

The Blackbox Trick: Magic in the Age of Techno-governance and Corporate Secrecy

39

In 1499, Johannes Trithemius, a German scholar and advisor to Emperor Maximilian, sent a letter to his friend Arnold Bostius regarding *Steganographia*, a new book he was working on. The letter described the work as involving methods to communicate across great distances and ways of expressing one's thoughts without using words or signs of any sorts. By the time the letter arrived, Bostius had died, and his colleagues, alarmed by the letter's contents, made it public, calling Trithemius an occultist and employer of demons.

by Chris Hamamoto and Federico Pérez Villoro

On the surface, the book indeed appears to be a work on magic. It lists demonological names, invocations and ways to use spirits to send secret messages. However, as was later learned upon closer examination, it also contains hidden sophisticated ciphers—a vast display of cryptographic techniques within its spells. For 100 years, the book circulated only as a manuscript; finally, in 1606, it was published accompanied by a shorter text, the *Clavis*—presumably also by Trithemius—which explained its cryptography.

Steganographia is divided in three volumes, but the third was left incomplete by Trithemius and was not deciphered in the *Clavis*, effectively leaving open to question whether *Steganographia* is fundamentally a work on cryptography disguised as magic, or the other way around. While some scholars over the years tried to vindicate Trithemius from accusations of sorcery, the fact that there were no ciphers found in the third book didn't help. *Steganographia* was banned by the Catholic Church and was included in the *Index librorum prohibitorum*. For the next 400 years, the majority consensus leaned towards the work being occult. The book was considered by occultists like Agrippa, Paracelsus, John Dee and Giordano Bruno, as well as by modern historians like D.P. Walker, as an important example of 16th-century black magic.

The code to the controversial third volume was broken only a few years ago by two researchers working independently: Thomas Ernst, a professor of German at La Roche College in Pennsylvania, and Jim Reeds, a mathematician at AT&T Labs. Within what look like tables of astronomical data, they found numerical substitution

ciphers—where letters are represented by numbers instead of being hidden within larger masses of letters, as was the case in the first two volumes. Among the encrypted messages, they found Trithemius' signature and variations of the sentence “Gaza frequens libycos duxit karthago triumphos,” which is a Latin equivalent of “The quick brown fox jumps over the lazy dog”—a sentence that uses every letter of the alphabet.

Reeds concludes his research paper by means of legal analogies, remarking that the debate over whether the book is magical could be understood as an ongoing trial whose “terms and standards of evidence have remained unchanged,”¹ but whose “motives and consequences of conviction have changed.” In other words, judgments of the same object have fluctuated as the motivations for studying it have changed. The book's tumultuous history over the past five centuries is useful for reflecting not only on the history of magic and cryptography, but also on how the power to construct and distribute knowledge has been amassed by religious, state, scientific and corporate institutions.

It seems unnecessary to go into depth about the reasons why magic was considered sacrilege within cultures governed by religious institutions, in particular by the Catholic Church. Long before becoming a popular form of entertainment, magic represented a true transgression, as it offered alternative beliefs to those favoured by the church. When power was concentrated as the control of spiritual knowledge and a supposed contact with the divine, any other mystical expression was threatening.

Similar tensions surrounded proto-scientific endeavours. Though there



Phantasmagoria at the Cour des Capucines, 1797; as it appears in E.G. Robertson, *Mémoires récréatifs, scientifiques et anecdotiques du physicien-aéronaute*, 1831
IMAGE © THE INTERNET ARCHIVE

were clear ethical and technical differences among occultists, sorcerers and alchemists, religious powers (at least in the European context) for centuries did not distinguish between a magic trick and forms of experimentation that were closer to science. Pulling a rabbit out of a hat, for instance, would not have been distinguished from the design of complex instruments and explorations with chemistry, metallurgy or medicine. In spite of the fact that magic and science almost seem like opposites now, they share a history in their original antagonism to the Catholic Church's exclusive claim to legitimate knowledge production.

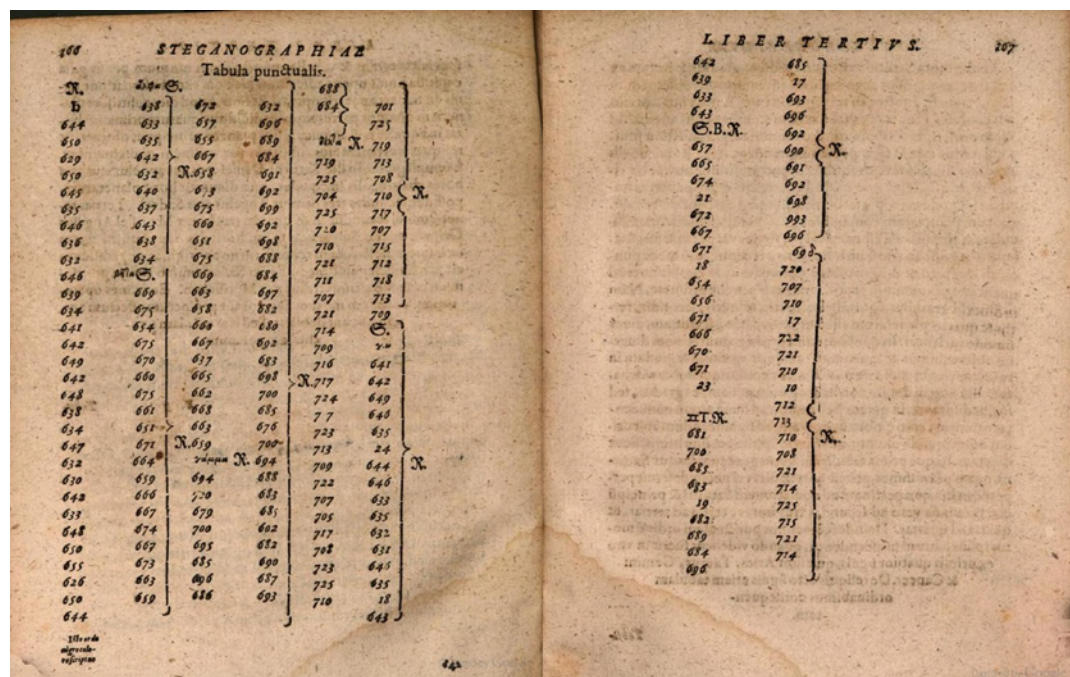
By the 18th century, magic had mostly evolved into its modern sense and was perceived more as a form of entertainment—at times, even integrating scientific advancements—than as a form of mystical power. The hand was simply quicker than the eye: no more, no less. And yet magic continued to challenge religious systems and a popular worldview that still regarded the supernatural as real. From the mid-18th century onward, the use of electricity became common among magicians. For many, electricity was experienced for the first time at magic shows. In an interview with *Cabinet Magazine*, scholar Simon During discusses his book, *Modern Enchantments: The Cultural Power of Secular Magic* (2004), and argues: “We tend to think of the process of secularization in terms of rationalization and empiricism, but it also owes a great deal to the empire of illusion, which stakes out a popular and commercial enlightenment.”²

Spectacular feats of magic and demonstrations of scientific discoveries lumped magicians and scientists together in the popular imagination for their ability to do the seemingly impossible.

However, with the embrace of science as part of an ascendant secular power and the development of technology perceived as an inherently scientific pursuit, a line was drawn. The scientific method and deductive exclusion of alternative explanations differentiated science from more informal experimentations. Additionally, magicians challenged science in their attempts to break known physical laws. For instance, in the famous Egg Bag trick, a magician pulls more objects out of a small bag than it would seem able to hold. Thus, the period's proponents of rationality regarded magic with suspicion—ineffable, mystical, beyond accountability. It was associated with the transgression of the authority of this new secular power. This was reinforced by magic's reliance on deception and in the preponderance of magic acts involving burglary.

The dissonance between magic and science remains. Where private technology companies increasingly have levels of power equal to or greater than governments, “magic” acquires a new nuance and our relationship with science changes yet again. Magic has become a useful language for the construction of narratives around technological products, a rhetorical device that helps tech companies communicate complex processes in attractive ways. It has also become a strategy that protects corporate secrets by effectively obfuscating the internal workings of technologies. In both cases, rather than elucidating, science confuses, removing its operations from political agency. This takes on greater relevance at a time when scientific knowledge is losing legitimacy and when the conception of reality itself is being re-articulated—effects that are largely due to the design of for-profit digital platforms and the

Johannes Trithemius, *Bayerische Staatsbibliothek*, 1608
IMAGE © THE INTERNET ARCHIVE



ways within which information flows and knowledge is reproduced.

Although governments have been the centre of power in modern societies, technology companies are increasingly taking on civic roles. Enabled by digital devices, online communication is being consolidated through massive platforms. Technology companies have come to set the standards that increasingly regulate our lives and livelihoods. The convoluted relationships between state regulations, private distributed data centres, virtual private network (VPN) access and decentralized production processes have dissolved traditional understandings of sovereignty. The role of platforms as gatekeepers of information and personal data grants them not only massive economic power, but also an increasingly influential role in the shaping of ideologies. Despite their reluctance to admit it, it is clear that technology companies exercise editorial discretion over the content they circulate. Furthermore, given their billions of users, companies like Facebook not only function as social spaces, but as privately regulated socio-political geographies in which usership becomes citizenship. All actions in such politicized spaces are counted, interpreted and packaged as commodities. In this context, each application's "terms of service" frames the rules of engagement within it, effectively refashioning contemporary codes of conduct by regulating interactions, influencing language and moderating what can be shared.

Like the all-powerful governments and religious institutions that preceded them, technology companies use litigation to keep tight control over their power to awe. This often takes the form of trade secret protection and the commodification of knowledge as intellectual property. For instance, Apple attempted to block the release of the Samsung Galaxy Tab 10.1 tablet computer, citing its 2004 D'889 Patent, in which the company asserts it invented tablet computers. Samsung countered by citing the use of similar devices in Stanley Kubrick's 1968 film *2001: A Space Odyssey* as a counterargument.³ This use of patent as protection and weapon persists, with companies attempting to monopolize technological developments. For instance, in recent years there has been a sharp increase in patent filings around artificial intelligence and deep learning; in particular, companies such as Google are claiming ownership over fundamental and basic techniques in that field. Companies will go as far as filing patents with the aim of confusing competitors by hiding their intentions within a deluge of less important patents. Since 2008, Amazon Technologies Inc. alone has filed more than 5,860 patents, many of

which are for innovations that seem superficial and even absurd.⁴ The use of patents was once a key strategy of magicians, who would create false patents for their tricks in an attempt to misdirect those wishing to reverse-engineer their techniques.

Technology can be even more opaque when it comes to marketing. Companies deploy marketing strategies that encourage a perception of their electronic products and services as truly magical. This tactic, which includes eschewing the use of technical jargon, has become a common tactic to make products seem enticing. In fact, words like "enchantment," "glamour" and "fascination"—not uncommon throughout the history of advertising—come from the world of sorcery. Apple's iPhone X's FaceID features a technology that scans the user's face with advanced cameras and infrared sensors, enabling a range of "magical" actions, from embodying emojis in order to sing karaoke, to unlocking the user's phone through their face: "the most unforgettable magical password ever created." The neologism "automagically" has become handy to describe such processes. Science fiction writer Arthur C. Clarke has famously stated that "any sufficiently advanced technology is indistinguishable from magic." This adage applies just as much today as it ever did. "Designed in California," for instance, which appears on the packaging of Apple products, renders magically invisible the biological costs of technology. In our inability to understand how technology operates beyond a surface level, we attribute natural processes to supernatural forces, just as pre-Enlightenment societies did.

While advancements in user experience and user interface design help these products function with magical ease, they are undergirded by intensely coordinated surveillance and data-tracking software. Tech companies monitor their users' personal information and actions to refine their products so they can predict their customers' desires with high degrees of specificity, while also selling that data to advertisers. But, while much of this information is voluntarily surrendered—our locations, interests, ages, relationship statuses, etc.—the depth of surveillance and the lengths to which companies such as Facebook will go to acquire data, for instance by cribbing information without our knowledge via our friend networks, or even buying personal information from credit report companies, is largely unrecognized.⁵ Personal data becomes even more profitable as a commodity when user profiles include economic, ideological and political traits. The results are commonly applied to micro-targeted advertising.



Apple presenting "twin test" in 3D facial recognition at iPhone X keynote, 2017

Through psychographic analysis, companies like (the now-defunct) Cambridge Analytica offer this data to efforts like Brexit and the Trump campaign to target social media messages to surgically selected groups of people. As our old notions of privacy dissolve, it's worth considering what can be accomplished by corporations who have more access than ever to personal information, including to new *types* of information. Biometric data, deployed in conjunction with artificial intelligence, is charting new territory for surveillance, analysis and discrimination.

With this in mind, transparency into these technologies becomes increasingly important. Magic was once, like religion, a lens through which we understood the world. Technology and science replaced these forms of understanding with objective reasoning. As computer technologies row in complexity, are assembled through the collective work of programming teams and are cobbled together with mixes of proprietary and open-source software, they surpass any one individual's grasp. We are now encouraged to perceive technologies as magical—to suppress our curiosity and accept, indeed enjoy, the diversion.

Technological opacity is not always intentional; sometimes it is a by-product of technology itself. From coding frameworks and background information processing to encrypted algorithms, most of our computers' behaviours are distributed, unnoticeable and incomprehensible. Leveraging the work of many people, and the precision of machines, they transcend individual understanding. Computer chips are too small for human hands to produce and require precise machines for assembly. Software is written by teams who specialize in discrete parts but lack an understanding of the comprehensive whole. Technological abstraction encases digital form and repels practical understanding. Bruno Latour supplies an image of "blackboxing" as "the way scientific and technical work is

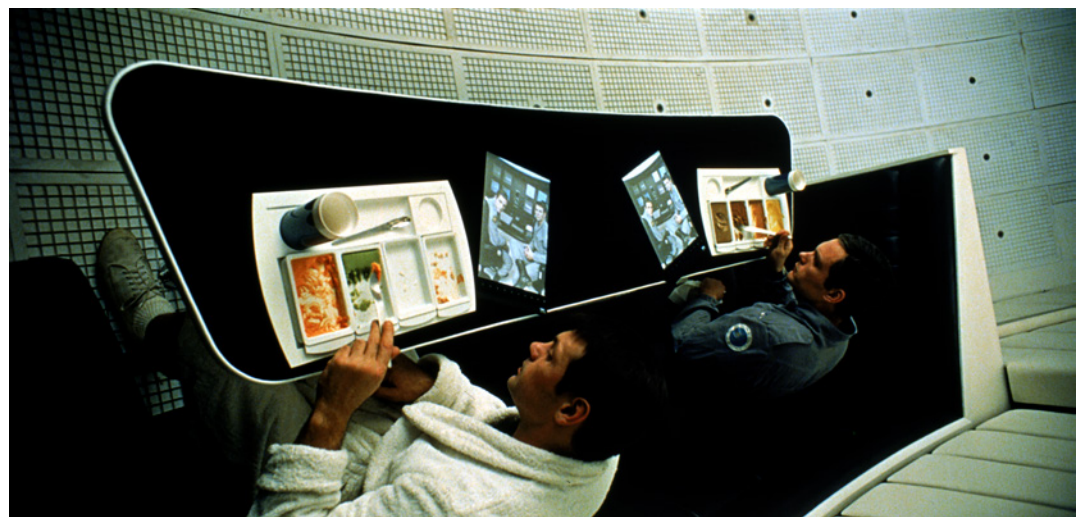
made invisible by its own success. When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become."⁶

Take for instance neural networks, which are computer programs consisting of self-correcting operations made of intricate layers of interconnected artificial neurons. While these systems have existed theoretically for some time, they've only recently become actionable thanks to vast increases in computing power. Neural computing becomes useful precisely to execute tasks with efficiencies and at speeds that exceed human capacities. It processes so much information that, at times, it is challenging to assess its inner logics—to do so would require more analysis than people can execute, making it difficult, if not impossible, even for its developers, to claim control over outputs and make sense of the steps within operations.

The long history of fictions around artificial intelligence in popular culture and academic circles has nurtured recent narratives around computers' supernatural potential. Matteo Pasquinelli suggests that "Artificial General Intelligence and Superintelligence are evoked as alchemic talismans of posthumanism with little explanation of the inner workings and postulates of computation."⁷ Take, for instance, the coverage of recent attempts to decode the Voynich Manuscript—a 600-year-old codex considered by some to be the world's most elusive cipher—using computational algorithms to detect matching patterns among hundreds of different languages. Most articles on the case misattributed this process to AI, even though the process actually involved simpler forms of statistical analysis. As James Vincent of the online media network *The Verge* points out, "In many ways, it makes sense that attempts to crack the Voynich



Mark Zuckerberg at Samsung Galaxy S7 launch, 2016
IMAGE © MARK ZUCKERBERG / FACEBOOK



Computer tablet devices in Stanley Kubrick, 2001: A Space Odyssey, 1968



This mystified enthusiasm for advanced technologies has considerable social implications, as more decision-making processes are being delegated to computation. When information is synonymous with data, meaning is extracted from patterns and knowledge is conceived of as a kind of database, algorithms come to seem like they are better at producing legitimate knowledge and formulating decisions than humans themselves. With this, we see both governments and citizens evading political autonomy in favour of a transference of authority to computation. Historian Yuval Noah Harari puts this process in theological terms and describes “dataism” as the result of an ongoing ideological evolution from a religious to a humanistic and then technological order, where the trust we invest in non-human entities is comparable to spiritual faith and replaces human empiricism. According to Noah Harari, this might extend to all aspects of our social lives—from shopping, to dating, to voting. It’s already visible in fields such as finance and medicine, where diagnoses are based less on human analysis than on algorithmic predictions informed by data.⁹

Even when neural networks are capable of making connections that would not be evident to humans without data-processing power, these exist only within the operational field of the network and are consistent with the nature of the categories with which the network was trained. Contemporary forms of

Machines are far from disconnected from human bias; in fact, they often contribute to a re-articulation of human cognitive logics. As technology becomes faster and more sophisticated, its outputs roam further away from human capacities for abstraction. However, the unexpected outcomes of an algorithmic process—even when the connections between steps are indecipherable—can be productive in allowing humans to form new conceptual connections. Paradoxically, as technology advances, it distances itself from its own ontologies; similar to what happens during a magic act, a temporary space is created that allows alternative forms of knowledge to crack open. These fissures provide opportunities to use a variety of technical and social lenses to analyze the relationship between complex new technologies and their effects in the formulation of ideological concepts. This would be a proactive step in avoiding symbolic misrepresentations that obscure the conflicts of interest behind them, as well as their more immediate effects, such as algorithmic magnification of social bias, or potential threats of automated labour.

As our very condition of reality is being re-articulated, it seems useful to

IMAGE © FACEBOOK ARTIFICIAL INTELLIGENCE RESEARCH



reflect on the transitory nature of what we consider magical. Magic's power resides between an ever-sought, absolute certainty and a paralyzing, permanent relativity. To engage in a magic act requires willingly suspending a system of belief in favour of another, even if temporarily, and a capacity to bend current agreements of truth. Beliefs are not absolute—they are not something that you have or don't have. Instead, During suggests that we should think about our investment in believing vis-à-vis the privatization of ideologies and reflect on how institutions that benefit from our beliefs interact with the ways that we relate to modern forms of truth, fiction and ideology.

Social agreements regarding what is real are sanctioned by power. The institutions and systems that sanction beliefs are fluid and contingent. Michel Foucault's notion of "regimes of truth" suggests that truth is constantly negotiated and manufactured: "Each society has its 'general politics' of truth: that is, the types of discourse which it accepts and makes function as true; the mechanisms and instances which enable one to distinguish true and false statements, the means by which each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; the status of those who are charged with saying what counts as true."¹²

Reflecting on Trithemius' *Steganographia* provides a helpful map for understanding the various forms of institutional authority that have looked upon it. The

condemnation of the book in the early 17th century protected the church and its followers from alternative, heretical ideas, while in contemporary times, the discovery that it was a work of cryptography enhanced Trithemius' reputation as a rational intellectual figure, and compelled the reassessment of magic's significance in the rationalization and secularization of power.

Some still acknowledge *Steganographia* as having mystical foundations and underlying theological motives. Trithemius conceived of cryptography as a "secular consequence of the ability of a soul specially empowered by God to reach, by magical means, from Earth to Heaven."¹³ We won't ever know (and couldn't understand in contemporary terms anyway) Trithemius' personal beliefs—for instance, if he truly considered ciphers divine supernatural expressions, or if he used the rhetoric of magic and religion as an entry point to cryptography. Regardless, after all these years, *Steganographia* has acquired new relevance, as encryption has become fundamental to communication, from the compression of messages into proprietary languages, to tools deployed by tech companies to keep intellectual property hidden and unavailable to competitors in order to maintain their power. *Steganographia* will likely continue to enjoy new interpretations and be redefined over time, particularly as we cede agency to uniquely opaque processes, putting faith in entities whose nature is just now coming into focus.



Promotional image of Magic Leap's augmented reality technology, 2017

Chris Hamamoto and Federico Pérez Villoro's work investigates the impact of emerging technologies in contemporary culture and politics. It often includes computer-based media, publications, video, writing and educational initiatives. They have been working collaboratively since 2015.

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