools have a wide range of learning opportunities for children, tailored to the developmental level of the child, so it's not too easy and not too hard." But this equally applies to activities at home.

What does this all mean? More than 95% of UK parents enrol their children in preschool, but the buck doesn't stop there: learning happens beyond the classroom as well. As for the 5% who haven't caught onto the trend, isn't it time you did?

Gursharan Randhawa, New Scientist contributor

Do animals understand death? Do humans?

While reading the papers this morning my eye was caught by the striking images of Gana, an 11-year old gorilla living at Munster zoo, Germany, holding her dead baby aloft.

According to all the news stories I've read, this photo demonstrates that she is grieving - feeling the same emotions as we would in these circumstances. Really? Or is this just rampant anthropomorphism?

There are many reports of animal behaviour that is said to constitute mourning. For example, biologist Marc Bekoff argues that magpies, elephants, and even llamas experience grief, with some animals even holding wakes to bid farewell to their dead.

But others have argued that foisting human emotions onto animals is unscientific. Just because animals sometimes behave like us does not mean that the same complex cognitive reasoning underlies these behaviours.

It could be grief, but it could equally be a morbid fascination with death. Or it could just be confusion.

Now, call me heartless, but the first thing that jumped into my head when I saw the picture of Gana with her dead infant was that, rather than mourning, she looked thoroughly flummoxed.

It seems to me that the question here is not do animals experience grief, so much as do they understand death? And, while I'm on that subject, do humans even understand death?

Science tells us that death is pretty much the end of the story in terms of human experience. But there are plenty of examples of human behaviour that seem to fly in the face of this.

One example is famadihana - the turning of the bones - a traditional

ritual carried out by the Malagasy people of Madagascar. Every seven years, the dead relatives are exhumed from the family tomb, re-wrapped, and danced around the tomb.

This ancient tradition is a form of ancestral worship; a way of showing respect for the dead. But it is also an opportunity to reunite the dead and the living, based on the belief that the dead will benefit from this experience.

Perhaps the origins of practices like these stem from an inherent inability to understand death that we share with other primates, which might explain why Gana looked so flummoxed. Most people know that their dead relatives are not going to come back to life, but whether this understanding is innate, or whether we are taught to believe this, I'm not sure.

Tamsin Osborne, contributor

Photographs courtesy of Munster Zoo

South African squirrels: well-endowed

In two days at the International Society for Behavioral Ecology's annual meeting in Ithaca, New York, I learned about the sexual quirks of dozens of animals, including cichlid fish, Gouldian finches, pipe fish, house mice, prairie voles, great tits, blue tits and even human beings.

Yet I was still taken aback by Jane Waterman's superb talk on the sex lives of African ground squirrels. The University of Central Florida ecologist studies two populations, one in Namibia's Kalahari Desert and another in much more lush South Africa.

Male Namibian squirrels frolic around the desert in small bands, impregnating females and displaying little sexual competition. "Love 'em and leave 'em" is how Waterman described it.

South African squirrels also romp around in social bands, but after a male copulates with a female, he fends off his buddies and leaves a post-coital semen cap in the female's vagina to decrease the chances of another male impregnating her. In short, sexual competition is rife in South Africa.

The South African squirrels look nearly the same as the Namibian squirrels, but for one feature: "They're hung," Waterman said, a likely result of the sexual battle for females.

The animals are so well-endowed that pornographic websites have posted pictures of them.

"If humans had that, they'd have a 35-centimetre scrotum," Waterman said. "That would be bad."

Ewen Callaway, online reporter

[Photograph courtesy of Jane Waterman, University of Central Florida, Orlando]

Doing things that don't make sense

I've done plenty of ill-advised things in my time as a journalist. There was the time I took a 50,000 volt hit from a Taser gun, for instance. But I'm not sure I've ever done anything as strange as letting someone take over my body.

That particular episode took place just round the corner from the New Scientist offices, at University College London's Institute of Cognitive Neuroscience. I didn't go with the intention of having becoming someone's puppet. I went to talk to the neuroscientist Patrick Haggard about the illusion of free will.

We started off playing with the Libet experiment, which demonstrates how conscious intention seems to lag a few milliseconds behind the brain's initiation of a movement (an impression that more recent research suggests may be misleading).

Then Haggard mentioned that direct stimulation of the correct part of the brain can cause involuntary movements. This was discovered by Itzhak Fried of the University of California, Los Angeles, in the early 1990s. Fried was implanting electrodes in the brains of epileptic patients when they told him they were experiencing the desire to move a particular part of their body. When Fried ramped up the current to the electrodes, the patient performed exactly the move they had described.

As soon as Haggard offered me the chance to try something similar, I signed the disclaimer and followed him down to the basement. Haggard didn't operate: he didn't need to. Instead, he held what looked like a huge yellow clockwork key over my skull. Then he pressed a button, and the key's "transcranial magnetic stimulation" induced a small current in my brain.

One of my fingers moved.

He shifted the position of the key slightly and pressed the button again. A different finger moved. If he had ramped up the current in his magnets and found the right place on my skull, he could have moved my arms or legs. It was like being someone else's puppet, and I didn't like it one bit.

That was probably the strangest experience I had while researching my book 13 Things That Don't Make Sense, which started life as a wildly popular New Scientist feature back in 2005. By comparison, being electrocuted in order to experience the placebo effect (an afternoon I'm writing about for a New Scientist feature that'll appear in due course) was nowhere near as odd. But I had plenty of other odd experiences while researching the book.

In the original article, I had just a couple of paragraphs in which to explore each anomaly. For the book I got the chance to dig a lot deeper, and the experience was suitably rewarding. Among other things, I ended up being followed around Los Alamos, meeting a man who got himself infected with a giant virus, finding myself (looking rather embarrassed) in a group photo of cold fusion researchers, discovering the basement secrets of a homeopathic pharmacy and talking about the rules of attraction with a transgendered professor, but - hey - it's all part of the job.

[Read Jennifer Ouellette's review of 13 Things That Don't Make Sense from New Scientist magazine.](#)

Michael Brooks, New Scientist consultant

Conservatives need a new mascot

Long beloved by right-wingers for their devotion to monogamy, prairie voles may be getting around far more than previously thought.

The animals, which inhabit American grasslands, have been touted as textbook examples of social monogamy.

This reputation isn't undeserved. Since the 1960s, Lowell Getz and his colleagues at the University of Illinois in Urbana-Champaign have documented the rodents' seemingly vanilla sex lives. One study of a population of wild prairie voles in Illinois found that more than half practice monogamy.

Since then, the humble rodent has become the poster-child for monogamy research, and comparisons between prairie voles and their more promiscuous cousin species, meadow voles, have identified genes and chemicals believed to be important for monogamy and social bonding.

But what if their monogamous reputation is undeserved and just a quirk of voles that live in Illinois?

"No one has gone to survey other populations of prairie voles," said Karen Mabry, an ecologist at Miami University in Oxford, Ohio, at the 12th meeting of the International Behavioral Ecology Congress in Ithaca, New York.

To find out, Mabry compared prairie voles in two college towns: Lawrence, Kansas and Bloomington, Indiana. The Illinois population has nearly gone extinct, Mabry said, and nearby Indiana offers a similar habitat: diverse grasslands that host clumps of vole nests. Kansas, on the other hand, is a monoculture grass, and nests tend to be evenly distributed.

There were differences between the vole families: the Kansans included many single males and females and the Hoosiers (that is, those from Indiana) formed lots of groups with more than two adults. But both practiced monogamy far less than the Illinois voles, with about a third of them opting for married life.

But a bigger shocker came when Mabry's team analysed the DNA of voles and their offspring. Whether monogamous or swinger, the researchers expected that most voles bred with the their nest-mates. Instead, 60% of voles find love outside their home, the researchers found.

At least conservatives looking for an animal mascot still have the bastion of male responsibility, the emperor penguin.

Oh wait, apparently they're gay.

Ewen Callaway, online reporter

On all things sperm

If love is a battlefield, then sperm is its most potent weapon. And on Tuesday I immersed myself, so to speak, in all things sperm: I attended an all-sperm symposium at the International Society for Behavioral Ecology meeting in Ithaca, New York.

No cell better represents the evolutionary tussle between males and females, though more often it's a tussle between males *for* females.

In the face of competition from other males, animals, from fish to fowl, have evolved larger, faster and more streamlined sperm cells, which are among the most diverse of all animal cells.

"The variety is even more puzzling given the fact that they all have the same goal," Simone Immler of the University of Sheffield.

One trait that makes sperm faster - and therefore more likely to beat another male's cells to the egg - is size. Whip-like tails called flagellum propel sperm through fluids, and the longer the better. To drive those oversized flagella, cells grow larger mid-pieces - essentially the engine of a sperm cell - to hold extra mitochondria.

Immler found that these characteristics can change in an individual animal, depending on the competition it faces.

Male Gouldian finches come in two varieties: dominant redheads and subordinate blackheads. Redheads get first dibs on females and food, and Immler wanted to know how this social structure affects the size of their sperm. She and her colleagues paired three birds together, in various combinations of redheads and blackheads, with females in sight, but out of reach.

After four weeks, the result was clear: competition breeds longer sperm cells. In most of the groups the flagellum grew slightly longer, and sperm cells from both kinds of males tended to grow longer mid-pieces.

But one problem with super-sized sperm cells is that they take up more room in the testes, explained Stefan Leupold, another Sheffield University sperm expert. Animals can compensate by growing larger

testes, but the things can only get so big.

To figure out how animals solve this quandary, Leupold studied 21 species of blackbirds and cowbirds, extremely promiscuous birds with huge variation in sperm size.

Birds that make larger sperm cells have big semeniferous tubules - the structure in the testes that gives birth to sperm - and they pack them densely into their testicles, Leopold and colleagues found.

But not all big sperm cells are necessarily fast, said John Fitzpatrick, of McMaster University in Hamilton, Ontario. Among cichlids - popular and colourful aquarium fish native to African lakes and streams - males appear to have evolved powerful and fast sperm cells, which later evolved to be large, Fitzpatrick said.

"You can increase the size of the car all you want, but if you don't have the engine to propel it, you're not going to go anywhere," he said.

Ewen Callaway, online reporter

Neuroscience teaches spooks new tricks

Functional neurological imaging isn't up to mind reading or lie detection yet, but combining it with other neurological techniques might hold hope for sensing people's psychological states and intentions. And neuropsychopharmacology might lead not only to new tools to enhance human cognition, but also to new drugs that could degrade performance of opponents in battle.

So concludes a National Research Council in a new report for the US Defense Intelligence Agency, titled "Emerging Cognitive Neuroscience and Related Technologies". It's basically a neuroscience update for spooks, briefing them not just what their side could use, but the other side - "the bad guys" - might do.

Mind-reading and lie-detection tools are at the top of any savvy spook's shopping list, but the panel says not to expect them soon. So far, they write that "insufficient high-quality research has been conducted to provide empirical support for the use of any single neurophysiological technology, including functional neuroimaging, to detect deception". But they recommend trying combined approaches "such as imaging techniques and the recording of electrophysiological, biochemical and pharmacological responses".

The rapid progress of functional neuroimaging should be monitored for other potential applications. The panel urges intelligence agencies and the Pentagon to consider possibilities of "enhancing cognition and facilitating training" to make smarter spooks and soldiers.

They also urge further study on what functional imaging can reveal about "states of emotion; motivation; psychopathology; language; imaging processing for measuring workload performance; and the differences between Western and non-Western cultures". Interestingly, the panel says that some evidence points to a relationship between culture and brain development, and urges more research on the matter.

Drug development could be a wild card as our models of brain function improve, especially if nanotechnology leads to drugs that bypass the blood-brain barrier. The promise is more precise delivery of drugs and ways to improve human brainpower. But the report also warns of

chilling perils in what it calls the "degradation market" - drugs that impair rather than enhance thought processes.

Instead of firing bullets at the enemy, troops could spray them with a drug that would slow their reaction times or dull their thoughts. "The concept of torture could also be altered," the report says, if "there could be technique developed to extract information from a prisoner that does not have any lasting side effects".

And it's not just drugs. The report mentions that tDCS (transcranial direct current stimulation) may delay people's response when they are lying, according to a small study of 15 people conducted last year in Italy.

The report says US officials should know what potential enemies might do. But after Abu Ghraib and Guantanamo, will other countries could not be blamed for worrying about the US.

Jeff Hecht, contributor

Why conservatives are happier than liberals

The exuberance displayed by Barack Obama's supporters might make Republicans look like geriatric chess enthusiasts, but a new survey suggests that conservatives are happier than liberals - and offers one reason why.

Liberals, claim New York University psychologists Jaime Napier and John Tost, have a tougher time rationalising social and economic inequality than conservatives.

The recent surge in home foreclosures, for instance, is due to poor economic choices on the part of borrowers, a conservative might think. Liberals, on the other hand, seethe at predatory lenders and lax government regulation of the mortgage industry.

The result: conservatives mix a martini and hit the country club, while liberals write angry letters and stage protests.

Of course, American political views aren't so binary, yet the happiness divide seems to be real. Previous studies, including a 2006 survey from Pew Research Center have found the same general trend, much to the delight of conservative pundits like George Will, who noted that "liberalism is a complicated and exacting, not to say grim and scolding, creed."

The authors of the Pew study suggested income, religion and ideology all played a role in shaping the happiness divide.

To add some ammo to these explanations, Napier and Tost conducted a series of surveys on political attitudes of Americans and citizens of 8 Western countries, using previously collected data. Their results affirmed the "conservatives are happy, liberals are mad" findings of previous polls, but income, education, religion and other demographic variables couldn't explain the happiness gap.

However, when the authors instead grouped people by their "rationalisation of inequality," the differences between conservatives and liberals dissolved. Republican or Democrat, people not bothered by social or economic disparities tend to be happy.

This trend held for non-Americans, as well. Right-wingers in the Czech Republic, Germany, New Zealand, Norway, Slovakia, Spain, Sweden and Switzerland were all happier than liberals, on average. And the poorer - and presumably more unequal - a country, the greater the happiness divide.

One may quibble with their methods. Respondents rated their political beliefs on a 1 to 10 scale, liberal to conservative, and I suspect the political beliefs of even the most doctrinaire Scandinavian conservatives would give Rush Limbaugh the willies. But the authors' comparisons were within countries, where relative differences still stand.

Napier and Post attempt to seal their case with one final point: the happiness divide has grown as income inequality in the US has surged. Between 1974 and 2006, the so-called Gini coefficient has document a growing divide between haves and have-nots.

The number varies between 0 and 1, with zero representing total income parity and 1 representing a total inequality. The lowest (.24) belong to Denmark, while the highest (.71) to Namibia.

In 1974 the American Gini coefficient stood at .39 in 1974 and by 2006 had risen to .47, about the same as Madagascar (.48) and Rwanda (.47), and higher than Iran (.43).

And the happiness gap could widen, depending on the results of this year's Presidential election. The authors note that conservative governments tend to increase inequality, compared to liberal governments.

At least Obama's supporters still have hope, if not happiness.

Ewen Callaway, online reporter

Is Stephen Colbert's spider a unique species?

Stephen Colbert is probably proud that the spider named after him, *Aptostichus stephencolberti*, stalks the beaches of liberal California bastions such as Santa Cruz, Monterey and San Francisco. But the faux-conservative comedian may be less enthralled to learn that *A. stephencolberti*'s tenuous claim as a unique species rests on the shoulders of evolutionary theory, not divine intervention.

In a paper posted this week on the website of the journal *Systematic Biology*, ecologists Jason Bond and Amy Stockman of East Carolina University in Greenville, North Carolina, argue that Colbert's spider should constitute its own species. (They also make the case for two other completely new species of trapdoor spiders: *Aptostichus angelinajoleae* and *Aptostichus miwok*. The latter refers to a group of Native American tribes that have lived in what is now Northern California for at least 5000 years.)

Bond offered Colbert the Linnaean tribute, after Colbert griped that Neil Young had received the honour instead of him (scroll down for clips).

But one problem with *A. stephencolberti*'s status as a species is that the arachnid looks exactly like several related species of spiders that live in many of the same kinds of habitats, up and down the California coast. In the new paper, the authors outline a way to resolve whether such species really constitute a unique species, melding geographic, ecologic and genetic approaches.

This dilemma isn't unique to celebrity-named spiders, but to all plants, animals and even bacteria. The debate is a can of worms that Linnaeus and Darwin both opened, then closed, and one this reporter would rather not address with two other deadlines looming. Suffice it to say, we wrote a feature story on the topic a decade ago, and some researchers devote their careers to the question.

Bond and Stockman conclude that *A. stephencolberti* makes the cut in large part because of its evolutionary history. DNA analysis shows that the spider is genetically distinct from related spiders, meaning that even though the species *can* interbreed to spawn fertile offspring, they don't in practice. Bond and Stockman also argue that the unique geographical

distribution of *A. stephencolberti* and its sister species support their designation.

They write:

The specific epithet is a patronym, named in honor of Mr. Stephen Colbert. Mr. Colbert is a fellow citizen who truly has the courage of his convictions and is willing to undertake the very difficult and sometimes unpopular work of speaking out against those who have done irreparable harm to our country and the world through both action and inaction. He will be especially remembered by many of Jason Bond's generation for his speech at the 2006 White House Correspondents Dinner.

Bond appears on Colbert Report tonight (hat tip to The Loom for flagging the visit).

Ewen Callaway, reporter

The first (hopefully last) test-tube orphan

It's now 30 years since Louise Brown, the world's first test-tube baby, was born, but this month saw the birth of the world's first test-tube orphan.

This bizarre state of affairs came about when a Japanese couple got divorced, after paying a surrogate mother in India to give birth to their child, who was conceived using in vitro fertilisation.

Since the split, Yuki Yamada, the baby girl's biological mother who was due to adopt her, is no longer interested, nor is the surrogate mother who carried the child. And, as a single man, Ikufumi Yamada is not legally allowed to adopt the 11-day old baby. So, she remains in the hospital in Jaipur City where she was born. Mr Yamada's mother is looking after the baby in hospital, but cannot take her out of India without adoption papers and a passport.

Commercial surrogacy is legal in India, unlike most other places around the world. Couples with fertility problems provide eggs and sperm which are the fertilised in vitro (in a test tube), and the embryo is implanted into the womb of a surrogate mother, who is paid a fee. This practice is increasingly popular but - thankfully - this particular situation has never arisen before. Perhaps it's the \$10,000 price tag that makes most couples give the whole thing a bit more thought before going ahead with it.

Louise Brown was the first of many test-tube babies, but let's hope that this is the world's first and last test-tube orphan. There are enough unwanted babies in the world already.

Tamsin Osborne, contributor

Are big brains to blame for schizophrenia?

Could mental illness be the price we pay for our bulging brains? The idea has been knocking around for some time now as an explanation for autism, depression and other diseases.

It's an attractive thought. Over the past two million years, the human brain has nearly doubled in size, perhaps birthing to consciousness, language and religious belief. Mental illness could be an unfortunate side effect of our overactive, over-wired and over-stimulated brains, the theory goes.

But the melding of two highly contentious and often speculative lines of research - the biology of mental illness and human evolution - demands we take any argument with a heaping pinch of salt.

The latest, published in *Genome Biology*, connects a big brain's energy demands to schizophrenia. It comes from Philipp Khaitovich, of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and his colleagues.

They looked at genes expressed in the brain that had been selected for in human evolution and compared them to genes that are turned excessively up or down in people with schizophrenia. Lo and behold, the researchers found some overlap, especially among genes involved in powering cells.

Next, Khaitovich's team compared the levels of 21 metabolic chemicals found in post-mortem brains of humans (both with and without schizophrenia) and chimpanzees. Nine of the chemicals - which come from the break-down of sugars, neurotransmitters and fats - showed different levels in people that had schizophrenia and other people.

When the researchers compared the levels of these 21 chemicals in the brains of humans and primates via a mathematical analysis, those same nine chemicals stuck out. Their levels were more likely to vary between humans and chimps than the other 12. In other words, some of the significant metabolic chemical differences between human and chimp brains are disrupted in people with schizophrenia.

However, post-mortem brain research is notoriously unreliable. A person's (or chimp's) age, sex, cause of death and post-mortem interval - the time between death and when the brain is preserved - can all muck up chemicals in the brain.

And schizophrenia genetics is notoriously fickle, with few studies implicating the same genes. Just last week, two teams revealed a host of genetic differences that seem to predispose some people to schizophrenia, but these mutations only account for half of 1% of all cases.

On the human evolution side, no one doubts that genetic change drove the development of bigger brains, and it follows that more cells with more connections demand more energy.

But Khaitovich's team notes that their analysis of the genetic changes that occurred during human evolution can only peer back 200,000 years, when some of the modern lineages of humans began to gel. Yet fossil records show that our ancestor's brains started swelling a full two million years ago.

So while it's interesting to ponder whether debilitating mental illnesses like schizophrenia and bipolar syndrome are a product of our big brains, the evidence just isn't there yet.

Ewen Callaway, online reporter

Convenient US army rules for biosafety?

In the next few days we might discover whether we were right, and that whoever mailed anthrax powder to senators and media people just after the 9/11 terrorist attacks in 2001 really was an insider - a government researcher who worked on biological defense, and wanted to attract more funding, or just raise the alarm.

The US Grand Jury is said to be on the point of closing its investigation and releasing its evidence for who the culprit was - the front runner being Bruce Ivins, who tragically died, an apparent suicide, last week.

The day Ivins reportedly took the pills, the US army promulgated a new rule that seems specifically designed to catch anyone working with dangerous germs in an army lab, or a civilian lab on an army contract, who might decide to take the law, and the germs, into their own hands.

The Biological Surety Army Regulation 50-1 establishes the "biological personnel reliability program" which, effective 28 October, will deny scientists working for the army the right to work with "select agents" - the list of dangerous germs deemed usable for bioterrorism - if they have a drug or alcohol problem, which seems reasonable, but also if they demonstrate an "inappropriate attitude, conduct, or behavior".

The regulation spells out what might be inappropriate: any serious incident indicating a "contemptuous attitude toward the law", including traffic laws, or signs of "arrogance, inflexibility, suspiciousness, hostility", flippancy toward the rules, "extreme moods", or "aggressive/threatening behavior toward other individuals".

"I'd always had this idea that the whole point of armies was to be aggressive and threatening," a colleague observes. Never mind armies - that list of character traits describes not a few prominent scientists I have had the pleasure, or otherwise, of knowing.

Army scientists will be subject to constant reevaluation, at least every five years, and must report any potentially disqualifying changes of circumstance, including financial problems or involvement in any court actions, and will be subject to "peer and supervisor observation and reporting".

Conspiracy theorists may note that this all seems a bit convenient in view of the similarities between some of these disqualifying attitudes and the rumours that have been reported concerning Ivins - though it should be noted that it took the blogosphere little time to discredit the social worker cited for most of them.

Apart from that, the regulation is clearly trying to spot the kind of people who would make you shudder at the very thought that they are in charge of dangerous germs. All fair enough.

My misgiving is that given the competitiveness of much scientific life, and the unfortunate but real prejudices about ethnicity, gender, and any number of other things that permeate life, including military life, I rather suspect I'd be a bit reluctant to commit to a research programme from which I could be dismissed the minute some obscure army officer discovered, or was told, I was demonstrating an "inappropriate" attitude. In fact, just those constant reevaluations might cause my attitude to become somewhat inappropriate.

This is important, not just because it will affect the large amount of biodefence and even basic biological research the army does, but because it establishes a disturbing new norm for the standards to which scientists could be held in order to work. People who work with dangerous germs in the US are already subjected to so many rules that some have switched research.

That is bad, because we need people to do research on dangerous germs, simply because they are dangerous and we need to defend against them. There must be better ways to ensure that doing the work does not actually increase the risk.

Debora MacKenzie, Brussels correspondent

Was Ivins the anthrax killer?

Every reporter who covered the US anthrax attacks of 2001 has been over the list of possible suspects in their heads hundreds of times. It would probably be an anthrax scientist who'd worked in US military labs, and before the attacks, there weren't that many. So it was probably someone we'd met.

But I don't know anyone who suspected Bruce Ivins of mailing anthrax spores to US media outlets and senators, killing five people. He committed suicide this week, apparently because he was about to be accused of precisely that.

I met him at the 1998 meeting of the world's then small anthrax research community in Plymouth, England. One night I found myself at dinner with Ivins and his lab. His students clearly regarded him as a great guy, a bit eccentric but not in a bad way.

He'd had a Guinness, which "made me a virtual zombie" he later told me, as he rarely drank alcohol. But after a reviving Coke, he and a number of us took a stroll through the midnight streets of Plymouth, singing snatches of old WW1 songs. He'd written a funny song about guinea worm, another disease his lab worked on. "Your partner in song" was how he signed an email to me in 2000.

Ivins committed suicide with an overdose of codeine and acetamenophen (Tylenol) last Tuesday. According to media reports, he'd been acting stressed since the US government exonerated the previous suspect in the anthrax attacks.

He'd been barred from the lab, and was reportedly about to be involuntarily retired. He and his extended family had been questioned, and his home raided twice - a colleague described it to reporters as "hounded" - since the FBI re-launched the investigation into the attacks under new leadership in 2006. He was hospitalised for depression in July, say reports.

Little wonder, especially since a colleague told reporters he was out of money for legal fees, and was "much more emotionally labile, in terms of sensitivity to things, than most scientists. He was very thin-skinned."

That sounds like the guy I met.

Was this another victim of pressure from a frustrated FBI desperate to fight the bioterrorists they are sure lurk in US labs? Like Tom Butler? Or was someone interested in making it seem that Ivins committed suicide? Like some people believe about the British bioweapons expert David Kelly?

Only hours after the suicide was announced, an investigative site posted court papers imposing a restraining order on Ivins in July after he allegedly threatened a psychological counsellor, who was due to testify on 1 August at a grand jury investigation of the attacks.

The papers describe "a history dating to his graduate days of homicidal threats, actions, plans, threats and actions". That would be 30 or 40 years ago. Was there really someone with a psychiatric history like that at the main US biodefense lab, USAMRIID, and he wasn't investigated before?

Ivins would certainly have had the access to the strain of anthrax used for the attacks, and the expertise to brew it up. It's not at all impossible that the conclusion everyone is being asked to jump to, that Ivins killed himself because he was about to be nailed, is true.

But I want to see some pretty good empirical evidence about where those spores came from before I'll believe my partner in song was the attacker.

Debora MacKenzie, Brussels correspondent

The case against forensic science

The case against a man held for 9 years for the murder of a UK TV celebrity unravelling today. The result provides a sobering reminder of why US and UK authorities no longer rely on gun residue evidence to convict of crimes, and more broadly, why we must resist the temptation to let forensic science dominate what happens in court rooms.

Barry George was convicted shooting TV presenter Jill Dando dead on her London doorstep in 1999 using what the prosecution said was a single microscopic particle of gunshot residue in his coat pocket. With only a single eye witness able to place him even on the same street, that particle was largely responsible for his spending 9 years in jail.

That evidence was later rejected on appeal, when the defence made the case that it may have been transferred there from firearms officers involved in the investigation. A retrial today decided there had never been sufficient evidence to convict George.

As forensic science has become more common in courts, its reliability has consistently been overstated. Past New Scientist inquiries have revealed that no one should be convicted on firearm forensics or fingerprint evidence in isolation. In fair trials using laboratory - not courtroom - science, neither meet the expectations often laid on them.

In recent years science from another arena altogether - that of the fictional CSI team - has become important. We reported this year on the "CSI effect"; juries increasingly expect to be shown forensic evidence.

It seems likely prosecutions and defences alike will strive to meet those expectations, pushing forensic techniques into supporting legal decisions actually based on thin air.

Tom Simonite, online technology editor



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