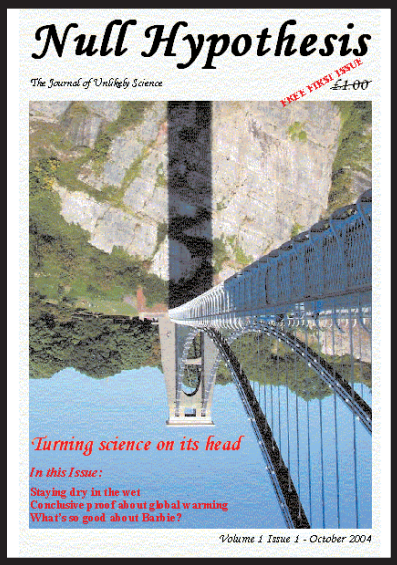
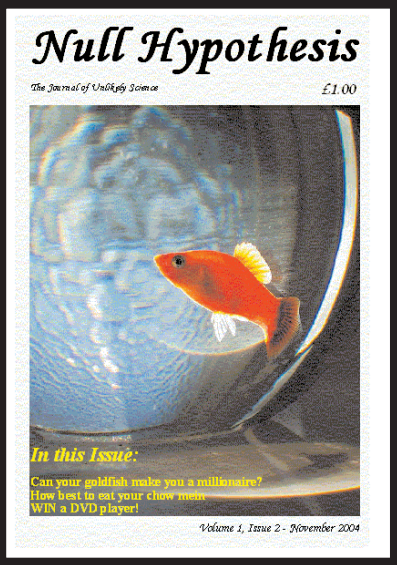
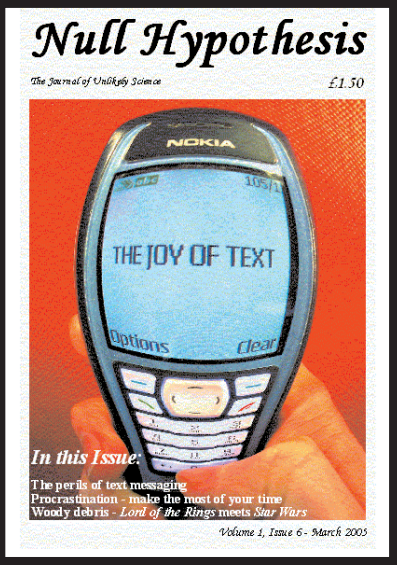
Null Hypothesis

The Journal of Unlikely Science





Selected articles from our first six issues



October 2004 - March 2005

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The Journal of Unlikely Science casts a wry eye over the world of science and technology. Published monthly, it caters for anyone who's ever laughed at, or been amazed by, the world around us. *Sections marked with an asterisk are based on material from published journals, scientific literature and research. Those without, may not be...

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Cover Picture

Front:
The face of *Null Hypothesis*.

Back:
Colin the kitten, half Siamese - half Burmese, and all-round bundle of mischief. Colin is 14 weeks old in this picture, which graced our first back cover. He resides in Cornwall.

To subscribe to *Null Hypothesis*, turn to page 12 or go to our website:
www.null-hypothesis.co.uk

A toast-based proof of a malevolent God

Lewis Dartnell
Centre for Mathematics and Physics in the Life Sciences and Experimental Biology (CoMPLEX), University College London, UK.

Introduction

We've all experienced it. It's Monday morning, you've slept through your alarm and are now in a hopeless rush to get in on time. The toast comes out of the toaster, you give it a quick sweep of butter, or in these more health-conscious times, margarine, and pick it up to take over to your newspaper on the kitchen table. And then it happens. Whether it simply slips out of your fingers, or it burns slightly and you subconsciously release it, the toast begins to drop towards the filthy floor. You watch in dismay as the toast falls, neatly performing a half-turn and landing flat on the floor, butter-side down in the grime. You don't even know why you tentatively hoped for the toast to land otherwise - the Universe seems out to get you as far as free-falling toast is concerned. Well, in fact it is.

The butter-side down eventuality is the necessary outcome due to a specific combination of parameters concerned with the dimensions of humans and ultimately the fundamental structure of the universe. This argument-by-design, therefore, not only conclusively demonstrates the existence of the Creator, but that he is a cantankerous old blighter who organised the Universe in this way to continually torment us with dirty toast.

Methods

A mathematical model of the toast situation can be constructed in order to demonstrate the butter-side down condition as the invariant outcome. To simplify the situation, the cuboid of toast is modelled as a rigid rod with uniform density and length $2a$. Thus rotation in only one plane, a change in pitch, is considered; roll and yaw during the descent are ignored. At the initial condition, the moment of release, the toast is horizontal and supported only at one extreme by the breakfaster's finger. The weight of the toast has become an unbalanced force, and so creates a turning moment and thus rotation about the pivot (finger). This turning force is equal to the component of the weight perpendicular to the surface of the toast. Figure 1 below shows the situation when the toast has pitched down through an angle of θ.

As long as the toast remains in contact with the pivot the rate of rotation increases. When the toast has pitched down to a certain dip-angle static friction between bread and finger is overcome and the toast slips off the pivot. The toast now enters freefall towards the floor, rotating at a steady rate about its centre of mass. The total drop height is given as h. The analysis is made simpler by two assumptions; that the size of the toast is insignificant compared to the drop height, and that the pitch angle at the point of slippage is a negligible proportion of a complete turn, i.e.:

$$a \ll h \quad \text{and} \quad \theta \ll 360°$$

The calculation of the number of turns completed before landing on the kitchen floor proceeds as follows:

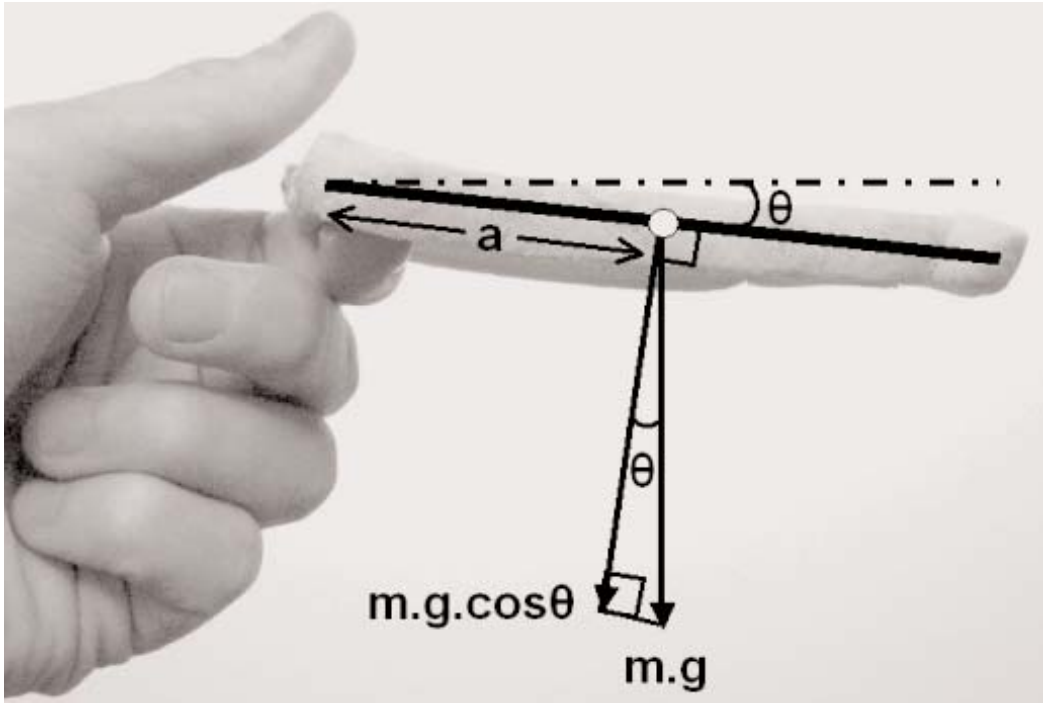


Figure 1. Diagram of the situation when the toast has pitched down by θ

After rotation through θ, toast centre of mass has dropped: $a.\ \sin\theta$

Therefore, loss in potential energy: $mga.\ \sin\theta$

Therefore, gain in kinetic energy of CoM rotating round pivot:

$$\frac{1}{2}mv^2 = mga.\sin\theta \qquad v = \sqrt{2\,ga.\sin\theta}$$

Circumference of complete turn: $2\pi a$

Therefore, time to complete a single turn: $\dfrac{2\pi a}{\sqrt{2\,ga.\sin\theta}}$

Distance travelled during acceleration:

$$s = \frac{1}{2}at^2 \qquad h = \frac{1}{2}gt^2$$

Therefore, time until toast impacts floor: $t = \sqrt{\dfrac{2h}{g}}$

Number of turns completed before toast impacts floor: $\sqrt{\dfrac{2h}{g}} \Big/ \dfrac{2\pi a}{\sqrt{2ga.\sin\theta}}$

Simplifies to… $\sqrt{\dfrac{h.\sin\theta}{\pi^2 a}}$

Results

Thus, two expressions are derived; one for the length of time required for the tumbling toast to rotate through a complete turn and the other for the time taken before the freefalling toast hits the floor. The number of rotations completed by the falling toast before it lands is the ratio of these two calculated times. The formula can be evaluated by substituting in average values for the parameters. A slice of Kingsmill square-cut thick white bread, which the author finds optimal for toasting, is 15cm long, giving a the value of 0.08m. The most natural posture to carry toast betwixt toaster and kitchen table is at a height just below elbow level, making h = 1m. After an extensive empirical study into the mean dip-angle that toast slides off the pivot θ was found to be 15°. Inserting these values into the derived formula yields:

$$\sqrt{\frac{\sin\ 15}{0.08\,\pi^2}} = 0.573$$

0.573 revolutions... The toast rotates an almost exact half-turn. Because toast is carried butter-side up this half-turn always results in it landing messy side down. In fact, this situation

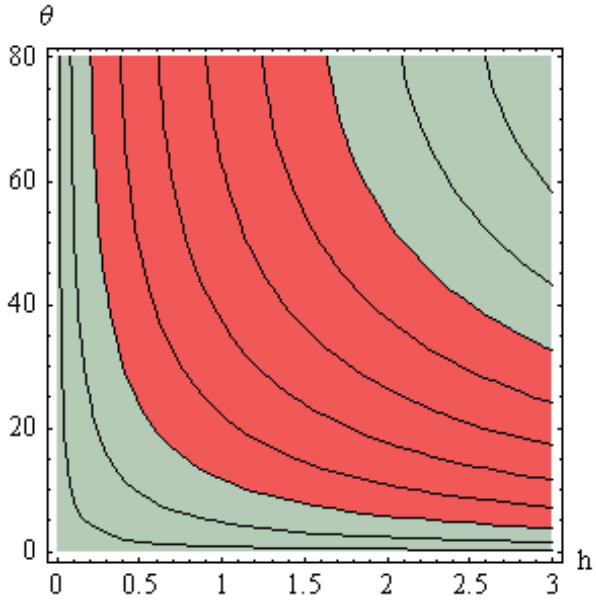


Figure 2. Parameter space of *h* and *θ*

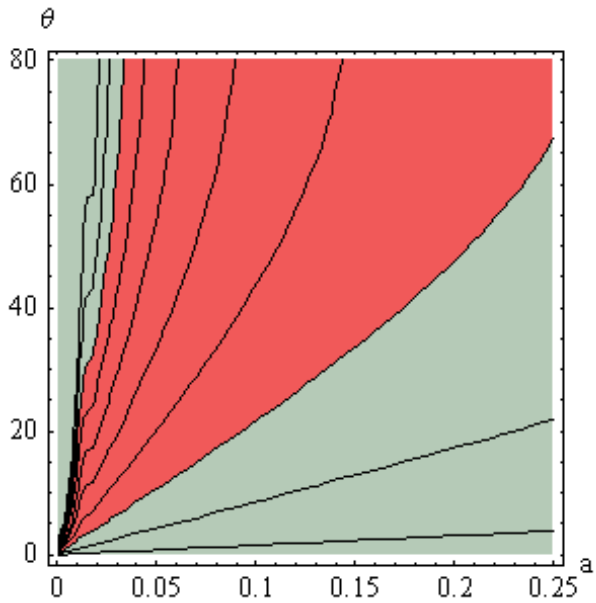


Figure 3. Parameter space of *a* and *θ*

only occurs because the three relevant variables; drop height (*h*), angle before sliding (*θ*) and size of toast (*a*) seem to have very specific values that allow the toast to only rotate half a turn. Figures 2 and 3 display the parameter space of these three variables. The graphs show contour lines of how far the toast has rotated when it lands on the floor. The dark colour coding indicates the danger area between 90° and 270° that results in a butter-side down impact. These graphs show that varying any one of the variables by only a small amount moves the toast out of the danger area, and it completes either less than a quarter-turn, or has time to complete almost a whole turn. The actual values for *a*, *h* and *θ* seem to be maliciously 'tuned' to be exactly those that guarantee a butter-side down catastrophe.

Discussion

The result of 0.573 revolutions is uncannily mathematically precise, and the three variables, *a*, *h* and *θ* have been apparently perfectly balanced to ensure that toast always lands butter-side down. This surely must be the result of intelligent design rather than coincidence. Other examples of such an extreme fine-tuning are known for many of the constants of physics. Change the proton mass by a tiny amount and bonds cannot hold molecules together, minutely alter the fine structure constant and all stars would rapidly burn through their fuel and form black holes, or tweak the strength of gravity and the universe would have collapsed long before life could have evolved. The Universe appears to have been exquisitely adjusted to allow our existence, and some have cited this as strong evidence that a benign Creator designed it so for our benefit. But this study has proven that not only has God designed the Universe to be clement to life, but he specifically arranged a few things to guarantee that the toast of intelligent beings always lands butter-side down. This presumably can only be part of some petty point-scoring or one-upmanship intended to continually remind us who really is boss.

The height of an intelligent life form is surprisingly tightly constrained. A brain complex enough to be self-aware and intelligent needs to be supported, both in structural and nutrient/energetic terms, by a body of a certain minimum size. There is an important upper limit on body size as well. In order to have appendages free for manipulation of the environment, like hands, a body cannot be too large or it would break the first time it trips over. The maximum size is determined by the ratio of electrostatic attraction (which ultimately gives the structural strength to bones and other tissues) to the size of the gravitational constant (which determines how hard something hits the ground when it falls). Both of these were defined by the Creator in the Beginning.

Notably large animals, such as the brontosaurus or blue whale, either have necessarily slow metabolisms, or have no nimble appendages with which to create and use tools. Therefore, it is no coincidence that humans are between 1m and 2.5m tall - it could never be any other way. This restricts the drop height, h, to between 0.65m and 1.60m.

The size of a piece of toast is, of course, directly linked to the size of the animal eating it. The angle at which the toast slides off the finger, and thus how much rotational speed it picks up, is dependent on the degree of stickiness between the two surfaces and so was also set by God. Gecko-based intelligent life would presumably be spared this torment then, as their finger-tip suckers would hang on the toast long enough so that it completes a full turn and lands safely.

The particular values of a, h and θ have been specially selected to ensure that toast always lands butter-side down. The Universe was therefore designed by a malevolent God. QED.

All is not lost, however, *Null Hypothesis* can exclusively reveal the Top 5 methods for beating this cosmic design and thus poking a finger in the eye of the malicious Creator who tried to outwit us.

1. Always carry toast butter-side down so that if it gets dropped it will perform a graceful half-turn and cleverly land butter-side up. The daily dripping of butter onto the floor is a small price to pay for this victory over an omnipotent Creator.

2. Stop dropping toast. Co-ordination night classes can help here.

3. If, despite all of your concentration, you feel the toast slipping, and fear that it is already too late to save, fling it as high into the air as you can, and if possible give it a good flick so it starts spinning nice and fast. That way the drop height and rate of rotation are randomised away from the values known to result in a butter-side down catastrophe. The chance of a buttered floor is reduced from near certainty to 50:50, that of a fair coin toss. There is unfortunately, however, the significantly increased risk of the toast landing butter-side up on the ceiling. It's your call.

4. Wear stilts when making breakfast. Toast rotates half a turn when dropped from a normal height, so make yourself at least 3.5m tall. Tripping over from such a height will result in your untimely death though. See above.

5. Bake your own bread. The turning rate is dependent on the size of the slice (a) and so varying this can ensure your toast lands safely. However, for the toast to rotate either less than 90° or more than 270° so that it lands butter-side up, the toast must be either smaller than 3cm or bigger than 25cm. And you'll never fit a slice of bread the size of a textbook in the toaster in the first place.

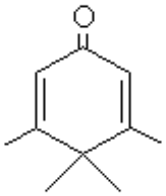
Crazy chemistry

Chemistry's not all about Bunsen burners, lab coats and that impossible periodic table. Well, it might be, but there is also a silly side. This month we highlight Dr Paul May for having compiled the most comprehensive list of ridiculously named chemicals we've ever seen. Here are just a few of them. Please follow the link at the bottom of the page for more mad molecules.

Diabolic Acid
These are a class of compounds where the chains have different lengths. The name comes from the Greek word *diabollo* - meaning to mislead, because they are difficult to isolate using standard gas chromatography procedures. One of its inventors, Professor Klein, also thought that they had 'horns like the devil'.

Megaphone
Yes, it's a silly name! But despite this, the molecule is quite ordinary. It gets its name from being both a constituent of *Aniba megaphylla* roots (a plant in the same genus as rosewood) and a ketone.

Penguinone
This compound's real name is: 3,4,4,5-tetramethylcyclohexa-2,5-dienone, and it gets its name from the similarity of its 2D structure to a penguin, although it is not immediately obvious!

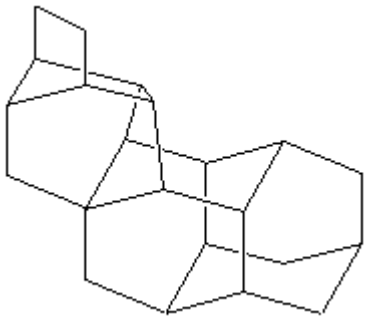


George and Bi-George
When undergraduate James Carnahan synthesised a new cage structure, he asked his supervisor, Professor Katz, to suggest a name for it. Since trivial names are often arbitrary, he suggested 'George'. When George is heated with an Rh catalyst it produces Bi-George!

Moronic Acid
This is a triterpenoid organic acid that is found in the resin of nuts from the cashew family (*Pistacia*). It is of interest to people studying archaeological relics, as there is evidence that *Pistacia* resin was used in mummification in Egypt, and in ancient bowls and containers. The reasons why it is called moronic acid is still unknown...

Complicatic Acid
Sadly, not all that complicated. The name comes from the plant *Stereum complicatum* from which it was isolated.

Bastardane
The proper name of this one is ethano-bridged noradamantane. However because of this unusual ethano bridge, which turned it into a variation from the standard structures found in the field of hydrocarbon cage rearrangements, it became known as *bastardane* - the "unwanted child" - harsh, but fair.



Welshite
This wonderfully named mineral is named after an US amateur mineralogist Wilfred R. Welsh. Its formula is $Ca_2SbMg_4FeBe_2Si_4O_{20}$.

Magic Acid
'Magic Acid' is the name given to one of the strongest of the inorganic 'superacids'. It is made by mixing antimony pentafluoride (SbF_5) with fluorosulphonic acid (HSO_3F), and it is so strong that it's capable of protonating even saturated alkanes, like methane, to produce carbonium ions - a pretty special quality in the chemistry world.

Draculin
Found in the saliva of vampire bats, this aptly named glycoprotein prevents a victim's blood from clotting, allowing the vampire to dine heartily.

Thanks to Dr. Paul May for allowing us to use several of his silly molecules! However, there are many more, which can be seen at:
www.chm.bris.ac.uk/sillymolecules/sillymols.htm
along with the famous *Molecule of the month*, which can be viewed at:
www.chm.bris.ac.uk/motm/motm.htm

Would you like *Fifteen millimetres of fame*? let us know at: **letters@null-hypothesis.co.uk**

Studies of the bleedin' obvious

Alien Hand Syndrome.

Biran, I. and Chatterjee, A. (2004). *Archives of Neurology* **61**, 292-294.

The authors are from the University of Pennsylvania, Philadelphia, USA.

Alien Hand Syndrome is defined as the feeling you get that your hand is being possessed by a force outside your control. It often comes about following a trauma to the brain, after brain surgery or after a stroke or brain infection. Affected people generally have feelings in the hand, but believe that it is not part of their body, and thus that they have no control over it - such that it belongs to an alien.

This paper outlines the origins and neurology of the condition, with some early observations. The authors take us back to the famous Stanley Kubrick film *Dr Strangelove*, where the main character shows a bizarre movement disorder. His hand seems to have a life of it's own, once saluting under it's own will and even clutching at his own throat while he restrains it with the other hand.

Although this seems a bit far-fetched, it's in fact not all that far from the truth, and the disorder (a type of neurologic disease) is often called alien hand syndrome.

The movement of a limb without the person's intention is quite alarming and frustrating of course, and patients can find themselves snatching at objects and not being able to let go of items in their grasp or trying to pry objects out of their grip with the other hand.

Hand(y) facts:

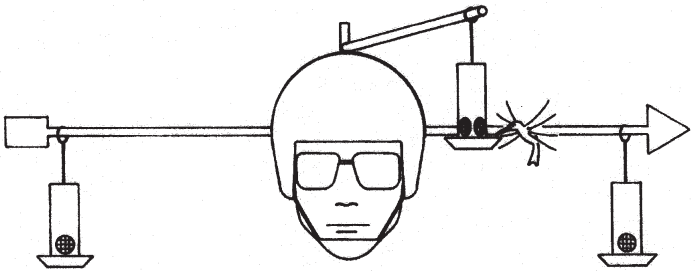
The phrase "rule of thumb" apparently comes from an old English law, which stated that you could not beat your wife with anything wider than your thumb. However, it may be older than that, and come from Rome, when gladiators' fates were decided using the thumb up or down.

The phrase "to win hands down" comes from horse racing, where a jockey who is on the way to a comfortable win would lower his hands, thus allowing the horse to run on without his control.

An ant will always fall over towards its right hand side when drunk.

Patent lunacy

Our monthly look at the weird and wonderful world of the UK patent office. Here, we present wacky ideas that have been stamped with the seal of approval. They may be unbelievable to us, but to the inventors, they represent months, and possibly years of blood, sweat and tears...



Wearable device for feeding and observing birds and other flying animals

See nature up close. The gear comprises of a hat with a support mounted on top, and one or more mounted feeders.

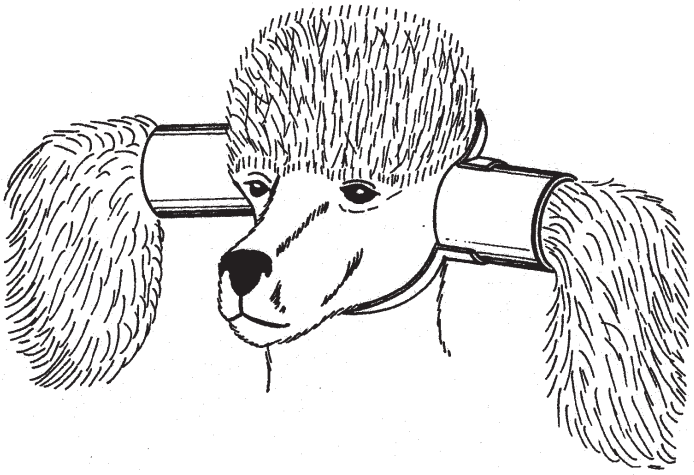
The person may observe flying animals from a short distance, which include hummingbirds, butterflies, and other airborne critters.

Shades optional...

Animal ear protectors

Are you constantly having to remove bits of dried dog food from your pet's furry ears? Well it will happen no more with this superb idea designed to protect the dog's ears while he or she eats their chunky nourishing food.

After eating, the dog can walk away with immaculate ears, preventing your pet going through embarrassing ear cleaning after every meal! Sorted...



More patents next month, but do you have ideas above your station? What unlikely item would you like to see invented that still remains just an idea inside your head... Let us know at **letters@null-hypothesis.co.uk**

Thanks to Dr. Jeremy Kaye for patent assistance...

Video games and sick leave in senior house officers in psychiatry

Dr. S. Seneviratne ***MRCPsych***
Consultant, University of Elephant and Castle,
London, UK.

Introduction

The future of medicine relies on our trainees. Their development is in our hands. However, a disturbing lack of regard has developed in this medical subgroup for their responsibilities around the time of launches of so-called "games" for the computer, such as *Halo 2*, *Doom 3* and of course the *culprit celebre*, *Grand Theft Auto*. The author has personal experience of such behaviour, and its infectious nature, which leads to self-limiting epidemics of 1 week or so.

The study's aims are to investigate rates of junior doctor absence days around the release dates of various major games, and compare them with releases of rubbish games.

Method

We sampled game releases from *Playstation 2*, PC and *Nintendo Gamecube* over a 2-year period. We excluded *Gameboy Advance* games, as these are played by children who are too young to enter medical school. *Dreamcast*, *N64* and *PS1* games have become obsolete. As the author does not possess an *Xbox* this was also excluded.

Ratings of good releases were based on official sales figures from retail outlets, and my 11-year old son. Rubbish games were similarly rated using the Seneviratne Jnr. Scale of Playground Kudos.

Fourteen consecutive junior 'doctors' were enlisted into the trial. A questionnaire rated their interest in gaming, and the average time spent each day at the console. Data was compiled on console of choice, and the PC specifications.

Sick leave and annual leave was compiled and totalled for each day. As this was effectively an audit and no patients were involved in the study, we were able to ignore the pencil-pushing ethics committee.

Statistical analysis was planned from the beginning of the project, but we lost the dongle for *SPSS*, and had to rely on some fancy charts that you get in *Excel*.

We declare there to be no conflicts of interest, although we did try for *Xbox* sponsorship.

Results

This was a retrospective study, and the human resources provided us with copious amounts of *Excel* data, which we hoped we could use as evidence that junior doctors are a bunch of lackeys. Time set aside for statistical analysis coincided, however, with the release of *Half Life 2* and was put on hold, well, just until I can get past those pesky headlice.

Later, during the outpatients' clinic, the junior doctor gleefully informed me that he had just bought a £300 graphics card and an Athlon™ 64. Outraged, and not to be outdone by a mere boy with far less earning potential than myself, I sought out the fastest dual processor system I could build with 4 gigabytes of memory and an overclocked graphics card. I certainly showed him, and it's tax deductible.

My Specialist Registrar appeared to be the only doctor in my team who demonstrated a modicum of restraint and professionalism throughout the study, so I allowed her to taste the legion power of the consultant and handed over control. I deemed it to be part of her training.

Some of the featured games sampled by the author and colleagues.

Discussion

From a Freudian perspective, the dynamic interplay between Consultant and Junior is reminiscent of the young child's castration fears, as embodied in the Oedipal Complex. The soothing mother figure, symbolically, takes control of the child, as represented by my Specialist Registrar. The paranoid-schizoid interplay flourished but was heightened to a peak, when I exploded, accusing her of trying to take my job. The research had taken up much of my time, leading me away from the hospital for extended periods (I have little recollection of those days) and she used the opportunity to ingratiate herself with the Nursing Staff, and steal their affections.

After my enforced sick leave (courtesy of senior management), during which time I was able to continue the battle against the hordes of Xen, I was greeted by my now smug junior. The Ward Round was peppered with him bleating endlessly about how he had beaten the game on the hard level. Meanwhile there was no let up at home, with my son whining: 'It is so unfair that I am not allowed to play *GTA San Andreas*. My friend's dad lets... etc'.

The research project has now been abandoned, as I smashed the computer keyboard in a fit of rage, having been unable to jump on to the moving train.

Conclusions

It remains unproven that junior doctors feign illness to avoid work in order to play video games. My prejudices, however, are borne out by the anecdotal experiences of my Consultant colleagues.

Competing with younger men is hazardous for the older gamer, and can lead to significant mental health problems.

Further reading

1. Conn, J. (2004). The games doctors play. *Modern Healthcare* **34**, 32-33.

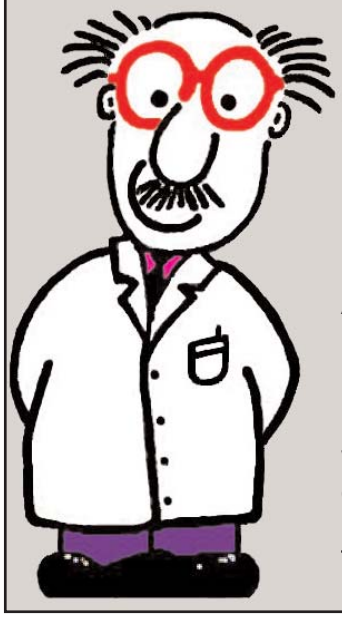
2. Haninger, K., Ryan, M.S., Thompson, K.M. (2004). Violence in teen-rated video games. *Medscape General Medicine* **6**, 1.

3. Khamas, W.A. and Nour, A. (2004). Veterinary medical education in Iraq. *Journal of Veterinary Medical Education* **31**, 301-309.

4. Coppola, G. (1995). [Medicine as art in the Roman world. Its advance from sacral to secular approach, its trading and public diffusion: Socio-political considerations and their legal consequences]. *Medicina nei Secoli* **7**, 1-100. Italian.

We'd like *your* articles! whether you write some unlikely science, or just something interesting about science and technology.
We'd love to hear from you. Write to **articles@null-hypothesis.co.uk**

Changes to your *Null Hypothesis*



The *Null* is soon to take on a new format, as we will be moving from the printed pages that you've come to know and love to the wholly more portable format of electronic pdfs and the Internet. You'll still get the same wacky science, up-to-date news and nuggets of the bizarre, but it will be much more accessible.

A pdf version will be available from the website and can be downloaded when it becomes available. The website will also offer a huge number of resources as part of our growing number changes to make science more fun, wild and accessible than ever before.

We hope that you'll bear with us as we go through these changes and enjoy our new bigger and better format.

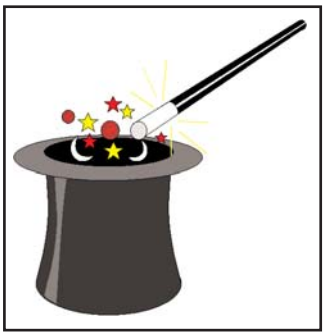
www.null-hypothesis.co.uk

Secure Payments by PayPal

ABC - Amazing Biological Curiosities

Biology is a weird and wonderful world! Here, we present a number of biological specimens that really exist, but have rather bizarre names.

Abra cadabra - A species of clam, now sadly in a new Genus *Theora*.
Ba humbugi - A snail, from the island of Mba, in Fiji.
Uebetia bigaulae - A moth, try out the pronunciation!
Heerz lukenatcha - a parasitic Braconid wasp.
Heerz tooya - another parasitic Braconid wasp.
Copeanus - fossil of a marine ray, named by Marsh, who was in conflict with Cope (a fellow palaeontologist) in the late 1800s.
Turbo - a type of snail - believe it or not!
Vini vidivici - a parrot, now sadly extinct, from the Marquesas Islands.
Pawpawsaurus - fossil dinosaur, named after the rock formation it was found in.



A type of clam?

Disaster?

Bonus - a species of limpet.
Disaster - an echinoid.
Euphoria - a scarab beetle, whether it is always happy is another matter...
Jynx - wryneck, a type of woodpecker.
Lepidotrigla jimjoebob - a fish, perhaps named after the friends of the explorer?

‘Thing’ of the month

This month:

Condoms...!

The first condoms appeared about 3000 years ago, with ancient Egyptians apparently using linen sheaths and papyrus to protect themselves during sex. In the Far East, the Chinese and Japanese used early protective coverings made from oiled paper and thin leather (called a Kawagata) respectively, and even tortoiseshell was used! The first evidence of use in Europe seems to come from around 100AD from cave paintings at Les Combarelles, in France, and ot is possible that some kind of protection was worn in Imperial Rome.

Despite these early claims, the first authentic documentation of condoms is from 1564, when anatomist Gabriel Fallopius designed a linen sheath to go over the tip of the penis and under the foreskin - held in place by pink ribbon, which would be attractive to women. It was primarily invented to protect against syphilis, only later being recognised for its role in pregnancy prevention. The oldest British condoms were found in a filled-in toilet in the keep at Dudley Castle dating back to about 1640.

They were initially made from the caecum or gut of sheep (even fish bladders!), which was soaked, turned inside out, steeped in an alkaline solution, scraped, left in brimstone vapour, washed, blown up, dried slowly, cut into sections and given a ribbon as a tie. This process was rather laborious and so the products were expensive to buy. Therefore, people often only brought one and re-used it, quite often ending up with the same diseases they were trying to prevent!

There is some disagreement about how they got their name. Some suggest that the Earl of Condom was a physician who supplied King Charles II with an oiled sheath made from sheep intestine to prevent him from fathering unwanted children. Others claim the word comes from Dr. Condon or Quondam, or Colonel Cundum, but it’s more likely that it is derived from the Latin ‘condus’, meaning receptacle. The famous lover Casanova allegedly referred to condoms as his “English Riding Coats.” Madame de Sevigné, however, was less approving, and she considered condoms to be ‘an armour against enjoyment and a spider-web against danger’.

The major leap forward in condom technology was made with the advent of vulcanisation in 1839. Charles Goodyear patented the process in 1844, and Goodyear and Hancock started producing condoms from vulcanised rubber (the nickname ‘rubber’ still used today), although these early ones had a seam! This process of mixing raw rubber with sulphur under extreme heat made a quality condom that was cheaper, stronger and more elasticated. Men were told to reuse them time and again, to wash them before and after sex and to rub petroleum jelly over them to keep them supple!

The first advert for condoms was in 1861 in the New York Times, which printed a commercial for ‘Dr. Power’s French Preventatives.’ However, in 1873, the Comstock Law was passed, making it illegal to advertise any kind of birth control, and it allowed Post Office personnel to confiscate condoms sent through the mail. Despite these measures, people were still having sex, and they were assisted further by the production of the first latex condom in the 1880s, although it was not until the 1930s that they became widespread. These latex skin-tight condoms - which were thinner, aged less quickly and did not smell - were cheaper and single-use. They were also seamless, made by dipping glass moulds into liquid latex.

During the world wars, governments urged their soldiers to “put it on before you put it in”, and by the mid-1930s, 1.5 million were being produced in America alone every day! Following on from this was the development of the ‘teat-ended’ condom, which was introduced in the early 1950s. In 1957, the first lubricated condom was launched in the UK by Durex. At this time there was also a condom produced that deadened sensation, to the relief of those premature males!

The arrival of the contraceptive pill in the 1960s led to a loss of popularity for the condom, as the pill, the coil and sterilisation became more popular, and new antibiotics reduced the risk of venereal disease. In 1973 the ribbed condom arrived, for ‘mutual pleasure’. Following the recognition of HIV/AIDS in the 1980s, the use of condoms increased strikingly in many countries; they also became more widely available in pubs, bars, newsagents and supermarkets.

The female condom was introduced in Europe in 1992. In 1994, the world's first polyurethane condom for men, *Durex Avanti*, was launched - a blessing for people allergic to latex. They were also stronger and thinner than latex, safe to use with oil-based lubricants, and non-permeable to all viruses. The 1990s also saw condoms being made in different sizes, shapes, widths and lengths; and the introduction of condoms with a variety of stimulating protuberances, in different colours and flavours, and even glow-in-the-dark ones! The most bizarre flavours we have encountered are: Curry, rhubarb and custard, Champagne, blueberry, lager and lime, tutti frutti, liquorice and whisky. Not sure about the curry one!!!

More than five billion condoms are made every year worldwide, and Japan uses more than any other country. The head office of Fuji Latex (a Japanese condom producer) is even built in the shape of a condom! Condoms can hold up to four litres of liquid - great for the survival kit in emergencies, and apparently, if you boil one in salted water for an hour you can stretch it over a phone box!!!

Self-citation : A practical guide

Professor Mark Griffiths
Psychology Division, Nottingham Trent University, UK.

All of us who are involved in any kind of academic writing have to conform to minimum standards such as the meticulous recording of source material in the form of references. It is generally thought that there are three main reasons why people use references. These being (i) the expression of an idea has been put forward more clearly elsewhere by someone else, (ii) to make specific reference to relevant past literature and (iii) to provide suggestions for further background reading.

These reasons can also be applied to self-citation. However, self-citation has additional advantages. Self-citation references can also be used to (i) let journal reviewers and referees know who has written the paper (which may not always be a good thing!), (ii) to establish to readers your reputation in a given area and/or (iii) satisfy cravings to see your name in print! In this short article I aim to examine the art of self-citation in academic writing and give some effortless hints and tips.

It has previously been asserted that self-citation is academia's way of expressing one's ego although this was based on anecdotal evidence rather than any kind of empirical investigation (Griffiths, 1998a). After an exhaustive literature search it perhaps came as no surprise that I found absolutely nothing on the subject of self-citation except a manuscript by myself (Griffiths, 1998b) which has been described as the best article in this area (Griffiths, 1998c). So what can the experienced self-citation expert get up to in the course of a single article? Self-citation aficionados are known to use such tricks as referring to themselves in less conventional formats such as letters to national newspaper (e.g. Griffiths, 1998d), articles in national newspapers (e.g. Griffiths, 2004a), educational leaflets (e.g. Griffiths, 1993a) or consultancy reports (e.g. Griffiths, 2002a). However, these work most effectively if they are buried away amongst more conventional references such as books and refereed journal articles.

Those experienced in self-citation will often sink to even murkier depths. For instance, self-citation is an excellent way of introducing something that seems implausible into your argument. Two common ways to disguise implausibility is the liberal use of such phrases as "paper forthcoming", "manuscript submitted for publication", "internal report" or "personal communication" (however, the latter should be used very sparingly as it suggests that the author is someone who talks about things more than writing them). If you sprinkle these into an article and intersperse them with a few very genuine citations such as books you wrote which received very good reviews (Griffiths, 1995; 2002b) or some of your good refereed journal papers spread across a number of years (Griffiths, 1991a; 1993b; 1994; 1996; 1997; 1999; 2000; 2001; 2003; 2004) it can look very professional and in some cases impressive.

"self-citation is academia's way of expressing one's ego"

For the really experienced, secondary self-citation or embedded self-citations can often be useful. This is a technique where you can use quotes attributed to you in a newspaper or magazine article written by someone else (e.g. Griffiths, 1991b) although it looks as though it is one of the author's *bona fide* references. However, as my last word on the subject, I will leave you with one practice you should defintely avoid. I am referring to the inclusion of self-citation by pseudonym which has been described as "a despicable habit to be stamped

out at any cost" (Mithgriffs, 1997) although this may not be as serious as it was once thought as it has been claimed that no-one reads references and footnotes anyway[1].

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The author would like to thank Keith Harris for the original idea behind this article.

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Eye on science

Our round-up of some of the most interesting recently-published research

Breakfast boost

We all know it's the most important meal of the day, but now its set to become even better for you. Cereals tend to contain very low levels of vitamins and minerals, and thus need to be fortified to give us the recommended daily intakes that we all see on the side of the packets. Usually these are added to the finished product, but now there is a new way that's being developed called biofortification. This is when the cereals increase their mineral uptake while growing, and with the help of selective breeding and genetic modification end up containing significantly more vitamins and minerals that we all need. So far, iron, zinc, vitamin and amino acid levels have been increased, but there are still some technical problems with the processes and pathways which needs closer investigation. But, it looks like brekky is here to stay, pass the milk…

Poletti, S. *et al*. (2004). *Current Opinion in Biotechnology* **15**, 162-165.

The People's Re-pub-lic

There are few cultures that have provided the world with as many life-enhancing, joy-bringing, all-round wonderful inventions than the Chinese. Guy Faulkes night would be a bit of a let down without fireworks and *Mary Poppins* wouldn't have been half as good if the final song had been "Let's go fly a flag"; furthermore, no wheelbarrow = no wheelbarrow races, no wheelbarrow races = no fun.

And now it seems we have one more, pretty major, reason to give the Chinese a manly pat on the back and some words of praise: they invented booze.

New research has found traces, dating back around 9,000 years, of a wine-esque beverage brewed from rice, honey and fruit. This means the Chinese had 1,600 years worth of alcoholic revelry before the rest of us even got a look in; the earliest signs of primitive tippling previous to these findings came from 7,400-year-old pots found in Iran.

The team from the University of Pennsylvania Museum of Archaeology and Anthropology extracted traces of substances from pottery fragments unearthed in Eastern China. These compounds bore the distinctive chemical signatures of rice, beeswax (which would be associated with honey), grapes and hawthorn fruits, and are amazingly similar to chemical structures found in modern day wines.

Of course, with so many more long, hazy nights down the pub during their history, is it any wonder that the Chinese beat us to all those other good ideas?

McGovern, P. E. *et al*. (2004). *Proceedings of the National Academy of Sciences.* Published online. **December 8.**

Still a man's world?

If it's a man's job, then a man better do it. This attitude has been part of an experiment to look at reactions to a woman's success in a male-gender-typed job. Results showed that firstly, women are less liked if they are known to have been successful, when compared to equivalently successful men. This is especially the case if the job in question happens to be something particularly male in character. Secondly, being disliked can have severe implications for future work and things like rewards and bonuses. It seems that even if proved successful and competent, it's never plain sailing at all.

Heilman, M.E. (2004). *J. Applied Psychology* **89**, 416-427.

Heart breaking science

Stress can leave you quite literally broken hearted according to research by cardiologist. Broken-heart syndrome has symptoms similar to a heart attack, and is caused by a massive surge in stress hormones such as adrenaline and noradrenaline. The heart muscle becomes temporarily stunned which, in some cases, leads to heart failure.

Pavey, D. and Kowey, P. *New England Journal of Medicine*. Published online 2005.

Splatter matters

Who'd have thought it: air pressure affects how much a liquid splatters when it hits a solid surface.

At normal atmospheric pressure water droplets crashing onto a glass slide spray up to form a perfect coronet, the type of which have been captured in many an art photograph, but you'd have a much more difficult time taking such a snap at the top of a mountain. At lower air pressures, the amount of splatter is drastically reduced, the droplet simply spreading out smoothly across the surface of the glass. But why should this be the case?

Well, researchers led by Lei Xu at the University of Chicago, think that, as water moves away from the point of impact, it compresses a small layer of air at its leading edge. At normal pressure this air forces the liquid up, where it breaks forming a splash; but when air pressure is reduced, much less resistance is formed, and the water glides disappointingly over the glass. No fun for the budding science photographer…

Available online at: http://arxiv.org/ftp/physics/papers/0501/0501149.pdf

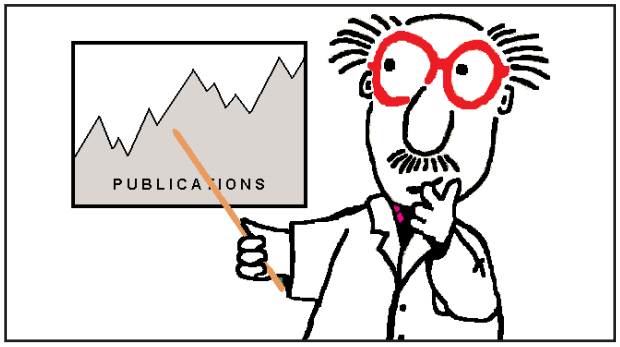
Look, but don't touch!

More and more divers are visiting coral reefs around the world, and this is increasing concern about the damage caused by divers to the reef structure, especially on unsupervised day or night dives.

Nola and colleagues study watched 353 divers in St. Lucia (good work if you can get it), and noted contact they had with the reef and looked for damage. Divers using underwater cameras were found to have significantly more contact with the reef than other divers without;also, shore dives and night dives had more reef contact than boat dives and daytime dives respectively.

After this was noted, they asked all future groups to not touch the reef - this made no difference, as people ever listen to what's told them! However, when the dive leaders were told to intervene, average reef contact rates for both shore and boat dives was reduced. Therefore, it may mean that Big Brother will be watching you under the sea.

Nola, H. *et al*. (2004). *Biological Conservation* **120**, 481-489.



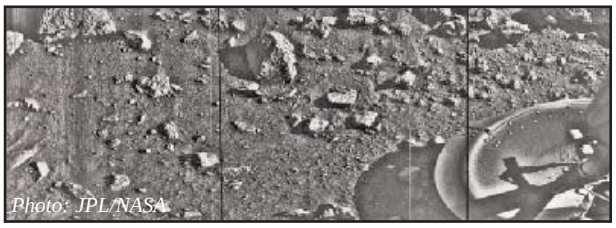
Keeping cool

The Antarctic Dry Valleys are possibly the worst place in the world in which you could choose to live. Temperatures fluctuate widely from the 'brrrr it's chilly' to 'oh my word that's mind-numbingly cold', UV levels are amongst the highest on Earth, and to top it all there's virtually no water or nutrients.

Indeed, these valleys seem more akin to a Martian environment than one we would expect to find on our own green and pleasant planet. Yet, even here, life ekes out an existence, providing interesting opportunities for those interested in the search for extra-terrestrials…

Microfungi live in small communities actually inside the rocks themselves, where they're somewhat buffered from the harshest elements of their environment. Exobiologists, interested in the cosmic evolution of life, are using these hardy little fellows to understand quite how far you can push the limits of life - and therefore where on Mars life is most likely to exist.

Onofri, S. *et al*. (2004). *Planetary and Space Science* **52**, 229-237.



Mars: inhospitable?

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Entropy - A study of student habitation

N.Tropy and H.L. Hole
Department of Chaotic Studies, University of Sodbury

Abstract - this project intends to show how study of student habitation can provide clear support for the second law of thermodynamics. The change in percentage of visible floor area of a typical student room, when exposed to a typical student, is measured and related to entropy.

Introduction

Entropy

Entropy is a measure of the disorder of a system. Something that is highly ordered has lower entropy than something that is more chaotic in structure. So the mixture of 1½ measure melon liqueur, ½ measure overproof white rum, ½ measure lime juice, ¼ measure pineapple syrup and 1½ measure lemonade, commonly, although erroneously, known as a '*Pan-Galactic Gargle Blaster*' (Cross 1995)[1], has greater entropy than the same amounts of these liquids kept in separate receptacles.

The second law of thermodynamics is mathematically written as:

$$S = (k \ln \Omega)$$

Here *k* is Boltzmann's constant, and Ω is the 'density of states', a function that represents the degeneracy of the system. Crystal clear... isn't it?

The second law of thermodynamics also states that heat cannot pass from a colder body to a hotter body. In more general terms this means that energy (heat) will naturally disperse from areas of high energy to areas of low energy. A colder body is more ordered than a hotter body, so heat passing from a cooler to a hotter body would be a decrease in entropy, which is not permitted. It turns out that this law has considerable implications for the workings of the Universe, one of which being that entropy will always increase, or things will get more random.

Doom and gloom

Since entropy always increases, it is theorised that the Universe may one day reach a state of maximum entropy, the point at which all energy is equally dispersed across the Universe, and nothing can change - at this point, the Universe becomes rather boring.

This is referred to as the 'heat death of the Universe' (since at this point the whole Universe would be at a constant, equal temperature), and will, in theory, occur if the lifetime of the Universe is infinite. 'Heat death' is as bad as it sounds, if not worse.

Students

Well known for their general untidiness, students are perfect specimens for the study of the second law of thermodynamics (and it's implications for entropy). The identity of our study specimen has been withheld out of concerns that he'll never get a girlfriend if this gets out.

Method

We randomly selected an empty room in university halls of residence. The Spartan nature of the furnishings, along with the general prison-cell nature of the room, indicated a very low level of entropy within the room (Figure 1).

A typical student, obtained very cheaply (cost: two lagers and a kebab) from a nearby drinking hell-pit, was introduced into the room and

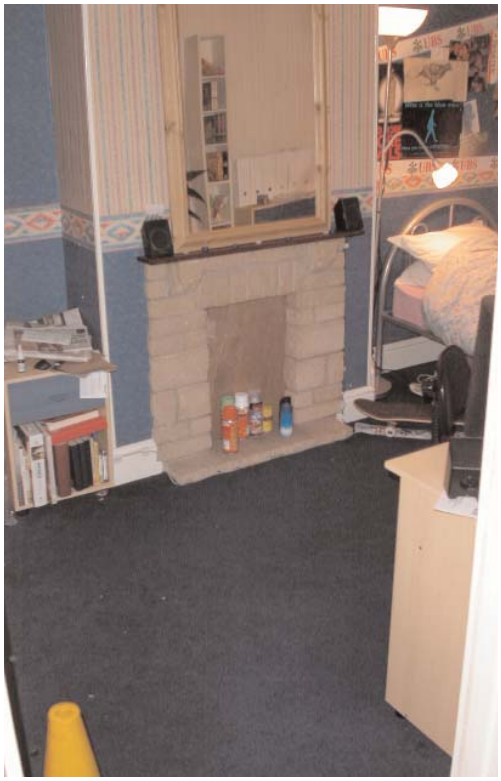

Figure 1: The room before starting the experiment.

monitored for one week. The initial introduction occurred at 17:00 on Sunday 24th June 2004. Photographs were then taken at 5pm every day for the next 7 days. The percentage of floor area visible to the naked eye (A) was then found using a protractor, a set-square and a bit of guesswork. It is theorised that:

$$A \propto 1/\Omega$$

So we expect A to decrease as entropy increases.

Results

The deterioration of the room from order to chaos, indicating a dispersion of energy is plainly evident from Figure 2a-c.

The percentage of the floor area visible to the naked eye (Figure 3) clearly shows an exponential decay over time, just as we'd expect in accordance with the dissipation of energy predicted by the second law of thermodynamics.

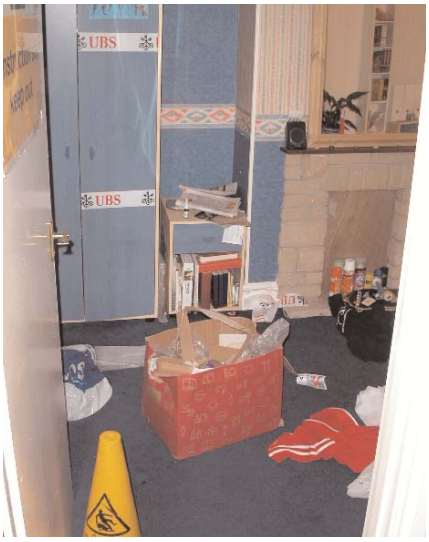

Figure 2a: The room after 1 day.

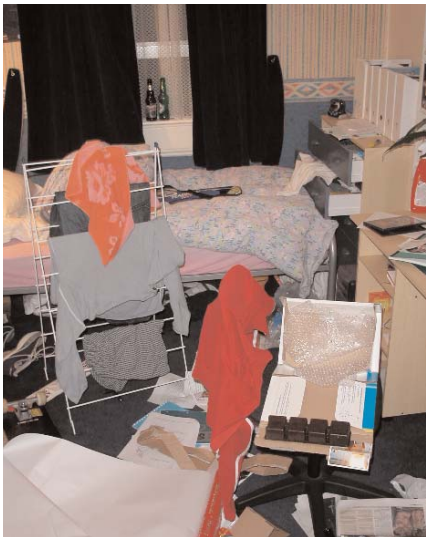

Figure 2b: The room after 4 days.

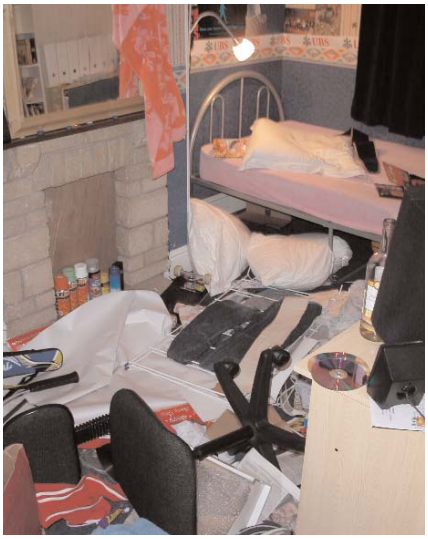

Figure 2c: The room after 7 days.

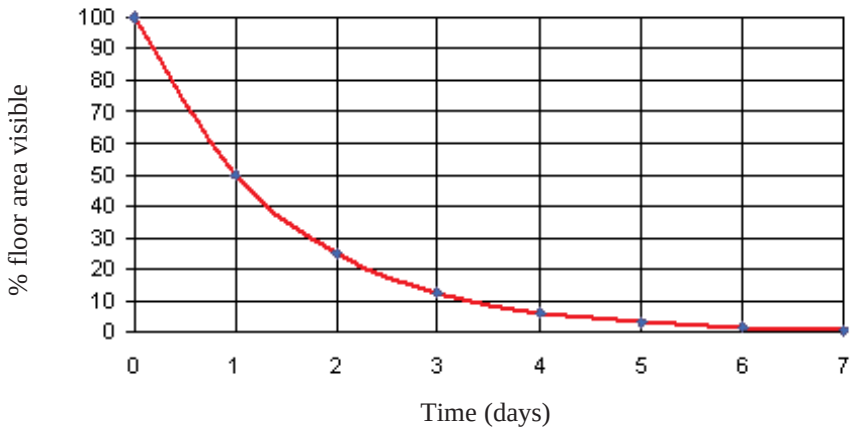

Figure 3: Exponential decrease in visible floor area with time.

Discussion

The result clearly supports the second law of thermodynamics, and by extension the theory that the heat death of the universe is likely to come to pass and we are all doomed[2].

It is also noted that, should the student tidy the bedroom, there is likely to be an increase in visible floor area, however this has never been seen and it is likely that such things simply do not occur in our universe. Indeed, this experiment suggests that, if the room were an entirely isolated system, a tidy student would be in violation of the laws of physics.

When shown to an expert Mess and Untidiness Monitor, Figure 2c provoked the verbal reaction 'that room looks like a bomb's hit it' (M.U.M. *pers comm.*, see also Mimsy-Quim 1987). We plan to test this assertion and have begun construction of a low-yield nuclear device.

Acknowledgements

The authors thank the anonymous volunteer: Cheers Phil.

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Cross, R. (1995). *The Classic 1000 Cocktails*.

Mimsy-Quim. (1987). A comparison of historical disaster areas and teenage living quarters: give me Krakatoa any day. *Good Housekeeping Magazine* **10.5**, 6-102.

[1]The true *Pan-Galactic Gargle Blaster* contains, amongst other ingredients, Arcturan Mega-gin, the tooth of an Algolian Suntiger, Fallian marsh gas and an olive. The effects of the drink have been likened to having your brains smashed out with a slice of lemon wrapped round a large gold brick (Anon, 1978).

[2]This may not occur if the lifetime of the Universe is not infinite, however if the Universe ever ends we are all doomed anyway.

Written by Laura Pickard et al.

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Time-wasting sites of the month

Tried and tested by the editors, websites that are definitely worth a look...

www.vectordefenders.com

Interactive site
www.vectordefenders.com
Superb interactive fun! But, if you find out what you're meant to do, please tell me! Follow the story through episodes 1 and 2, fly space ships, rescue people, be the hero.

Game site
http://thinks.com/java/fiver/fiver.htm
An interesting, and at times, very tricky game - turn all the white circles black.

www.terraserver.com

Informative site
www.terraserver.com
Satellite photographs and aerial images of your city, town and location anywhere in the world.

Coffee-break site
http://jigzone.com
Piece together the jigsaws, and beat the best times (which are pretty quick!). Puzzles from an easy 6 pieces up to a challenging 247 piece triangular jigsaw - hard work!

Lies, damn lies and statistics

No lies in fact, all real fascinating statistics...

If all the people in Europe (about a billion of them), all stood hand in hand around the equator, half of them would drown.

Average cost of raising a medium-size dog to the age of eleven: £3,500.
Average cost of raising a child to the age of eleven: £90,888.

A bee could travel for 4 million miles (6.5 million km) at 7 mph (11 km/h) on the energy it would obtain from 1 gallon (3.785 litres) of nectar. The journey would take it roughly 65 years! However, were the bee to work a 9 'til 5 day, five days a week it would take him about 313 years, and that's assuming he doesn't take any holiday...

A teaspoonful of neutron star material weighs approximately 110 million tons, equivalent to about 322 billion apples - that's a lot of crumble!

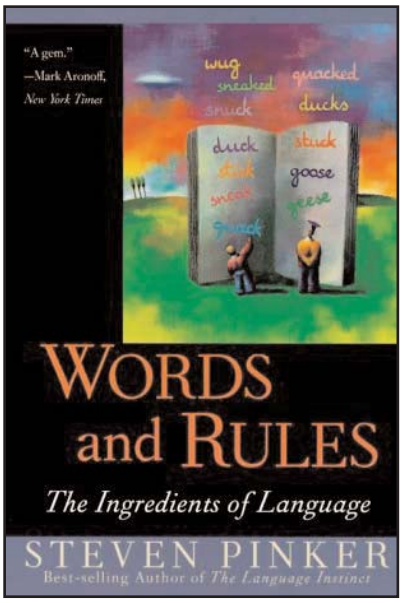
Over 2500 left handed people a year are killed from using products made for right handed people.

The wingspan of a Boeing 747 is longer than the Wright brother's first flight (120ft).

Something I read in a book...

Why aren't mongooses, mongeese?

Irregular plurals (where the plural rule "to add an S" isn't used) have to be learnt. We have all learnt these, so we can pluralize man to men, mouse to mice, goose to geese. We can also use these irregular plurals in compound words, so that we get policemen and house mice. Why then, Mongooses?



This book I read*, argued that we only use the irregular plural for compound words (policeman), when that compound word is of the same nature as the root word (man). Thus, a policeman is a type of man, a house mouse is a type of mouse. But, a Mongoose isn't a type of goose, and so we don't use the irregular plural, but rather use the regular plural rule 'add an S'. So, Mongooses are not Mongeese. This book also suggests, that this applies to what we hold in our hands most of the time - the computer mouse. Because these bits of plastic are not a type of mouse we often call groups of them mouses - try it.

*[Steven Pinker, *Words and Rules*, Basic Books, 1st edition, 1999]

Reviewed by Prof. Mark Viney, University of Bristol.

What did *YOU* read in a book? Write to us at **letters@null-hypothesis.co.uk**

No longer the life and sole...

Pinheiro, J. *et al*. (2003). Choking death on a live fish (*Dicologoglossa cuneata*). *American Journal of Forensic Medicine and Pathology* **24**, 177-178.

The authors are from the National Institute of Legal Medicine, Coimbra Delegation, Largo da Se Nova, Portugal.

Things you shouldn't do when you are on a boat and need both hands…

This paper reports on a healthy man who choked to death while putting a live sole in his mouth in order to free his hands to continue collecting fish for his basket. The fish broke loose from the man's jaw grip, and disappeared into his larynx and upper windpipe. The man's colleagues tried to rescue him by using pliers to remove the fish, but the attempts failed.

Other such cases are reviewed in this paper, and some of the risks and preventions are discussed.

Send us your bizarre papers. Write to us at **letters@null-hypothesis.co.uk**

Comic science...

It takes a great deal of intelligence to be a top comedian. They tell us that it also takes a great deal of intelligence to be a top scientist. So it's heartening to find that so many comedians take time out of their hectic schedules to further the cause of science. Here are just a few selected publications from our foremost rib-ticklers:

Gervais, R. (1980). Effects of vigilance level on information: Transfer of median olfactory pathways of rats. *Journal De Physiologie* **76**, A18.
The Office star Ricky Gervais brought out his brilliant DVD *Animals* to try and mask the fact that he spends his spare time frightening the b'jesus out of rats. Typically had to publish his findings in the pretentiously named *Journal De Physiologie* didn't he.

Robinson, A. (2004). Catt flap I. *Electronics World* **110**, 52.
A quality piece from the *Time Team* leader - pity his spelling's worse than Baldrick's.

Carson, F. (1974). Neuropathology. *American Journal of Medical Technology* **40**, 251.
Neuropathology: it's a cracker!

Fry, S. (1996). Fruits of the C. *New Scientist* **151**, U2.
We can only shudder to think what might be meant by the mysterious 'C'.

Izzard, E. (1972). Children of special value: Interracial adoption in America - Anderson, D.C. *Journal of Child Psychology and Psychiatry and Allied Disciplines* **13**, 303.
Proving that there is a serious side to one of the UK's funniest men.

Pace, P., Hale, M. *et al*. (1983). A simplified, miniature tea: CO_2 laser using a semiconductive preionization technique. *Optics and Laser Technology* **15**, 189-190.
You may think that Hale and Pace didn't do much for the comedy scene, but they revolutionized tea drinking in the early 1980s. Before their radical tea miniaturisation methods came along we were all supping from teacups eight storeys high.

Laurie, H. (2002). Optimal transport in central place foraging, with an application to the overdispersion of heuweltjies. *South African Journal of Science* **98**, 141-146.
Heuweltjies: A good word.

Abbott, R. (2004). The endoscopic management of arachnoidal cysts. *Neurosurgery Clinics of North America* **15**, 9.
Arachnoidal cysts sound like the worst form of torture - who better to manage it then than good old Russ?

Dee, J. (2001). Untitled. *Journal of the American Animal Hospital Association* **37**, 115.
Deadpan mini-maestro Jack Dee bucked the trend leaving his masterpiece nameless.

Connolly, B. (2004). SQL and data mining and genetic programming. *Dr Dobbs Journal* **29**, 34-39.
Trust Billy to publish his article about mining squirrels in this fabulously named publication.

Some comedians even let their characters get a look in:

Blackadder, E. (1986). Recommendation to increase private-practice fees by 10-percent. *British Medical Journal* **292**, 766.
Revealed: the reason why Lord Blackadder was one of the wealthiest men in Britain!

Partridge, A., *et al*. (1972). Levels of As-75 and decay of Ge-75 isomers. *Bulletin of the American Physical Society* **17**, 560.
We were unsure whether this was really the work of the legendary sports presenter until we realised that cunningly hidden within the title of paper and journal is the phrase "I'm Alan Partridge, eat my goal" - well… it's almost there.

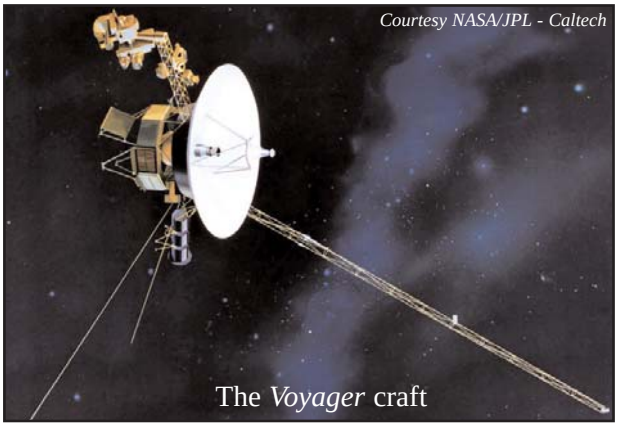
Fifteen millimetres of fame

Dr. Stamatios Krimigis and Dr. Norman Ness

When the Huygen's probe left the *Cassini* spacecraft and plunged down through the methane-rich atmosphere of Saturn's moon Titan, humanity sat up and watched in amazement as images of a new world were relayed back to us from over two and a half millions miles away. But let's not forget that *Cassini* itself was following in the footsteps of the two marathon runners of the space probe fraternity, *Voyager 1* and *Voyager 2*.

When these two probes were launched, way back in 1977, they were expected to function for approximately five years; during this time they would reach, study and photograph Jupiter and Saturn. This they did, and much more besides. All in all the *Voyagers* have returned nearly 80,000 images of not only Jupiter and Saturn, but also Uranus and Neptune, as well as upwards of five trillion bits of data. And they're still going. Almost twenty-eight years after their launch *Voyager 1* and *Voyager 2* are forging further into the depths of space than any other man-made object and are still supplying valuable data. Currently, *Voyager 1* is over 8.5 billion miles away from the sun.

Two scientists have worked on the *Voyager* project ever since its inception back in the '70s. This month's 15 millimetres of fame goes to



The *Voyager* craft

Dr. Stamatios Krimigis of John Hopkins University, Maryland, and Dr. Norman Ness of the University of Delaware. For almost thirty years these two men have watched, calculated and analysed as the *Voyagers* continue to exceed all expectations and head towards inter-stellar space. If all goes well the probes could be sending data back from the outer reaches of space for another 15 years, hopefully still under the watchful eye of our two docs. Now that's the kind of probing we do enjoy!

Find out more by visiting:
http://voyager.jpl.nasa.gov

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How to lubricate your salad...

Steffe, J.F., Agrawal, E. and Dolan, K.D. (2003). Lubricity index of mayonnaise. *Journal of Texture Studies* **34**, 42-52.

The authors are from the Department of Food Science and Human Nutrition, Michigan State University, USA.

Top chefs have dedicated lifetimes to finding the best ways to titillate our taste-buds. Well, now some of your favourite oral experiences can be measured scientifically on the Lubricity Index (*Li*). Using a piece of savagely named equipment, the helical ribbon mixer viscometer, it's possible to collect information on how sloppy foods (such as mayonnaise, tomato ketchup and soup) move about as you eat them.

As food rolls around your mouth mid-chew its temperature and moisture content changes, affecting its movement across your tongue; however, the amount of change is, naturally, different for different foodstuffs. For instance this study found that fat free mayo changes a lot less in viscosity than regular mayo, making it less likely to dribble embarrassingly out of the side of your mouth.

The authors hope that the *Li* will help us work out the complicated business of chewing liquid foods in the future. Pass the celery…

Please send us your weird references and bizarre papers. Write to us at **letters@null-ypothesis.co.uk**

Famous quotes

Back off man, I'm a scientist.
~ Bill Murray, Ghostbusters

A straight line may be the shortest distance between two points, but it is by no means the most interesting
~ Dr. Who, from 'The Time Warrior'

If your experiment needs statistics, then you ought to have done a better experiment.
~ Ernest Rutherford, English physicist

Basic research is what I am doing when I don't know what I am doing.
~ Werner Von Braun, German rocket engineer

The best way to have a good idea is to have lots of ideas.
~ Linus Pauling, American chemist

Not everything that can be counted counts, and not everything that counts can be counted.
~ Albert Einstein

The most exciting phrase to hear in science, the one that heralds new discoveries, is not "Eureka!" but "that's funny..."
~ Isaac Asimov, science fiction writer.

Copy from one, it's plagiarism; copy from two, it's research.
~ Wilson Mizner, US screenwriter

Roll of honour

Prof. C. M. Choux
Department of Food Physics
Summ University
Switzerland.

Introduction

A rolling stone, we are told, gathers no moss... But what about a rolling roll? The rolling potential of four edible foodstuffs that have at one time in their manufacture been 'rolled' was measured. Bread, sausage, Swiss and spring rolls were all compared, rolled down a steep hill and the resting distances measured.

Rolls can be described as: The rotary motion of an object by turning over and over on or as if on an axis; something that is rolled up into a cylinder or ball or rounded as if rolled to propel forward, and any of various food preparations rolled up for cooking or serving, in particular, baked yeast dough.

With those definitions in mind, and taking a little from each of them somewhat like a subtle chef blending seasoning and herbs, we proceeded with the study.

Methods

A tarmac surface was chosen, this was preferred over grass to reduce drag and to keep experimental conditions constant. The slope of the road was measured using a clinometer, because it looks like a gun and is fun to play around with. It was 40 degrees (Figure 1), great.

All rolls were transported to the study area from their point of purchase, and removed from any packaging and boxes, gloves were used to prevent contamination of or damage to outer coatings.

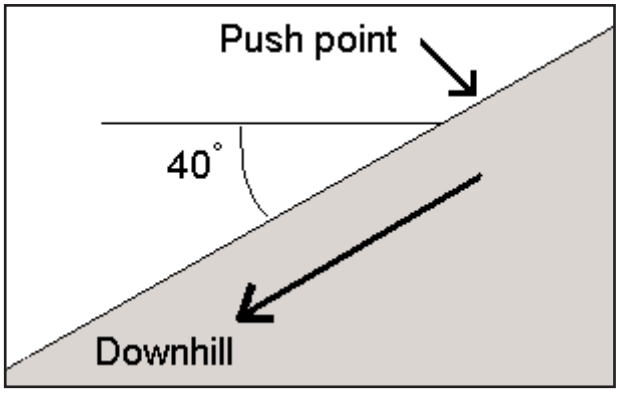


Figure 1. Sloping study site

Rolls were obtained from the following sources:

Bread roll - finger shaped (for hot-dogs), from local supermarket
Spring roll - vegetarian, cooked, from Mr Yoi's Chinese take-away
Swiss roll - Chocolate, traditional, with cream interior, from local supermarket
Sausage roll - Flaky pastry, jumbo size, 12.5% minimum meat content, from the bakers

At the top of the slope, rolls were manoeuvred into position, then given a gentle push and allowed to roll freely downhill. All rolls had to roll more than 10 meters to be officially counted, and the procedure was repeated on each roll type until we got bored.

The total distance that the roll rolled was measured using a wheel-stick; again, because it looked good and made others think we were hard-working scientists. Independent witnesses were on hand to verify and double-check all measurements, although most had wondered off shortly after the experiments had started.

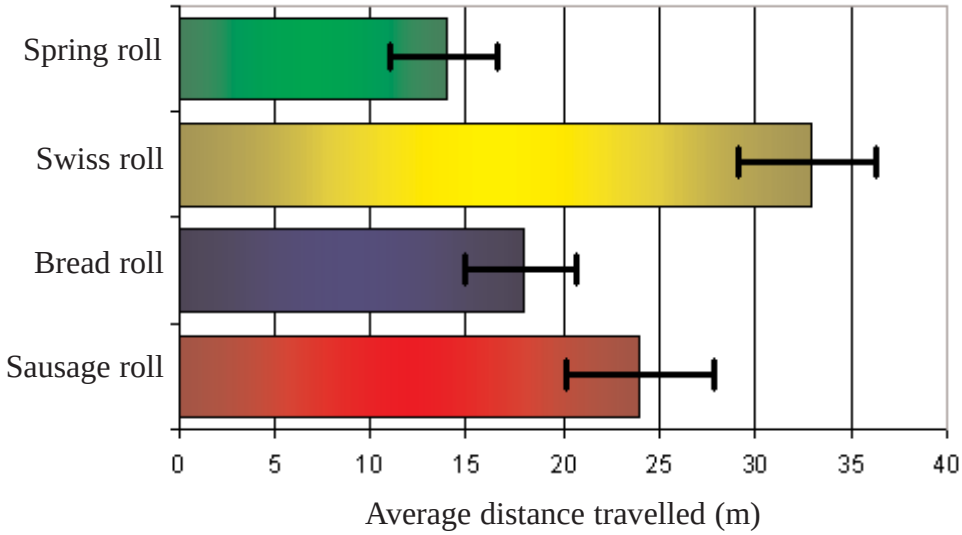


Figure 1. Average distance travelled of all four foodstuffs with standard deviations

Results

The Swiss roll was the most elegant mover, with an average of 32.7m (+/- 3.6m). The sausage roll was second (average 24.1 +/- 3.9m), then the bread roll (average 18.1 +/- 2.9m), finally the spring roll with an average of 14.1 (+/- 2.6m).

Texture and coating of the sausage and spring rolls probably added to the lack of rollability, with their outer coatings particularly flaky and greasy respectively. This caused them to break apart and become fatally un-aerodynamic. The bread roll, while having good initial momentum, came to an abrupt halt. The Swiss roll maintained its cohesion, and consistently rolled the furthest distance, coming to a smooth standstill on most occasions.

Discussion

Bread rolls initially showed promise, however, a lack of weight was the critical problem, and the superior initial momentum soon came to nothing. Insufficient oomph and grrrrrr in the dough-rolling process also added to the problems and it pulled up short a little too often.

Sausage rolls retained a solid brick-like internal structure, but were sadly let down by the soft flaky pastry that was very susceptible to abrasion. A softer surface would have been much kinder to the exterior, although many interiors remained undamaged after heavy collisions during the experiments.

The spring roll's internal vegetables become unstable at velocities of >0.47m/sec and this caused stresses and unbalancing (compare to Sim *et al*., 1993) that inevitably ruptured the outer coating causing widespread devastation, especially for the bean sprouts. Such instability is common among the more primitive vegetables.

The Swiss roll maintained its cohesion due to a well-rounded combination of cream and sponge. The soft covering of sponge also absorbed the road surface bumps and abrasions (Attenburrow *et al*. 1989).

Swiss rolls have been known to withstand forces of over 4G, and in wind tunnel testing, have successfully negotiated winds of >467m/s (Friend of a Friend 2003).

The old yarn of "how do you make a Swiss roll? Push him over an Alp" remains true, but it seems that Swiss rolls are pretty damn tough. Sponge is set to get even tougher, however, and decreases in the sodium lauryl sulphate (SLS) level (Gujral *et al*. 2003) may mean even more distance in future studies. SLS means softer crumb, and may potentially give increased suspension on rough slopes.

Sponge technology is also currently being investigated for car bumpers, "soft" anti-RADAR submarines and bullet-proof vests.

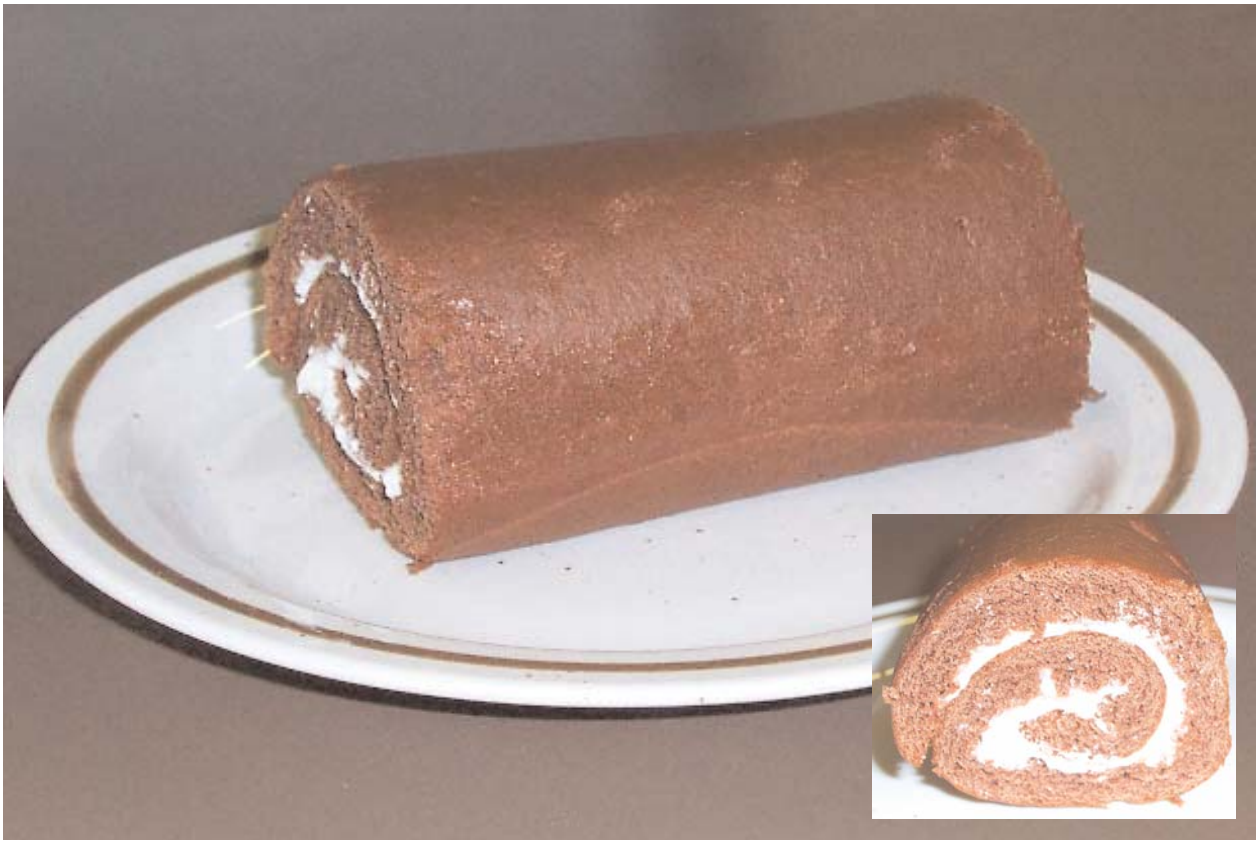
References

Attenburrow, G.E., Goodband, R.M., Taylor L.J. and Lillford, P.J. (1989). Structure, mechanics and texture of a food sponge. *Journal of Cereal Science* **9**, 61-70.

Friend of a Friend. (2003). A Friend of a friend told me, if you don't believe me, ask him.

Gujral, H.S., Rosell, C.M., Sharma, S. and Singh, S. (2003). Effect of sodium lauryl sulphate on the texture of sponge cake. *Food Science and Technology International* **9**, 89-93.

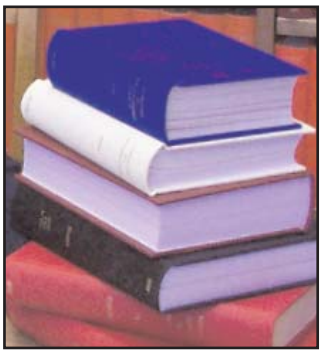
Sim, B.J., Lucas, P.W., Pereira, B.P. and Oates, C.G. (1993). Mechanical and sensory assessment of the texture of refrigerator-stored spring roll pastry. *Journal of Texture Studies* **24**, 27-44.



The Swiss roll - winner by a mile - well, in fact by 8.6 metres (inset - creamy interior binding zone)

Pretty peculiar periodicals

We all sometimes pay a quick visit to *Nature*, *Science* or *New Scientist*, but how often do you need to know about cereals or clay science? Here, we lift the lid on some of the more curious publications, explaining exactly what they mean.



Journal of Happiness Studies - an interdisciplinary forum on subjective well-being. Maybe we should all subscribe to this!

Adhesives Age - journal about adhesives and sealants. You can really get stuck into this.

Journal of Spacecraft and Rockets - The best new work in spacecraft and missile systems. It's not rocket science - oh wait, yes it is.

Advances in Peanut Science - peanut industry research and news. Every pub-goers dream.

Applied Clay Science - an international journal on the application and technology of clays and clay minerals. I wonder if the editors are always getting fired?

European Journal of Pain - journal to improve pain research and pain management. Contrary to popular belief the pages don't have razor blades slipped in between them!

The Foot - an International journal covering all aspects of medical and surgical treatment of the foot, as well as scientific topics. This one really keeps you on your toes.

New Review of Film and Television Studies - promotes current research making a central contribution to film and television studies. Surely it's a great job being a reviewer for this one!

Journal of Dairy Science - for research in dairy foods, physiology and management. Available in full cream, or semi-written format.

Advances in Taxation - any aspect of Federal, state, local, or international taxation. ZZzzzzz

Journal of Lie Theory - it's about zebras - or is it?

Australian Concrete Construction - advances in concrete technology and application. Purely for hardened readers.

The Foot - an International journal covering all aspects of medical and surgical treatment of the foot, as well as scientific topics. This one really keeps you on your toes.

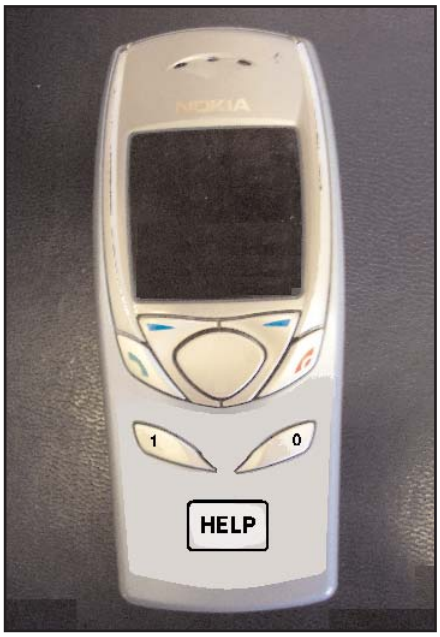
Journal of Cereal Science - casting a rye eye over the functional and nutritional quality of cereal grains and their products. Great for currant affairs.

Journal of Sex Research - covers the science of sexuality: medical, legal, psychological, sociological, biological, and endocrinological. Pornography for the discerning scientist.

The American Journal of Insanity - psychiatry and social studies. You would be mad to miss it.

Journal of the Less Common Metals - studies of the physical sciences of their compounds and alloys. *Carpe Diem* - caesium the day...

Discovery corner



THE BINARY TELEPHONE

By K. Manning, Communications Advice Bureau, London.

A new discovery that, we think, makes telephones much easier to use. Instead of a complicated 0-9 numbering system, here we have a mobile telephone in the binary system. Simple to use, worry free, and no need to remember a long string of 11 random digits. The HELP button is always available for teething troubles, and in case you get caught out in the wrong base.

List of useful numbers:

Speaking clock: 1111011
Operator: 11100110101100110
Police: 1111100111
Dial-a-pizza: 100101001000010000001101
Maths helpline: 1000111000000001011011111101010010

Share your discoveries with us...
E-mail us at: **letters@null-hypothesis.co.uk**

Back from the grave... part 2

More scribblings from beyond the grave...

Spencer, D. (2003). Empyema thoracis: Not time to put down the knife. *Archives of Disease in Childhood* **88**, 842-843.

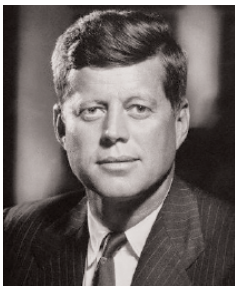
Preferring to use her maiden name for publications to avoid excess publicity, Princess Di managed to get her concern for the world's poor and needy down on paper for good of the scientific community.

Schifano, F., Oyefeso, A., Corkery, J., **Cobain, K.**, Jambert-Gray, R., Martinotti, G., Ghodse, A.H. (2003). Death rates from ecstasy (MDMA, MDA) and polydrug use in England and Wales 1996-2002. *Human Psychopharmacology: Clinical and Experimental* **18**, 519-524.

Published posthumously, this tragic collaboration showed that Kurt did understand the basics of drug use and abuse, but debate still rages as to whether his death was suicide.

Dean, J. (1972). Restoration of leather bindings: Middleton, BC. *Library Quarterly* **42**, 439.

Dean's legal team fought hard to stop this being published, but the truth was out 17 years after his death, that the icon of coolness was in fact a closet librarian.



Kennedy, J.F. (2000). Quality in nutritional assessment: The role of the nutrition nurse in the implementation of a nutritional assessment tool. *Proceedings of the Nutrition Society* **59**, 183.

A career in nutritional medicine always played second fiddle to politics, and was tragically cut short in 1965.

Castagna, A., **Sinatra, F.**, Castagna, G., Stoli, A. and Zafarana, S. (1985). Trace element evaluations in marine organisms. *Marine Pollution Bulletin* **16**, 416-419.

Ol' blue eyes managed to balance a career on Broadway with some top quality marine biology studies, lending to unpublished remixes such as: "I've got you under my chitin"; "Fly me to the moonshell" and "Mack the limpet".

Prof's page

Prof. H.O.Null, *DAS, D.Litt., FIMS, FRS*

Reader's letters

Sir,

In response to the article on global warming (V*ol 1 (1), page 8*); if ice takes up more space than water due to it's crystaline structure as a solid, then surely if an ice cap melted, the melt water would take up less space than the ice did so sea levels should fall. Is this true?
I don't know, I just do numbers.

Sam Gunter
Bristol

Dear Sam,

Yours is an excellent question, and one which I have often pondered myself. As you rightly point out ice is less dense than water, therefore water levels should fall if the ice melts. However, the density of ice and water are pretty similar (water = 1g/ml, ice = 0.92g/ml), so the change would not be too dramatic, especially when we take into account the fact that some sea ice picks up above the water (the bit of the iceberg you can see). So the melting of sea ice shouldn't cause much change in sea levels at all.

There are, however, four other sources of ice that could provide more of a problem: There's mountain glaciers and snowcaps, and three large ice sheets in Greenland, East Antarctica and West Antarctica. Ice sheets are large bodies of ice which sit on land instead of on/in water.

We actually don't expect three out of four of these ice sources to contribute much to sea level rise. There simply isn't that much water in mountain glaciers and snowcaps, East Antarctica is just so cold that it would take a huge increase in temperatures to melt it, and the Greenland ice sheet is protected by mountains which effectively dam up the ice sheet and mean that it would take a very long time to melt.

The Western Antarctica ice sheet is another kettle of fish entirely. This sheet includes two bodies of ice, each about the size of France and half a kilometre thick, called ice shelves which act as buttresses to the rest of the ice sheet. If these were to melt/float off as a myriad icebergs then the ice sheet within could collapse very rapidly (in glaciological terms, which could be up to a few hundred years). A collapse of this ice sheet would result in a mean sea level rise of about 6 metres - which would be pretty catastrophic.

For more information see Robert Grumbine's excellent web-page at: http://www.radix.net/~bobg/faqs/sea.level.faq.html

Yours, The Professor.

Sirs,

We write in defence of the Digestive biscuit (*Null Hypothesis*, Vol.1, Issue 4, pg. 10). "Dull etc... not to be trusted with hot beverages... fit only for cheesecake bases..." Poppycock!
As experts in the dunking field for many years, we consider the Digestive to be the ultimate dunker. The skill required to dunk and avoid plop is considerable - positively an art form! Whereas, the challenge presented by a ginger nut is nil, far too stiff upper lip and not at all satisfactory. We also question the wisdom of dunking cream-filled and other fancy types as this impairs the delicate flavour of our favourite brew. Finally, a word on Garibaldi's, we ponder still the origin of one ingredient (*Musca domestica*?) [Ed. a fly]. Forget the research gentlemen, let aesthetics reign. Please raise your teacups to the Digestive.

Yours,
T&D Stirring Group

Sirs,

Would I be right in thinking that that your goldfish is in fact a red platy *Xiphophorus maculatus*? If so can I really trust your results?

Phil Croxton
Centre for Ecology and Hydrology, Cambridge.

Indeed, the cover picture was that of a red platy, a reasonable substitute for a goldfish in emergencies. Not a goldfish, but a gold fish - would you expect anything less from the Journal of Unlikely Science?

The Professor

Do you have something to write?
Have your say - send your letters and comments to us by e-mailing us at: **letters@null-hypothesis.co.uk**

Puzzles and miscellaneous

Caption competition:

Think of something appropriate for each month's picture, then let us know what it is. We feature the best of the previous month's entries on the website. To enter, email **puzzles@null-hypothesis.co.uk**

October 2004: "Brian hoped that the new serum would rid him of the sceptical head growing out of his shoulder" *Dave Kelly, University of Bristol*

November 2004: "Duncan spent the afternoon 'pouring' over textbooks in the library" *Paul May, Bristol*

December 2004: "As John's lecture on "the art of pulling faces" entered it's 4th hour, the last student alive looked for inspiration." *Hayley Milsom, University of Manchester*

January 2005: "For the last time... where are the weapons of mass destruction?" *'Magic' Mike, Florida, USA.*

February 2005: "You have a cheek to call me one-sided" *Raphael Kearns, N. Ireland.*

March 2005: "Kevin knew that success in the lab's annual gecko blending competition was finally his" *Erica Thomas, Liverpool.*

Instructions for authors:

We welcome papers, with or without photographs, illustrations and figures, from all fields of science, technology, mathematics, medicine, humanities, psychology and sociology. Papers should take the form of popular science or scientific research, typically consisting of an introduction, methods, results and discussion. Abstract, conclusions and references are optional. They can be up to 2000 words in length and please include the names and addresses of all authors. Send your finished papers to: **articles@null-hypothesis.co.uk**

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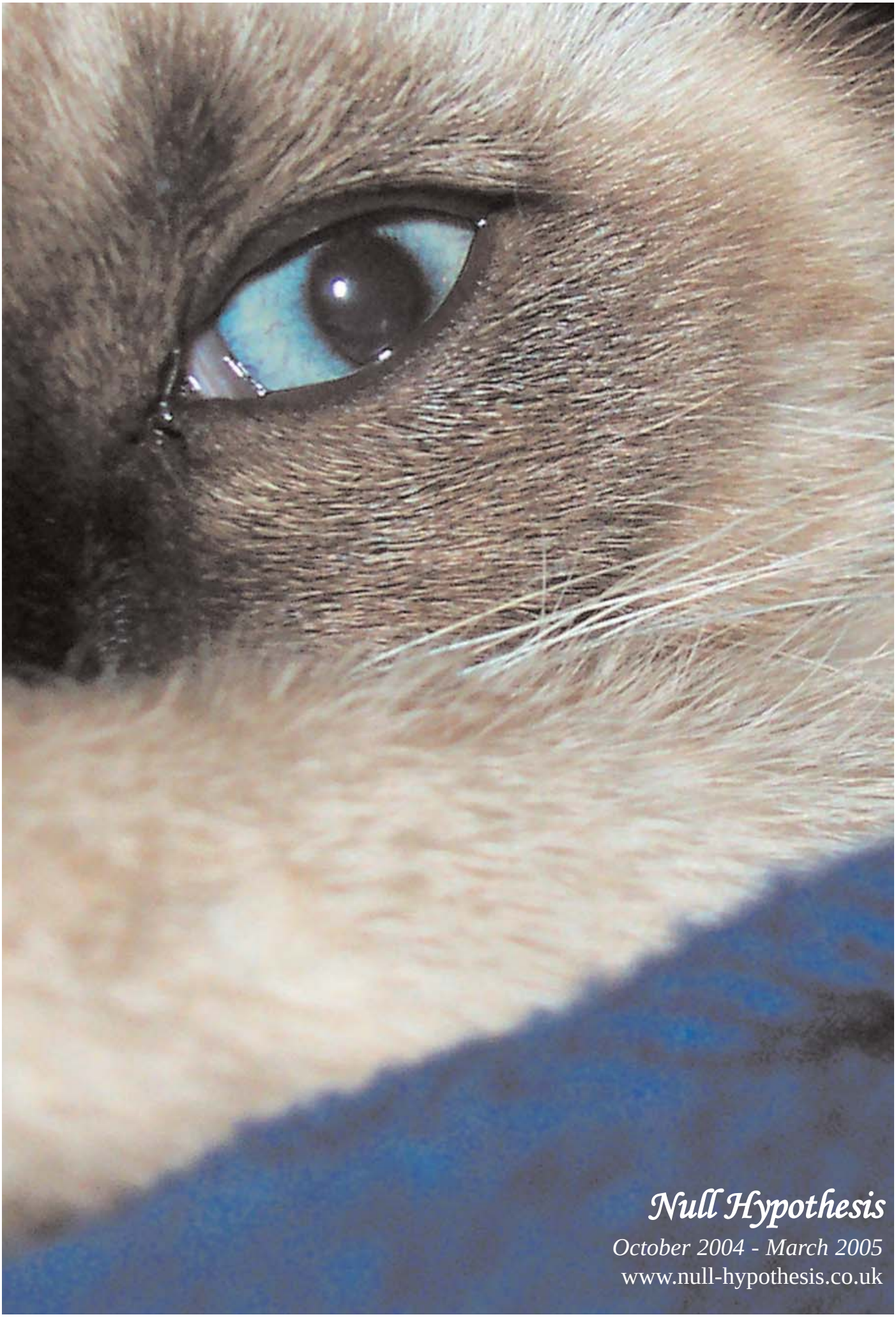

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