

It Ain't Necessarily So ... Bro

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This book is dedicated to Pluto, a small compensation for your loss of status...Pluto was discovered 1930 by a farm boy—who was in the right place but for the wrong reasons.

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YOUNG EARTH

We humans have a deep sense of curiosity and want to understand the world around us. One question that we often ask is, ‘How old is our world?’. With today’s knowledge, science tells us that the Earth is about 4.6 billion years old, but a small number of people—the ‘Young Earthers’—stick ferociously to a belief that our planet is 6000 years old.

History of Earth’s Age

Back around 400 AD, St Jerome, the Italian scholar and priest, made a 6000-year estimate for the age of the Earth, as did the later scholars, Scaliger and Venerable Bede. Around 1600, in the Shakespearean play *As You Like It* (Act IV, Scene 1), Rosalind says, ‘The poor world is almost six thousand years old...’

In the Bible, Psalm 90, Verse 4 reads, ‘For a thousand years in your sight are like a day that has just gone by, or like a watch in the night’. In other words, the six Days of Creation could take 6000 years to pass, which would fit in well with the Earth being roughly 6000 years old.

In 1642, Dr John Lightfoot, English minister, rabbinical and linguistic scholar and later Vice Chancellor of Cambridge University in the United Kingdom, wrote his *Observations on Genesis*—a book of some 20 pages. In it, he observed that Man (not the World) was created at 9.00 am. He based this on *Genesis*, Verse 26, Chapter 1: ‘Man was created by the Trinity about the third hour of the day or nine of the clock in the morning.’ Two years later, on the basis of further interpretation of the Bible, he wrote that the Earth was created on Sunday, 12 September 3928 BC. He also estimated that Man was created five days later, on Friday, 17 September.

Ussher, Mega-brain

The ‘Young Earthers’ use the planet-dating estimate which came from James Ussher (1581–1665), a gifted linguist and prolific religious scholar.

Ussher entered Trinity College in Dublin at the age of 13, received a master’s degree at the age of 20, was ordained as a priest at 21 and appointed Professor of Theology at Trinity when he was only 22. He was also twice Vice Chancellor of Trinity, in 1614 and 1617. In 1625, he was appointed Archbishop of Amargh, and by 1634 was Primate of All Ireland. A prolific writer, he published some 17 volumes. Ussher was a very smart and hard-working dude.

In 1650, he published the first part of *Annals of the Old Testament, Deduced from the First Origins of the World* in Latin. The second part was published four years later. It was an immense work, covering everything from the creation of the world to the dispersion of the Jews in the reign of Vespasian (69–79 AD). Fuller translated the *Annals* into English in 1658.

How Ussher Did It

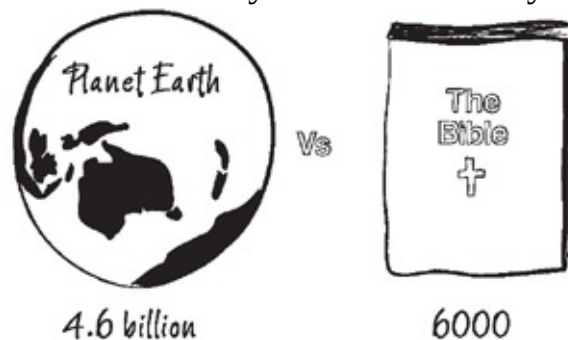
Archbishop Ussher used the best of his considerable historical and scholastic skills to deal with the poor historical and archeological records of the time. He also had to deal with the fact that there were several different versions of the Bible, built up from different sources over several centuries. He studied three different time periods.

The first time period—Early Times: Creation up to Solomon—was the easiest to calculate. The Bible gives a continuous male lineage from Adam to Solomon—‘Adam begat Seth begat Enosh begat Kenon...’—together with everybody’s ages. All Ussher had to do was add the ages together. But there was one minor problem—different versions of the Bible gave different ages. So Ussher simply used the Hebrew Bible.

The second time period—Early Age of Kings: Solomon to the Destruction of the Temple and the Babylonian Captivity—was more difficult. Once the ‘begats’ ran out, Ussher had only the lengths of kings’ reigns in the Bible to work with. So he cross-referenced these with the then known historical records to continue his timeline.

In the third time period—Late Age of Kings: Ezra and Nehemiah up to the Birth of Jesus—Ussher had to link individual events in the Bible with the historical records of the relevant societies. For example, *2 Kings* 25:27 reads: ‘In the thirty-seventh year of the exile of Jehoiachin, king of Judah, in the year Evil-merodach became King of Babylon, he released Jehoiachin from prison on the twenty-seventh day of the twelfth month.’ From historical non-biblical records, this can be separately related to Nebuchadnezzar II’s death.

You don’t look a day over 4.6 billion years...



The simple question of ‘How old is our world?’ can bring answers ranging from 6000 to 4.6 billion years. Let’s go to the adjudicators...

Ussher Into Bible

This hard work gave Ussher a date of about 4000 BC for the Creation. The scholars of the day already knew of the counting error that Dionysius Exiguus (Dennis the Small), who set up the AD year counting system, had accidentally made. Thanks to this error, Jesus Christ was probably born in 4 BC. So Ussher added four years to 4000 BC to give 4004 BC as the date when God created Life, the Universe and Everything.

In his *Annals*, Ussher stated that the world was created on Sunday, 23 October 4004 BC.

The ‘Sunday’ was easy to calculate. The Bible tells us that God rested on the seventh day, which under the Hebrew system, was Saturday. Counting backwards to the first day gives us Sunday.

He came up with ‘23 October’ by using the slightly incorrect astronomical tables of the day to find the autumnal equinox (when the hours of daylight and darkness are equal). He chose the autumnal equinox because it was the beginning of Jewish calendar year.

In 1701, this estimate for the world’s creation found favour with Bishop William Lloyd of

Winchester, who got the publishers, Clarendon Press at Oxford, to insert it in the Great Edition of the King James Bible. They placed his dates—without authorisation!—in the margins of the appropriate pages of *Genesis*, where they remained for centuries. There are no footnotes or explanations in the Bible to justify how these dates came to be inserted.

The fact that this unauthorised date appeared in the margins of the Bible made it ‘gospel truth’ for most Christians back then, and for a much smaller percentage today.

‘Young Earthers’

Today’s ‘Young Earthers’—a very small but passionate creationist group—still use Ussher’s estimate of 4004 BC. (Their interpretation is at odds with most Christian faiths, including the Catholic Church and the Church of England.) They get around the geological and other scientific evidence with extreme mental gymnastics, by suspending many of the known laws of science.

For example, they claim that in the past the continents drifted at kilometres per hour rather than centimetres per year. They also claim that coral reefs formed at 40 000 times their present rate, that oceans evaporated at 4 m per day to form salt beds, that ocean floor sediments formed at 80 million times their present rate, and so on.

Big It Up for Ussher

Today, many people mock James Ussher. But evolutionist Stephen Jay Gould, who disagreed with Ussher’s 6000-year estimate, nevertheless respected him as a scholar. He wrote: ‘I shall be defending Ussher’s chronology as an honourable effort for its time, and arguing that our usual ridicule only records a lamentable small-mindedness based on mistaken use of present criteria to judge a distant and different past.’

It is my own personal belief that if Archbishop Ussher were alive today, he would look at the evidence with his keen mind, and happily accept the current 4.6-billion-year estimate of the age of the Earth...

Other Religions

Zoraster, a Persian prophet from the 6th century BC, set the age of the Earth at 12 000 years. The priesthood of Chaldea in ancient Babylonia set it much older—at two million years. The Brahmians of India took it to the max—they saw both the Earth and Time as eternal. Surprisingly, and true to their name, the ‘Young Earthers’ estimate of 6000 years is probably the youngest figure on record.

Science Enters

James Hutton, often known as the ‘Father of Modern Geology’, brought science to the

discussion of the age of the Earth. In 1785, he read his essay, 'Theory of the Earth' to the Royal Society of Edinburgh. He discussed how the land that his audience walked on had been made by the rivers and seas of past ages, and how the time needed to lay down this land was truly immense. His early critics scoffed at him for 'running about the hillsides with a hammer to find how the world was made', and it was decades before his theories of geology were accepted. He knew that the time needed to lay down the land was immense, but he didn't know how long.

Charles Lyell, born in 1797, the year that Hutton died, continued Hutton's work. Lyell went to the volcano of Etna on Sicily, and realised that each new layer of molten lava was deposited on the layer beneath, and so on, and so on. He knew the height of the volcano, how quickly it grew and how often it erupted. Simple maths gave him an age for the volcano in the hundreds of thousands of years.



Theological Backlash

Ussher was a clever man. He used the best historical, biblical and astronomical data of his day to try to work out the age of the Earth. But in later times he fell out of favour, even with theologians.

In 1890, Dr William Henry Green, Professor of Old Testament at the Princeton Theological Seminary, re-analysed Ussher's work in a more modern context and demolished it in his paper, *Primeval Chronology*. He concluded, '...The Scriptures furnish no data for a chronological computation prior to the life of Abraham; and the Mosaic records do not fix, and were not intended to fix, the precise date either of the Flood, or the Creation of the World.'

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MYSTERIOUS KILLER CHEMICAL

Early in 2006, commercial fishers were forbidden to ply their trade in Sydney Harbour. The problem was toxic quantities of a nasty chemical, dioxin, getting into their fish from sediment on the harbour floor. The problem had been present for many years but had been ignored. Unfortunately, this happened with many nasty chemicals. The elected officials simply hope that the expensive cleanup will be left for the next government in power.

Chemical DHMO

Consider the chemical DiHydrogen MonOxide, usually called DHMO.

It is found in many different cancers, but there is no proven causal link between its presence and the cancers in which it lurks—so far. The figures are astonishingly high—DHMO has been found in over 95% of all fatal cervical cancers, and in over 85% of all cancers collected from terminal cancer patients. Surprisingly, some elite athletes will load up with DHMO before they participate in endurance sports such as cycling and running. However, the athletes later find that withdrawal from DHMO can be difficult, and

DHMO...a chemical MOFO



DHMO is still widely used as an industrial solvent and coolant, and as a fire retardant and suppressant. It is also essential in the manufacture of biological and chemical weapons, and in nuclear power plants. DiHydrogen MonOxide aka Hydric Acid, Hydronium Hydroxide and...Water

even fatal. Medically, it is almost always involved in diseases that have sweating, vomiting and diarrhoea as their symptoms.

Despite these known associations, DHMO is still widely used as an industrial solvent and coolant, and as a fire retardant and suppressant. It is essential in the manufacture of biological and chemical weapons—and in nuclear power plants. While it has many industrial uses, it is cheap enough to be dumped casually into the environment, where it has many unwanted side effects. DHMO is a major contributor to acid rain and is heavily involved in the Greenhouse Effect. In industry, it can short out electrical circuits. It causes corrosion of some metals and can reduce the efficiency of your car's brakes.

It is used to help distribute pesticides and herbicides that have known side effects. In fact, no matter how well you wash your fruits and vegetables, trace amounts of DHMO will always remain.

And in the environment where the fruits and vegetables were grown, long after the pesticides and herbicides have degraded away, the DHMO will remain, because it is so stable. Indeed, DHMO is not thought to be a significant contributor to landscape erosion. Like DDT, this chemical has been found in the desolate remote wastelands of the Antarctic.

One reason why DHMO can be so dangerous is its chameleonlike ability to not only infiltrate in the background but also to change its state. As a solid, it causes severe tissue burns, while in its hot gaseous state it kills hundreds of people each year. Thousands more die each year by breathing in small quantities of liquid DHMO into their lungs.

The Bans

In 1990, at the Santa Cruz campus of the University of California, Eric Lechner and Lars Norpchen publicised the dangers of DHMO—DiHydrogen MonOxide. Enough people had begun to use the Internet by 1994 to give Craig Jackson an ideal forum (via his web page) to set up *The Coalition to Ban DHMO*. Slowly, awareness of this chemical spread. In 1997, 14-year-old Nathan Zohner at the Eagle Rock Junior High School in Idaho told 50 of his fellow students about DHMO. He then surveyed their attitudes—and 43 of them signed a petition to ban this chemical immediately.

In March 2004, the small city of Aliso Viejo in Orange County in California began a process to ban DHMO. An enthusiastic paralegal on the Aliso Viejo city payroll had read of DHMO's evil properties on the Internet, specifically its use in the production of styrofoam containers. As a direct result, a motion to ban styrofoam containers was placed on the official agenda of the next meeting of the council.

Luckily for the reputation of the city, the motion was withdrawn before it could be voted on. Why luckily, you ask?

Da Dahhhhh!

Well, DHMO, DiHydrogen MonOxide—also known as Hydric Acid and Hydronium Hydroxide—is usually called just plain water. First-year university chemistry students have made laboured jokes about water for years.

But, here's the point about misinformation, or disinformation.

You can give people this totally accurate (but emotionally laden and sensationalist) information about water and then, when you survey them, 70–90% will willingly sign a petition to ban it. And it doesn't matter where in the world you do the survey.

In the case of Nathan Zohner, his 50 fellow year nine students were studying science. Many of them had parents who worked in the nearby Idaho Nuclear Engineering and Environmental Laboratory. The students could have asked their science teacher for advice—but none did. Of the students, 43 signed the petition to ban water, six were undecided, while one recognised DHMO for what it was and would not sign.

We live under the illusion that we understand the world around us, but in reality, very few of us can change a car's spark plug, or the memory or hard drive in our computer. In 1997, Nathan Zohner from Eagle Rock, Idaho, won a Science Fair Prize for his project. It was called, 'How Gullible Are We?'.
We?

Perhaps the answer is, ‘pretty gullible’, depending on our particular field of ignorance.



World's Worst Carcinogen

Citric acid has been described as the most dangerous carcinogen known to the human race—according to a letter that supposedly originated from a Paris hospital in 1974. It listed 139 dangerous food additives, with first position reserved for citric acid.

Arnold Bender, Professor of Nutrition and Dietetics at the University of London, debunked this hoax. Even so, in July 1976, the French Minister of Agriculture had to explain to the French Senate that citric acid was perfectly harmless, and that his department was trying to find out who started the hoax. But this list resurfaces every few years in various countries around the world.

Citric acid occurs naturally in many fruits, e.g. tomatoes, pineapples, strawberries, oranges and lemons. It is also used as a food additive (additive code 330) because its natural tartness balances beautifully against the sweetness of sugar. As an extra advantage, it's an antioxidant that works with other antioxidants to preserve foods and stop them from spoiling. When it is used as a food additive, the amount added is usually less than what is already naturally present in many foods.

However, there's another very good reason why we should not worry about citric acid—our bodies make it all the time. When I was a first-year medical student, a large part of the biochemistry lectures was devoted to the Citric Acid Cycle, also called the TCA (Tricarboxylic Acid) Cycle or the Krebs Cycle. Sir Hans Krebs won the Nobel Prize in 1953 for his work in describing this cycle. The cycle is absolutely essential to our metabolism when we convert glucose to energy. As part of this cycle, citric acid is manufactured.

Citric acid is made millions of times every day in every cell of the body—and yet, somebody tried to convince us that it was the most dangerous carcinogen in the known Universe.

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COMA AND THE TV SOAP OPERA

The TV soap opera is a sadly underrated art form. I myself was blessed with a most prestigious honour—yes, I actually appeared on *Neighbours*.

In Episode 4550 (which went to air in Science Week, August 2004), I, a real-life Dr Karl, played opposite an on-screen, in-house *Neighbours* character, also called Dr Karl. We had a curiously existentialist dialogue where we subtly explored the boundaries of personal separation and ego, while superficially appearing to be discussing a mere case of mistaken identity (‘What, *you’re* Dr Karl? So am I.’). However, as much as I do love my TV soaps, I have to admit that they sometimes bend the truth—excluding *Neighbours*, of course. A good example is the TV coma.

Coma

Medically speaking, a coma is a state of unconsciousness, in which the patient does not show any spontaneous activity and does not respond to external stimuli.

There are many causes of coma, but they can be broadly broken into two categories. The first category includes traumatic causes such as head injury, smoke inhalation, motor vehicle collisions and falls, and (God bless the soaps) shipwrecks and aeroplane crashes. The second category involves non-traumatic causes, e.g. poisoning, stroke, heart attack and diabetes.

Either way, some coma patients die, some recover full function and some stay deeply unconscious. There are also cases where coma patients are unaware of themselves and the environment and yet they show sleep–wake cycles. (This condition is known as a ‘persistent vegetative state’.)

The eyes of a person in a coma can be open. The arm and leg muscles after a while contract (and bend the limbs), but also lose strength rapidly and waste away. Many coma patients need to be given air and food through tubes. They also suffer skin ulcers, as well as bladder and bowel incontinence.

Finding TV Comas

In December 2005, Dr David Casarett and his colleagues published their ground-breaking paper, ‘Epidemiology and prognosis of coma in daytime television dramas’, in the *British Medical Journal* (BMJ). They had examined people’s perceptions of, and attitudes to, comas.

They trawled through a decade of TV soaps (1995–2005), including *Days of Our Lives*, *The Young and the Restless*, *The Bold and the Beautiful*, *General Hospital* and *Passions*. They found a total of 73 comas, but had to disqualify nine of them for various reasons. One character woke up for meals, two were faking it, three seemed to be drug-induced, and there were a final three in whom the writers seemed to lose interest (so the audience never found out what happened to them). This left 64 people in comas.

TV Coma Mistakes

There were many mistakes.

~~The most common was the ‘Sleeping Beauty’ syndrome, where the coma patients slept with their eyes shut, were well tanned and well groomed and had normal muscle tone.~~

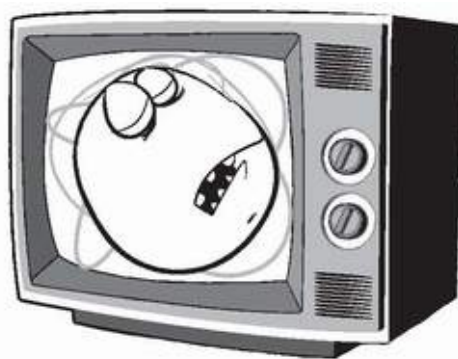
But let’s look at the dramatic stuff, that TV loves to deal with.

First, how many died? With the TV coma patients who had suffered trauma, the death rate was 6% (vs 67% in real life). For non-trauma coma patients, the death rate was 4% (vs 53% in real life). By the way, in the TV soaps, two of the people who ‘died’ were later revealed to be actually alive (but one was replaced by a mannequin). The authors ‘counted them as deaths, because we reasoned that viewers would perceive them as having died’—and the study was about viewer perceptions of coma.

Second, most people who do survive a coma suffer disabilities. But in TV-land, 89% of trauma coma patients pull through and return to full function with no disabilities (vs 7% in real life). For non-trauma coma patients, 91% of TV coma victims pull through (vs 1% in real life). Furthermore, in the real world, the vast majority of coma patients need months of rehabilitation, while in TV soaps, 86% awaken, hop out of bed and immediately kiss their secret lover.

The TV coma victims did however, suffer curious personality changes and memory lapses, which helped push the plot in unexpected directions.

There’s no telling if and when he will recover...



TV soaps sometimes bend the truth...the way a coma is shown on TV differs greatly from what happens in real life.

Deep Soap

Unexpected directions are why TV soaps have such loyal audiences. The characters are deep and complex, and the many interweaving stories form a tangle of intrigue and subplots.

Soap operas attract huge audiences. *Coronation Street* attracted 13 million viewers per episode in 2001, while in the USA, soapie audiences number around 40 million people—and American soaps are popular in 90 countries.

TV soaps exist to entertain the audience and keep them glued to the telly to help sell the advertisers’ products. So, as a rule, the writers don’t want them to be too depressing. Oddly, however, another study in the *BMJ* showed that death rates in British soapies are up to seven times higher than in the general population. So the people in *EastEnders* lead more perilous lives than Formula One drivers, oil rig divers and bomb disposal experts.

Perhaps they have to compensate for the very high death rates by making comas so survivable..

The Power of Soap

TV soap operas have the power to change people's beliefs and actions.

—In April/May 2001, Alma in the famous British soapie *Coronation Street* developed cervical cancer. In the United Kingdom there was an immediate 20% increase in the number of pap smears (which can diagnose cervical cancer) performed. This lasted until mid-August (six weeks after the character died).

Coma and Movies

As you might have guessed, movies are just as bad as TV soap operas in how they depict comas.

Dr Wijdicks, a neurologist, found 30 movies made between 1970 and 2004 that depict a character in a prolonged coma. He showed 22 clips from 17 of these movies to a viewing audience of educated, mature-age people. Only two of these movies—*Dream Life of Angels* and *Reversal of Fortune*—were reasonably accurate.

In general, the movies were lax in showing the great complexity of care needed to keep a comatose patient alive. For example, one patient had only a simple nasal air tube, but the soundtrack was that of a respirator, which would involve a large tube down the throat. They were also usually wrong about the cause of the coma and the probable chance of the patient awakening. Finally, the movies did not show an appropriate level of compassionate discussion between the medical team and the family members.

The viewing audience could not pick the errors in one-third of cases. They were asked what they would do if they suddenly found themselves in the situation of having to deal with a family member or friend in a prolonged coma. Predictably, in 40% of cases, they said they would use what they had learnt about comas from the movies—even though it was wrong.

What's so Good About Truth?

The movie critic, Roger Ebert, knows what he wants in a movie.

He wrote: 'I want moods, tones, fears, imaginings, whims, speculations, nightmares. As a general principle, I believe films are the wrong medium for fact. Fact belongs in print. Films are about emotions.'

Birth and TV

As you might have guessed, TV soapies also get it wrong with births—not to mention that the newborn babies always look big enough to be two years of age.

First, there is a very high death rate in TV mothers and babies, much higher than in real life. Second, 37% of TV labours are so quick that the babies are delivered

unexpectedly, without the medical team, spouse, partner or family members present. Finally, pain relief (e.g. inhalational analgesia, narcotics and epidurals) was given in only 3–7% of TV births.

The lesson is obvious.

If your relative is in a coma, take them to a TV station for an instant cure. But leave right away if there is an imminent birth.

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WATER OFF THE DUCT TAPE

A while ago, a tiny spring in the on/off switch on my 20-year-old television set died. ‘It’s easy,’ I said to my wife, ‘I’ll just pull the 240-volt plug out of the wall, safely discharge the 25 000 volts present on the TV set tube, pull the chassis apart, solder in a new switch and put it all back together again.’ Well, she raised her eyebrows at me and said, ‘I’ll show you “easy”,’ as she tore a strip of duct tape from a roll that happened to be lying around, and taped the switch into the ‘on’ position. It was a semi-permanent and effective repair, needing a new strip of duct tape every week or so, a job that takes about 10 seconds each time.

Most people believe that duct tape was invented for air-conditioning ducts—but it wasn’t. In fact for some time, duct tape was not allowed to be used on ducts.

Invention of Duct Tape

Duct tape was invented during World War II for the military, who wanted a strong, waterproof self-adhesive tape to keep water out of ammunition cases. John Denoye and Bill Gross led the team that invented it. They worked at Permacell, a division of Johnson & Johnson, a company with much experience in producing adhesive surgical tapes. So the team began by experimenting with a surgical tape.

Their first duct tape was a dull greenish, cotton-mesh fabric coated with polyurethane sealant on one side and a rubber-based adhesive on the other. This made it both waterproof and easy to peel off—and very strong. Even better, you didn’t need scissors to cut it—you could tear it both longways and crossways, by hand.

Name of Duct Tape

At the time it was called ‘duck tape’ (as in ‘quack, quack’). We don’t really know why, but there are three popular theories.

One theory suggests that the soldiers called it ‘duck tape’, because water rolled off it like off a duck’s back. Another theory links the name to the cotton fabric known as ‘duck’ used in the manufacture of the tape. The third theory claims some kind of link to an amphibious military vehicle used in World War II. It was called a ‘duck’, because the manufacturer’s code name for it was DUKW.

However, because it was used on ammunition cases, it was also called ‘gun tape’. In the racing car business it is called ‘100-mile-per-hour tape’ and ‘200-mile-per-hour tape’, because it will adhere to a car at these speeds. Air force technicians call it ‘1000-mile-per-hour’ tape, because it will adhere to the radome (radar dome) of a jet fighter at this phenomenal speed.

It was called ‘duck tape’ in a Gimbels department store advertisement of June 1942 (‘blinds in cream with cream tape, or in white with duck tape’) and in a US government surplus property ad offering ‘44 108 yards of cotton duck tape’ in 1945.

The very first use of the phrase ‘duct tape’ (with a ‘T’ as in Tango) seems to be in 1970, when th

bankrupt Larry Plotnik Company of Chelsea, Massachusetts, unloaded 14 000 rolls of the stuff.

Perhaps the 'duct' version comes from the Latin word *ducere*, meaning 'to lead' or 'to convey'. It already appears in 'viaduct' (that carries cars or trains over a valley or gorge) and in 'aqueduct' (that carries water over long distances).

Whatever it's called, it's magic stuff.

Did you say duck tape?



Duct tape was developed for the military in WWII. They had a need for tape that was strong, waterproof and easy to peel off and as a bonus it could be torn both longways and crossways, by hand.

Banned in Air-Con Ducts!

Thanks to the post-World War II building boom, a variety of duck/duct tape was being used to join sections of air-conditioning ducts. It had now evolved into a silvery version that was stronger, with a more powerful adhesive—and nothing like the stuff you buy in hardware stores. HVAC (Heating, Ventilation and Air Conditioning) professionals wouldn't dream of using the inferior grades of tape.

However, even the top grades were not very good. In the late 1990s, the Lawrence Berkeley National Laboratory (Environmental Technologies Division) in California looked at how much energy escaped from air-con ducts. Surprisingly, they found that clear polyester tape was better than the best HVAC-grade duct tape.

In response, various US government bodies prohibited the use of duct tape in the HVAC industry. So yes, for a while, you weren't allowed to use duct tape on air-con ducts.

Of course, the HVAC industry responded by developing new, improved grades of duct tape.

Other Uses

On 10 February 2003, the US Department of Homeland Security broadcast that a terrorist attack was likely. It advised Americans to buy plastic sheeting and duct tape, in case of a biological or chemical attack. People bought lots of duct tape. In response, the Pressure Sensitive Tape Council announced that its 26 members had 'mobilised to meet the increased demand for duct tape', with the regret that 'we wish we were increasing sales for another reason'. However, Glen Anderson, then Executive Vice President of the Pressure Sensitive Tape Council had mixed feelings about the duct tape itself. He said, 'Polypropylene tape would be most acceptable. Duct tape will leave a residue, whereas polypropylene will not.'

A matte black version of duct tape is used in the theatre, music and entertainment industry, where it is called gaffer tape. It's matte so that it doesn't reflect light. The tape also sticks to things using a special glue that won't leave a residue when you remove the tape. Roadies who do pub gigs tell me that they prefer the Nashua version over the equally fine 3M version—because the Nashua version

deals a little better with spilt beer! The film and music industry could not survive without duct tape. ~~Medicos at the Madigan Army Medical Center in Tacoma, Washington, have found that duct tape can treat warts. Alligator hunters in the bayous of Mississippi and Louisiana use it to strap shut the mouths of alligators. Intertape Polymer Group makes a grade specifically for nuclear reactors. Duct tape is also used in fashion to repair jeans—and boost cleavage.~~

Do Anything Tape...

A whole mythology has risen around duct tape.

In Scandinavia, it's called 'Jesus tape', because it can fix anything. Some people, including John Leland of *The New York Times*, think of duct tape as 'national shorthand for a job done almost right'. In other words, it could be used to fix things, usually temporarily, usually by unskilled people, and usually with the bare minimum of time and effort. This might be true in some cases, but not always.

In April 1970, the astronauts of the crippled *Apollo 13* mission used duct tape to make an emergency carbon dioxide scrubber, which kept them alive. An explosion had crippled the spacecraft on its way to the moon, just 55 hours after takeoff. Ed Smylie, one of the NASA engineers on the ground, designed the life-saving cardboard/duct tape assembly, using only material available to the astronauts in the spaceship. For nearly four days the three astronauts had to remain in the lunar module, which was designed to keep two men alive for only two days. One problem that had to be solved was how to remove the carbon dioxide from the limited air supply. Ed Smylie said that he wasn't worried, once he knew that the astronauts had duct tape on board. In 2005 he said, 'One thing Southern boy will never say is "I don't think duct tape will fix it".'

It is claimed that the 'do-it-yourselfer' needs only two tools—duct tape to stick stuff together and WD-40 to unstick stuff.

And Carl Zwanzig, the famous sci-fi fan, said, 'Duct tape is like The Force—it has a light side and a dark side, and it binds the Universe together.'

Builder's Tape

A builder from Brisbane emailed me with his preference in duct tape. He called it 'speed tape', because it could strap anything together very quickly.

It was a silvery tape, which had to be cut with a knife. He used it to strap 6 m lengths of dressed pine to his ute. It was quicker to use than ropes or nylon ratchet tie-downs. More importantly, it caused less damage to the sharp edges of the dressed pine, which had to be kept in as good a condition as possible.

Houston Problem Myth

Most people who know the *Apollo 13* story, or who are interested in space travel, know the phrase, 'Houston, we have a problem'.

Close, but not quite...

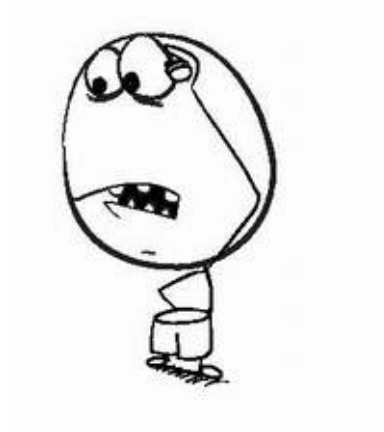
Jack Swigert, the command module pilot, said, 'Okay Houston, we've had a problem here.' James A. Lovell, the commander, then said, 'Houston, we've had a problem.'

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BLACKOUT BABY BOOM

We have all heard what happens when a massive, prolonged blackout throws men and women together with no warning—and no television. The story is that they love each very much in a special way and nine months later a miracle happens, and the maternity wards of hospitals are full of happy couples and lovely little reminders of the event. It's a sweet story, but totally untrue.

Power Grid Mathematics

If you have one electrical generating station, you need another one for backup in case the first one dies. If you have five stations, you can still get by with just one for backup. If you have 10 power stations, you don't need a separate backup station because each of the 10 power stations usually has enough reserve capacity (say 10%) to be able to share the extra load between them if one of them stops working. This is one of the big advantages of having electrical power stations tied into a grid.

One of the disadvantages is that the grid becomes very complicated to run.

For example, just to design a simple grid with a few generators means that you *have* to use fancy maths that involve the square root of minus one (the two identical 'imaginary' numbers that when multiplied together give you a negative number). This sounds crazy. If you multiply two positive numbers together you get a positive number. If you multiply two negative numbers together you get a positive number. It is 'impossible' to multiply a 'real' number (e.g. 2, 12.345, etc.) by itself and get a negative number. Even so, electrical engineers use 'imaginary' numbers to design a grid that feeds power to your fridge, to keep your ice cream cold.

Biggest Blackout Ever

Probably the biggest blackout in history happened on 14 August 2003, affecting 50 million people from Canada to New York and Michigan. It was a week before the power was reliably restored.

The system that crashed was huge. At the time of the blackout, 142 separate regional control rooms oversaw the activities of about 3000 utilities that ran 6000 electrical power plants with a total generating capacity of 61 800 MW.

Unfortunately, the American electrical grid had been deregulated in the 1990s. Cost cutting and profit gouging meant regular maintenance was scrapped. Another factor was the big profits involved in long-distance electrical power sales. This meant that the load on the grid increased, making it more complex to run.

Trees Caused Biggest Blackout

The Final Report of the US–Canada Power System Outage Task Force named four causes for the 2003 blackout.

First was 'inadequate system understanding'. A few of the utilities (FirstEnergy and ECAR) in

the area that crashed first did not realise how fragile and vulnerable the overloaded system was.

~~Second was 'inadequate situational awareness'. In other words, FirstEnergy did not recognise, or understand, that the system was deteriorating and beginning to crash.~~

Third was 'inadequate tree trimming'. Trees had not been trimmed, because the company wanted to generate bigger short-term profits by cutting back on regular maintenance. The trees grew, as they do, and touched and then shorted out three of FirstEnergy's 345-kV lines and one 138-kV line.

Fourth was 'inadequate reliability coordinator diagnostic support'. This jargon means that the operators did not have realtime data as the system crashed, so they did not know that it was crashing.

How to Prevent Future Blackouts

It's not possible to prevent all future blackouts, but there are valuable lessons to be learnt from the blackouts of the past.

First, there are advantages to decentralised power generation. One step is obvious—solar cells on the roof.

The second lesson is to realise that redundancy is not always a waste. Having a little slack in the system lets you deal with unexpected emergencies.

Finally, there are disadvantages to relentlessly increasing the speed and connectivity of our essential systems (such as electrical power, Internet access, etc.). A glitch in a super-fast system can make it crash before we have time to recognise the problem.

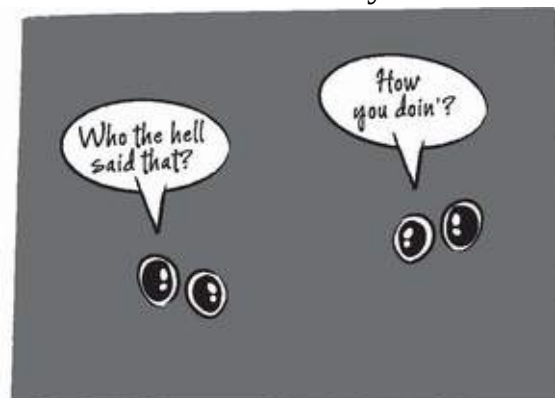
The Pregnancy Myth

But getting back to the story of blackouts causing a baby boom nine months later...

This myth has been around for some time. It has been regularly trotted out for many unexpected events where men and women may be caught together, such as ice storms, the September 11 terrorist attacks on the World Trade Center in New York, and the massive blackout of 14 August 2003 in North America. In each case, there was no surge in births nine months later.

While many people futilely awaited statistics to prove a post 9/11 baby boom, Salon.com wisely noted in 2002: 'Ever since the 1930s, Americans have conjured baby booms and busts in the wake of recessions, wars, blizzards and blackouts. Disaster, we reason with amateur zeal, begets increased intimacy, which in turn begets sex' ...and children.

The Blackout Baby Boom



The debunker of the Baby Blackout Boom theory is Dr S. Philip Morgan, Professor of Sociology at Duke University in the USA and President of the Population Association of America. He's an expert in this field, his research focusing on human fertility.

More specifically, he explores what causes variations in human fertility in different populations. In his two books and 69 published papers in scientific journals, he has studied low human fertility in Iran, the relationship between fertility and the status of women in Nepal, and the link of early childbearing to marriage and subsequent fertility in New Zealand. He has also conducted various other studies in India, Japan, Sudan, Ethiopia, Australia and, of course, the USA.

Professor Morgan says that the Baby Blackout Boom really became an urban myth with the famous New York blackout of 9 November 1965, in which 25 million people were left without power in the USA and parts of Canada. But his studies showed that there was no surge in births nine months later.

Why No Babies?

So what's going on?

There are many factors involved in making babies. Some couples are actually kept separated from each other by the blackout due to commuter problems, a need to stay at work, traffic gridlocks, and the like. Other couples could find the blackout to be a deterrent to sex, e.g. no air conditioning on a hot night. In fact, in the south of the USA, before the advent of air conditioning, the lowest birth rate was nine months after the hottest month of the year. So in hot weather, keeping cool is sometimes more important than getting 'hot'.

Of course, despite the blackout, many couples would still be able to use contraception on the night. (Even with only a candle, people should be able to find a condom.) Some women may be in the infertile part of their menstrual cycle. Even if a couple did conceive, the pregnancy might not go ahead.

And what of the couples who might be forced to stay with nearby relatives and in-laws? That, in itself, can apparently be a powerful anti-aphrodisiac.

Experiment in Air Chemistry

The blackout of 14 August 2003 was massive. Suddenly, 6000 large electrical power plants had to be shut down.

Within 24 hours, the air over the northeastern regions of the USA and parts of Canada became suddenly cleaner. The SO₂ level dropped by 90%, O₃ by 50%, and 'light-scattering particles' dropped by 70%.

The First Blackout

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