Translated extract from

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Lexikon des Unwissens
Worauf es bisher keine Antwort gibt

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Encyclopedia of Ignorance
Everything we don’t know so far

Translated by Franklin Bolsillo Mares

Contents

A few things worth knowing about unknowns

There are known knowns:
There are things we know that we know.
There are known unknowns: that is to say
there are things that we now know we don't know.
But there are also unknown unknowns:
there are things we do not know we don't know.
And each year we discover
a few more of those unknown unknowns
Donald Rumsfeld

What are unknowns?

Gaps in our knowledge generally emerge due to the age-old device of forgetting. This book intends to produce, though in a considerably less humiliating way, 42 additional gaps in each reader's store of knowledge. These gaps, however, are of the highest quality. Not only will we rack our brains over them, so will the rest of humanity, including many scientists of above-average intelligence. The *Lexicon of Unknowns* is the first book of its kind which, if carefully read, causes the reader to know less – though less on a higher level.

If human knowledge could be represented on a large map, then what we know would comprise the landmass of this imaginary world, and the deep blue sea would designate all the unknowns. It is the task of science to drive back the map's wetlands – something

easier said than done. New puddles have a tendency to reappear in places long considered dry. One such example is the question of when America was first settled – and by whom. For more than half a century we thought we knew the answer, yet on account of recent findings the question is once again completely open to debate. Researchers seem to have a knack for expanding not only what we do know, but also what we don't. Thus, at the close of the 19th century many physicists were convinced that everything in the world had been completely discovered and all that was left to do was to hash out the details. Then quantum mechanics and the theory of relativity exposed the shortcoming in much of their thinking – and a vast new body of water washed ashore.

Unknowns can only be described along their borders – by clinging to the last known certainties. Thus, returning to our map for a moment, an entry in the *Lexicon of the Unknowns* is akin to walking around a lake: regardless of where one stops to look, one can still never say what exactly lies hidden out there. Yet not even the shoreline dividing the knowns from the unknowns can ever be determined with precision since several different theories are nearly always vying for the solution to a specific problem.

The unknowns that concern us here must fulfill three criteria: there may not be one dominant solution to a problem that is accepted by a majority of experts and that requires little more than a sifting of details. On the other hand, the problem must already be examined at least to the extent that it is clearly discernable along its borders. And finally, it should be a problem that is fundamentally solvable. There are, for example, many historical questions we will never be able to answer, short of inventing a time machine.

The statement by Donald Rumsfeld cited above has been unjustly ridiculed far too often, for it represents a milestone in our general understanding of unknowns. According to this perception, unknowns can be classified into two categories: things we know we don't know, and things we don't even know we don't know. This book can naturally only address the first category, the "known unknowns", since at this point in time nothing can be said at all about the second.

Why unknowns of all things?

In Douglas Adams's "The Hitchhiker's Guide to the Galaxy", pan-dimensional, hyper-intelligent beings develop the computer Deep Thought which is supposed to supply the answer to the question of "life, the universe and everything else". Seven-and-a-half million years later the answer is revealed: 42. That is when Deep Thought's developers first realize that they do not even know what the question was. It then takes another ten million years to figure it out. We can learn two things from this: first, we need to know the question if we eventually want to understand the answer. And second, it is often more difficult to ask the right question than to answer it – just watch an inexperienced Google user. The physicist Eugene Wigner received half of the Nobel Prize in Physics in 1963 for posing the right question – namely, what was the reason for the "magic numbers" in the Periodic Table. The two scientists who found the answer received the other half of the award.

Asking the right questions and thereby revealing unknowns – that is an important task of science. After all, unknowns are always there already, but just not readily apparent to everyone. They are similar to optical illusions in which a black background offsets a picture of a white animal: only after looking at the picture long enough does one notice that the background is itself an animal – and then it is impossible to overlook. If this book is able to direct a bit of the reader's attention towards this black background – the unknowns of the world – it will have served its purpose. Readers will then start recognizing unknowns even when they meet them out in the wild.

What would a lexicon of unknowns have looked like 100 years ago?

Unknowns are elusive. They disappear, only to pop up somewhere else. In short, they can be trusted even less than knowledge. That is why a lexicon of unknowns cannot be built for eternity. Comparing this book with its one-hundred-year-old predecessor, which, alas, was never written, would bring several interesting things to light: A few unknowns were not even known at the time, for example, plate tectonics or dark matter. Others had been lying around just begging to be investigated, but for various reasons either weren't or weren't rationally. One example would be the mystery surrounding female ejaculation. And then there are the problems, such as the Riemann hypothesis and the structure of matter, which remain unsolved to this very day and are therefore entitled to appear in both editions. Yet the unknowns which give most reason for optimism are the ones which do not even appear in this book although they were perplexing just one hundred years ago. For example, no one knew why stars shine. People suspected that the Earth's core is

not just made of dirt, but it was not until two decades later that they discovered it to be molten – a rather disquieting finding. It was also unknown why citrus fruit helps against scurvy. In fact, no one even knew where eels spawn.

Present-day readers of a century-old lexicon of unknowns would certainly consider themselves rather clever. Our great-grandchildren are bound to feel the same way when they hold this book in their hands one day. Dark matter, they'll say. Of course that's the left-rotational super-axoquattrions. Everybody knows that. And how could anyone ever have believed that sleep had any sort of function. Naturally, cats don't purr. That's just an acoustic illusion. And it says right there in the Voynich Manuscript what rat kings are. And so, over the course of time, this book will contain fewer and fewer true unknowns until, finally, no one will want to publish a new edition for the two lone remaining pages. Fortunately, that is unlikely to happen during the lifetime of the book's authors.
(…)

Why is there so much talk about what's known, yet hardly any about what isn't?

One reason doubtlessly has to do with how researchers work. In order not to lose themselves in endless speculation, they have to adhere to what they already know, thereby turning their backs, as it were, on the unknowns. Only once in a while will they turn around again, so as not to lose sight of what their work is actually all about – namely, clarifying what they don't know. These are precisely the moments that need to be pursued when searching for unknowns.

But there are other causes as well for the neglect of unknowns in public discourse: given the option, journalists are naturally going to choose to report on new findings and successful research. The headline “No new news on X” is considerably less gripping than “Mystery of X finally solved”. Also, it is usually a lot easier to just cite the press releases that institutes compile to publicize their work, whereas unknowns demand intense research and are thereby much more costly. And finally, it is much more pleasant to foster the illusion that we basically already know all there is to know – even though such a preconception can prove itself to be quite a hindrance to future knowledge. In 1874, the physics professor Philipp von Jolly advised a young Max Planck against studying physics, claiming that there was very little left to discover in the discipline. Fortunately, Max Planck ignored the advice and, within a few years, initiated the development of quantum theory, a revolution in modern physics.

There are, however, a few places where unknowns are specifically subject to research. Donald Rumsfeld did not just come up with the “unknown unknowns” on his own – though it would not have been a surprise if he had. Actually, it is a well-known problem in military theory which the U.S. Army has dubbed “unk-unk” (for unknown-unknown). Since many things cannot be foreseen in war, all possibilities must be considered, including the unforeseeable. Failing to do so can be embarrassing and expensive. For this same reason, NASA maintains a database of “lessons learned” so that mistakes due to unforeseen unknowns are only made once. These references to attempts made at curbing the outbreak of unknowns have been gratefully borrowed from the interdisciplinary research project “Cultures of Non-Knowledge” conducted at the University of Augsburg from 2003 to 2007.

(…)

Los Padres National Forest

The land is meager, unfruitful and cold, though it lies such that it should rather be hot or at least temperate. Frequent locusts are thereat.
"California" in: Zedler's Great and Unabridged Universal Lexicon of All Sciences and Arts, 1732-1754.

On August 21, 2004 a bush fire broke out in the Los Padres National Forest in California. That in itself is not very extraordinary. There are so many fires there that the fire department presumably sounds the alarm when, for a change, nothing happens to be burning. Yet when the ground refused to cool off even several days after the fire was extinguished, the firemen informed Forest Service geologist Allen King, just to be on the safe side. With the aid of a reconnaissance flight and heat-sensitive photography it was discovered that the fire was not the cause of the abnormal heat – instead, the fire had actually erupted over an area of roughly 129,000 ft.² that apparently was equipped with a floor heating system. The hottest point, at a depth of only 13 ft., measured 585°F, while at just four inches below the surface, the ground temperature was reading 493°F. Later, following a more precise survey of the region, the hottest spots were found to be limited to very confined areas, extending to no more than 33 ft. below ground and measuring less than 10 ft.²

Unfortunately, over the following months the region was either not investigated very often or else the responsible geologists had better things to do than continually publish their latest findings. During a follow-up analysis ten months later, scientists learned that

the ground had cooled only slightly: the hottest spot now measured 565°F. Only a few hypotheses can explain the peculiar ground temperatures. There are no known oil, natural gas, or coal reserves of any major size in the direct vicinity; nuclear radiation and signs of explosions or volcanic activity have also been ruled out. Hot springs do exist in the Los Padres National Forest, but not in the region in question.

According to Allen King, there is one fairly large fault roughly half a mile away and several smaller ones located near the hot spots. Flammable gases, such as methane, which had previously remained hidden, could have slowly spread from these faults and ignited underground. On account of a landslide that had befallen the area six year prior to the fire, some conjecture that a chemical reaction may have occurred between oxygen within the air and minerals deposited within the crumbled rock. King suspects that the sulfides present in the rock, pyrite and marcasite, release heat when exposed to oxygen, thereby oxidizing the airtight organic material in the rock. During an expedition in December 2005, no pyrite was found, but many iron-oxygen compounds were – and they can form from the decay of pyrite. If there is so little pyrite present at the location, could its decay have served as the fuse for the leaking natural gas? Scott Minor of the U.S. Geological Survey certainly thinks it is possible. Surface measurements did detect both carbon monoxide and carbon dioxide, suggesting that combustion had occurred; however, a certain form of helium typical in natural gas deposits was not found. During the same investigation it was also learned that even though temperatures had fallen almost everywhere, they had risen at two locations. California’s underground has been very cooperative in protracting the cooling process to allow researchers to test all possible theories. Unfortunately, only scientists know the exact location of the hot spots.

Vacationers to the Los Padres National Park are therefore urged to bring their own propane stoves and not to rely on the goodwill of Mother Nature to warm their instant soup.

(…)

Sexual interests

Randy Marsh: You know, Token, when a man and a woman really, really, really like each other, the man sticks his penis in the woman's vagina. That's called 'making love' and is totally normal.

Token: And if the woman has four penises in her and then pees on the men standing up, is that making love, too? When five dwarves beat up a man covered in Thousand Island dressing, are they making love too?

South Park

The sex life of animals is no longer the orderly, god-fearing activity we once thought it was: homosexual behavior has been detected in several hundred species, swans fall hopelessly in love with paddleboats, and 60% of all trout fake their orgasms (no, we're not making this up). But it's we humans who have made everything so irrevocably complicated that it is no longer even possible to make sense of the bewildering multitude of sexual sub-categories now found on the Internet. Presumably, this development – similar to the trajectory from hunter-gatherer to restaurant critic – is simply an unintended side effect of the increasing differentiation of our brains. Yet whereas few people spend much time wondering why they don't like pea soup as much as the next guy, a good many of them are engrossed when it comes to pondering the source of their sexual interests. If only we had some conclusive answers…

The concepts themselves are thorny. Are we to speak of sexual preferences, sexual orientation, or sexual identity? Every definition engenders its own set of problems. For example, homo- and heterosexuality are frequently referred to as sexual orientation, but bisexuality is much more difficult to label. An interest in feet or S&M practices will generally be considered a preference, which, however, can be present in addition to or independent of one's orientation. And yet this classification is not based upon any foolproof knowledge concerning sexual interests and their respective development, prevalence or permanence; if anything, it is conditional upon historical circumstances. To put it simply, if it has a lobby, it's a "sexual orientation" and, at least in some countries, is thereby protected by law against discrimination.

Up until the 19th century any deviation from the sexual norm, assuming such a norm was even acknowledged, was regarded as a bad habit. Over the course of the century the predominant assumption gradually segued from "sexual misconduct leads to insanity" to "insanity and degeneration lead to sexual misconduct." In the first half of the 20th century, even progressive research adhered to the belief that male homosexuality was caused by a lack of testosterone and could thus be cured by the transplantation of "heterosexual" testicles. At roughly the same time, Freud and his successors were developing the theory that abnormal family relations led to abnormal sexual behavior – which, however, could be cured by psychoanalysis. Deviant sexual behavior was considered to be a sign of "psychosexual infantilism", in which adults remain rooted in a phase otherwise natural for childhood development. In the 1930s the physician Theo

Lang conjectured that homosexuals were “transmutative males” and belonged genetically to the other sex – a thesis which went up in smoke twenty years later when researchers learned to identify sex chromosomes.

In the 1950s, behaviorism pulled up alongside psychoanalysis with theories of its own. Abnormal sexual interests were said to arise through conditioning as a result of certain childhood events, generally traumatic ones. This conditioned behavior then later intensifies through sexual activity. One of the disadvantages of this theory is that it is hard to prove in people. And that animals can be made into fetishists in experiments says very little: lab animals tend to develop abnormal sexual behavior anyway, and, besides, most animals are zoophile fur fetishists by nature. Brian Mustanski, professor of psychiatry at the University of Illinois, sums it up in this way: “Behavior representative of a certain species (for example, the way rats arch their backs or jump up) cannot impart a complete picture of human sexual orientation.”

Since the 1970s, good explanations have grown scarce. The former prevalent hypotheses regarding homosexuality have all but disappeared, especially the seduction and contagion theories which were often used by lawmakers as justification for aggressive intervention. Nobody today seriously makes the claim that homosexuality is conditioned or caused by a disturbed relationship to the parent of the same sex or some other childhood trauma. Such theories are still sometimes heard regarding other sexual behaviors, but they are bound to go down the same road as the former explanations for homosexuality. We need something new, but where is it going to come from?

Since the outset of the 1990s, the fields of medicine and psychology have generally been concentrating more and more on “biologistic” research which focuses primarily on the

effects of genes, hormones and infections, instead of on social influences. On the one hand, this development is clearly a result of the research tools available today, but it is also due to the declining influence of psychoanalysis. This new trend has reopened the investigation of an observation which inspired Theo Lang to his theory of transmutative males back in the 1930s: namely, the more older brothers a man has, the more likely he is to be homosexual. This supposition, as ridiculous as it may initially seem, has meanwhile been well supported by roughly twenty studies. Older sisters, on the other hand, have no such influence, and for female homosexuality there exists no such correlation. Freud would probably have alleged that older brothers influence the family dynamic, yet it turns out that the older brothers need not even be present when the child in question grows up. Conversely, brothers having a different mother, even if they are present, have no influence. Only the sons of one and the same mother matter. These findings seem to suggest a factor based within the womb, and not in the sandbox. What that factor could be has yet to be determined. One clue may lie in how the mother's immune system reacts to "male" proteins. But since nature does not want to make things all-too easy for the researchers, these findings only pertain to people who are right-handed.

Another theory of biology-based research states that the level of male hormones within the womb affects both the future sexual orientation of the child and the ratio between the lengths of the ring finger and the index finger (something much easier to measure). Thus far, the results of these studies have been very contradictory, owing to the fact that other factors as well, such as ethnic background, influence digit ratio. Studies on homosexuality involving twins do seem to suggest some slight genetic influence, which may be more pronounced in males than in females. Some researchers suspect male

homosexuality is linked to the X chromosome because it is more prevalent on the mother's side of the family. Others, however, point out that homosexuality is less frequently passed on by the male line simply because gay men have children far less often. Overall, research would seem to suggest that, in addition to other forms, there is a biologically determined form of homosexuality (however it happens to be generated), and that it develops differently in women than in men.

Due to a lack of research it is not known if similar correlations exist for other sexual interests besides homosexuality. There are the anecdotal accounts of people who suddenly develop – or abandon – uncommon sexual inclinations as a result of a brain injury or medication, yet research on fetishists, sadomasochists or zoophiles which goes beyond individual cases has not been produced. We know very little about men in this respect, and even less about women. In fact, some researchers deny that such inclinations even occur in women, aside from in extremely rare cases. And it does not appear as though the current state of research is going to change for the better anytime soon. There are only very few researchers in the world investigating the causes of sexual interests, primarily because there are not very many sexologists in the world. Physicians and psychologists generally do not vie for these topics since it is wise to have the support of a large, influential and discrimination-proof lobby if one wants to receive research money, land academic posts, and avoid being call a "specialist in toe-sucking" by the media.

For now, these conditions have been partially met only for the research of homosexuality. Every now and then one happens to learn something about human sexuality from other disciplines. Based on his research of phantom pain, the U.S. neurologist Vilayanur S. Ramachandran attributes the widespread phenomenon of foot fetishism to the fact that

information from the foot is processed in the brain right next to information from the genitalia. One of Ramachandran's patients has reported that following the amputation of his foot he experiences orgasms in his phantom limb and that these orgasms are even more pleasurable than before. Ultimately, however, this theory only helps to explain why people enjoy having their toes sucked, whereas a simple explanation for the foot fetishist's desire to suck other people's toes continues to elude us. Ramachandran attributes it to "mirror neurons", which have been extremely popular among neurologists in recent years. Mirror neurons are nerve cells which activate the same region of the brain when one observes an action as when one performs the same action. At the moment, they are the panacea of neuroscience since they can be linked to almost everything. According to Ramachandran, foot fetishists actually only want their feet to be attended to – which cannot be completely ruled out, but is rather doubtful. Nonetheless, the theory is quite an advancement in comparison to the speculation of the psychoanalysts Alfred Adler and Wilhelm Stekel: they proposed that people who sucked their own big toes as babies grew up to become foot fetishists.

Generally in fetish research – if the few investigations on the subject can be classified as such – the most common sexually charged parts of the body, namely, the mouth, breasts, rear and genitalia, are not considered fetishes, even though they are only partially necessary for reproduction. Only hair and feet are recognized as classic body-related fetishes, which may have something to do with either the history of science or social conventions. And yet it appears that nearly all body parts, which are in some way optically striking, can become objects of a fetish, especially when they are normally clothed in everyday life. However, research has yet to determine how frequently

individual parts of the body or even materials become fetishized and to what degree this frequency is dependent upon trends and social conditions. On the whole, useful data only exists for very few sexual interests with which we could compare the situation in different countries and, ideally, detect cultural influences.

In 2006 the Canadian psychologists Patricia Cross and Kim Matheson tested the most prevalent theories of sadomasochistic sexuality with the aid of established personality tests and concluded that none of the theories could be upheld. The masochists who were examined did not suffer from sexual feelings of guilt, as psychoanalysis claims, nor did they display a higher degree of psychological problems or instability. The sadists in question demonstrated, in comparison with a control group, no authoritarian traits, nor did they exhibit any antisocial personality disorders. In terms of values and gender roles, the views of the examinees tended towards a relatively pro-feminist position. Finally, Cross and Matheson were not even able to confirm the theory proposed by the psychologist Roy Baumister, which states that masochistic practices are one of many means to escape the burden of modern selfhood.

Every few years, data is at least collected on the type of sexual behavior individual population groups demonstrate. These studies clearly reveal that deviations from the sexual norm rarely occur separately. There may be many reasons for this. After coming out, do gay individuals figure they might as well indulge in a latex fetish as well? Are people who are sexually open and have diverse interests more inclined to provide information about their sex life in an anonymous telephone survey, instead of just hanging up? Or does the willingness to form uncommon sexual interests differ sharply among individuals and gravitate towards certain themes over the course of their sexual

development through – thus far unexplained – external influences? Many of those asked responded that the sexual interests present in their adulthood had clearly revealed themselves prior to puberty. Experts dispute, however, whether these assertions can be believed, or if they are not simply retroactive justifications ("I can't help it. That's how I've always been.") It thus remains unsettled whether sexual preferences can change appreciably over the course of one's life or be influenced by appropriate therapy, or if they remain constant following puberty. Many observations suggest the latter, and yet there are so many interested parties, from the religious-conservative camps to the various subcultures, hoping to answer the question in a way that supports their own doctrines, that the statements of both sides need to be treated with a good deal of skepticism.

For now, in any case, it does not appear that the complex behavior comprising human sexuality can be attributed to any simple causes. Sexual interests most likely have several different causes, and identical sexual behavior most likely has different causes in different people. Perhaps we should first try to answer the question why some people like pea soup more than others.