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Seeing things:

The human search for meaningful patterns

and the media ecology of computer-generated text

Human brains, by evolutionary design, find pattern and impute agency (Foster and Kokko, 2009, Churchland, 2019). Computer-generated texts (in particular, narrative) have reached a level of complexity such that we experience them in everyday contexts without interrogating their way of coming to presence, raising concerns that echo critiques by both philosophers and media theorists. A machine "finished" Beethoven's 10th Symphony; gamers are immersed in an entirely computer-generated text adventures, and computer "poetry" and chatbots have proliferated across the Web. Our inbuilt assumptions about pattern and agency are triggered by such experiences.

This raises important questions for those studying the communication technology as an environment—what Marshall McLuhan called *media ecology* (Media Ecology Association, 2021)—about understanding and managing the implications of human interaction with such computer-generated texts. How do humans make sense of and generate meaning from interactions with such nonconscious objects considered as texts? What are the features of computer-generated texts that make them uniquely likely to trigger categorical errors? And, most importantly, what media ecological approaches offer insight (and perhaps remedies) to the errors of thought provoked by these texts?

Perceptual error has a long history

The inquiry into human errors of perception dates back to the earliest written documents. The 10th-century BCE *Epic of Gilgamesh* features multiple instances of misapprehension, and even deliberate obfuscation perpetrated on humans by the gods (Gardner, 1985). Interestingly, for the instant study, it also features dedicated analysts, or *shailtu*, whose job is to intuit meaning by finding patterns in the noisy chaos of human dreams (Deagon, 1998). This is perhaps the first documented example of apophenia, the psychological tendency to find pattern in unrelated phenomena (Blain et al., 2020). Seeking patterns in the world—and even in dreams—while recognizing that the non-human entities behind appearance could be deceivers has an almost Enlightenment ring to it, and yet researchers find that we're still making similar mistakes 3,000 years later.

Among the many topics Plato covers in the *Republic*, none is perhaps as well-known as the Allegory of the Cave (Plato, *Republic*, 514a). As a way of illustrating his notions of the Divided Line and conceptions of the approach to the ideal world of Forms, Plato sets out the familiar image of prisoners chained in front of a wall of projected images they take to be reality. Here is launched a skepticism about perception that finds its fullest flower in the post-Kantian phenomenology of Husserl and, in particular, American philosopher C. I. Lewis, who articulated the notion of the *pragmatic a priori* (Lewis et al., 1970, 231-239), arguing for the fundamentally contingent nature of the concepts through which we parse the *given* element in experience.

Recent investigations have explored the psychology of error

Recent insights from cognitive science have only reinforced what philosophers have long asserted. Psychologist Daniel Kahneman, in his influential text *Thinking Fast and Slow* (Kahneman, 2011), identifies two subsystems in cognition, the impulsive and intuitive immediate

response of Type 1, and the reasoned and effortful (but lazy) Type 2 (2011, 49). Studies of unconscious bias have shown that even "intelligent" people are as likely to make erroneous inferences when outside the experience base upon which their Type 1 "gut feelings" have been trained (Lilienfeld et al., 2020, Basterfield et al., 2020).

Underlying both Type 1 and Type 2 is the fundamental organizing principle of human perception, the essence of which is pattern recognition (Mattson, 2014). The ability for hominins to find patterns in their environment was unquestionably a survival advantage: those protohumans who made the leap from the percept "moving stripe" to the concept "tiger" are our ancestors; those who didn't, are not. However, in evolutionary terms, false negatives have a higher cost than false positives, leading to an inevitable bias toward "seeing" patterns where none exist. This inbuilt tendency, called *apophenia*, is a double-edged sword, linked both to creativity (Christensen, 2020, Blain et al., 2020) and dysrationality (Foster and Kokko, 2009, Goldfarb and King, 2013). This pattern-seeking tendency leads to snap "Type 1" intuitions that can easily play us false (Stanovich, 2009).

One special case of pattern recognition is our human tendency to infer interior life and mental states in others, which cognitive scientists call *theory of mind* (Frith and Frith, 2005). This capability for "mind reading" also conferred evolutionary advantage, and may even be deeply implicated in our success as the last hominin standing (Churchland, 2019, Ravilious, 2021). But just as apophenia can cause us to see faces in clouds and conspiracies in suburban pizza restaurants, our predisposition to see "mind" behind in the flux of experience can lead us to find agency where there is only process (Schermer, 2011).

Non-human "texts" have long mystified readers

In addition to the Sumerian interpretation of dreams, other examples from antiquity suggest

that humans have an enduring fascination with phenomena in the world regarded as texts. The widespread prevalence and variety of divination practices—haruspicy, augury, astrology, the Oracle at Delphi, etc. (Harvard University, 2021)—illustrate a pan-human tendency to deploy both apophenia and theory of mind to intuit meaning in both natural (e.g., celestial observation) and, increasingly in human-constructed (e.g., tarot) systems. Anthropologists have studied, in particular, how cultural notions are coded up in such objects (Tilley, 2007) and how societies (often, but not exclusively preliterate) impute agency to them (Hoskins, 2006).

In this, we see the attempt of humans to make sense of an indifferently incomprehensible universe. We can see a through-line in the language of myth (gods explaining natural phenomena like thunder) down through folktales (Galatea and the Golem) and on into our current obsessions (artificial intelligence and robots) as humans struggle to conceptualize a world that is not inherently patterned but rather, as Lewis argued, presents us the continual challenge of searching for "things worth naming" (1970, 234).

The human invention of written language added a new system uniquely susceptible to errors of interpretation, given that it is deeply implicated in our thought processes themselves, potentially leading any investigation into a hall of mirrors. The history of human interaction with textual objects is full of examples of imputed agency, from Kabbalist decoding through ritual magick and aleatoric generation practices like oulipo, Dada, and the "cut up technique" of William S. Burroughs and Brion Gysin (Ryan, 2021). Burroughs even suggested, possibly only half-jokingly, that words were a virus (Burroughs, 2012) an intriguing idea that would be developed by Richard Dawkins in his notion of memes (Dawkins, 2016).

Perhaps the most challenging aleatoric text is the so-called "universal library," first proposed in a 1904 short story, "*Die Universalbibliothek*" by Kurd Lasswitz (Lasswitz, 2017). The

principle is simple: taking the lower-case letters of the alphabet and standard punctuation, devise a machine that will randomly produce every possible combination of characters[1]. Jorge Luis Borges, in his 1939 essay "The Total Library" traces the origin of this idea back to Aristotle's *Metaphysics*, which posits the world as a "fortuitous conjunction of atoms" (Borges, 2007, 215). Borges gave this notion its fullest fictional expression in his 1941 short story "The Library of Babel," which imagines a vast library that houses every possible 410-page book, where each page contains 40 lines of 80 characters (Borges, 1944, 88). Mathematician William Bloch has analyzed the possibilities and determined that Borges' library would contain $10^{1,834,097}$ books (2008, 18) which, even assuming you could fit 1,000 books into a square meter of space, would be larger than the visible universe, which could hold only a paltry 10^{84} volumes (2008, 19).

Literary theorist and programmer Jonathan Basile created a web site which procedurally generates books in the style of Borges' library, slightly simplified to display "all possible pages of 3200 characters, about 10^{4677} books" (Basile, 2021). A close look at the end of the fifth line from the bottom in figure 1 will reveal a phrase recognizable from Marshall McLuhan's work—"the medium is the message"—which has been produced entirely at random. Since all possible versions of this phrase, including misspellings, word transpositions, and translations are also produced, elsewhere in the "library," and contending as we must with the welter of nonsense above and below this single readable phrase, we may legitimately ask: in what sense is this pattern "there" rather than being elevated to visibility by apophenia and the application of our pragmatic *a priori*?

[1] A popular-culture variant is the witticism about 1,000 monkeys with typewriters producing Shakespeare.

Figure 1. Random text generation, https://libraryofbabel.info/bookmark.cgi?mediumismessage

In his accompanying philosophical study of automatic text generation, *Tar for Mortar*, Basile argues that we should not be surprised to find that text, as a powerful symbol-manipulation technology, should incline us to invest it with agency.

> We should recognize not that some machine or program has displaced our intentions and their former necessity, but rather that language was always possible without us. Iterability is this capacity of anything that functions like a sign to be wrested from its motivating context, to replace its speaker, its recipient, and its referent for another or for none at all (2018, 66).

Indeed, the origin of this idea with the newly alphabetic Greek philosophers would be no surprise to media ecologists. But, it can be argued, we are still making a categorical error when we come across what we regard as a *meaningful* string of letters and think of it has having been "produced" by some process. There are no faces in clouds; only in our minds, but computers, in particular, lure us to believe otherwise.

While Basile focused on purely *random* text generation, what most concerned Joseph Weizenbaum in his *Computer Power and Human Reason* (1971) was the ability for (what were then) primitive natural language processing programs to provoke human thoughts of agency.

Weizenbaum worried about how easily people were taken in by a very simple program called "Eliza," which applied brute-force rules to chop up user inputs and generate a simulation of the responses of a non-directive psychotherapist.

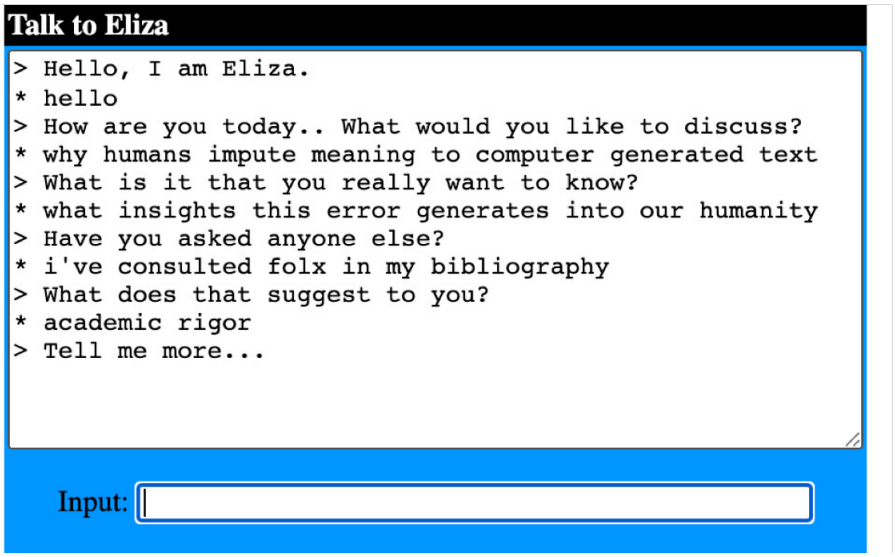

Figure 2. Output of ELIZA program. Source: http://psych.fullerton.edu/mbirnbaum/psych101/eliza.htm

Weizenbaum tells the story of his secretary, who had watched him write the program, ask him to leave the room so she could converse with it in private. "What I had not realized is that extremely short exposures to a relatively simple computer program could induce powerful delusional thinking in quite normal people" (1971, 7).

In the many machine and software generations since, computer generated texts have only become more complex as they leveraged enhanced processing power, analyzed larger and larger natural language corpora, and deployed ever more sophisticated algorithms drawing on Markov chains (Pernicano, 2021) and machine learning (Floridi and Chiriatti, 2020). Advanced text generation tools like OpenAI's GPT-3 (an acronym of Generative Pre-trained Transformer) are machine "learning" systems which digest petabytes of text and have millions of tunable parameters that allow them to emulate either specific domains—GPT-3 is used to create real-time multi-player interactive "dungeons and dragons"-style real-time text adventures which users

find largely indistinguishable from those created by humans (Latitude, 2021)—or even specific authorial style and voice.

This investigator, using beta developer access to GPT-3, was able to generate aphorisms about the medium of videogames in the style of Marshall McLuhan by prompting the system to finish the sentence "Video games…" Here is what GPT-3 (OpenAI, 2021) said:

> Video games are the crack cocaine of the movie industry.
> Video games have become the dominant art form of the digital age.
> Video games bring people into a shared digital illusion, and thus have a socializing and bonding effect.
> Video games are a "tactile" medium that promotes kinesthetic learning and spatial reasoning.

Required disclaimer: John McDaid generated this text in part with GPT-3, OpenAI's large-scale language-generation model. Upon generating draft language, the author reviewed, edited, and revised the language to their own liking and takes ultimate responsibility for the content of this publication.

Obviously, McLuhan, having passed in 1980, could not have authored any of these, and yet they undeniably have the flavor of much of his writing. One can only imagine the concern with which Joseph Weizenbaum would respond. Except that with GPT-3, we don't have to:

> Joseph Weizenbaum thinks that GPT-3 can do something that can't be done by humans or other machines.
> Joseph Weizenbaum thinks that GPT-3 may be a strong AI because it can apply the knowledge it has acquired to a wide variety of domains. I have to agree. I'll have to wait until the paper is published (I can only read it if I pay $30), but I'm looking forward to reading it.
> Joseph Weizenbaum thinks that GPT-3 is "a stunning achievement" and so do I. But as with almost any new development in AI, we should be cautious about its meaning and significance.

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This investigator is not convinced that GPT-3 has accurately captured the sense of Weizenbaum's critique, but it must be remembered that it has been trained on publicly accessible texts from the web, which may present an overly optimistic sampling bias. (Although one must admit that the complaint about paying to access research is eerily accurate…) Nonetheless, these examples of are sufficiently complex to prompt us to read them as legitimate texts, applying our

theory of mind at an unconscious level. Had we encountered them "in the wild" without disclaimers, we might well have been taken in, as many fretted when they read the first newspaper article written by the system in *The Guardian* (GPT-3, 2020). And therein lies the problem.

Media ecological approaches to the problem

It can be argued that the best way to avoid making the kind of categorical error to which computer-generated texts predispose us lies in scrutinizing their existence using a broad multidisciplinary media theoretical lens—that is, from the perspective of media ecology. Several of the field's central thinkers touched on topics related to the present issue.

In 1934, Lewis Mumford's *Technics and Civilization* (Mumford and Winner, 2010) laid the groundwork for the deep-history study of technology and identified the dissection of holistic analog time by the medieval mechanical clock as a key invention that catapulted Western civilization toward modernity. Clockwork is not only essential to many early "automatic writing" devices but is the direct ancestor of the computer. Canadian theorist Harold Innis, in his 1951 *The Bias of Communication* (Innis and Watson, 2008), drilled down in fine detail into the effects of the medium on the messages it carried. He was the first to articulate the three main media paradigms—orality, print, and electric—that theorists now take as a given, and was first to argue that the shift from orality to literacy—driven by the phonetic alphabet—powerfully reshaped Greek culture: "the written letter replaced the graven image" (2008, 39). The Jesuit theorist Walter Ong investigated the shift between these first two paradigms in his book *Orality and Literacy* (Ong, 2002). Significantly for the current study, Ong stressed the strongly transactional, reflexive nature of the communication act. "I have to sense something in the other's mind to which my own utterance can relate. Human communication is never one-way. Always, it not

only calls for response but is shaped in its very form and content by anticipated response." (2002, 172) Since this is the regime under which humans produce communicational messages, it should certainly be no surprise that we readily infer the existence of other minds behind messages which display the appearance of complexity: our theory of mind has primed us to expect nothing less.

Marshall McLuhan, in the groundbreaking 1964 work *Understanding Media*, advanced the notion that all media are extensions of some human sense or faculty (McLuhan, 2003). For McLuhan, the wheel is an extension of the foot, the gun an extension of the fist, clothing, the skin. Accompanying this act of extension, McLuhan argues, is an "autoamputation," a dissociation of the self from this extension which makes the study of media challenging:

> It is this continuous embrace of our own technology in daily use that puts us in the Narcissus role of subliminal awareness and numbness in relation to these images of ourselves. By continuously embracing technologies, we relate ourselves to them as servomechanisms. That is why we must, to use them at all, serve these objects, these extensions of ourselves, as gods or minor religions (2003, 68).

In the case of electronic and computer technology which extends our consciousness itself, McLuhan argues, our analysis is particularly fraught because we see, in such an extension, our own image (hence the "Narcissus" in the quote above). In this scenario, inferences of meaning and attributions of agency become highly likely. For McLuhan, it was the role of the artist, acting as what Ezra Pound called the "antenna of the race," to shake us loose from perceptual slumber. "The artist is indispensable in the shaping and analysis and understanding of the life of forms, and structures created by electric technology." (2003, 96) The linearity of alphabetic literacy, which led us to the mechanical clock, the printing press, the power loom, the punch card, and the computer, McLuhan said, powerfully constrained perception. Hence McLuhan's focus on aphorism, elliptical suggestion, and, in works like *War and Peace in the Global Village* (McLuhan et al., 1968) and *The Medium is the Massage* (McLuhan and Fiore, 2001), a

fragmented, cut-up style with word and image juxtaposed to jolt readers out of their somnambulism.

The ultimate goal that McLuhan sees for media as extensions of the human is what he refers to as the "unified sensorium." (2003, 413). Since, for McLuhan, consciousness is a harmonious "ratio" among the senses which was shattered by piecewise technological extensions, the computer, as holistic "outering" of the central nervous system, represents an opportunity to recover this ideal sensory balance:

> If the work of the city is the remaking or translating of man into a more suitable form than his nomadic ancestors achieved, then might not our current translation of our entire lives into the spiritual form of information seem to make of the entire globe, and of the human family, a single consciousness? (2003, 90)

Building on McLuhan's work, media ecologist Neil Postman, in his 1993 *Technopoly*, argues for a view of human civilization divided into three periods roughly analogous to the three media paradigms: tool use, technocracy, and technopoly (Postman, 1993). The difference among these periods is found in the relationship between culture and the technologies it uses. In a tool using culture, the society possesses a "more or less comprehensive, ordered world view, resting on a set of metaphysical or theological assumptions" (1993, 58). Significantly, this world view controls and limits the uses to which technologies can be put; they are not allowed to threaten the social order. In technocracies, the siren song of technology has begun to erode the society's master narrative and begin to shape the culture in their image. Postman uses Mumford's example of the mechanical clock, invented by medieval monks to coordinate their hourly devotions, which escapes the bell towers of churches and plays a central role in the rise of commercial enterprise. "Here is a clear example of a tool being employed to loosen the authority of a central institution" (1993, 27). Such was clearly not the intent of the monks who invented the device.

Finally, Postman says, in the shift from technocracy to technopoly, society's coherent worldview has succumbed entirely to the power of the technologies it employs. The changeover from a logical, sequential print-based alphabetic social order to one based on the evanescent, image-based world of the electronic revolution, Postman argues, has profound psychic effects. The metaphor he uses to describe the shift is a deck of cards. A tool using culture or technocracy both have a comprehensive world view like a brand-new, unshuffled deck: if you turn over the ace of spades, you can expect the two of spades to be next. There is, in short, comprehensibility. In a technopoly, it is as if the deck has been shuffled and any card is just as likely as any other. "Having no expectation of a pattern, no basis for assuming a given order, you have no reason to react with incredulity or even surprise to whatever card turns up" (1993, 59). This leaching of coherence, which Postman has elsewhere called the "peek-a-boo world" (2006, 64) leaves us especially vulnerable to believing nonsense. Or, for the purposes of the present study, seeing meaning where there is none and imputing agency to the technical solutions which emulate human activities.

Philosopher and literary theorist N. Katherine Hayles, in *My Mother Was a Computer: Digital Subjects and Literary Texts*, echoes Postman's concern. "When for some reason narratives cannot be constructed, the result is likely to be a world without order, a world of inexplicable occurrences and bewildering turns of events" (Hayles, 2010, 197). But she goes beyond Postman and other media ecologists who find themselves at a loss when tasked with articulating a path forward.[2] Their essential problem is that they are still operating from within the print paradigm, exhibiting what McLuhan calls "rear mirrorism" (2001, 74) and trapped

[2] Arguably, McLuhan gestured toward a new notion of the digital self in his "unified sensorium."

within notions of order—and the self—defined by that medium. Hayles calls such constructions of the self "analog," and contrasts them with electronic technology's "digital" subject:

> The digital subject implies an emergent complexity that is related through hierarchical coding levels to simple underlying rules, a dynamic of fragmentation and recombination that gives rise to emergent properties, and a disjunction between surface and interior that is instantiated by and envisioned within the digital technologies of computational culture (2010, 203).

From within this analog self —which Hayles elsewhere identifies as the liberal humanist subject (Hayles, 1999, 2)—we are subject to the apophenia and theory of mind baked into our brains by evolution. "The body is the net result of thousands of years of sedimented evolutionary history, and it is naïve to think that this history does not affect human behaviors at every level of thought and action." (1999, 284) We make these mistakes because of the way our fundamental oral self has been subsequently shaped by alphabetic literacy resulting in an idealized, monadic liberal humanist subject with rigid boundaries, a flavor of subjectivity which media ecology has only glancingly explored. But Hayles and others offer insights that can augment the discipline's existing critical approaches.

Donna Haraway, in her seminal 1985 essay "Cyborg Manifesto," argued for a vision of the human subject in relation rather than isolation: "There is no fundamental, ontological separation in our formal knowledge of machine and organism, of technical and organic." (Haraway, 2006, 60). Nor is this a new idea; a canonical media ecology author, the anthropologist Gregory Bateson, said much the same in his 1972 *Steps to an Ecology of Mind*:

> What "thinks" and engages in "trial and error" is the man plus the computer plus the environment. And the lines between man, computer, and environment are purely artificial, fictitious lines. They are lines across the pathways along which information or difference is transmitted. They are not boundaries of the thinking system. What thinks is the total system which engages in trial and error, which is man plus environment (Bateson, 1972, 488).

This philosophical lens is characterized by the term "posthumanism," which Hayles is quick to point out is not the shallow attempts at reifying the existing subject characteristic of

*trans*humanism, but rather "the end of a certain conception of the human, a conception that may have applied, at best, to that fraction of humanity who had the wealth, power, and leisure to conceptualize themselves as autonomous beings." (1999, 286) The philosopher Francesca Ferrando, in her survey of the field, *Philosophical Posthumanism* (2019) puts it this way:

> To osmose with the robot ontology, humans have to undergo a radical deconstruction of the human as a fixed notion, emphasizing instead its dynamic and constantly evolving side, and celebrating the differences inhabiting the human species itself. For this reason, employing a critical posthumanist frame is crucial (2019, 107).

Hayles suggests in her latest book, *Unthought* (2017), that the key posthumanist turn is to separate "consciousness" and "cognition," reserving the former for humans, but recognizing the latter as a spectrum of capabilities. For Hayles, today's posthuman subject always exists in a field of extended cognitive systems, or "nonconscious cognizers," and such a recognition opens the subject to "comparisons with other biological cognizers on one hand and on the other to the cognitive capabilities of technical systems" (2017, 11). This is an important move not just for us as individuals, but for the academic enterprise of the humanities, where questions about existence, epistemology, and ontology are properly situated. Says Hayles:

> This realization allows the humanities to see cognition in a new light, not as an ability unique to humans and an attribute virtually synonymous with rationality or higher consciousness, but rather as a capability present in many non-human life forms and, increasingly, a vast array of intelligent devices (2017, 116).

Conclusion

Humans are the product of evolution, and it should be no surprise that the pattern-seeking processes that served us well since our days on the savannah a five hundred thousand years ago may need some tweaking to deal with a technological environment whose complexity is orders of magnitude removed from those humble origins. Our *a priori* are always, as Lewis reminds us, pragmatic: the things that we need to notice in order to survive will get noticed. So that free-running apophenia and indiscriminate theory of mind which are adaptive in the natural world of

preliterate tribes is due for an upgrade. But this is a task for which media ecology is uniquely suited, and by combining the best thinking of the field with the insights of posthumanist scholars, we can develop fresh mental maps of ourselves and our relationships with the world of non-conscious cognizing entities. Relationships that are more clear-headed, because they move beyond notions of the self derived from the world of orality and literacy, and that allow us to see the complex entities around us as they are, rather than as our conditioned perceptions imagine. This researcher finds a quote from Marcel Proust's novel *Swann's Way* sums it up rather nicely: "Perhaps the immobility of the things that surround us is forced upon them by our conviction that they are themselves, and not anything else, and by the immobility of our conceptions of them" (Proust, 1998, 12).

References

Basile, Jonathan. 2021. “Libraryofbabel.info.” Accessed Dec. 10, 2021. https://libraryofbabel.info/About.html.

Basterfield, Candice, Scott O Lilienfeld, Shawna M Bowes, and T Costello. 2020. “The Nobel Disease: When Intelligence Fails to Protect Against Irrationality.” *Skeptical Inquirer* 44, no. 3 (2020): 32–37.

Bateson, Gregory. 1972. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology*. Northvale, NJ: Jason Aronson.

Blain, SD, JM Longenecker, RG Grazioplene, B Klimes-Dougan, and CG DeYoung. 2020. “Apophenia as the Disposition to False Positives: A Unifying Framework for Openness and Psychoticism.” *J Abnorm Psychol* 129, no. 3 (2020): 279–92.

Bloch, William Goldbloom. 2008. *The Unimaginable Mathematics of Borges’ Library of Babel*. Oxford University Press.

Borges, Jorge Luis. 1941. “La Biblioteca De Babel.” In *Ficciones*, Madrid: Alianza.

_____. 2007. “The Total Library.” In *The Total Library: Non-Fiction 1922-1986*, New York: Penguin.

Burroughs, William. 2012. *The Ticket That Exploded*. HarperCollins UK.

Christensen, Alexander P. 2020. “Openness to Experience.” In *The Palgrave Encyclopedia of the Possible*, edited by V. Glăveanu, Cham: Palgrave Macmillan.

Churchland, Patricia. 2019. “Deliver Us From Evil: How Biology, Not Religion, Made Humans Moral.. *NewScientist* 3249 (2019).

Dawkins, Richard. 2016. *The Selfish Gene*. Oxford University Press.

Deagon, Andrea. 1998. “The Twelve Double-Hours of Night: Insomnia and Transformation in 'Gilgamesh'.” *Soundings: An Interdisciplinary Journal* 81, no. 3/4 (1998): 461–89.

Ferrando, Francesca. 2019. *Philosophical Posthumanism*. Bloomsbury Publishing.

Floridi, Luciano, and Massimo Chiriatti. 2020. “Gpt-3: Its Nature, Scope, Limits, and Consequences.” *Minds and Machines* 30, no. 4 (2020): 681–94.

Foster, KR, and H Kokko. 2009. “The Evolution of Superstitious and Superstition-Like Behaviour.” *Proc Biol Sci* 276, no. 1654 (2009): 31–37.

Frith, Chris, and Uta Frith. 2005. “Theory of Mind.” *Current biology* 15, no. 17 (2005): R644–45.

Gardner, John. 1985. *Gilgamesh*. New York: Vintage.

Goldfarb, Brent D., and Andrew A. King. “Scientific Apophenia in Strategic Management Research.” *SSRN Electronic Journal*

GPT-3. 2020. “A Robot Wrote This Entire Article. Are You Scared Yet, Human?” *The Guardian* (2020) https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3

Haraway, Donna. 2006. “A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late 20th Century.” In *Manifestly Haraway*. University of Minnesota Press.

Harvard University. 2021. “Prediction Project Website.” Accessed November 25, 2021. https://projects.iq.harvard.edu/predictionx/diviners-guide.

Hayles, Katherine. 1999. *How We Became Posthuman*. University of Chicago Press.

_____. 2010. *My Mother Was a Computer: Digital Subjects and Literary Texts*. University of Chicago Press.

_____. 2017. *Unthought*. Chicago: University of Chicago Press.

Hoskins, Janet. 2006. “Agency, Biography and Objects.” In *Handbook of Material Culture*, edited by Chris Tilley, Professor Christopher Tilley, Webb Keane, Susanne Kuechler, Patricia Spyer, Mike Rowlands, 74–84. SAGE Publishing.

Innis, Harold Adams, and Alexander John Watson. 2008. *The Bias of Communication*. University of Toronto Press.

Kahneman, Daniel. 2011. *Thinking, Fast and Slow*. New York: Farrar, Straus and Giroux.

Lasswitz, Kurd. 2017. “The Universal Library" translated by Erik Born. *Mithila Review* 9 (2017)

Latitude. “Aidungeon.io.” Accessed Dec. 10, 2021. https://play.aidungeon.io/main/home.

Lewis, Clarence Irving. 1970. *Collected Papers.* Edited By John D. Goheen and John L. Mothershead, Jr. Stanford University Press.

Lilienfeld, Scott O., Candice Basterfield, Shauna M. Bowes, and Thomas H. Costello. 2020. “Nobelists Gone Wild.” In *Critical Thinking in Psychology*, 10–38. Cambridge University Press.

Mattson, Mark P. 2014. “Superior Pattern Processing is the Essence of the Evolved Human Brain.” *Frontiers in Neuroscience* 8 (2014).

McLuhan, Marshall, Quentin Fiore, and Jerome Agel. *War and Peace in the Global Village: An Inventory of Some of the Current Spastic Situations That Could be Eliminated By More Feedforward*. New York: McGraw-Hill.

_____, and Quentin Fiore. 2001. *The Medium is the Massage: An Inventory of Effects*. Berkeley, CA: Gingko Press.

_____. 2003. *Understanding Media: The Extensions of of Man (Critical Edition)*. Berkeley, CA: Gingko Press.

Media Ecology Association. 2021. “What is Media Ecology?” Accessed Dec. 10, 2021. https://media-ecology.org/What-Is-Media-Ecology.

Mumford, Lewis, and Langdon Winner. 2010. *Technics and Civilization*. University of Chicago Press.

Ong, Walter J. 2002. *Orality and Literacy : the Technologizing of the Word*. London; New York: Routledge.

OpenAI. 2021. “Openai Gpt-3.” Accessed May 20, 2021. http://openai.com.

Pernicano, Gregory. 2021. “Text Generation With Markov Chains: An Introduction to Using Markovify.” Accessed Nov 28, 2021. https://towardsdatascience.com/text-generation-with-markov-chains-an-introduction-to-using-markovify-742e6680dc33.

Plato. “Republic.” *Perseus Project* 514a, Accessed Dec. 10, 2021. https://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0168%3Abook%3D7%3Asection%3D514a.

Postman, Neil. 1993. *Technopoly: The Surrender of Culture to Technology*. NY: Vantage Books.

_____. *Amusing Ourselves to Death*. NY: Penguin, 2006.

Proust, Marcel. 1998. *Swann’s Way*. NY: Penguin.

Ravilious, Kate. 2021. “The Last Human.” *New Scientist* 252, no. 3362 (2021): 38–41.

Ryan, CTS. 2021. “Cut Ups.” Accessed Dec 5, 2021. https://www.briongysin.com/cut-ups/.

Schermer, Michael. 2011. “The Believing Brain.” *Scientific American* 305, no. 1 (2011): 85–85.

Stanovich, Keith E. 2009. “Rational and Irrational Thought: The Thinking That Iq Tests Miss.” *Scientific American Mind* 20, no. 6.

Tilley, Christopher. 2007. “Ethnography and Material Culture.” In *Handbook of Ethnography*, edited by Paul Atkinson, Sara Delamont, Amanda Coffey, John Lofland, and Lyn Lofland, 258–72. SAGE, 2007.

Weizenbaum, Joseph. 1971. *Computer Power and Human Reason: From Judgment to Calculation*. San Francisco: S. H. Freeman.