ALGORITHMS AS CARTOMANCY
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When I said I wanted to discuss algorithms as a form of cartomancy I was, of course, being a bit provocative. One could argue that there is nothing more removed, more distant from the sterile, mathematical world of algorithmic calculations than the intuitive, rather unthinking world of tarot or card divination. And yet, one would be wrong.

It's the year 820 and Muhammad ibn Musa al-Khwarizmi finishes compiling the last tables of his Zij al-Sindhind, a treatise or 'system' to calculate celestial positions. al-Khwarizmi is an astrologer. But not just an astrologer. He is a mathematician, a geographer, a scholar. Born in the year 780 (or perhaps it would be more accurate to say "around the year 780" since the historical records show variations of a couple of years), al-Khwarizmi worked under the patronage of Caliph Al-Ma'mun of the Abbasid Caliphate. Around 820 AD he was appointed as the astronomer and head of the library of the House of Wisdom in Baghdad. [1]

To understand the importance of astrology during this period, I'm going to quote an essay from Marika Sardar from the Department of Islamic Art at The Metropolitan Museum of Art in New York: [2]

1. "Abu Ja'far Muhammad Ibn Musa Al-Khwarizmi." MacTutor History of Mathematics Archive. Accessed May 01, 2019. http://www-history.mcs.st-andrews.ac.uk/Biographies/Al-Khwarizmi.html.
2. Sardar, Marika. "Astronomy and Astrology in the Medieval Islamic World." In *Heilbrunn Timeline of Art History*. New York: The Metropolitan Museum of Art, 2000–. www.metmuseum.org/toah/hd/astr/hd_astr.htm (August 2011)

Astrology seeks to predict the influence of the heavenly bodies on events on earth, relying on understanding the movement of the planets and the ability to calculate their positions in the future. In this way, astrology was considered a branch of astronomy, and serious scientists all wrote astrological treatises. [...]

[A]strologers offered their services in bazaars, where anyone could pay for horoscope readings and predictions; and they were employed at royal courts, to help rulers decide such matters as when to announce an heir or launch a military campaign, or to predict the future state of their kingdoms. Horoscopes were also devised at the foundation of capital cities, such as Baghdad, capital of the Abbasids, and al-Mahdiyya, capital of the Fatimids, to foretell their futures.

The three tools of the astrologer were the astrolabe, used to determine the time by measuring the altitude of the sun or any visible stellar object, the ephemeris, a table that gives the positions of astronomical objects in the sky at a given time; and the dust board (takht), a tablet covered with sand on which calculations could be made and erased. Most astrologers learned their practice by studying with a master, acquiring a basic knowledge of astronomy and mathematics and the ability to use astronomical instruments.

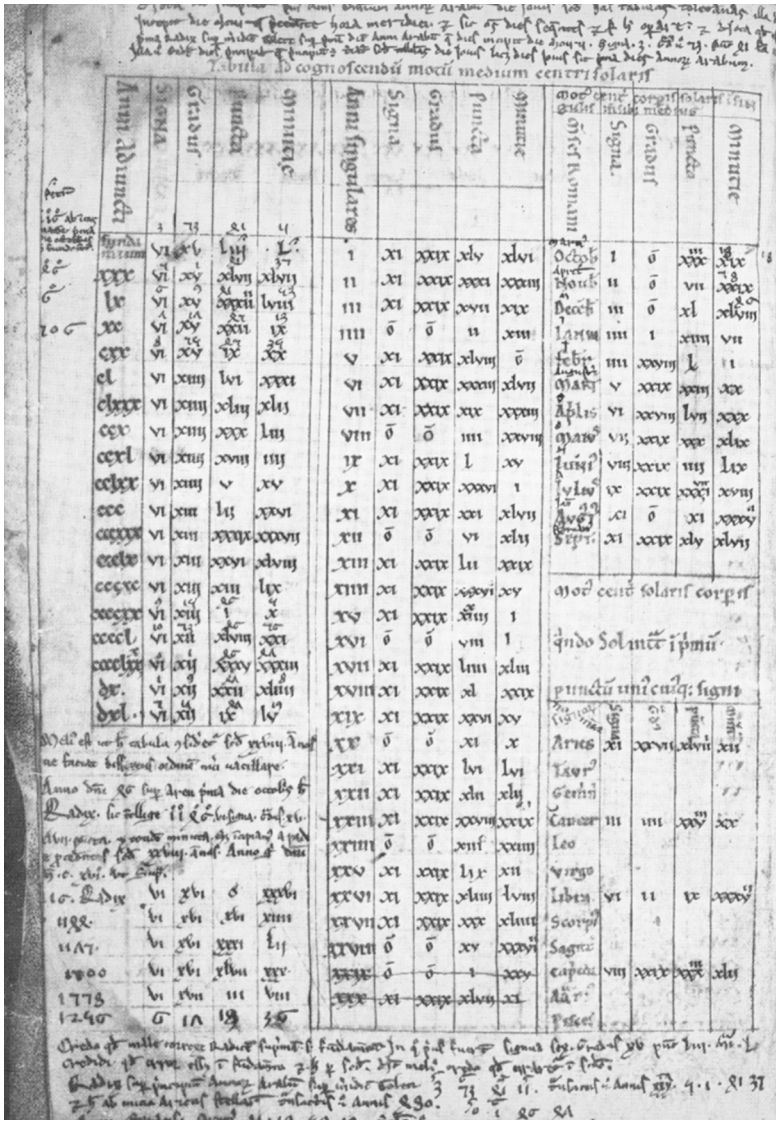
After taking the measurements and making their calculations, the astrologist would then interpret the signs and what they meant for the patron's future. (Incidentally, the planetary table I am showing here [see image on the right], from al-Khwarizmi's system is not the original because there is no surviving copy of this particular work in Arabic. We only have Latin copies made years after the fact when his work finally reached Spain and was translated into Latin, the language of science at the time).

Al-Khwarizmi contributions to mathematics, geography, astronomy, and cartography established the basis for innovation in algebra and trigonometry.[3] His systematic approach to solving linear and quadratic equation led to algebra, a word derived from the title of his 830 book on the subject: *The Compendious Book on Calculation by Completion and Balancing*.

Historians believe that Caliph Al-Ma'mun sponsored Al-Khwarizmi science because he liked to have his horoscope read regularly. He consulted his own astrologer before making any political decisions. The word algebra was derived from the title of his book *Al Jabr wa al Muqabilah* ('The Compendious Book on Calculation by Completion and Balancing').

But it is his surname, Al-Khwarizmi, which was Latinized by Spanish scholars and evolved to our present day 'algorithm'.

3. Mehri, Bahman. "From Al-Khwarizmi to Algorithm." *Olympiads In Informatics* 11, no. 2 (2017): 71-74. doi:10.15388/ioi.2017.special.11.



Page from *Corpus Christi College MS 283*. A Latin translation of al-Khwarizmi's *Zij*.

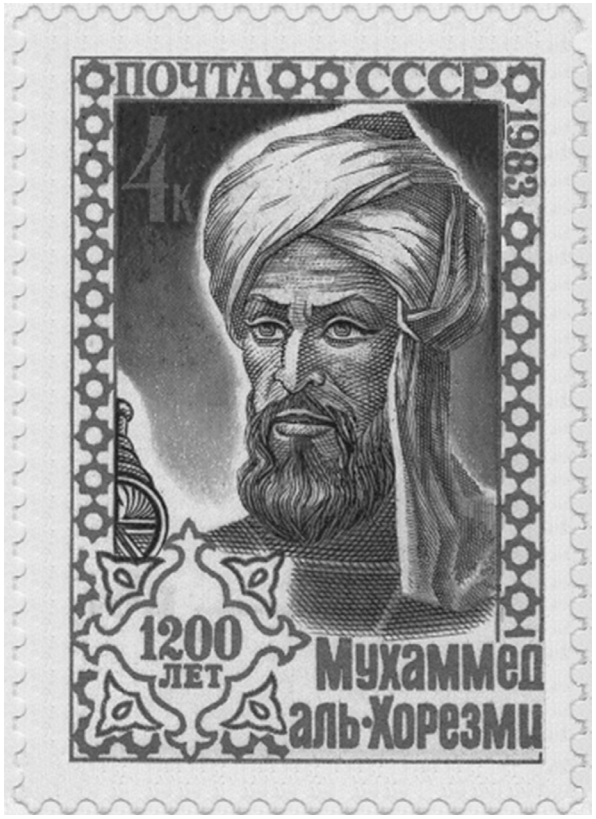
I'm going to quote briefly on this etymology from the Oxford English Dictionary:

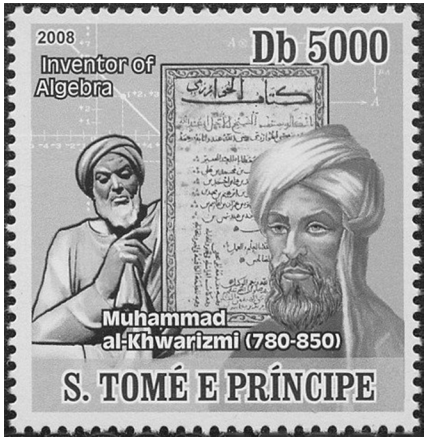
> *About 825, al-Khwarizmi wrote an Arabic language treatise on the Hindu–Arabic numeral system, which was translated into Latin during the 12th century under the title Algoritmi de numero Indorum. This title means "Algoritmi on the numbers of the Indians", where "Algoritmi" was the translator's Latinization of Al-Khwarizmi's name. Al-Khwarizmi was the most widely read mathematician in Europe in the late Middle Ages, primarily through another of his books, the Algebra.[16] In late medieval Latin, algorismus, English 'algorism', the corruption of his name, simply meant the "decimal number system". In the 15th century, under the influence of the Greek word ἀριθμός 'number' (cf. 'arithmetic'), the Latin word was altered to algorithmus, and the corresponding English term 'algorithm' is first attested in the 17th century; the modern sense was introduced in the 19th century4*

In English, the word algorithm was first used in the year 1230 and then later on it was used by Chaucer in 1391. The English language adopted the French term, but it wasn't until the late 19th century that 'algorithm' took on the meaning that it has in modern English.

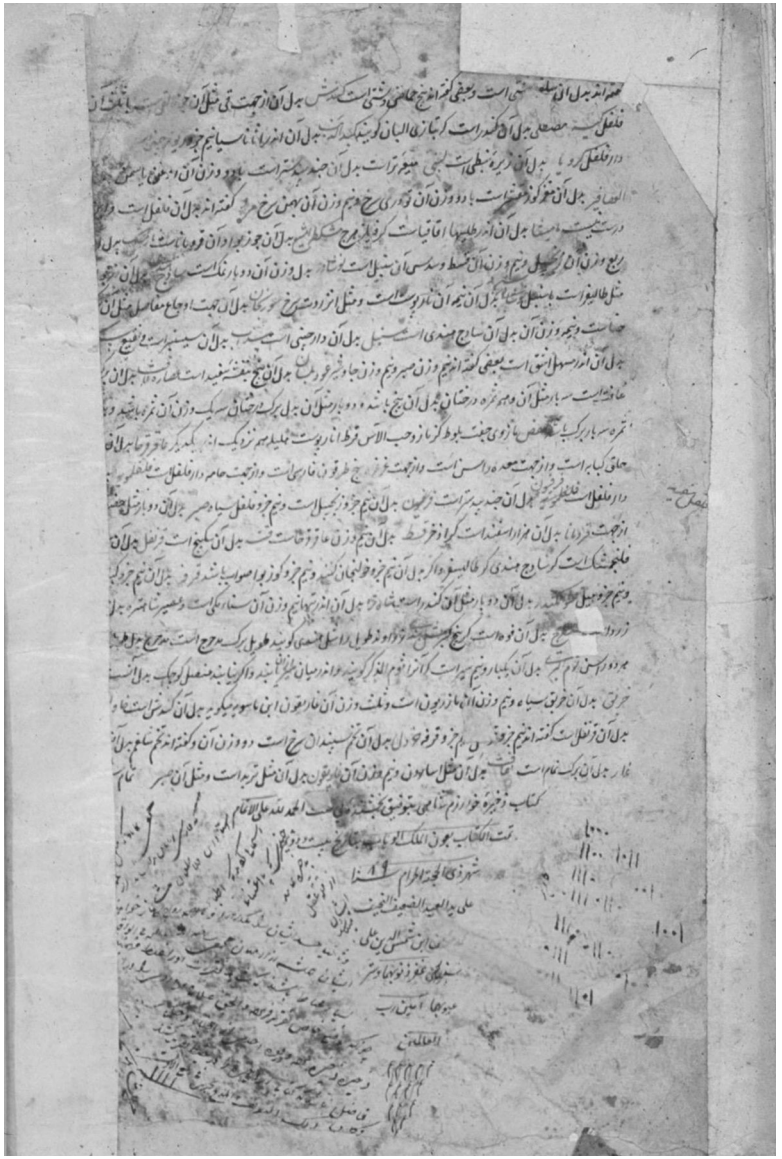
There is also a 1240 poem, under the title *Carmen de Algorismo* composed by Alexandre de

4. *Oxford English Dictionary*, Third Edition, 2012.





Al-Kwarizmi postage stamps.



The colophon of a copy of *The Treasure of Khvarazm'Shah* by Jurjani.

Villedieu: "Algorism is the art by which at present we use those Indian figures, which number two times five."[5] This poem is a few hundred lines long and summarizes the art of calculating with what were at the time a new style of Hindu numerals.

Now, the same academies that housed this transdisciplinary scholar who gave us algorithms and algebra also hosted scholars of Abjad science, the art of Arabic numerology which was used to predict the future, determine marriage compatibility and evaluate lyrical compositions by assigning a numerical value to each letter of the alphabet and using a system of additions and subtractions to obtain an index that would determine the outcome.

To complicate things even further in this fuzzy division between what constitutes science and what constitutes divination, around this time, it was common to practice an offshoot of astrology known as 'geomancy' which was based on reading patterns that can be compared to our contemporary understandings of sacred geometry. To illustrate this blurring of boundaries between what constitutes science and what constitutes divination, I managed to track a copy of this manuscript in the digital archives of the Islamic Medical Manuscripts collection of the US National Library of Medicine.[6] This manuscript, *The Treasure of Khvarazm'Shah*, written in the year 1100 is one of the first medical encyclopedias. The work

5. "Algorithm." The Programmers Book. Accessed May 01, 2019. www.theprogrammersbook.com/algorithm/.
6. "Islamic Medical Manuscripts : Catalogue - Encycolopedias 11-13." U.S. National Library of Medicine. December 13, 2013. Accessed April 29, 2019. www.nlm.nih.gov/hmd/arabic/E11_E13.html.

is composed of ten volumes covering ten medical fields: anatomy, physiology, hygiene, diagnosis and prognosis, fevers, diseases particular to a part of the body, surgery, skin diseases, poisons and antidotes, and medicaments.

In the margins of this manuscript, if you look carefully, there are some scribblings and this is the exact quote with the description from the Library of Medicine:

> *The colophon of a copy of The Treasure of Khvarazm'Shah by Jurjāni where it states that the copy was completed on 22 Dhu al-Hijjah 1089 [=17 August 1679] by a scribe named Muḥ ammad Mu'min ibn Shams al-Din 'Ali (with the last part of the name, the nisbah, not legible. In the margin there is a geomantic tableau for use in divination by a method known in Arabic as 'ilm al-raml (the art of the sand) and in English as 'geomancy'*

But it wasn't only Arabic and Persian scholars interested in blurring the lines between science and the more esoteric or occult topics. Closer in time, European scientists were in their own quest. To quote professor Dan Edelstein in the essay *Dark Side of the Enlightenment,* published by the Stanford Humanities Centre:

> *When most people talk about the age of enlightenment they are usually referring to a period in 18th century European history when logic and reason rose*

> *to supremacy. During this important period of cultural growth, public intellectuals like John Locke, Jean-Jacques Rousseau, and Voltaire dedicated themselves to solving perennial human dilemmas. They and their contemporaries gathered in salons and coffeehouses and exchanged volumes of letters in the name of sharing knowledge and improving the human condition.*[7]

Professor Edelstein researches an aspect of the Enlightenment that is unfamiliar to most people, the so-called 'dark side' of the Enlightenment. In his research, he described the differentiating factors. "The prevailing understanding of the enlightenment is one in which there was only scientific and rational thinking, but there was also a significant number of people contributing to the enlightenment who were absorbed in dubious scholarly pursuits like alchemy, mythology, astrology and secret societies," he writes.[8]

Perhaps the most famous and transcendental of these 'Dark Enlightenment Scholars' is Isaac Newton. Newton, born in 1642 was an English mathematician, physicist, astronomer, theologian, and author (described in his own day as a 'natural philosopher') who is widely recognised as one of the most influential scientists of all time, and a key figure in the scientific revolution. His book *Philosophiæ Naturalis Principia Mathematica* ('Mathematical Principles of

7. Stanford. "Dark Side of the Enlightenment." Stanford Humanities. March 24, 2014. Accessed April 29, 2019. www.shc.stanford.edu/news/research/dark-side-enlightenment.
8. Ibid.

Natural Philosophy'), first published in 1687, laid the foundations of classical mechanics. Newton also made seminal contributions to optics, and shares credit with Gottfried Wilhelm Leibniz for developing the infinitesimal calculus which is considered by mathematicians to be the foundational science behind algorithmic calculations. Newton is considered one of the founding fathers of Enlightenment and of modern science. He also wrote more than 3 million words on the occult, the supernatural, astrology and tarot.

For example, Newton extensively studied and wrote about the Temple of Solomon, dedicating an entire chapter of *The Chronology of Ancient Kingdoms Amended* to his observations of the temple.[9] Newton's primary source of information was the description of the structure given within *1 Kings of the Hebrew Bible*, which he translated himself from Hebrew. As a Bible scholar, Newton was initially interested in the sacred geometry of Solomon's Temple, such as golden sections, conic sections, spirals, orthographic projection, and other harmonious constructions. And in that sense, how different were his pursuits from those of the 11th century scholars in Persia and across the Arab world, combining astrology and geomancy to cast predictions about the future?

Upon his death, his heirs were terrified that these writings would come to light and tarnish his reputation as a proper scientist so they hid those

9. Stanford. "Dark Side of the Enlightenment." Stanford Humanities. March 24, 2014. Accessed April 29, 2019. www.shc.stanford.edu/news/research/dark-side-enlightenment.

papers which only came back to light in the late 19th and early 20th centuries. It was John Maynard Keynes, an economist who worked on financial prediction analysis in the 1930s who bought Newton's papers on esoterica and the occult and created an archive of them.

Grace Bobson, the woman who created the largest archive of Isaac Newton objects in the US was married to a man who was dead set on proving the evils of gravity. To prove these 'evils' he gave a Prize every year which Stephen Hawking won 3 times.[10]

The day before writing this lecture, I was commenting on my research on social media and I jokingly said that I feel that this paragraph contains a novel already. It is taken from an interview with author Sarah Dry whose research and scholarship compiled the occult writings of Newton in her book *The Newton Papers*. She says:

> *There's also Grace Babson, who created the largest collection of Newton objects and papers in America. She was married to a man who got rich predicting the crash of 1929. And Roger Babson [her husband] based his market research on Newtonian principles, using the idea that for every action there is an equal an opposite reaction. The market goes up so it must come down. Interestingly, he thought of gravity as an evil scourge. He had some relatives that drowned, and he thought that it was because grav-*

10. Mann, Adam. "The Strange, Secret History of Isaac Newton's Papers." Wired. June 03, 2017. Accessed April 29, 2019. www.wired.com/2014/05/newton-papers-q-and-a

ity pulled them down. So he started the Gravity Research Foundation, which went on to do research into anti-gravity technology. It was completely wacky, but it still exists today. An interesting note, though, is that it funds an essay prize, and Stephen Hawking won that prize three times.[11]

And the reason I am particularly interested in this side of Newton is precisely because of how 'rational' people will go on about astrology or tarot being invalid forms of knowledge and 'unscientific' while the man who set the basis for our modern understanding of science used them extensively as part of his daily practice and production.

While at the same time, many of these people who decry astrology or the occult as 'irrational' rely on a pseudoscience such as scientific racism to validate the creation of racial profiling algorithms to predict crime or political outcomes. It's the selective application of the label of 'pseudoscience' that interests me.

Newton was obviously a man with a vivid imagination and a creativity that transcended what we would today consider traditional science. He believed that god had created the universe as some kind of machine and as the drawings of the temple of Salomon attest, he was interested in the use of sacred geometry to prove his theory.[12] One could perhaps say that he was one of the first to think of our reality as computer generated. Newton was what at the time

11. Ibid.
12. Newton, Isaac. *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John: In Two Parts*. Charleston, SC: BiblioBazaar, 2007.

would have been considered a heretic. He had very strange and, dare I say, unorthodox views of religion and took to the Bible not with theological fervor but as a predictive technology, using stuff like the Book of Daniel to try to foretell the future.[13]

Also he left seeds of proto theories around ideas of infinite consciousness which are currently topics of exploration in physics and quantum theories, especially when he wrote "is not infinite space the sensory of a Being incorporeal, living, intelligent, omnipresent?"[14] If these manuscripts had been published, Newton would have gotten into serious trouble for going against Church doctrine, not unlike Galileo a few centuries earlier.

Incidentally, he predicted the end of the world for 2060 and left behind a detailed explanation of these calculations.[15] Scholars believe that these have informed the subsequent creation of scientific prediction models (dare I say, algorithms?). Newton may not have been referring to the apocalyptic 2060 event as a destructive act resulting in annihilation of the planet, but rather an event in which he believed the world, as he knew it, was to be replaced with a new one.

A few paragraphs ago I mentioned racial profiling. It wasn't a throw-away remark or something in passing. I said, "many of these people who decry astrology or the occult as 'irrational' will rely on a pseudoscience such as scientific racism to validate

13. Ibid.
14. Sambrook, James. *Eighteenth Century: The Intellectual and Cultural Context of English Literature 1700-1789*. Place of Publication Not Identified: Routledge, 2016, 8.
15. Newton, Isaac. *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John: In Two Parts*. Charleston, SC: BiblioBazaar, 2007.

the creation of racial profiling algorithms to predict crime or political outcomes." It was Carl Linnaeus who gave us the current taxonomies that are still in use to classify all forms of life. Linnaeus wasn't the first to attempt to classify the world but he certainly was the most successful since his system is still in use to these days.

Carl Linnaeus, considered the "father of modern taxonomy", born in Sweden in 1707 and died in 1778. He published the first edition of his Systema Naturae in the Netherlands, which in turn, became the foundational text of modern taxonomy. He, obviously a paradigm of modesty, used to describe his contribution to science as: God created, but Linnaeus organised.

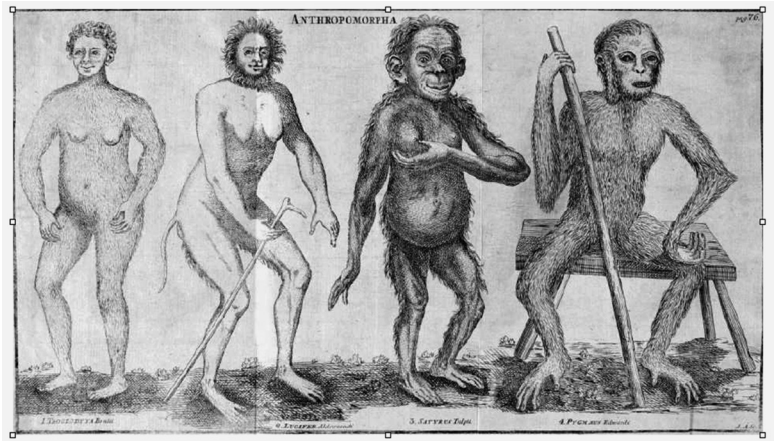
While Linnaeus developed a system to classify life forms (a binomial system no less, that pinned on us only two genders and tied sexuality into a knot for ever), which is to say, his influence on modern day science, cannot be overstated.

Carl Linnaeus was also an irredeemable, unforgivable racist. In the *Systema Naturae* (which I have to insist again, was first published in The Netherlands), Linnaeus labeled the "varieties" of the human race:

> *The Americanus: red, choleraic, righteous; black, straight, thick hair; stubborn, zealous, free; painting himself with red lines, and regulated by customs.*
>
> *The Europeanus: white, sanguine, browny; with abundant, long hair; blue eyes; gentle, acute, inventive; covered with close vestments; and governed by laws.*
>
> *The Asiaticus: yellow, melancholic, stiff; black hair, dark eyes; severe, haughty, greedy; covered with loose clothing; and ruled by opinions.*
>
> *The Afer or Africanus: black, phlegmatic, relaxed; black, frizzled hair; silky skin, flat nose, tumid lips; females without shame; mammary glands give milk abundantly; crafty, sly, lazy, cunning, lustful, careless; anoints himself with grease; and governed by caprice.*

The 'Monstrosus' were mythological humans which didn't appear in the first editions of Systema Naturae. The sub-species included the "four-footed, mute, hairy" Homo feralis (Feral man); the animal-reared Juvenis lupinus hessensis (Hessian wolf boy), the Juvenis hannoveranus (Hannoverian boy), the Puella campanica (Wild-girl of Champagne), and the agile, but faint-hearted Homo monstrosus (Monstrous man): the Patagonian giant, the Dwarf of the Alps, and the monorchid Khoikhoi (Hottentot). In Amoenitates academicae (1763), Linnaeus presented the mythologic Homo anthropomorpha (Anthropomorphic man), humanoid creatures, such as the troglodyte, the satyr, the hydra, and the phoenix, incorrectly identified as simian creatures.

It was Carl Linnaeus, with his "scientific racism" who allowed the ideologies that justified the enslavement of Africans, the genocides of Native Americans and



Carl Linnaeus' *Homo Monstrosus*

the colonisation of vast areas of the world due to the fact that "the white man" was superior to all the other races. It is through Linnaeus that the coloniser found validation in his sense of superiority to subdue all other races. Finally, Enlightenment-Era Europe had the intellectual basis to occupy, plunder, ravage and begin the centuries long process of resource accumulation that leads to present day capitalism.

And here I want to fully lay down the scope of the importance of this moment and how it has shaped the totality of human history. Scientific racism not only created the conditions that enabled slavery and the creation of an underclass for the purpose of labor exploitation, but its underpinnings justified genocides, wars and devastating colonial interventions.

A brief timeline of the legacy of scientific racism since it's foundation to now, an abridged and

edited version of the more extensive timeline that can be found at the project of The Eugenics Record Office at the Asian/Pacific/American Institute at NYU:

1759: Botanist Carl Linnaeus publishes the 10th edition of Systema Naturae, which is the first to fully describe the four races of man.

1828: George Combe publishes The Constitution of Man Considered in Relation to External Objects, linking phrenology and racial comparison.

1839: Samuel Morton measures the skulls of Native Americans and Black, enslaved people to compare them with measurements of white people expanding the field of phrenology.

1844: Scottish publisher Robert Chambers releases his Vestiges of the Natural History of Mankind, the most popular work of natural history prior to Darwin's Origin of Species. Chambers argues that each race represents a different stage of human evolution with whites being the most evolved.

1866: Physician John Downs defines "Mongolian idiocy" which he argues is a regression to the "Oriental stage" of human development.

1869: Francis Galton publishes Hereditary Genius, outlining his theories or human breeding.

1905: The German Society for Racial Hygiene is founded.

1905: Alfred Binet invents the IQ test for measuring intelligence.1907: The Eugenics Education Society is founded in Britain.

1912: The First International Conference of Eugenics is held in London, presided over by Charles Darwin's son Leonard.

1933: The Third Reich enacts the first German compulsory sterilisation law.

1933 to 1945: The Holocaust.

2003: North Carolina finally repeals its compulsory sterilisation law.

2014: New York Times journalist Nicholas Wade argues for race-based science in A Troublesome Inheritance.[16]

And this is a very, very brief summary of the legacy of scientific racism and how it has informed our politics since the 18th century onwards. It is always interesting to me how we hear a deluge of opinion pieces all over the media, from both the left and right, against the evils of 'identity politics' with nearly no contextualisation as to how these identities came to be and how their formation was foundational to notions of Statehood, capitalism and our understanding of hierarchies and social structures.

16. "Haunted Files: The Eugenics Record Office." AsianPacificAmerican Institute at NYU. Accessed April 29, 2019. www.apa.nyu.edu/haunted-files-the-eugenics-record-office-2/.

But Linnaeus taxonomies did not begin and end with the foundation of scientific racism. We also have to thank his Systema Naturae for our understanding of gender and sex. In Why Mammals are Called Mammals: Gender Politics in Eighteenth-Century Natural History published by Londa Schiebinger in The American History Review:

> *In 1758, in the tenth edition of his Systema naturae, Carolus Linnaeus introduced the term Mammalia into zoological taxonomy. For his revolutionary classification of the animal kingdom-hailed in the twentieth century as the starting point of modern zoological nomenclature-Linnaeus devised this word, meaning literally "of the breast," to distinguish the class of animals embracing humans, apes, ungulates, sloths, sea cows, elephants, bats, and all other organisms with hair, three ear bones, and a four-chambered heart. ' In so doing, he made the female mammae the icon of that class.* [17]

And, she adds:

> *Linnaeus's nomenclature is taken more or less for granted as part of his foundational work in zoology. No one has grappled with the social origins or consequences of the term Mammalia. Certainly, no one has questioned the gender politics informing Linnaeus's choice of this term. It is possible,*

17. Schiebinger, Londa. "Why Mammals Are Called Mammals: Gender Politics in Eighteenth-Century Natural History." *The American Historical Review*, 1993. doi:10.1086/ahr/98.2.382.

> *however, to see the Linnaean coinage as a political act. The presence of milk-producing mammae is, after all, but one characteristic of mammals, as was commonly known to eighteenth-century European naturalists. Furthermore, the mammae are "functional" in only half of this group of animals (the females) and, among those, for a relatively short period of time (during lactation) or not at all. Linnaeus could have derived a term from a number of equally unique, and perhaps more universal, characteristics of the class he designated mammals, choosing Pilosa (the hairy ones-although the significance given hair, and especially beards, was also saturated with gender), for example, or Aurecaviga (the hollow-eared ones).*[18]

And here I have to make an aside, inadvertently, the Comte de Buffon, a known adversary of Linnaeus at the time who scorned at this megalomaniac undertaking offered a peek into the enterprise of enlightenment in one of his rebuttals: *to divide nature's bounty into artificial groups. The bounty that was at the heart of the colonial project*. But to go back to Londa Schiebinger:

> *It is important to note, however, that in the same volume in which Linnaeus introduced the term Mammalia, he also introduced the name Homo sapiens. This term, "man of wisdom," was used to distinguish humans from other primates.*

18. Schiebinger, Londa. "Why Mammals Are Called Mammals: Gender Politics in Eighteenth-Century Natural History." *The American Historical Review*, 1993. doi:10.1086/ahr/98.2.382.

> *Thus, within Linnaean terminology, a female characteristic (the lactating mamma) ties humans to brutes, while a traditionally male characteristic (reason) marks our separateness.*[19]

It is then that we have these taxonomies to thank for the way women are both gendered and racialized: these classifications continue to inform what we see as acceptable standards of beauty, they inform the access to healthcare marred by body related stereotypes that carry a legacy of racial inequalities, and, as importantly, these taxonomical classifications are the basis for the systemic exclusion of trans women from the category of women. After all, if all that makes us women are breasts and reproductive functions, then who is allowed to call herself a woman and who is violently excluded from the pool of womanhood?

Soon after these taxonomies were set in motion, they became the cornerstone for early forms of databases, or proto Big Data projects before there were even digital means of archiving data. The census, then, as one of the early Big Data projects to classify and divide humans into rigid racial and gender categories, separating whiteness from everything else. Every form of data collection done by the State has made use of these racial and gender taxonomies. These taxonomies have informed government policy, aid, assistance programs, healthcare policy and a long list of etceteras that cannot even be covered in a single lecture.

19. Ibid.

And yet, it is all bullshit. All based on pseudoscience that created nonsensical divisions across non existent racial and gender lines based on the ideas of some 18th century man who had such a superiority complex that he considered himself "god's organiser". But here we are. Our algorithms, the entirety of the systems that form the backbone of our technologies and cultures operate on this pseudoscientific paradigms. And this is why I consider algorithms to be a form of esoterica, not different than cartomancy, astrology or prediction by sacred geometry. In all cases, all these technologies not only share a common origin as part of both institutions and individuals who pursued them vis a vis their interest in occultism but also because algorithms are generally viewed as infallible oracles that predict outcomes based on operations that remain inaccessible to the untrained eye.

In April of 2018, Edward Burmila, an assistant professor at Bradley University, wrote in The Nation:

> *Judging by the headlines, pseudo-scientific racism is making a comeback. Nineties-relic Charles Murray (The Bell Curve) is popping up on campuses and in conservative media outlets, much to the delight of those who think his graphs confer legitimacy to their prejudices. Atheist philosopher and podcaster Sam Harris is extolling Murray's highfalutin version of racist graffiti as " forbidden knowledge." New York Times' increasingly off-the-rails op-ed page gave genetics professor David Reich the opportunity to write that "it is simply no longer possible to ignore average genetic differences among 'races.'" And Andrew Sullivan, as ever, is fervently repackaging Gilded Age eugenics for a 21st-century audience. They and the "intellectual" tradition they represent have allies in high places now. When President Donald Trump told members of Congress in February that the country needed fewer immigrants from "shithole" countries and more from countries "like Norway," I did a double-take. Having studied what's now called "the racialist movement" that stretches from Charles Darwin to the outbreak of World War II, Trump's language was nearly identical to the rhetoric of Nordic superiority during that period.*[20]

I started this lecture with an introduction to the work of Persian mathematician and astrologer Muhammad ibn Musa al-Khwarizmi, whose contributions to the field of predictive technology were so important that the word algorithm itself carries his name. Yet, many of his areas of study, as well as the areas of studies of other similar scholars (including Isaac Newton, no less) are dismissed as pseudoscience and the realm of charlatans and carnival attractions. Astrology, tarot or the occult have no place in 'serious' predictive technologies. Yet, the racist ideas of these snake oil salesmen continue shaping our worldview and we carry them in our telephones, computers and game

20. Burmila, Edward. "Scientific Racism Isn't 'Back'-It Never Went Away." The Nation. April 06, 2018. Accessed April 29, 2019. www.thenation.com/article/scientific-racism-isnt-back-it-never-went-away/.

consoles every time an algorithm predicts who we are and what we like based on our ethnic, gender and class profiles.

Throughout this year I have undertaken a research project about the coloniality of the algorithm. Taking on Anibal Quijano's and Maria Lugones arguments about coloniality as an ongoing project that remains long after the coloniser left, I have tried to trace the many ways in which our contemporary technologies continue reproducing these epistemic models of occupation.

It is via Maria Lugones' *Coloniality of Gender* that I recall Anne McClintock's *Imperial Leather*, where she writes:

> *For centuries, the uncertain continents—Africa, the Americas, Asia—were figured in European lore as libidinously eroticized. Travelers' tales abounded with visions of the monstrous sexuality of far-off lands, where, as legend had it, men sported gigantic penises and women consorted with apes, feminized men's breasts flowed with milk and militarized women lopped theirs off. Within this porno tropic tradition, women figured as the epitome of sexual aberration and excess. Folklore saw them, even more than the men, as given to a lascivious venery so promiscuous as to border on the bestial.* [21]

21. McClintock, Anne. *Imperial Leather Race, Gender and Sexuality in the Colonial Contest*. New York, NY: Routledge, 2015, 22.

The uncertain continents! The territories to be occupied and plundered were viewed as uncertain continents which, given the topic of this symposium seems like a very apt framework. It is, perhaps, that an Eurocentrism that has claimed a hegemony on 'the rational' and 'the logical' requires its predictive technologies to be dressed under a veneer of science and 'enlightenment values'. The thinking, rational man cannot consort with the astrologer or the tarot reader. That is the realm of the unthinking, the savage, the uneducated, those of us who hail from the uncertain continents.

In *The Missing Chapter of Empire, postmodern reorganisation of coloniality*, Santiago Gomez asks: *"Is there only one world or are there various possible worlds?"* [22]

And I want to make some of his words mine when he says he wants to reformulate this question in the following way: is it possible to share a single world where many worlds are possible? Or to put it yet another way, is it possible to share a world where different ways of knowing that world can coexist and complement each other? A world where epistemological plurality can be recognized and valued?

Unfortunately, it would seem that the answer to these questions would have to be a 'no' because to this day, at least for the last 500 years, it has not been possible to recognize the epistemological plurality of the world. Like Gomez insists, and in this he echoes Quijano and Lugones, a single way of knowing the

22. Castro-Gómez, Santiago. "The Missing Chapter Of Empire." *Cultural Studies* 21, no. 2-3 (2007): 428-48. doi:10.1080/09502380601162639.

world, the scientific-technical rationality of the so called West, has been postulated as the only valid episteme. Like Walter Mignolo has also stated, all other ways of knowing the world have been relegated to the sphere of opinion or belief.[23] These beliefs, in turn are even considered an 'epistemological obstacle' to attaining the certainty of knowledge.

I want to end these musings on astrology, science and algorithms asking if, perhaps, science itself with its computational calculations based on racist interventions and stubborn attachment to artificially created categories is not what stands as an obstacle to the certainty of knowledge.

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23. Mignolo, Walter. *Local Histories/global Designs: Coloniality, Subaltern Knowledges, and Border Thinking.* Princeton, NJ: Princeton University Press, 2012, 9.