

Misinformation Age:

What early modern scientific fakes can tell us about today's online fabrications

by Marlis Hinckley

Introduction

Over the last year, misinformation about COVID-19 have proliferated online,¹ causing consternation not only among public health officials, but also among commentators horrified by the apparent depth and breadth of public belief in false scientific claims.² In this respect, science communication has joined the ranks of the many elements of society where deep problems were unmasked by the coronavirus pandemic. This misinformation is not new, but rather the latest iteration of informational troubles which have been decades in the making. In many cases, COVID misinformation has been linked to the anti-vaccine movement, which has been perpetuating false scientific narratives for nearly a decade, ever since a new, largely online anti-vaccine movement began to nucleate around the 1998 Wakefield study.³ Given the close connection between the Internet and the proliferation of faked scientific 'evidence', it can be tempting to imagine that the rise of misinformation is historically unprecedented. However, belief in fake information today has a close analogue in another 'Information Age': the late sixteenth century, when European global expansion and

¹ Mehreen Arshad et al., "Covid -19, Misinformation, and Antimicrobial Resistance," *BMJ* 371 (November 24, 2020): m4501; G. Gonsalves and G. Yamey. "Political interference in public health science during Covid-19." *BMJ* 371 (2020); M.S. Islam, T. Sarkar, S.H. Khan et al. "Covid-19-related infodemic and its impact on public health: a global social media analysis". *American Journal of Tropical Medicine and Hygiene* 103(4) (2020): 1621-9.

² See, for examples from December 2020 alone, D. Alba and S. Frenkel, "From Voter Fraud to Vaccine Lies: Misinformation Peddlers Shift Gears," *The New York Times*, December 16, 2020; Marie O'Halloran, "Anti-Vaccination Leaflets 'Exactly like' HSE Advice Sheets Being Distributed in Dublin," *The Irish Times*, December 18, 2020; J. Al-Khalili, "Scientists Fought Coronavirus, Now They Face a Battle against Disinformation," *The Guardian*, December 28, 2020.

³ Yuxi Wang et al., "Systematic Literature Review on the Spread of Health-Related Misinformation on Social Media," *Social Science & Medicine* 240 (November 1, 2019): 112552; H. Maisonneuve and D. Floret, "Affaire Wakefield: 12 ans d'errance car aucun lien entre autisme et vaccination ROR n'a été montré," *La Presse Médicale*, vol. 41, no. 9, Part 1 (September 1, 2012).

the growing medium of print enabled a similar surge of scientific fakes to spread rapidly through the literate community.

How does scientific misinformation take hold, and once it has, what can be done about it? While this essay centers on a historical comparison between the early modern period and the present day, it will necessarily also address philosophical matters, as well as making ethical recommendations. Drawing on the ‘philosophy of information’,⁴ it will combine a focus on information’s mobility with an interest in ethics and epistemology, arguing that a granular focus on the accuracy and belief value of particular statements misses their mutability in transit, an aspect necessary to understand the spread of misinformation, both in historical examples and today.

This essay will take a pragmatic, impact-focused approach, exploring the causes and consequences of misinformation in a central pair of historical examples. It will take as a central concept the notion of ‘common sense’: a rapid, collectively shared ability to determine whether a certain proposition is plausible. The relation of a proposition to common sense, more than its actual truth value or its ability to generate belief in the individual, is posited as a determinant of how it is transmitted as information. As such, this essay will place greater weight on the information-sharing process and its consequences than on questions about the nature of belief itself.⁵ It will also take a normative approach, characterizing pieces of information as potentially epistemically unstable and providing recommendations for individuals as the decision-makers in the progression of information spread.

⁴ See L. Floridi, *The Philosophy of Information* (Oxford: OUP, 2001), 1-25 and 137; Patrick Allo, “Putting Information First: Luciano Floridi and the Philosophy of Information,” in *Putting Information First* (John Wiley & Sons, Ltd, 2011), 1–8.

⁵ This does not entail accepting the idea that decisions can be seen as a proxy for belief or degrees of belief, as per B. Skyrms, *Choice and Chance: An Introduction to Inductive Logic* (Encino, Calif.: Dickenson Pub. Co., 1975); it is also agnostic as to the internal architecture of belief and credence, as reviewed in R. Foley, “The Epistemology of Belief and the Epistemology of Degrees of Belief.” *American Philosophical Quarterly* 29 (1992): 111–21.

What's in a Fake?

In 1572, the famed naturalist Ulisse Aldrovandi acquired a dragon recently killed by peasants in the Tuscan countryside.⁶ While the specimen itself no longer survives, a pair of engravings do: it is a bulbous creature with a long, snakelike neck, two legs at the front of its lemon-shaped body, and a long, serpentine tail. Not only did Aldrovandi take his acquisition of the specimen as an opportunity to write a treatise on the history, mythology, and anatomy of the dragon, he gave it pride of place in his museum, corresponded widely with local notables eager for confirmation of its veracity, and even weighed in on the issue of whether the dragon's appearance carried supernatural meaning for the newly elevated Pope Gregory XIII.⁷

But what was this creature? Modern scholars have suggested various explanations, ranging from it being a deformed lizard to it being an elaborate fake sewn together from the parts of various other animals.⁸ One study has even claimed to identify exactly what animal pieces the 'monstrous serpent' was made of: the head and tail of a grass snake, the body of a fish (possibly a perch or carp), and the legs of a toad.⁹ This explanation is very possible, as many such composite specimens were created in the sixteenth century, including mer-people made from rays and basilisks made from chickens or lizards.¹⁰ And in this case, we are confronted with a creature that, as Hoffman notes, "does not look like anything that might have been real"; its anatomy is not only unfamiliar, but implausible, with its limbs positioned much too far forward to support its bulky body.¹¹ Pertinently, there are also some differences

⁶ This episode is described in P. Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (UC Press, 1994), 17.

⁷ Findlen, *Possessing Nature*, 20-21.

⁸ K. Hoffmann, "Sutured Bodies: Counterfeit Marvels in Early-Modern Europe," *Seventeenth-Century French Studies* 24, no. 1 (June 1, 2002): 57-70.

⁹ P. Senter, Phil, L.C. Hill, and B.J. Moton. "Solution to a 440-Year-Old Zoological Mystery: The Case of Aldrovandi's Dragon." *Annals of Science* 70, no. 4 (October 2013): 531-37.

¹⁰ See Hoffman; and M. Conforti, 'Divers, Sirens, and Fishes', in *Fakes*, 130-152.

¹¹ Hoffman, "Sutured Bodies", 63.

in the descriptions of the dragon given by subsequent visitors to the museum, which Hoffman suggests is evidence that replacement specimens may have been fabricated once the original deteriorated. It seems likely that, as she affirms, the dragon was “a very good counterfeit,” or perhaps several serial ones. Nonetheless, the specimen proved influential, and Aldrovandi’s work served as the basis for other works on dragons for over a century.

A little over five hundred years later, a doctor called Andrew Wakefield published a study in the medical journal *The Lancet*. The 1998 study showed a correlation between the childhood MMR vaccine, intestinal damage, and emergent autism.¹² Its placement in the *Lancet* suggested its veracity, or at least its plausibility. A panel of peer reviewers had confirmed that the study appeared valid: it had a well-designed method, clear data analysis, and a reasonable-sounding interpretation of its results. Initially, at least, the study appeared to pass muster.

In 2004, the investigative journalist Brian Deer obtained the original patient data and compared it to the published study.¹³ He eventually found that “in no single case could the medical records be fully reconciled with the descriptions, diagnoses, or histories published in the journal”; in other words, the results of the study had been at least partially fabricated.¹⁴ Nonetheless, the article had already proved hugely influential, becoming the centerpiece of a set of vaccine-critical studies that launched emergency vaccination halts in the UK, congressional hearings in the US, and a popular anti-vaccine movement that persists to this day.¹⁵

Fertile Ground for Fraud

¹² P. Offit, “Flawed Research and Its Enduring Repercussions,” *Science* 370, no. 6512 (October 2, 2020): 43.

¹³ F. Godlee, J. Smith, and H. Marcovitch, “Wakefield’s Article Linking MMR Vaccine and Autism Was Fraudulent,” *BMJ* 342 (January 6, 2011): c7452.

¹⁴ Brian Deer, “How the Case against the MMR Vaccine Was Fixed,” *BMJ* 342 (January 6, 2011): c5347.

¹⁵ See Offit, “Flawed research,” and B. Chamak, “L’affaire Wakefield et le mouvement anti-vaccination,” *Neuropsychiatrie de l’Enfance et de l’Adolescence* 65, no. 8 (December 1, 2017): 469–73.

Both of the examples given above are instances of scientific fabrication. Two scientific objects were produced – a counterfeit dragon and a falsified study – that subsequently deceived people about their true nature. Both came from times of rapid epistemological and methodological change; both leveraged a generalized confusion about the possible to proffer objects that, to later eyes, would look absurd. By looking at the broader scientific context surrounding these fakes, we can observe some of the conditions that generate a situation ripe for fraud.

The first condition for a hoax's success, and perhaps the most basic, is its ability to convince viewers that it was plausible. In other words, it must not violate the principle of 'common sense': the basic standards within a community of what seems likely, probable, or possible. Given this stipulation, it would likely be easier to pass off a hoax at a time when common sense was not particularly 'common' in the collective sense of the term; in other words, when the viewing public was of multiple minds about what sorts of things might exist, or what methods might be particularly suitable for demonstrating truth.

Just such a condition was met in the Aldrovandi case. The sixteenth century was a boom time for wonders, freaks, and marvels. As modern scholars have noted, Europeans brought back exotic goods from across the globe and combed their own back gardens for curiosities, filling *Wunderkammern* with dazzling arrays of strange and unusual objects.¹⁶ Part of this interest in novelty was likely driven by overseas expansion. The age of European imperialism ushered in an age where a 'common sense' honed on the Scholastic classics no longer applied. Aristotelian doctrines such as the 'torrid zone' were explicitly and gleefully debunked by Spanish colonial chroniclers from Diaz del Castillo to Acosta.¹⁷ In the animal

¹⁶ See Findlen, ; P. Smith and P. Findlen, *Merchants and Marvels: Commerce, Science, and Art in Early Modern Europe* (London,: Taylor & Francis Group, 2001).

¹⁷ For this historiographical theory, see A. Grafton, *New Worlds, Ancient Texts: The Power of Tradition and the Shock of Discovery* (Harvard University Press, 1995).

kingdom, traditional animal models were falling before the evidence of bizarre category-jumping creatures, like the scaly and hairy armadillo, introduced from foreign lands.¹⁸ Such a fundamental destabilization meant that common sense could no longer reject out of hand the possibility of strange creatures, including Aldrovandi's 'bird-footed serpent.'

There is strong evidence to suggest that this destabilization led to instances of misinformation, where fake objects became transmuted into misleading, mobile, and widely disseminated reports. One such instance was the myth that birds of paradise have no feet. As Ogilvie describes, the techniques employed to preserve 16th-century East Indian bird of paradise specimens meant that many of them arrived in Europe with no feet. This may be seen as creating a class of 'accidental fakes': deliberately modified scientific objects that "rendered plausible" the claim made by some natural historians that the birds had to remain in permanent flight,¹⁹ as well as allowing the birds to be considered "a quasi-fantastic natural specimen" with great emblematic import.²⁰ Both of these factors created an expectation among metropolitan consumers that birds of paradise should be without feet, and therefore an incentive for field collectors to keep preserving them in this misleading way. These specimens, in turn, continued to make the idea of perpetual flight seem plausible, and the debate about birds of paradise's feet persisted well into the 17th century.²¹

This information-rich destabilization affected not only the common sense of what animals existed, but also the common sense what types of proof could be used to demonstrate claims. As Shapin and Schaffer have noted, the epistemological destabilization of the 16th century led to the spread of many new methods of verification, including technologies of

¹⁸ Ann Moyal, *Platypus: The Extraordinary Story of How a Curious Creature Baffled the World* (JHU Press, 2004), 2.

¹⁹ B. W. Ogilvie, *The Science of Describing: Natural History in Renaissance Europe* (University of Chicago Press, 2008), 250.

²⁰ C. Swan, "Exotica on the Move: Birds of Paradise in Early Modern Holland", *Art History* 38/4 (Sept. 2015): 631.

²¹ Ogilvie, *Science of Describing*, 252.

“virtual witnessing” such as illustrations and elaborate first-person descriptions.²²

Paradoxically, the advent of these new modes of confirmation provided ample opportunity for fraud by creating large, apparently trustworthy apparatus that could easily be falsified. Just as nearly one hundred years prior, the infamous forger Annius of Viterbo had used new humanistic standards of citation to foist a wide range of fictional Hebrew sages on a readership unfamiliar with the new flood of names, the richness and novelty of virtual witnessing created space for falsification.

As the world of animals was rapidly expanding in the late 16th century, the world of chemicals was doing so in the late 20th. In the postwar period, an increasing number of new synthetic chemicals were produced and used in food and pharmaceutical production. Such chemicals became the object of increasing public health concern in the 1990s, with public statements like the Wingspread Statement warning consumers about the possible negative effects of unfamiliar compounds.²³ Common sense, at least for most of the reading public, was only weakly able to distinguish between the various similarly-named chemical agents available. By the time Wakefield’s falsified data pointed to the preservative thimerosal as an autism-causing agent, the common sense of even the educated reader would not necessarily see this as implausible, or even unlikely.

Similarly, the advent of new data-based methods was also destabilizing general wisdom regarding modes of proof. First, the advent of large datasets – a method made possible by a technological development, namely powerful computers – made statistical processing a more central feature of modern scientific studies than in decades past. The rapid shifts in statistical standards led to confusion about which standards should be applied in

²² See S. Shapin and S. Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton University Press, 2011).

²³ A. Zeide, *Canned: The Rise and Fall of Consumer Confidence in the American Food Industry* (UC Press, 2018), 176.

which cases, even among scientists. The resulting opportunity for misleading choices, or even outright fraud, continues to be noted to this day.²⁴

Lastly, Wakefield's study formed part of the first wave of scientific products to be widely shared on the Internet. A wider range of studies was suddenly available to more people than ever before, pushing the always-existent range of studies within medical science into public light. Such an event had great potential to destabilize common-sense methods of distinguishing the plausible and the implausible, as reputable sources published apparently contradictory findings.²⁵ The ground for Wakefield's study, which would eventually become a prime piece of online vaccine misinformation, was already primed by the destabilization caused by the Internet.

Why Fraudsters Defraud

Given the proper conditions – an unstable “period of speculation”²⁶ where common sense provides a weak guide to plausibility – there is opportunity for fraud. But those who would fabricate scientific objects still need a reason to do so. Some of these motivations are relatively simple: for money or for prestige. Either or both of these may apply in the Aldrovandi case. He certainly profited in the latter respect from his dragon; thanks to its appearance at the same time as the elevation of the new Pope, its discovery made his work the object of intense interest from the high clergy, and Findlen suggests that his efforts to turn their attention into reputation were largely successful.²⁷ His work could therefore have been a

²⁴ See, for example, A. Brodeur et al., “Methods Matter: P-Hacking and Publication Bias in Causal Analysis in Economics”, *American Economic Review* vol. 110 i. 11: 3634-60.

²⁵ The destabilizing potential of publicly advertising ‘normal’ scientific debate out of context is discussed in N. Oreskes and E. M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (A&C Black, 2011), 34-35.

²⁶ This has been suggested by Erwin Stresemann; Ogilvie, *Science of Describing*, 251.

²⁷ Findlen, *Possessing Nature*, 24.

deliberate, self-interested forgery; maybe even one important enough, as Hoffman insinuates, to pay off a surgeon to ‘confirm’ the specimen’s natural character.²⁸

It is possible that more complex factors were in play. The distinction between fiction, exaggeration, forgery, and simple error is notoriously difficult to pin down, and this difficulty is only amplified by changes in scientific and epistemological standards over the centuries.²⁹ Like his near-contemporary Athanasius Kircher, Aldrovandi could have seen the object as an artificial object that revealed deeper natural truths.³⁰ Such an object might be seen as a work not of forgery, but of fiction. Or perhaps he was blinded by his view of it as a papal portent confirming current events and engaged in some motivated reasoning. If so, he would be neither the first nor the last scientist to engage in manipulation to make reality conform more closely to his beliefs or expectations.³¹

The Wakefield case, though closer in time, is similarly opaque. Wakefield has refused to admit any wrongdoing in the case, so we can only speculate. Some have suggested a profit motive;³² others have pointed to the prestige he stood to gain from ‘discovering’ a new syndrome.³³ Neither can a softer motive be excluded; as scientists in other disciplines have noted, the practice of ‘cleaning up’ data can edge closer to falsification than is entirely comfortable either for individual studies or disciplines as a whole.³⁴

²⁸ Hoffmann, “Sutured Bodies”, 65.

²⁹ For reflections on forgery and fiction in general, see W. Stephens and E. Havens (eds), *Literary Forgery in Early Modern Europe, 1450-1800* (JHU Press, 2018), and A. Grafton and A. Blair, *Forgers and Critics, New Edition: Creativity and Duplicity in Western Scholarship* (Princeton University Press, 2019); for science-specific reflections, see H. Rheinberger, *On Historicizing Epistemology: An Essay* (Stanford University Press, 2010), M. Gordin, *The Pseudoscience Wars: Immanuel Velikovsky and the Birth of the Modern Fringe* (Chicago London: The University of Chicago Press, 2012), and M. Beretta and M. Conforti (eds), *Fakes!? Hoaxes, Counterfeits and Deception in Early Modern Science* (Science History Publications, 2014).

³⁰ See M. Waddell, *Jesuit Science and the End of Nature's Secrets* (Surrey: Ashgate Publishing Ltd., 2015)

³¹ This may be seen as an extreme form of the seeing-the-expected phenomenon characterized in T. Laqueur, *Making Sex: Body and Gender From the Greeks to Freud* (Harvard University Press, 1990)

³² Z. Stav, “A Deadly Shot in the Dark.” *Newsweek Global* 164 (7) (2015): 12–15.

³³ Chamak, “L’affaire Wakefield”, 470.

³⁴ See Brodeur, “Methods Matter”

How Misinformation Spreads

As a hoax spreads, it becomes misinformation. The object loses its unitary status, transforming from a physical object into a set of reports, each linked to its own set of intentions and epistemological judgements. It is passed along by people; their beliefs, relationships, and interests condition how they accept and disseminate this information. And it spreads through particular media, whose particular characteristics can speed or slow its distribution.

A central thread that ties together both of the examples discussed here is the key role played by new technologies in allowing the original fabrication to expand into a broader body of related misinformation. In the former case, this technology was print. Print, a relatively cheap and easy medium, meant that more people could own and read books than ever before; its impact on almost every aspects of European culture is now a historical commonplace.³⁵ This creature's example proves no exception. Print allowed word of the 'dragon' to spread in the form of Aldrovandi's publications and the reports of those who claimed to have seen the specimen in the museum, as well through reports based on those reports. Thanks to print, the story spread further and faster than was available using other methods. While the hoax may have originated with the specimen delivered to Aldrovandi in the late 1500s, the form in which it spread during the 1600s was as a written report.

Personal networks also played a significant role in the spread of the dragon, particularly in its early years. Aldrovandi received numerous letters inquiring after the specimen, with one man writing to Aldrovandi for confirmation of the specimen's reality after having heard of it through "certain monks from Certosa".³⁶ In his response,

³⁵ See, for example, N. J. Morgan and R. M. Thomson (eds), *The Cambridge History of the Book in Britain*, 7 vols, (CUP, 2014), vol. III; A. J. Gillespie, A. J. and D. Wakelin (eds), *The Production of Books in England 1350-1500* (CUP, 2011).

³⁶ Hoffman, "Sutured Bodies", 63.

Aldrovandi leveraged the power of his individual authority and the trust involved in personal correspondence to convince others of the dragon's veracity. Word of mouth – or perhaps of pen – was another route through which the rumor spread.

Clear analogies for both of these phenomena are present in the Wakefield case. However, the 21st-century forces in play were arguably far stronger, allowing the hoax to launch an entire body of related misinformation within a decade. The early 21st century saw the rise of the Internet, a radical information technology that has made more information available to a greater number of people than ever before. Reports of the Wakefield study spread quickly across many different Internet sites. This made it available to a broader sector of society and placed several degrees of separation between *The Lancet*, where the study was originally published, and the places where most readers encountered it. Arguably, this report-of-a-report mode of dissemination created a layer of insulation between *The Lancet* and Wakefield's readers, meaning that the paper's eventual retraction from the journal had less impact on its readership than might have otherwise be expected.³⁷

Beginning in the 2010s, social media took up a leading role in the dissemination of vaccine misinformation, including works based on the original Wakefield study.³⁸ Social media has also gained ground in popular science communication more generally, and has recently been identified as central to the spread of COVID-19 misinformation.³⁹ Social

³⁷ See Chamak, "L'affaire Wakefield", 472.

³⁸ S. M. Jang, B. W. McKeever, R. McKeever, and J. K. Kim. "From Social Media to Mainstream News: The Information Flow of the Vaccine-Autism Controversy in the US, Canada, and the UK." *Health Communication* 34 (1) (2019): 111.

³⁹ For a sampling of the literature on this topic, see M. J. Sá, C. M. Ferreira, and S. Serpa, "Science Communication and Online Social Networks: Challenges and Opportunities," *Knowledge Management: An International Journal* 19, no. 2 (December 2019): 1–22; A. Koerber, "Is It Fake News or Is It Open Science? Science Communication in the COVID-19 Pandemic," *Journal of Business & Technical Communication* 35, no. 1 (January 2021): 22–27; M.S. Islam, T. Sarkar, S.H. Khan et al. "Covid-19-related infodemic and its impact on public health: a global social media analysis". *American Journal of Tropical Medicine and Hygiene* 103(4) (2020): 1621-9.

media, like the personal correspondence of earlier eras, is able to leverage the authority of individuals and the social trust involved in personal relationships to spread information.

Why Misinformation Spreads

In both cases, people made the active choice to pass along reports. Whether they did so by composing new reports based on the fraudulent sources or by simply handing along existing ones, people's decisions played a key role in the transmutation of scientific frauds into bodies of misinformation. As such, the question of why individuals share information is particularly important to understanding misinformation as a phenomenon.

While it might seem intuitive to assume that people share information because they believe it, Margocsy cites the example of 'pub chat' for a clear instance where this is not the case. In this context, there is a premium on repeating "entertaining and surprising" reports without requiring that either party find them convincing.⁴⁰ This pattern of interaction strikes at the heart of the division between forgery and fiction. Are those who discuss fakes simply seeking, as Margocsy would have it, 'lively conversation'?⁴¹ Do they, like Aldrovandi, see the fakes as real? Or perhaps, like Wakefield, hope that others may? And are the two entirely divisible?

Such ambiguous motives may apply in the Aldrovandi case. Hoffman points to the specimen's novelty, and even perhaps its grotesqueness, as a key feature of its appeal, calling it a "spectacle of knowledge" comparable to the fairground attractions of later centuries.⁴² A similar mode of thinking applies in the case of viral misinformation, which is often shared

⁴⁰ D. Margocsy, "Certain Fakes and Uncertain Facts," in *Fakes!? Hoaxes, Counterfeits and Deception in Early Modern Science*, ed. M. Beretta and M. Conforti (Science History Publications, 2014), 191.

⁴¹ Ibid.

⁴² Hoffman, "Sutured Bodies", 65.

when it “elicits high-arousal emotional responses”, regardless of its content.⁴³ The question of the sharer’s beliefs does not seem to enter into the equation.

This agnosticism about belief allows a piece of information to spread in a number of registers at once, blurring the boundary between a deceptive fake and an entertaining artifice. In the 16th century, counterfeit creatures were objects of interest in their own right, attracting collectors drawn to the ingenuity and skill with which they were fabricated.⁴⁴ For example, the Italian writer Mattioli argued that human-shaped mandrake roots were an amusing artifice of legitimate interest for collectors. At the same time, he complained that they were often passed off as natural objects by “swindlers” who “deceived the poor” for profit.⁴⁵ To draw a modern analogy, satirical or comical content is occasionally picked up and shared by readers who apparently believe it to be true.⁴⁶ Whether an object is a counterfeit or an amusement depends on the context in which it is presented, and as information travels, one object may find itself presented in many ways concurrently. Under such conditions, the seemingly straightforward distinction between fiction and forgery – the former aiming to entertain, the latter to deceive – dissolves, allowing misinformation to be shared both by those who believe it and those who do not.⁴⁷

This phenomenon is apparent in both the popular and academic spheres. Mattioli attempted to separate belief in mandrakes along class lines: mandrakes were correctly believed to be *artificialia* by the educated, and incorrectly to be *naturalia* by the poor. His elitism appears to have been misplaced, however, as the head of the Neapolitan natural

⁴³ Mill et al., “Fake News”, 4.

⁴⁴ A. Tosi, “Contrivances of Art: The Power of Imagery in the Early Modern Culture of Curiosity”, in *Fakes*, 153.

⁴⁵ Tosi, “Contrivances,” 157.

⁴⁶ For an example of this process involving (probably) deliberately absurd cooking videos, see R. Lyster, “Watch This Disgusting Food Video Right Now. It Explains Everything,” *New York Times*, December 10, 2020; for a regularly updated list of posts ostensibly mistaking the satirical news site *The Onion* for actual news, see the Reddit page “r/AteTheOnion”. (It should be noted that these posts may themselves be satire, highlighting the epistemic ambiguity of the entire process.)

⁴⁷ For some reflections on the fluidity of the notion of forgery, see Grafton, *Forgers and Critics*, 24-26.

history museum proved to be a most vigorous defender the human-shaped mandrake as a true natural phenomenon.⁴⁸ Margocsy emphasizes that an interest in “uncertain facts” was not exclusively the province of the fairground spectacle, but formed a central part of natural-historical enquiry during the age of encyclopedism.⁴⁹ While modern academic science takes a much harder line on the acceptable methods of scientific production than its 16th-century predecessor, it arguably still makes ample use of uncertainty to stimulate intellectual inquiry. Wakefield’s study, like any study claiming to point to a new correlation, was published in *The Lancet* not because it was known to be true, but because it was thought to be methodologically sound and epistemologically possible; a belief judgement on its epistemic status was suspended pending further study. More generally, forms of speculative publication such as hypotheticals and models are also seen as serving a valuable intellectual purpose.

The Consequences of Scientific Misinformation

The ability of false scientific objects to travel in a state of epistemic uncertainty is a key element of the modern problem of misinformation. It seems highly likely that the embrace of ‘uncertain facts’ by early modern encyclopedists and collectors allowed fakes to thrive. As Beretta and Conforti point out, even as period writers bemoaned and debunked scientific frauds, they demanded the sorts of novelties and artifices that drove the creation of more.⁵⁰ Like in the mandrake case cited above, clever fabrications could travel as both fakes and fictions at once, leveraging their status as interesting objects to draw in the curious and the credulous alike.

⁴⁸ Tosi, “Contrivances,” 157.

⁴⁹ Margocsy, “Certain Fakes,” 191-92.

⁵⁰ Beretta and Conforti, ‘Introduction,’ in *Fakes*, xiv.

Modern misinformation has shown that the consequences of this ambiguity-fueled spread can be nefarious, particularly in the world of public health.⁵¹ This world has been made possible by an erosion of common sense's ability to distinguish between the plausible and the implausible, as well as an embrace of epistemic ambiguity. Particularly with health-related information, a 'why not?' tendency to share unconfirmed reports, even among those who would not characterize themselves as true believers, has allowed misinformation to spread with alarming rapidity.

A particularly troubling issue with this phenomenon is that it creates a feedback loop. Just as a destabilized common sense creates an ideal precondition for fakes to grow, the subsequent spread of sensational fakes erodes the boundaries of common sense yet further. We can see this phenomenon contributing to the proliferation of dubious animal reports in the early modern period. As Margocsy notes, global European expansion around the beginning of the 16th century created a "forest of uncertain facts" about what kinds of animals could really exist, and faced with this apparently "infinite variability" in the animal kingdom, some encyclopedists simply threw up their hands and included everything.⁵² The economics of print likewise placed a premium on novelty at the expense of verification.⁵³ Such an alignment created ideal conditions for eroding yet further any common sense – any broadly shared, basic idea – of what reports might be plausible.

The Internet provides the same issue, amplified. By making a large amount of information broadly available, online sources have radically expanded the number of stories any one person is likely to hear, and consequently, their perception of what is possible or indeed likely. Here, both fraudulent and genuine reports contribute to a broader

⁵¹ B. Brett and J. Justice. "The Postmodern Medical Paradigm: A Case Study of Anti-MMR Vaccine Arguments." *Western Journal of Communication* 83, no. 2 (March 2019): 172–89.

⁵² Margocsy, "Certain Fakes", 205.

⁵³ Smith, *Merchants and Marvels*, 18-19; Margocsy, "Certain Fakes", 209.

destabilization of the range of probability. It is a commonplace sentiment, for example, that a person can find a nutritional study to support any position. Arguably, there are problems on both the supply and demand side of nutrition study production; many low-quality studies are produced, and because of the popularity of the topic, they also tend to be widely reported. This has contributed to a broad-based reduction of trust in nutritional studies that, scientists have noted, will be notoriously hard to repair.⁵⁴ When common sense no longer serves to place boundaries on the realm of possibility, fakes become harder to spot, and high-quality information equally difficult to identify.

A Roadmap towards Common Sense

What can be done to halt this spiral of misinformation? Recognizing that we are in a period of epistemic destabilization, we must combat the further erosion of common sense's boundaries by examining two dimensions of belief involved in information sharing: the belief that a proposition is true or false, and the belief that other people will share the common sense to make an epistemological judgement the proposition in question. By deciding whether or not to pass along information on the basis of not only one's belief in its veracity, but also the epistemic state of the broader population, we can deliberately strengthen the line between fake and fiction, consciously rebuilding the common sense that would otherwise tend to erode itself.

As previously noted, the strength of one's belief in a proposition does not seem to be the primary driver in the decision to share a piece of information.⁵⁵ A person can believe with equal strength that articles in *Newsweek* are true and the events described in *Hamlet* are false and still be interested in sharing both. I argue, however, that it is only ethical to share

⁵⁴ C. Wilson, "Feature," *New Scientist* 243, no. 3238 (July 13, 2019): 34.

⁵⁵ Assuming, that is, that beliefs come in such as different strengths; for an alternate perspective, see A. Moon, "Beliefs Do Not Come in Degrees." *Canadian Journal of Philosophy* 47 (6) (2017): p. 769.

information of either type – believed or unbelieved – when the information sharer believes that common sense provides sufficient grounds for others to make this epistemological determination. In other words, ethics require people to take responsibility not only for my own belief in the moment, but for future belief further along the information chain. This means freely sharing both believed and unbelieved information when common sense is strong, but hesitating to share information of either kind when common sense is weak.

Take, for example, the issue of counterfeit animals. Today, although new species are still being discovered, the taxonomic structure is relatively well-established; while the particulars are fluid, there is a robust common sense of what types of animals are possible. We are in a situation, Situation (1), where a strong collective idea framework allows most people to look at both real and fake objects with little risk of confusing the factual and the fictional. Composite animals, like those at Ripley's Believe-It-Or-Not, can reasonably be expected to strike the viewer's eye as productions of artifice, and can therefore enjoy the risk that they will erode people's common sense of what types of animal are possible in reality. Even though these may originally have been built as fakes, under condition 1, they effectively become fictions, which unlike fakes, do not open the door to future fraud.

In the 16th century, viewers were in Situation (2), where common sense could not be relied upon to tell real from fake. Encyclopedists like Jonson recognized that the epistemic situation was fluid, with common sense unable to clearly distinguish plausible animals from implausible ones. Because they were in Situation (2), sharing reports of false animals like Aldrovandi's dragon contributed to the further destabilization of the common-sense system by expanding yet further the bounds of plausibility. This created a vicious cycle in which naturalists and printers, by sharing information, helped perpetuate and increase the common-sense confusion that had allowed them to be fooled in the first place. This held regardless of their personal beliefs about the objects in question. Aldrovandi may have strongly believed

his dragon to be the genuine article, which Jonson seems to have slightly disbelieved some of the things he published. Regardless, though, both were responsible for creating the confusing situation that allowed animal frauds to continue for over a century.

As the Situation (2) model focuses on information spread, it is particularly useful for understanding vaccine misinformation in the modern age. Arguably, Wakefield's 1998 study was initially launched into a Situation (1) environment. In the scientific community represented by *The Lancet*, there were clear, commonly shared ways of determining epistemological value; while Wakefield's study initially made a splash, it triggered the alarm of science journalism's common sense, and was therefore spotted and accurately named as a fraud relatively quickly, with a formal retraction made in 2004. When the study went onto the Internet, however, it entered a Situation (2) environment. In contrast to the scientific reaction to the paper, the popular reaction was much more mixed; public common sense regarding novel chemicals was far less established, and therefore susceptible to fraud.

The rapid spread of vaccine misinformation is readily characterizable under the Situation (2) parameters put forward above. It entered a community in a state of relative epistemic disarray on the relevant topic, namely the safety of novel chemicals; it was novel, and therefore interesting; its link to health, and children's health in particular, gave it a strong affective pull. Consequently, it was repeated by true believers and the inquisitive alike, allowing its footprint to spread extremely rapidly through the new technological medium.

The COVID-19 pandemic, by these parameters, created a perfect situation for false information to spread. Scientists and the public alike were arguably in Situation (2), as there could be no established sense regarding a novel virus. As such, misinformation – hoaxes and misinterpretations alike – were able to slip through the initial filter of common sense. Now, the proliferation of reports of all kinds has made misinformation even more difficult to spot.

As the health effects of this are many and apparent, it is worth considering whether previous instances of Situation (2) present options for how such problems could be avoided, or at least more effectively managed. I argue that in Situation (2) conditions, information sharers are ethically obliged to reduce their spreading activity, regardless of their level of belief in the validity of any particular piece of information. The existence of a Situation (2) is, in the above cases, the result of too many pieces of information relative to the number of extant facts. The proliferation itself erodes the community's ability to detect fakes using common sense, so contributing to the quantity of information, even with relatively high-quality pieces, is likely to exacerbate the situation.

Rather, a consciously reduced selection of pieces should be shared. These can be objects that the sharer believes to be true or believes to be false; the central contingency is that the information sharer should be clear and explicit about the parameters they used to make their epistemological determination. In this way, information sharers can contribute positively to the construction of a common set of epistemological principles, compensating for the damage created by adding another piece of information to an already information-overloaded Situation (2). This system takes a neutral position on matters of belief and on matters of epistemology. It does not prefer the sharing of true information, or even the sharing of believed information. Rather, its interest is in epistemological stability, attempting to foster a robust collective framework – a 'common sense' held truly in common – for evaluating various propositions.

A particular advantage of this system for addressing misinformation is that, because of its neutrality towards matters of belief and epistemic value, it is well-suited to addressing the 'filter bubble' problem, which has proved acute in the COVID-19 pandemic. This phenomenon, in which people find themselves surrounded with information that conforms to their existing viewpoints, is possible at any time in which information proliferates, as a

simple lack of time may cause people to filter out a subset the information they consume. The most notorious of these bubbles in modern times are those that have coalesced around controversial topics, including vaccine and COVID-19 misinformation. Those who discuss such topics are very clearly in Situation (2), where no robust common understanding exists to separate real reports from faked ones. Even those who are deep in filter bubbles are clearly aware of the Situation (2) conditions. Both sides side of the vaccine debate, for example, regularly attack the other, indicating that both are aware that their epistemological standards are not, in the collective meaning of the term, common sense. The framework set out in this essay does not recommend that either side be shut out, as it is agnostic on matters of belief and truth. Rather, it suggests that both sides reduce their sharing activity, with greater transparency in the remaining instances about the methods used. By building on perhaps the only premise on which both sides would agree – namely, that there is no common understanding of the issue at hand – it harnesses the interests of all debate participants. As such, it has the potential to reverse the erosion of common-sense standards organically, without requiring the intervention of an outside arbitrator.

Conclusion

Today, in matters relating to health information, we increasingly find ourselves in Situation (2): public common sense seems incapable of commonly separating fact from fiction. Peculiarly modern phenomena, such as the Internet, have certainly contributed to this state of affairs. If we take a step back, however, we realize that similar events have happened before. While the technological and epistemological factors of the 16th century were different, the characteristics of their destabilization have many marked similarities to our present situation. Then, as now, our first line of defense against fraud – a ‘common sense’ of what is plausible and what is not – was substantially eroded by an explosion of new information and

evidentiary standards. History allows us to recognize that we are consequently in a historical moment particularly vulnerable to fraud.

In the 16th century, some natural historians responded to an erosion of common-sense standards by erring on the side of inclusion, passing along interesting tales of which they were unsure despite the often-realized risk that they would be taken as true by other readers.⁵⁶ While this produced a rich vein of study for modern scholars, it arguably prolonged the conditions of epistemic destabilization that allowed frauds and forgeries to thrive. If we wish to avoid creating a similar situation in our own time, history may suggest that a more deliberate program of epistemological reinforcement is needed.

Action is urgent, as evidenced by the incredibly rapid rise of COVID-19 misinformation over the past year. This misinformation has been strengthened by conspiracy narratives that have been brewing on vaccine-doubting websites for decades.⁵⁷ The damage done to public trust by conspiracy narratives can hardly be underestimated, and their notorious resistance to all known techniques of debunking is particularly concerning. This is particularly true in democracies, where public opinion has a direct say in government.

The recommendations outlined in this paper charge ‘information sharers’ with responsibility for considering more than just their own degree of belief when deciding whether or not to share a piece of information, be that a report of an exotic new animal or a study purporting to show links between certain chemicals and health complaints. This means considering the broader epistemological context, assessing not only the veracity of particular claims, but also their place in the broader constellation of available information and misinformation. From a philosophical perspective, such a pragmatic approach requires

⁵⁶ See Margoecsy, “Certain Fakes”, 204.

⁵⁷ A. Kata, “A Postmodern Pandora’s Box: Anti-Vaccination Misinformation on the Internet,” *Vaccine* 28, no. 7 (February 2010): 1710.

moving beyond issues of epistemology or belief towards an ethics of information that regards facts as both mobile and mutable. The problem of misinformation cannot be addressed by a finer-tuned individual epistemology; it is a collective problem, and as such, must be tackled in relation to the broader situation.

The filter provided by ‘common sense’ – a rough initial judgement about whether or not a ‘fact’ is plausible – is a central defense against false information, both among scientists and the general public. As such, preventing the erosion of common sense is a matter of public interest. This filter, however, is vulnerable to a vicious cycle of erosion, particularly in times of abundant new information. Such times erode the ability of common sense to identify the plausible, and when common sense is weak, frauds and misinterpretations can travel farther and faster, expanding the range of the plausible in the public eye and eroding the edges of common sense yet further. In such situations, it is urgent to arrest the process by consciously rebuilding collective standards.

A focus on standards, rather than on belief or truth, has a number of advantages. One is that it recognizes the value of the speculative and the fictive. In the spirit of Margocsy, it is important to consider the role of ideas other than the strictly factual in stimulating intellectual inquiry. Another advantage is that where hypothetical and actual divides appear on matters of truth, both sides can potentially be convinced of their mutual interest in standards. This provides a possible route to self-correction; once common standards are re-established, greater consensus on matters of truth and belief are likely to follow. Such an approach provides a pragmatic roadmap for eventually reaching greater recognition of truth with minimal outside intervention.