Machine Learning, Sociogeny, and the Substance of Race

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Declaration of Authorship

I Ramon Amaro hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

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Acknowledgements

This is all I have to give. These words, in summary, appear in the acknowledgements section of recording artist Seal's third studio album *Human Being* (1998). Over the years I have understood this emphatic declaration as an affirmative endowment of sorts — an edict, if I may, of how one might live in this world in order to expand their own lives and the lives of others. To give fully to ourselves, by giving as much as possible to the people, objects, and phenomenon around us is a difficult process, to say the least. It is the balance between what one needs and what one has to give that is the art. One can either give too much or too little; and often the sacrifice can be either too great to bear or the perfect opportunity to expand and grow. It takes an immense amount of courage, wisdom, and compassion to embark on this journey — battling with a single question at each moment of interaction: Is this all I have to give?

To give sometimes materialises as extraordinary generosity, a moment of care and concern, an action to resolve conflict, a letter, an email or a simple hello; or something that is particularly valuable for a PhD researcher, time. I am fortunate to have had a number of people in my life who have given and continue to give through varies combinations of care.

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Lastly, I would like to thank my mother, Phyllis Teresa Johnson. How lucky I am to have had you in my life. You were always full of wisdom and infinite amounts of joy. You taught me what love is. You taught me what courage is. You gave me everything — all that you had to give. I hope that I was able to give enough in return. I dedicate this work to you.

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Abstract

This thesis examines the relationship between machine learning, *sociogeny*, and race. Machine learning is understood here as an epistemic process that organises data into discrete spatio-temporal classifications. Following Kara Keeling, the thesis defines spatio-temporal classification as a coordinate that makes the racial imaginary possible, while itself eluding representation. Lastly, *sociogeny*, as defined by Frantz Fanon, is a 'sociodiagnostic' phenomenon that emerges at the ontological limit of the episteme, resulting in the discursive exclusion of the lived reality of racialised individuals.

The thesis argues that an immediate parallel can be drawn between the scientific production of knowledge, as established truths, and perceptions of otherness. While historically science and technology have worked to support racial classification, contemporary machine leaning algorithms have been shown, even unwittingly, to replicate existing race relations. The thesis contends that racial classification in machine learning is symptomatic of a wider logics of pathology, as well as enumeration — which, if taken as a spatio-temporal coordinate, arrests self-actualisation. By aligning machine learning with Fanon's notion of *sociogeny,* and the spatio-temporal coordinate, the thesis challenges views of a causal relationship between classification, racial position and psychic fragmentation. Instead, the thesis argues for an alternative view of *sociogeny* as a non-linear process, always-already in excess of racial perception under the conditions of duress. Ultimately, the thesis investigates machine learning as a methodological space to re-articulate the spatio-temporal coordinate and, in turn, affirmative black psychic generation.

For Phyllis

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Introduction

0.1: We believe in data

In the last decade, the use of machine learning for private and public use has risen exponentially. Numerous institutions around the world are turning to machine learning to gain a more granular understanding of individual and collective citizens, as well as broader social, political and economic environments. Inexpensive storage space, more advanced data capturing devices and agile databases have made the collection and storage of vast amounts of data more feasible and desirable by researchers and industry. In many ways we have become a society that feeds on data and information.[1]

It is believed that data can produce insights into processes and behaviours previously unseen — or unrealised — while also illuminating behaviours thought to be at odds with designated commercial, political and economic objectives. In many instances, it is hoped that these insights might materialise into new modes of operation that can help institutions close perceived gaps between their empirical objectives and actual operational efficiencies. At the same time, it is hoped that any knowledges gained from machine learning might also help reduce levels of uncertainty about the future of governance, not to mention institutional and social administration. As such, knowledge gained from machine learning can be particularly useful as an actionable step towards the prediction, prevention or alteration of otherwise contingent outcomes.

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[1] Witten, I. H., Eibe Frank, and Mark A. Hall. *Data Mining: Practical Machine Learning Tools and Techniques*. 3rd ed. Morgan Kaufmann Series in Data Management Systems. Burlington, MA: Morgan Kaufmann, 2011.

Machine learning algorithms rely on statistics and probability functions to derive target outcomes. In other words, they are executable operations comprised of mathematical formulae that learn from data to predict both specified and non-specified classifications. Nonetheless, the primary aims and objectives of most institutional and commercial bodies that adopt machine learning as a form of intelligence remains hidden from public view, even as the results of these initiatives work to justify public policies and procedures. In this way, machine learning algorithms become proxies for the co-ordination of power, including social, economic and governmental activities that have been shown to reduce the life chances of racialised individuals.

The convergence of machine learning and governance makes apparent how our over-dependencies on data often serve as a new iterations of social management, which I will argue reduces the dynamic, and often messy, relations of the social, including the re-enforcement of race and racial hierarchy. I discuss machine learning in great detail in Chapter 4.

As I show throughout, in their present form, machine learning algorithms are fallible to social discriminations, cultural biases, racisms, segregations and other reductions of life chances. I argue that machine learning, as currently used, echoes an abundance of alienation. For governance, this alienation is articulated as one of present and future uncertainty, which foreshadows a perceived necessity to predict and regulate existing forms of sociality. The individual, on the other hand, is denied independence from these logics of governance, which demand a continued adherence to the aspirations of power. As result, the self is organised in part by external logics of enumeration, which operates at the expense of a fully materialised self-actualisation.

In this way, data reinforces beliefs that contemporary life and individual and community behaviour can be reduced to one giant mathematical problem. However, what we are faced with is a tension between the desire to classify optimise social phenomenon and the re-production of existing forms of racism and violence. What I mean is that the data, although commonly viewed as a raw material to be experimented upon and analysed, is representative of the flesh. It is, as Kitchin writes, effective at 'abstracting the world into categories, measures and other representational forms —numbers, characters, symbols, images, sounds, electromagnetic waves, bits — that constitute the building blocks from which information and knowledge are created'.[2]

As Oscar H. Gandy, Jr. suggests: 'most public decisions these days are made on the basis of some analysis of data'.[3] This further challenges pre-existing social inequalities. In *The Panoptic Sort: Political Economy of Personal Information*, Gandy considers the roles data and enumeration play in 'the reduction of life chances' under what he terms 'a panoptic sort of data'.[4] Gandy conceives of the *panoptic sort* as a type of data that extends beyond general surveillance. The *panoptic sort* is an 'all-seeing' discriminatory apparatus that classifies individuals on the basis of their estimated economic or political value, and is continually optimised for the efficient transfer of value into data and information that, as I will argue, dislocates and reassembles racialised bodies under the spatio-

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[2] Kitchin, Rob. *The Data Revolution: Big Data, Open Data, Data Infrastructures & Their Consequences*. Los Angeles, California: SAGE Publications, 2014.

[3] Gandy, Oscar H. *Coming to Terms with Chance: Engaging Rational Discrimination and Cumulative Disadvantage*. Farnham, England; Burlington, VT: Ashgate, 2009, 4.

[4] Gandy, Oscar H. *The Panoptic Sort: A Political Economy of Personal Information*. Critical Studies in Communication and in the Cultural Industries. Boulder: Westview Press, 1993.

temporal objectives of institutions that maintain ownership over the circulation and classification of data.[5]

Gandy builds on Foucault's 1975 book *Discipline and Punish* to addresses the magnification of discipline on the racialised body.[6] Drawing on the concept of the panopticon, Gandy argues that the space of the prison is only one component of a wider distribution of power that leaks into the every day activities of commerce. These spaces, which are circulated through statistical classifications, are formed around institutional and commercial operations and consumer value. For Gandy, statistical classifications re-configure the universal position of surveillance, as they typically have a disproportionate effect on black and racialised individuals. As Haggerty and Ericson describe, 'the moving about between environments and activities that has become a key characteristic of post-modern life, has also become a source of value to be realised on the market for commodified information.'[7] As such, the classification of racialised bodies have become key components of capital exchange, as well health, education, and other institutional policies. I speak more on race and capital value in Chapter 2.

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[5] D. Haggerty, Richard V. Ericson, Kevin. "The Surveillant Assemblage." *British Journal of Sociology* 51, no. 4 (December 1, 2000): 605–22. https://doi.org/10.1080/00071310020015280. See also: Lyon, David. *Surveillance after September 11*. Themes for the 21st Century. Malden, Mass: Polity Press in association with Blackwell Pub. Inc, 2003.

[6] In his well-cited work, *Discipline and Punish,* Foucault uses Jeremy Bentham's concept of the panopticon to illustrate the regulatory effects of surveillance and disciplinary power. The panopticon was designed by Bentham to maximise the surveillant perimetry of prison guards while minimising direct control over detainees. To maximise guard visibility, the structure of the prison was re-organised in a circular layout with a control tower as the central focal point. In theory, a central tower would reduce the number of guards needed, as it provided complete and uninterrupted views of all prisoner cells along the inside circumference of the building. Individual prisoners were constantly subjected to bright lights originating from the tower, rendering their mundane activities visible, while also obscuring any view of the guards above. Spotlights prevent the prisoners from returning the surveillant gaze, and distances them from any corporeal forms of power, only abstract visibility. In this configuration, the every day activities of the surveilled individual is distributed as a mechanism of auto-regulatory control in the general population.

[7] D. Haggerty, Richard V. Ericson, Kevin. "The Surveillant Assemblage." *British Journal of Sociology* 51, no. 4 (December 1, 2000): 605–22. https://doi.org/10.1080/00071310020015280.

At this juncture, What is most apparent, and perhaps just as troubling, is that while altering (or in the case of race, maintaining) orders of perception, governance can also form new modes of objectivities that operate under the weight of data analysis in support of racial difference.[8] They furthermore shift accountability for these operations away from what Wynter describes as the production of a racialised substance of the social to the algorithm. Here, either the algorithm or the engineer is held accountable for the repetition of race and racism, while the substances of race that are a symptom of wider logics of enumeration remain untouchable and out of view. For instance, every day transactions, from credit card transactions, online payments and browsing habits, customer reward programmes, barcode scans, digital access points, biometric sampling to job applications and drug testing are just a few examples of the means by which blacks are targeted for exploitation, discrimination, redlining, criminality and suspicion, as described in the Introduction.[9] As Gandy suggests, any discourse on the *biopolitical* impact of data should therefore extend beyond the general sites of data aggregation. This is necessary to consider how the distribution of power aligns with the impositions of race and capitalism.

While racial discrimination in technology is nothing new, machine learning enables an unprecedented penetration of racial logics into the social milieu. These dynamics are clearly illustrated in the rapid adoption of machine learning algorithms for purposes of tracking, monitoring

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[8] See also: Barocas, Solon. "Data Mining and the Discourse on Discrimination." In Proceedings of the Data Ethics Workshop, 4, 2014.

[9] Seeta Peña Gangadharan defines data discrimination as the 'processes of algorithmically driven decision-making and their connection to injustice and unfairness in society'. Since algorithms are code that instruct computers to perform in certain capacities and data are discreet elements of our identity as representatives of the real, then it is safe to say that discrimination can be considered as a process by which data is continually instructed to drive unfairness into our cultural landscapes. In other words, what is articulated through data and machine learning are mechanism of power concealed as objective decision-making. See: Gangadharan, Seeta Peña. "Data and Discrimination: Collected Essays." New America: Open Technology Institute (2014). https://www.newamerica.org/oti/policy-papers/data-and-discrimination.

and other forms of surveillance. Machine learning can mediate the consistency of racist logics by positioning the black, brown, criminalised, and otherwise Othered body as always already sites of investigation. We see this most readily when machine learning algorithms produce racist and/ or discriminatory outputs on widely recognised digital platforms, even when these algorithms are not designed with these intentions. In this way, while the algorithm itself may not comprehend, computationally, the complexities of race or racism, they can be perceived as racist when outputs simulate existing racialised human dynamics. For instance, in a 2013 study researcher Latanya Arvette Sweeney found that when searching for so-called 'black sounding' names on Google search, Google's Adsense advertising algorithm (which uses advanced machine learning to tailor online ads to users based on individual search histories) would often display ads that suggest that certain black individuals are in possession of criminal records, even if they had never been arrested. On the other hand, Sweeney discovered that when searching for a so-called 'white sounding' name, the ad would not suggest criminality, even if the individual was in possession of a criminal record. While the ads do not explicit state innocence or criminality, they do insinuate either claim, while promoting further investigation into certain bodies that might not have otherwise prompted suspicion.

Other studies have indicated that pricing and other automated digital commerce systems display higher prices in geographical areas known to have large concentrations of Black and minority individuals.[10] Analysis of Google maps once indicated that searches for racist expressions, such as the 'n-word', directed users to then Pres. Barack Obama's residence at The White House. In another example, it was discovered that photo service Flickr's automated tagging service had mislabeled a Black woman under the category of 'monkeys', a racial stereotype often associated

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[10] Sweeney, Latanya. "Discrimination in Online Ad Delivery." eprint arXiv:1301.6822, 2013.

with Black people. These instances of algorithmic discriminations are not exclusive. They are part of a growing list of events that emerge with an increasing regularity.

When power does reveal itself through the algorithmic, it remains obscure while shifting accountability to the algorithm. In this sense, racial discrimination is often framed as algorithmic error or computational inefficiency that requires further capital investment in technological solutions. These mechanisms do not merely reinstate power. They are, as Sylvia Wynter argus, a *bioepistemic* relation that flows through systems of sociality while altering the very nature of racial perception. As I will show in Chapter 2, with the notion of the *bioepistemic* Wynter alerts us to the pervasiveness of epistemic forms of power, and how the production of knowledge becomes the principle weapon by which the body of difference is formed and re-iterated. These knowledges are enacted through sciences that serve as proxies for objective forms of truth and natural law.

Nonetheless, a key element of the *bioepistemic* is the substantiation of what Wynter calls the substance of race. According to Wynter, the substance of race is a pre-condition for the staging of white European males as a basis from which all difference is derived. The substance, backed by science, gives the white European male a fictive sense of position at the apex of species, and consequently an implicit and explicit sense of power over the Other. Again, I discuss this in more detail in Chapter 2.

Although Wynter speaks of science in more general terms as the weaponisation of the Eurocentric logics of racial difference, I argue that machine learning re-opens and re-instantiates these logics at

an precedented rate. Again, I detail how this process is possible through the adoption of machine learning algorithms in Chapter 4.

For now, I argue that a connection can be made between the notion of the *bioepistemic* and Foucault's formulations of *biopower*. In his series of lectures entitled 'Society Must Be Defended' (1984), Foucault warns against the preservation of empirical standards as a type of power or *biopolitics*, that is enforced through the ordering of space, the prescription of behaviour and disciplinary actions against those that do not adhere to the measures set forth.[11] By the second half of the Eighteenth Century, however, this power transformed into techniques that did not do away with discipline per se, but evolved into 'nondisciplinary' instruments dissolved into everyday social practices. Here, Foucault points us toward broader distributions of power that extend into civic operations, such as inspections, bookkeeping, reporting procedures, surveillance, and formal accumulations of data. In a readily cited passage on *biopower*, Foucault argues that 'after a seizure of power over the body in an individualizing mode, we have a second seizure of power that is not individualizing, but, if you like massifying, that is directed not at man-as-body but as man-as-species.'[12]

Foucault outlines a three node schematic that characterises our reliance on production of so-called *truth effects*.[13] First are the 'rules of right that power implements to produce discourses of truth'.[14]

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[11] Foucault, Michel, and François Ewald. *Society Must Be Defended: Lectures at the Collège de France, 1975-76*. Nachdr. Lectures at the Collège de France. London: Penguin, 2008, 243.

[12] Ibid., 243.

[13] Ibid., 24.

[14] Foucault, Michel, and François Ewald. *Society Must Be Defended: Lectures at the Collège de France, 1975-76*. Nachdr. Lectures at the Collège de France. London: Penguin, 2008.

These rule-governed and legitimated forms of power do not have single centres, but instead traverse, characterise and constitute the dynamic social body. They are emboldened by the normalising logics of species in accordance with classificatory operations that enact judgement, condemnation and the forced performance of mundane tasks. A key characteristic of these *truth effects* are illusions of transcendental embodiment, or imposition. What I mean is that what makes this type of power unique is the way in which the body becomes a mediator between ideological truth and subject formation. This is illustrated in the construction of race as a category through which phenotype can be understood in relation to the ideal subject to power. Illusions of ideal forms of subjectivity, according to Foucault, playa a central role in the invention of the straight European while male as the ideal 'figure of *Man*' — against which the Other is measured, sorted and arranged.[15] The fictive *Man* represents a change in the 'fundamental arrangements of knowledge', or that which instantiates the truth as an expression of natural law.

On this grid, the Other is constituted by relations that are on the one hand quantifiable, and on the other calculable in terms of their deviation from normalised standards of behaviour. In other words, for Foucault, order is that which brings the Other into confrontation with the law, and the Enlightenment values of clarity and transparency. As he describes in *The Order of Things* (1970), the Other is legitimated by exposure to values that link behaviours that are incongruent (or what I argue are *incompossible*) with the approximate averaging of things, 'in which fragments of a large number of possible orders glitter separately in the dimension, without law or geometry, of the

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[15] Ibid.

heteroclite… in such a state 'laid', 'placed', 'arranged' in sites so very different from one another that it is impossible to find a place of residence for them, to define a *common locus* beneath them all'.[16]

Foucault asks: 'What type of power is it that is capable of producing discourses of power that have, in a society like ours, such powerful effects?'[17] To answer this question, Foucault urges us to look beyond the ownership of power, and invest in the discovery of the real and effective practices of power, as well as the applicable effects these powers have on the constitution of the subject: 'In other words, rather than asking ourselves what the sovereign looks like from on high we are implored to discover how multiple bodies, forces, energies, matters, desires, thoughts, and so on are gradually, progressively, actually and materially constituted as subjects, or as the subject.'[18] Third, Foucault cautions against views of power as a phenomenon of mass or homogeneous domination, or as a power that looks on high through a chain of events. He writes: 'Power functions. Power is exercised through networks, and individuals do not simply circulate in those networks; they are in a position to both submit to and exercise this power. They are never the inert or consenting targets of power; they are always its relays. In other words, power passes through individuals. It is not applied to them.'[19]

I argue that the relation Foucault describes is a pre-existing arrangement that stages data as a *common locus* that rests beneath the displacement of the racialised. Data, in this sense, are more

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[16] Foucault, Michel. The Order of Things: An Archaeology of the Human Sciences. Repr. Routledge Classics. London: Routledge, 2007, p. xix, *emphasis in original*

[17] Ibid., 24.

[18] Foucault, Michel, and François Ewald. *Society Must Be Defended: Lectures at the Collège de France, 1975-76*. Nachdr. Lectures at the Collège de France. London: Penguin, 2008, 28.

[19] Ibid., 29.

than operative forms of value; they establish the values of difference as the subject and object of organisation. They organise space into 'interstitial blanks' (as Foucault calls them), or what I posit are sites of *incompossibility* that are constructed under the fictive relationship between difference and ideal models of species.[20] I elaborate on what I mean by *incompossibility* in Chapter 5.

For now, to a large extent, the distribution of these types of calculuses are also pre-conditioned by the fictive substances of race. Foucault is critical of discourses on race that centre displaced groups as the site of power, which he argues reinstates classifications of difference that portray racial distinction as contrary to the ideal model of *Man*. While attempts at intervening in racial discourse might produce some form of equitability, they also re-establish power as that which can regulate social behaviour. The illusion sets forth the conditions for the defence of certain racialised bodies over others as biological threats to natural, and therefore societal, equilibrium.

As such, the principles of race serve as calculable principles of Otherness, exclusion, and segregation.[21] Here society directs its attention (and intentions) inward in search of entities which might articulate disharmony or disorder, while simultaneously staging the conditions for incompatibility within wider ideals of harmony. Foucault argues further that these logics are distinct from any concrete justification for their operations, which widens the gap between the logics of exception and any real sense of understanding of these mechanisms by the public.[22]

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[20] Foucault, Michel. The Order of Things: An Archaeology of the Human Sciences. Repr. Routledge Classics. London: Routledge, 2007.

[21] Dixon-Román, Ezekiel. "Toward a hauntology on data: On the sociopolitical forces of data assemblages." *Research in Education*, 98, no. 1 (August 14, 2017), p. 44–58. https://doi.org/10.1177/0034523717723387.

[22] Foucault, M. in Senellart, M. and Ewald, F. (eds.) *Security, territory, population: lectures at the Collège de France, 1977-1978.* New York: Picador/Palgrave Macmillan, (2009)1984

An immediate parallel can be drawn between Foucault's outline of *biopower* and Frantz Fanon's accounts of subject formation — a proposal Fanon puts forth in his Tunis lectures arguably prior to Foucault's notion of *biopolitics*. While both Fanon and Foucault are concerned with the distribution of power, they diverge in their ideas on the initial conditions from which the Other is constituted. On the one hand, Foucault presupposes a more general distribution of the means of power that brings the Other into view. Although Fanon does not mention Foucault explicitly, he is critical of discourse that prioritises the means of subjection as universally embodied.

As I will argue in Chapter 1, Fanon places particular emphasis on colonialism and the naturalisation of race as the basis from which all sociality is understood. Here, the racialised subject does not enter into a universal relation with the category. Instead, the categorical is not only what allows the operations of power to unfold, but the precise location through which the colonised body is excised from the category of human. Fanon is clear in *Black Skin, White Masks* that the logics of exclusion, as well as the epistemic operation of categorisation — or what he describes as a 'drama' of discovery — precedes the Enlightenment principles of ideal subjectivity. This composition extends beyond the corporeal body and into the universal perception of blackness, which is exposed by stereotype and emboldened by the distributed power of interpellation. It re-articulates the framing of life and death, put forward by Foucault, as that which instead exhausts simultaneously within the composition of the colonised. The colonised body, in this sense, lives as a universal form of history yet is exposed as the negation of life itself in the physiological expression of the present.

Although Fanon's comments on technology are limited, he does suggest that the fragmented body is not a passive vessel.[23] The collision between the fragmented body — as a racialised object — and the technical object articulated a relation of inequitable power distribution, as well as a site of contestation. For Fanon, technology can be a means by which colonised body can auto-generate new forms of radical subjectivity. For example, he references the CCTV (closed circuit television) camera as a localised form of surveillance on the every day activities of colonised Algerians. Here, he pre-empts panoptic *biopolitics* by pointing towards the dissonances between the identification of social deviancy and the continual monitoring of public and employee activities as suspicious, and potentially criminal.

The camera, he argues, serves as a unidirectional eye which sees all but can never be gazed back upon. Fanon shows that while the camera is installed and made visible by shop owners under the explicit premise of customer theft deterrence, it also organises the spaces of employee labour. Employees are monitored by an interrupted stream of their movement and actions within the shop. Fanon notes, however, that in response to the explicitness of managerial oversight, employees often used the means available to them to perform acts of resistance. This often materialised through acts that would disrupt the operations of power, such as taking unexpected sick leaves, displaying boredom, and being late or not showing up at all for work shifts.

While these actions might appear passive, Simone Browne argues that they can also be intentional means of contestation.[24] The result is what Simone Browne calls *digital epidermalization*, or methods

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[23] Fanon comments on social diagnosis and the embodied effects of surveillance practices in a section of notes on a series of lectures titled 'Le contrôle et la surveillance,' translated in English as 'Surveillance and Control'. See: Simone Browne, *Dark Matters: On The Surveillance of Blackness.*

[24] Browne, Simone. *Dark Matters: On the Surveillance of Blackness. Durham*: Duke University Press, 2015.

by which power is exercised through the disembodiment of the Other under the gaze of surveillance and other technologies.[25] Here, Browne demonstrates the fragility of the technology gaze which is enacted under the alienating logics of truth and categorical reasoning. Nonetheless, in doing so, Browne builds upon the dissonant relationship blacks have had historically with Anglo-centric technologies. As Browne argues, understanding this relation is fundamental to any discourse on surveillance and the ethics of technology. This is particularly important considering the prevalence of discourse today that centres the technical object as the subject of investigation without thorough (if any) insight into how technology shapes social space.

In *Dark Matters: On The Surveillance of Blackness,* Browne returns to Fanon as a point of departure to consider how anti-black violence has helped shape technical knowledge and surveillance, while simultaneously rendering black bodies as non existent. In the Introduction, Browne describes a correspondence she initiated with the Central Intelligence Agency (CIA) and the Federal Bureau of Investigation (FBI) concerning any documents the US government held on Frantz Fanon during his travels to the United States to receive treatment for myeloid leukaemia at National Institutes of Health Clinical Center in Bethesda, Maryland. Fanon was a patient at the Center from October 10, 1961 until his death on December 6, 1961 at the age of thirty six.

In response to her Freedom of Information Act (FOIA) request, Browne received three declassified files from the FBI. In the files were a newspaper clipping about Fanon, a memo marked 'secret', a book review of David Caute's 1970 biography *Frantz Fanon,* filed under 'extremist matters', and other previously classified documents that mentioned Fanon's potential influence on Black Panther

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[25] Ibid.

Party members and 'amongst young [American] Negroes'. The FBI files — which Browne notes are heavily redacted — form traces of US government surveillance activities against black radicalism, including details on Fanon's physical presence in the United States, as well as any intellectual and visual influence he may have had on black youth. In his biography of Fanon Caute notes that the files held on Fanon were described as 'extremist matters' with the theorist profiled as being 'no friend of the United States or of a free society'[26]

The detail of these files are in contrast to the more obscure files released by the CIA under the same act. The CIA exercised Executive Order 13526 in response to Browne's FOIA request, which allows the agency to 'neither confirm nor deny the existence or nonexistence of requested records'.[27] The repose states that 'the fact of the existence or nonexistence of requested records is currently and properly classified and is intelligence sources and methods information that is protected from disclosure.'[28] It is here that Browne argues against public spaces that are shaped by and through whiteness, which works to through acts of normalisation, code and disciplinary measures. Data enacts a new form of power, through which prejudicial practices become sites where fear and terror are realised. While the black body, as the subject of these operations, is restricted in terms of social, political and economic access, they are also asked to wilfully participate in their own regulation.

It is interesting to reflect on this regulatory exchange, what Browne calls her stalled 'surveillance of the records of the FBI's surveillance', the 'willful absenting of the record and the state's disavowal of

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[26] Browne, Simone. *Dark Matters: On the Surveillance of Blackness. Durham*: Duke University Press, 2015.

[27] Ibid., 1.

[28] Ibid., 1.

the bureaucratic traces of Fanon,' and how data takes shape as state power.[29] Notable are the

points at which the existence of the corporeal body is rendered human only in as much as it

maintains a wilful compliance to technological governance. Here, to exist as a black being in the

public realm is to avoid punitive redaction from the public sphere, which Browne posits is part of a

long history of attempts to regulate the classification and declassification of the black body.[30]

By connecting data to power and knowledge, researchers can be implored to consider how data

might replicate the immediacies of racism and discrimination. As Browne has shown, the logics of

classification are enduring in their ability to stall the building of self-knowledge in the present while

also regulating the existence of certain bodies, even after death. They also speak to the immediate

shaping of public space.

Fanon is insistent that any discourse on the relation between the corporeal body and its

environment is impotent without due consideration of how this relation regulates the humanness

of black beings. As I have shown, the colonial *episteme* presupposes the generation of being as

always already available for categorisation. It more so, positions whiteness as the baseline of social

and phenotypical measurement, as well as the fundamental principle against which one can be

classified as human.

In this sense, one might think of classification as an epistemic judgement over life and death. In

contrast to early-modern colonial occupation, Mbembe argues that high technology tools, or the

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[29] Browne, Simone. *Dark Matters: On the Surveillance of Blackness. Durham*: Duke University Press, 2015.

[30] Ibid., 6.

'spoils of modernity' — such as the gunboat, steam engine, submarine telegraph cables, railroad infrastructures, and so forth — have been weaponised throughout history to enact full unmitigated rights over segregation and the death of subjugated populations. These rights, Mbembe argues, are distributed to institutions as well as citizens as exercises of power and sovereignty. He writes: 'To exercise sovereignty is to exercise control over mortality and to define life as the deployment and manifestation of power'.[31] This power enables 'the generalized instrumentalization of human existence and the material destruction of human bodies and populations'.[32]

While the colonial operations are largely conceived of as an operation of history, in Mbembe's view, what might be thought of as the distant past is indeed another stage of imperialism that involves the configuration (and I argue, reconfiguration) of key technologies for colonial aims.[33] Informed by Arendt's account of the seizing and delimiting of territories by nazi regimes during the second World War, and segregation in apartheid South Africa, Mbembe elaborates on the function of colonial expansion as a historical consistency of segregation, mass discretisations of space, and

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[31] Mbembe, A. "Necropolitics." *Public Culture* 15, no. 1 (January 1, 2003), p.12. https://doi.org/10.1215/08992363-15-1-11.

[32] Ibid.

[33] Anne McClintock makes a distinction between the logics of imperialism and the operation of colonialism, as the two are often conflated. In *Imperial Leather,* McClintock explains that: 'Imperialism is not something that happened elsewhere—a disagereeable fact of history external to Western identity. Rather, imperialism and the invention of race were fundamental aspects of Western, industrial modernity.' She goes to further describe the nuances of imperialism and colonialism:

> European imperialism was, from the outset, a violent encounter with preexisting hierarchies of power that took shape not as the unfolding of its own inner destiny but as untidy, opportunistic interference with other regimes of power.

Unlike the common conception of imperialism and colonisation as merely a system of labour exchange, imperialism is much more than that. It is bound to the spaces of every day life. It is useful to consider, then, that imperialism is an action that involves the extension of power by the acquisition and discretisation of territories. Colonialism, on the hand, is the the expression of imperialism in every day life. As I will argue later, Mbembe extends this framework of power into the unfolding of restrictions of movement to implement separations along the model of the discriminatory state, where:

> a patchwork of overlapping and incomplete rights to rule emerges, inextricably superimposed and tangled, in which different de facto juridical instances are geographically interwoven and plural allegiances, asymmetrical suzerainties, and enclaves abound.

human extermination. In this way, technologies enable the *spatio-temporal* re-positioning of the Other into new sets of social, economic and political relations. This, what Mbembe calls the politics of exception, grants rights of life and protection to the most dominant, while sanctioning the death of those outside of the category of normality. The *necropolitical* process reinforces the boundaries of separation that produce hierarchies and distribute sovereignty as forms of life.

Violence and subjection, in this sense, are articulations of the colonial imaginary, and are furthermore predicated on the blueprints of fragmentation, identity, and death as *necropolitical* consequence of imperialist ideas. Mbembe writes that this exercise:

> involves the setting of boundaries and internal frontiers epitomized by barracks and police stations; it is regulated by the language of pure force, immediate presence, and frequent and direct action; and it is premised on the principle of reciprocal exclusivity.[34]

We see throughout Mbembe's work how the historical process is linked to notions of technological advancement and terror, taking seriously the critique of actionable operations of reason as the state of exception with endless justifications for the 'concatenation of multiple powers: disciplinary, *biopolitical*, and necropolitical'.[35] The presence, and consistency, of these powers is totalising, regularised and endlessly shifting in their approach to subjection. Mbembe expands on Foucault's concept of *biopower* to consider how the splintering of populations creates a further divide

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[34] Mbembe, A. "Necropolitics." *Public Culture* 15, no. 1 (January 1, 2003), p.26 . https://doi.org/10.1215/08992363-15-1-11.

[35] Ibid.

between the individual's ability to self-generate (or in terms of *necropolitics*, self-terminate) and the distribution of the colonial fantasy of sovereignty:

> The objective of this process is twofold: to render any movement impossible and to implement separation along the model of the… state. The occupied territories are therefore divided into a web of intricate internal borders and various isolated cells.[36]

Similar to Mbembe, in 'Necrologies' (2011) Eugene Thacker extends the notion of exceptional life under the conditions of perpetual insecurity — a life that is 'constantly rendered in its precariousness, a life that is always potentially under attack and therefore always an exceptional life'.[37] Thacker builds upon Giorgio Agamben's concpet of *bare life* to reconceptualise what we think of as *biopolitics* to emphasise the ordering of the body politic and its recurrent resurrections. Thacker draws a link between the biopolitical order and the medicalisation of the human body. Within the the necrological operation, Thacker argues, the proper functionality of the political body is to protect itself from the threat of dysfunctionality, and as such is continually attempting to preserve its own life, while discretising the body into the parts that pose threats to the whole. Building on the continuity between *biopolitics* and *necropolitics*, Thacker suggests that the neoliberal notion of politics operates through the continued folding of what he calls the 'whatever-life' into biological sovereignty into 'forms of nonhuman life that are the agents of attack'.[38]

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[36] Ibid.

[37] Thacker, Eugene. "Necrologies; or, the Death of the Body Politic." In *Beyond Biopolitics*, edited by Patricia Ticineto Clough and Craig Willse, 139–62. Duke University Press, 2011, p.158. https://doi.org/10.1215/9780822394235-006.

[38] Thacker, Eugene. "Necrologies; or, the Death of the Body Politic." In *Beyond Biopolitics*, edited by Patricia Ticineto Clough and Craig Willse, 139–62. Duke University Press, 2011, p.159. https://doi.org/10.1215/9780822394235-006.

My intention here is not to engage in a type of technological or social reactionism. Instead, I argue that Fanon's work on pathological alienation can be adapted in the present moment to re-articulate our present understandings of data, and in turn re-imagine how machine learning might be viewed outside of representation. I draw on Fanon to consider how any discourses today on machine learning (as well as race and machine learning) might be always-already predicated on the exclusion of the Black body. My ultimate aim is to consider whether any echoing of racism and racial hierarchy might not be a problem of mathematics, but a symptom of a larger exclusionary exercise that predates machine learning technology. What I hope to reveal is how the black psyche might affirmatively auto-actualise within racialised systems.

I extend upon the profound solution Fanon sets forth in *Black Skin, White Mask,* where he argues that the legitimacy of the racial imaginary can be disrupted through auto-actualisation, when the individual takes on a psychic refusal to representation. For Fanon, the individual, both black and non black, who refuses to stay in past representation or consider the present as definitive is disalienated, or lodged free of oppressive representation. This idea has a considerable impact on contemporary thoughts concerning big data. Fanon's radical humanism asserts that the reclamation of individual freedom is found by prioritising the future, whereas data prioritises the past as a prediction of a future that exists only by mathematical certainty.

Fanon's disengagement with historical circumstance is crucial in considering the capacity to adopt a resistance to representation. It suggests a responsibility for the individual to 'travel' through the dynamic creation of subjectivity to (re)imagine new representations and ways of living. I argue that this process, although not void of historical influence, is not only a necessary element of freedom

but a politics in itself, particularly as data becomes an increasingly important factor in the social and political subjection of the individual.

The psychic implications of this 'certain uncertainty', in Fanon's words, is what I want to examine in this contemporary space.[39] Machine learning's convergence with the black psyche can then be understood as a relation of pre-established categorisation by which practices of power, as well as black psychic generation might be examined more closely. As I will show, machine learning is a fairly 'young' technology, which has increased in popularity in the last few decades. As the latest, and move sophisticated technological invention of our time, I argue that it is through machine learning that we might gain new methods by which black psychic generation might be liberated from negating forms of power. Fanon argues that possible resolutions to negation are found in invention — not in the form of the object such as gunpowder or the compass, but though accounts of one's own lived experiences.

More so I am interested in how the conditions of these relations collide with the potential for self-actualisation, and the re-building of social spaces. In its present form, machine learning can in many cases paralyse the processes of self-actualisation. In this sense, mathematical rule sets and symbolic reasons take priority over the fostering of human conviviality. Furthermore, an unmitigated weight is placed on data through the valorisation of difference, which necessitated the re-invention (or re-imagining, I should say) of the anthropomorphic dilemma between the classification of nature and the embodiment of the logics of normalcy. Here, as I argue throughout the thesis, in order to understand how we can release data from the racialising effects of truth and order, we must first

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[39] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 463.

understand how data and machine learning have emerged as a proxy for individual and collective decision-making.

I contend that while these concerns appear to be recent instalments in the historical trajectories of race and technologies — particularly given the exponential increase in machine learning devices and debates on automation and big data — they are underwritten by a much larger genealogy of racial sorting, as well as the distribution of *bioepistemic* modes of control. To separate these trajectories is in itself connectionist, and does little to displace the complexity of the relation between discrete human-machine elements and the universal substances of racial hierarchy that contribute to the conditions that make the techno-social possible. Nonetheless, the genealogy of these forces deserve unpacking, if only to build a foundation upon which new approaches to the techno-social, black being, and being black in the techno-social, can emerge.

It is useful to consider machine learning as more than a technological tool. To the contrary, machine learning should be viewed as an iteration of empirically reinforced racial organisation — one that penetrates the very fabric of our existence, while positioning false perceptions of one another other as objective forms of knowledge.

I argue that any actions required to mitigate these concerns are situated beyond an ethical or regulatory framework. What is needed is a methodological shift in the way we view data and machine learning as remedies to social problems. I ask, to what extent can Fanon's pathological schema be useful in the study of machine learning? Is it possible to make use of the black psychic

scheme to problematise existing discourse in machine learning research and theories of race? This thesis serves as a starting point to unravel this problematic.

0.2: Approach and method

This thesis takes the position that the lived experience of race are not produced by machine learning algorithms, but are instead substances mediated by machine learning as a contemporary iteration of technological development. It also contends that the use of machine learning for this aim is part of a wider logics of control by means of scientific enquiry and categorisation. In the thesis I attempt to excavate these lines of thought to expose what Frank Apunkt Schneider and Günther Friesinger call the 'source code', or the interior of the modes of operation, that I argue expose the conditions underlying the presence of racism in machine learning algorithms. As I will argue, these conditions inform the spatio-temporal order of the colonial imaginary, disseminated as a racialised order of information. In this way, the colonial imaginary is a logic of relation that is actualised as a type of 'blueprint', using Schneider and Friesinger's term, of *spatio-temporal* ordering of race. The blueprint includes the signs, symbols, rules, codes and motivations behind the engineering of the social in the image of colonial design.

I contend that racial classification is based on a principle of constant exploitation that is made operational by technology and others systems of knowledge production. Because the principle aim of colonialism is to acquire power, it is advantageous for colonial systems to limit knowledge, regulate possession, and control the distribution of goods and knowledge. As Fanon reminds us, they possess the necessary military and technological apparatuses to enforce these limits. These apparatuses are then instrumentalised until the colonial system is satisfied that any capital or

intellectual exchanges within its proposed spaces of relation are conducted to the specifications of the original colonial blueprint.

The strategy of the blueprint is part of the larger method of *reverse engineering.* The term *reverse engineering* originates from the field of mechanical engineering.[40] In mechanical engineering, *reverse engineering* can be described as the prediction of what a product or process should do, followed by modelling, analysing, dissecting and experimentation of its actual performance.[41] Schneider and Friesinger stage *reverse engineering* as a beneficial method that can be used outside of mechanical engineering to gain direct access to digital technologies, including existing operations therein. This is achieved through a process of 'analysing an existing object or system by laying out its construction plan to then rebuild it in every detail'.[42] I quote Schneider and Friesinger at length:

> When technology is hidden from us, by manifesting itself as mere 'design' or a set of controls, we are kept at a distance. We are barred from the arcane knowledge of the engineers and programmers that pulsates within the artefact. And when repairs or modifications are needed, we are relegated to customer service and specialists. Only they have the legitimate right to open, check and repair our tools, gadgets and apparatus. To the extent that we are unable to understand the inner workings of our tools, we are also dependent: upon the tools themselves and upon the heteronomous structure that was

[40] Schneider, Frank Apunkt, Friesinger, Günther. "Technology vs. Technocracy: "Reverse Engineering" as User Rebellion - Preliminary Thoughts on *paraflows .7*" in Friesinger, Günther, Herwig, Jana. Symposium "Open. Dissect. Rebuild.," and Paraflows, eds. *The Art of Reverse Engineering: Open - Dissect - Rebuild*: [Based on the Symposium "Open. Dissect. Rebuild.," Which Took Place 2012 in the Context of the Paraflows Festival in Vienna]. Kultur- Und Medientheorie. Bielefeld: transcript-Verl, 2014.

[41] Kutz, Myer, ed. *Environmentally Conscious Mechanical Design.* Wiley Series in Environmentally Conscious Engineering. Hoboken, N.J.: John Wiley & Sons, 2007.

[42] Schneider and Friesinger.

erected for their maintenance… [By reverse engineering], we can thereby free

technology from all the alienation which we experience again and again in its

heteronomous use, turning it against the technocracy to which we are subjected when

we utilize technology in accordance with the political and economic interests of those

who provide it.[43]

In this way, *reverse engineering* creates a kind of rupture. It has the power to suspend the

production of the object; to open new opportunities to 'look inside' existing objects in order to

rebuild alternative relations. At the same time it proposes a type of distance from the object that

arrests the capture of the durability of the original design. In this sense, I contend that it is not

enough to simply suspend, dismantle and observe technologically re-enforced racism. There is an

opportunity in reverse engineering to enact a type of 'user rebellion' that can materialise into new

psychic positions in the act of re-organising space.

I take the conceptual leap to consider the above in relation to contemporary anxieties with

machine learning. I contend that machine learning manifests itself as a set of controls from which

we are set at a distance. At this distance we are barred from knowledge of its interior, which is kept

by a select few engineers. I argue that this distance produces a certain alienation between machine

learning algorithms and the people that is enacted again and again. The relation is more so

imbalanced. As I will demonstrate, machine learning algorithms can reveal the interiority of human

behaviour (what I argue in this thesis is part of an individual's psychic generation) without revealing

its own interior source code.

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[43] Friesinger and Friesinger, 10.

As such, machine learning can provide access to the interiority of the public inline with political and economic interests, while simultaneously prohibiting access to the specifics of those aims. In this way, the social becomes an artefact that is observed in a scientific investigation or experiment, and machine learning is utilised as the tool by which the social is organised to achieve these objectives. Furthermore, I argue that the interiority of human in relation to machine learning is not a universal experience. As I will argue throughout, the conditions that make machine learning possible are already predicated on experiments with human sorting and spatio-temporal organisation. It is therefore necessary to re-visit the conditions of organisation and sorting to reveal any hidden logics that contribute to the designs of racialised spaces.

Ultimately, I aim to adopt *reverse engineering* as a method to creatively appropriate the blueprints of power against it as a type of user rebellion — one that 'allows for modifications and adjustments to new demands and requirements'.[44] In this way, *reverse engineering* as method is a demand or claim to open up, explore and ultimately modify existing artefacts of race according to one's own requirements. The excavation demands that the operations of power in this context not be taken for granted. Therefore, a close reading of the interior of black psychic genesis and the colonial imaginary, as well as the wider genealogy of calculation and machine learning, are necessary to uncover relations that remain obscure. Lastly, I use these knowledges to propose new ways to rebuild the artefacts of race outside of existing terms of relation.

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[44] Ibid.

Having established an initial overview of my arguments, in the next part of this chapter I provide an overview of the chapters throughout the thesis.

0.3 Chapter organisation and overview

The thesis is organised into the following structure:

Chapter 1

In Chapter 1 I introduce the theoretical framework of the thesis and the research questions. I also explain the overall approach to the research. The aim of the chapter is to contextualise the thesis, as well as establish its point of departure. I outline the major ontological themes found in Frantz Fanon's work, *Black Skin, White Masks*. In the text he introduces the concept of *sociogeny*, which I argue is fundamental to understanding not just the *why* of colonial expansion, but the *how* as well. *Sociogeny* places colonialism in line with the ontological refusal to account for black existence. Fanon argues that this refusal is self-justificatory. It validates its own existence by reducing blacks experiences to categories of lower species. Here, the black man is seen as an object, or a 'nonbeing'. The ontological refusal re-instates its position of power with the help of science, including the field of psychiatry. The sciences aid in installing empirical methods for the purposes of validation and control. The aim was to empirically validate racial hierarchy as Divine provenance. Once fully materialised, Fanon argues that empiricism opened a pathway to capital exploitation, which was enacted primarily through technical objects, infrastructures, and regulatory measures. It is here that I argue that a current technical object such as machine learning might reveal similar modes of exploitative operations, as well as opportunities for resistance. Having established the context of the thesis, I propose that we return to *sociogeny* and the human colonial relation to investigate the modes of operation found in machine learning.

Chapter 2

In Chapter 2, I aim to discover how the non-black being — the *prototypical* white being — has come into existence in metaphysical ontologies of being. I consider Sylvia Wynter's return to philosophies of origin, where she builds a critical link between the search for being, the Divine, and the sanctioning of black ontological dissociation.

In her essay, 'Human Being as Noun? Or *Being Human* as Praxis? Towards the Autopoetic Turn/ Overturn: A Manifesto', Wynter elaborates on the legitimating structures of colonial hierarchies, and the 'indispensable condition of the formation and stable replication of each respective societal order'.[45] Wynter draws on Fanon's depiction of black existence as dynamic and 'hellish cycle' or 'infernal circle' of anticipation and colonial violence.[46] Wynter describes the genesis of this cycle as an *autopoetically instituted* living system that frees human knowledge of its physical and biological realities. In the *autopoetically instituted* system, human knowledge is substituted for order-stabilising and order legitimating codes of symbolic forms of life. In other words, human life is replaced by empirical forms of reality.

Autopoiesis, a term introduced by Humberto Maturana, Francisco Varela and Ricardo B. Uribe, connotes a system that is capable of creating and sustaining itself. *Autopoiesis* is a symbolic view of the relation between an organism and its medium. The researchers posit that *autopoiesis* is a way of describing living systems. On a basic level, the notion of a*utopoiesis* involves an organised network of processes and the production of interrelated components. The components are

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[45] Sylvia Wynter, 'Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto'. Durham and London: Duke University Press, 2015.

[46] Ibid.

continuously regenerated and transformed through an autonomous system of interaction. They also specify a specific spatio-temporal arrangement.

An *autopoietic* system also extends to cognition. Maturana, Varela and Uribe theorise that cognition can be thought through as an *autopoietic* living system that is self-maintaining. In general, cognition refers to the assimilation and use of knowledge, and as such is limited to beings with complex nervous systems.[47] In this way, cognition can be adjusted by adjusting the internal parameters of the system. Furthermore, Maturana, Varela and Uribe argue that the relation between an organism — including cognition — and its medium is correlated through perception.

By applying *autopoiesis* to the colonial imaginary, Wynter attempts to demonstrate how certain forms of anti-black knowledges are constituted and self-maintaining. She situates her enquiry in the ontological question of origin, and the recurrent reinstatement of self-ordering and symbolic codes that constitute knowledge within this context. Her critique begins with the fictive invention of the Anglo-European *Man* as the apex of species. She describes the dissemination of these fictive narratives as a 'heresay' that reinforces self- justificatory acts of *ethnophenotypical* sorting of any being other than *Man*. Futhermore, Wynter suggests that colonialism functions as a recurrent self-maintaining system that enacts what she calls the *perceptual categorization* of e*thonophenotypic* people. The medium of *perceptual categorization* enables the management, organisation and regulation of racialised people. In this way, I draw closer to validating Fanon's claim that colonial perception is a discursive practice that is exclusive of black existence.

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[47] John Mingers, 'The Cognitive Theories of Maturana and Varela', *Systems Practice*, 4, 4, 1991.

Chapter 3

In Chapter 3, I attempt to disassemble Wynter's *bioepistemic* by mapping the genealogy of data. My aim is to reveal any logics of discrete classification, regulation and organisation that might mirror the colonial operations Fanon and Wynter describe. First, I map early advances in statistics and data accumulation, particularly from within the natural sciences. I argue that these practices open critical pathways to the accessibility and potential applications of social data. I consider early movements in the philosophy of mathematics, particularly those that emphasise biological and social phenomena. Throughout the development of statistical modelling, natural events tended to generate symbolic or empirical shapes that were approximated by mathematical functions.[48] Examples of these are mortality indexes and formal models like the Guassian or Normal Distribution in mathematics. In later advances, however, symbolic representations coincided with moral and religious ideas. These practices materialised into a *moral science* that used the patterns found in biological data to justify the existence of the Divine. Knowledge of these patterns suggested a Divine provenance expressed through mathematics. With an empirically reinforced provenance in place, I demonstrate how the *ethnophenotypic* sorting of the Other — and the violences that ensued — could be both justified and anticipated.

I argue that the genealogy of data accumulation and statistics is important, since it is widely thought that our contemporary desire for data finds its origin in contemporary data-reliant companies, such as Google, Facebook or Amazon. To the contrary, the conditions for these companies, as well as their operations, were already set forth by a wider Anglo-European fixation on discretisation,

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[48] Schutt, Rachel, and Cathy O'Neil. *Doing Data Science*. First edition. Beijing; Sebastopol: O'Reilly Media, 2013.

patterning and classification. The genealogy also speaks to an overriding tendency to manage and regulate social movement with the assistance of data and the normalising logics of order.

Chapter 4

Statistics, data and symbolic mathematical logics are the primary operational functions in machine learning models. In Chapter 4, I extend the reach of the thesis to investigate machine learning as a contemporary system of discretisation, patterning and classification. I argue that what we know today as 'Big Data' is part of a longer historical practice of data accumulation. I question whether our present obsessions with data are truly unique to the conditions of contemporary culture. To gain insight into this question, I excavate the genealogy of statistics to reveal a wider logics of enumeration. Although early data practices were motivated by amateur interests, as statistical methods gained popularity they were appropriated by various government bodies as mechanisms by which populations could be organised and administered.

My goal — given the roles of *bioepistemic epidermalization* (Wynter/Fanon) and *white prototypticality* (Gordon) — is to understand what capacities machine learning has to reinforce or reinstate the colonial imaginary. As Adrian Mackenzie argues, 'Machine learners today circulate into domains that lie afield of the eugenic and psychology laboratories, industrial research institutes, or specialized engineering settings in which they first took shape'.[49] In this way, machine learning can be understood as a device that operates within a relation of *bioepistemic* ordering and forms of *prototypicality*. Despite these impositions, I contend that any articulation of race, as by machine

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[49] Mackenzie, Adrian. *Machine Learners: Archaeology of a Data Practice.* Cambridge, MA: The MIT Press, 2017, 6.

learning algortihms, are symptomatic of a larger logics of enumeration. I argue that racial logics can be disrupted our ontological and perceptual view of the individual, collective and technical object.

In Chapter 4, using reverse engineering methods, I disassemble the mathematical functions behind machine learning, including its operational logics. I take the definition of machine learning as a point of departure. First, I note the significant ambiguity in expert definitions of machine learning, which vary depending on use, objective and location. Machine learning, however, play a key role in deriving insights from data. These insights are often used for a number of commercial and institutional aims. While these aims motivate additional research in the field, few researchers question the origin of the mathematics underneath machine learning. In this way, as I argue, machine learning is often viewed as a functional tool, rather than a process of reduction and symbolic organisation. I show the difficulty in delineating machine learning techniques from other computational and statistical methods, such as artificial intelligence, pattern recognition, computer science, and deep learning. As I argue in Chapter 4, machine learning can be viewed as more of an ensemble of mathematical methods than a distinct field of research.

Nonetheless, recent advances in machine learning methods have helped accelerate the development of other techniques that also benefit from data rich environments. Whereas most statistical and early machine learning methods are useful in linear environments, they are less adept at classifying nonlinear data structures. By data structure, I mean a particular way of organising data so that it can be used more efficiently to accomplish certain aims. A data structure is said to be linear if the elements forms a sequence, such as an arrays, lists, and queues. In contrast, nonlinear data structures do not form a sequence, which makes the data more useful for binary trees. Binary

trees, for example, are useful for forming data hierarchies, often in parent-child relations. The

principle idea of data structures is to reduce the complexity of tasks in terms of space and time;

space complexity being the total space taken by an algorithm with respect to the input size, and

time complexity being the estimated time it takes for one iteration of an algorithm.

For example, artificial neural networks are powerful types of nonlinear machine learning model.

They are at the basis of robot vision and autonomous land vehicles. Artificial neural network

models are made nonlinear by the sigmoid or activation function. In biologically inspired neural

networks, the sigmoid function is usually an abstract representation of the rate of neuronal firing

activity, which is typically a binary process. In Chapter 4, I show how the sigmoid function is used to

solve complex (nontrivial) problems, including machine perception. In machine learning, perception

can be defined as the capacity to interpret data in a manner that is similar to the way humans

sense and relate to the world. In biologically inspired neural networks, the sigmoid function brings

the model closer to performing this function. Neural networks are, therefore, better able to

interpret visual input patterns than linear machine learning models.

Chapter 5

In calculus, a branch of mathematics, the sigmoid function is a differentiable function, meaning it is

the derivative of a real variable that exists at each point in a given domain. A derivative is a linear

approximation that measures dynamic changes in output values with respect to input values. A

differentiable function must be continuous. As such, a function is said to be continuously

differentiable if the derivative is itself a continuous function. In Chapter 5 I disassemble the ontology

behind differential functions, which are mathematical functions that power sigmoid functions and, therefore, artificial neural networks.

An important discovery in Chapter 5 is the ontological origin of the differential function, which powers the sigmoid function and, therefore, artificial neural networks. As I show in Chapter 3, Leibniz not only formalised the correlation between biological phenomena and statistical patterning, I argue in Chapter 4 that he also created differential calculus. In Chapter 5 I show that the ontological motivations behind Leibniz's calculus. I argue that differential calculus is motivated by the ability to create linear estimates of otherwise non linear events in space and time. Leibniz's ontological concern is in the dynamic relation between the part and the whole within designated domains of space and time.

In *The Monadology,* Leibniz rejects Descartes's materialism, or the view that everything exists in physical form.[50] Descartes's principle favours matter over mind. For Descartes, the mind is merely an instrument that the individual uses to ascertain truths in their relation to the world. Leibniz, however, posits that the mind and the physical form are two distinct non-dualistic domains. He argues that the mind — which includes perception — cannot be explained mechanically, and thus cannot be physical processes. Instead, the mind and any perception of the world must be one, single domain or conscious being of 'I'. He suggests that the mind and perception are extensions of a single 'perfect' substance. In this context, any relation between perception and the world — which he argues is also comprised of distinct parts - are also extensions of a single substance. I elaborated on Leibniz's argument in Chapter 5. To summarise, an important component of Leibniz's claim is his

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[50] Leibniz, Gottfried Wilhelm. *The Monadology.* New York: Prometheus Books, 1992.

articulation of the relation between distinct parts in a whole domain. Leibniz accounts for the relation between distinct parts (as well as their characteristic differences) by arguing that — while appearing to be self-organising — are, to the contrary, interacting in a *preestablished harmony,* which is set forth by the simple substance of the Divine.

In this sense, the differential is an important invention in the history of philosophy, as well as mathematics and machine learning. It substitutes individual difference for a symbolic language that not only reduces interrelation to a single substance, but also situates any perceptual view of the world, or any *spatio-temporal* arrangements within it, within a determinacy. Here, I questioned how nonlinearity perception in artificial neural networks might rebuild the relation between the colonial imaginary and the *bioepistemic* relation.

Chapter 6

The thesis concludes in Chapter 6 by building on Fanon's concept of *sociogeny* to propose potential openings for a non linear study of race and technology. The chapter establishes critical links between Fanon's psychic schema and non linear machine learning models. I contend that the black individual resides in a pre-existing milieu which may harbour, but is not limited, to active modes of racism and discrimination, or what I call, borrowing from Wynter, the substance of race. I find interest here in the ways in which black people hold the capacity for self-actualisation within systems larger autopoietic systems, and how self-actualisation might generate new perceptual fields of relations.

I draw on Gilbert Simondon's concept of *psychic and collective individuation* to argue the the reconciliation of black being, as such, does not deny historical fragmentation, but is instead generated through incompatibility and the contradiction of being, as opposed to a closed system of feedback and entropy. Simondon argues that 'psychic and collective individuation incessantly and persistently creates being as it advances, maintaining in each created or individuated scope of being'.[51] I locate my argument here to suggest that although *incompossibility* brings forth a consistency of relations between objects (be they human, technological, or structural), these relations are not pre-determinate. To the contrary, *incompossibility* presupposes the material presence of difference. Perceptions of difference the preconditions of relation which occur prior to recognition or visual coherence.

Third, this thesis seeks to understand duress as an affirmative catalyst for resistance, exciting a latent potential in black individuals and communities. Simondon argues:

> In a theory of the phases of being, becoming is something other than an alteration or a succession of states comparable to a serial development. Becoming is in effect a perpetuated and renovated resolution, an incorporating resolution, proceeding through crises, such that its sense is in its center, not at its origin or its end.[52]

Simondon urges us to reject perceptions of causal foregrounding in favour of an object relation that prioritises the full spectrum of sensation. Here, objects and processes are perceived as causal

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[51] Scott, David. Gilbert *Simondon's Psychic and Collective Individuation: A Critical Introduction and Guide.* Edinburgh: Edinburgh University Press, 2014, 77.

[52] Scott, David. Gilbert *Simondon's Psychic and Collective Individuation: A Critical Introduction and Guide.* Edinburgh: Edinburgh University Press, 2014, 223.

foregrounds and backgrounds are instead viewed as sensations of fragmentations that are already

present within the conditions of psychic development. In Chapter 6 I argue that these

fragmentations (what Fanon articulates as alienation) can be conceived as, instead, as coherency in

itself. I contend that a coherency, as such, is always-already present in the internal perception of

fragmentation and cannot be reduced to the gaze of the Other or the fictive substances of race.

The ultimate aim of the chapter is to propose a methodology by which an affirmative non linear

and non representational black individual and collective psychic genesis might actualise.

Chapter 1: Sociogeny and black psychic alienation

Introduction

The aim of this chapter is to introduce a framework through which we can consider the interior relation between individuals and racialised ecologies. To begin, I briefly describe the overall context of black psychic genesis, and its primary point of departure: Frantz Fanon's autobiographical work, *Black Skin, White Masks* and the concept of *sociogeny*.[53]

I begin the chapter with an overview of Fanon's first major work, *Black Skin, White Masks*. The goal of this chapter is to establish the theoretical context of the research, namely Fanon's notion of *sociogeny* — which I describe in more detail later. Throughout the chapter I consider the relationship between *sociogeny* and the generation of the black psyche generation. As I argue, throughout, *sociogeny* — as a context through which the generation of black being can conceptualised — might provide alternative ways to conceptualise the contemporary relationship between race and machine learning. The link between *sociogeny* and machine learning is not immediately apparent, but it is my intention to provide further clarity on the relation between the pathological organisation of the black psyche, the organisation of the social (as facilitated through machine learning), and the discretisation and racial sorting. I argue that psychic generation, particularly the pathological schema problematised by Fanon in *Black Skin, White Masks*, offers further insight into the problem of race and black psychic genesis, and how this might be re-inforced, even unwittingly, by machine learning applications. I contend that Fanon's psychic scheme, if

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[53] Fanon, Frantz. Black Skin, White Masks. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

thought through as a non linear process of psychic generation, as opposed to a negation of self and environment, can provide new concepts of relation between the contingent capacities of machine learning algorithms and the actualisation of more affirmative black modes of perception.

I describe the specificities of these claims in more detail in the pages to follow. For now, I want to take Fanon's exploration of the black psyche as a point of departure to establish a consistency between *sociogenic* process, and the arresting of affirmative black psychic genesis. As I will argue, it is necessary to return to *sociogeny,* and both its pathological and empirical relations, if any attempt at disrupting the durability of racial sorting and the negation of black being in techno-racial ecologies. By techno-racial, I mean the materialisation (and most often the production) of discriminations, prejudices, and reductions of life chances that emerge at the intersections of race and technologies that aid in the perception of blacks and the environment from a scientific point of view. The techno-social is key to what I posit are the conditions that exist prior to any present engagements with data and machine learning models.

As I will show, Fanon had already situated the problem of race as a problem of exclusion, as well as the arresting of black psychic potential. For Fanon, any ontological consideration of psychic genesis, human development or social praxis are epistemological deficient if they do not recognise racism and colonialism as the cause of the disproportionate relation between social development and the black psyche.

In the sections to follow, I reverse engineer Fanon's schema in an attempt to first identify the limitations of colonial representation; and secondly to recapture the genesis of the black psyche. By

'recapture', my aim is to demonstrate that the limits of Fanon's schema are inherent in the limits of linear causality, namely that between racial sorting and black psychic genesis. Instead, my goal is dismantle the schema in order to rebuild it as a relation that can reveal more affirmative modes of psychic generation. As I will argue in Chapter 6, this would require a new relation between the black psyche and technology — which I contend is possible through the liberation of machine learning models from present modes of linear perception. The process would require a revision of the concept of human, a new humanism, which — as Fanon argues — is out of reach for the racialised individual under existing colonial structures.

For now, it is important to provide an overview of the conditions that have informed Fanon's schema, which are documented in his autobiographical work *Black Skin, White Masks*. I then discuss the relation between Fanon's psychic schema and scientifically re-enforced social organisation. Finally, and in no particular order, I dismantle Fanon's ontological revisions of key concepts in psychoanalysis, as well as ontologies of being.

1.1: We can neither confirm nor deny black existence

Frantz Fanon was one of the most extraordinary figures of the decolonial struggle which took place after the Nazi occupation of France in the 1940s. Between 1939 and 1943 he received his secondary education at a private school (*lycée*), where he was taught by Aimé Césaire, the founder of Négritude.[54] As Azzedine Haddour notes, he was nurtured on the values of French culture and was a member of the black middle classes.[55] However, he left his home in Fort-de-France, Martinique in 1943 — at the age of 18 — to enlist in the Free French Forces, an exiled

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[54] Fanon, Frantz. *The Fanon Reader: Frantz Fanon.* Edited by Azzedine Haddour. London: Pluto, 2006.

[55] Ibid.

government led by Charles de Gaulle during the Second World War.[56] He believed' in the fiction of assimilation', or — as Haddour suggests — a naive sense of belonging in French society.[57] This might explain his decision to join The Free French Forces to support resistance efforts in France during the Nazi occupation, despite his official classification as a French colonial subject. In other words, Fanon's nationalist sentiments overrode the realities of his racialised position as a colonial subject.

Fanon was increasingly dismayed by the anti-black racism he and the other non-white soldiers experienced. He was not only confronted with a new found awareness of his exclusion from a predominantly white French society, but was also embittered by the shattering of his own delusions of being and belonging. This was apparent in Fanon's repatriation to Martinique after the defeat of the Nazis. Despite being awarded the French *Croix de guerre* for bravery, he and other non white soldiers were sent to the French province of Toulon before being returned home to their respective colonies. These moments were crucial for Fanon's psychic development (interestingly from within the context of war and violence). He experienced first-hand how Europe's global conquest fundamentally changed the scope of oppression. Not only did European colonial expansion function through the acquisition of capital, greed for land, and the forced labour of millions, but it also operated on the level of the psyche. Fanon was dismayed by the role psychiatry played in the revising historical narratives.

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[56] Munholland, Kim. *Rock of Contention: Free French and Americans at War in New Caledonia, 1940–1945.* New York: Berghahn, 2005.

[57] Fanon, Frantz. *The Fanon Reader: Frantz Fanon.* Edited by Azzedine Haddour. London: Pluto, 2006.

The conquest of land has culminated into what Hussein Abdilahi Bulhan calls the 'occupation of psyches' that has re-enforced the self-aggrandisement of the European position.[58] This infiltration of global space, time and the pathological has given rise to what Fanon articulates as a Manichean world occupied by distinct 'species' of men: masters/slaves and the colonisers/colonised. The question of oppression, according to Bulhan, is 'primarily a problem of psyches confronting each other in society'.[59] He was also critical of psychiatry's abandonment of the colonised individual, which Fanon argues helped secure the European hold over other lands and their inhabitants.

Having failed to assimilate in French society, he returned to France in 1947 to study psychiatry at the University of Lyon, where he successfully completed and defended his thesis in 1951. He published his first work — his doctoral thesis — *Peau Noire, Masques Blancs* (*Black Skin, White Masks*) that same year. Although *Black Skin, White Masks* was one the first critical bodies of work that investigated the psychosocial effects of colonialism, Fanon diverges from traditional psychoanalysis to make radical assumptions that challenge ontological investigations into what it means to be human, which Fanon argues is exclusive of the lived experience of black and colonial subjects. The text is unique in its dramatic unfolding of the relation between racial perception and the *colonial episteme*. More so, it sets the preconditions for the exclusion of black being as a problem of ontology. I describe these dynamics in detail, particularly as they relate to the fragmentation of the psyche within consistencies of domination. As Fanon states: 'Although I had more or less concentrated on the psychic alienation of the black man, I could not remain silent about certain things which, however psychological they may be, produce consequences that extend

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[58] Bulhan, Hussein Abdilahi. *Frantz Fanon and the Psychology of Oppression*. PATH in Psychology. New York: Plenum Press, 1985, 101.

[59] Ibid., 118

into the domains of other sciences'.[60] I posit that *Black Skin, White Masks* can be read as

methodological text centred on what Fanon describes as the 'the lived experience of the black

man'.

Having provided the autobiographical conditions that informed Fanon's development of his psychic

scheme, I now turn to the actualisation of the black individual's relation to race as one that is alway

already a problem of spatio-temporal organisation.

1.2: The spatio-temporal organisation of the black body

One of the underlying advantages of Fanon's work are the associations he makes between the

spatio-temporal organisation of racialised bodies and the epistemic operations of colonialism. By

spatio-temporal organisation, I refer to Kara Keeling's argument that the ontological predicament of

the black man [sic] is situated at the epistemological limits — or what she calls the *co-ordinate* — of

the colonial imaginary. Here, the colonial world 'shackles life to the past as a way of rationalising

colonial existence' while also reinstating the black's inferiority.[61] I elaborate on this argument in

Chapter 2 when I discuss the *spatio-temporal* ordering and the production of colonial perception.

For now, as Fanon posits, racism is not a constant of the human spirit. It is produced and enacted in

obedience to the 'flawless logic' of a culture that 'draws its substance from the exploitation of

other peoples'.[62] He describes the disposition of racism as a latency of psycho-affective and

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[60] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 35.

[61] Keeling, Kara. "'In the Interval': Frantz Fanon and the 'Problems' Of Visual Representation." *Qui Parle* 13, no. 2 (December 1, 2003): 91–117. https://doi.org/10.1215/quiparle.13.2.91, 97

[62] Fanon, Frantz. *The Fanon Reader: Frantz Fanon*. Edited by Azzedine Haddour. London: Pluto, 2006, 27.

economic relations that result in the cultural abandonment of the racialised individual, a futile

alienation, as well as the individual's psychological 'craving' for 'History' and 'Truth'.[63] Fanon writes:

> Discovering the futility of his alienation, his progressive deprivation, the inferiorised
>
> individual, after this phase of deculturation, of extraneousness, comes back to his original
>
> position.[64]

Fanon refers to this 'position' as the liquidation of the racialised individual's system of reference.

The coloniser, as Fanon argues, instead takes ultimate authority over what the spatio-temporal

position of the colonised. The coloniser manages the grid of relation by imposing 'new ways of

seeing and, in particular, a pejorative judgement with respect to [the oppressor's] original forms of

existing'.[65] This often emerges through scientific 'Truth' (which Fanon establishes as the 'original

position') and the day-to-day activities of the racialised. As result, the racialised can only recognise

their occupancy in the colonial world through the fictive invention of an ideal subject, which in

Fanon's view is an Anglo-European secular man. For Fanon, *spatio-temporal* organisation serves an

additional function. By claiming ultimate authority over the management of the colonial space, the

coloniser is able to construct an image of himself as the ideal secular being — a being that I will

later argue in Chapters 2, 4 and 5 is sanctioned by illusions of Divine will. As I will also show, these

illusions were supported by the distribution of scientific knowledge, which — in terms of the

racialised — is enacted through eugenics-based operations. I speak more on eugenics in Chapters

2 and 3.

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[63] Ibid.

[64] Ibid., 27.

[65] Ibid., 2.

It is important to note that, according to Fanon, the epistemic relation subtends quantification, and thus perception, of the black body as a negated form of species. Interestingly, Fanon defines this construction of the European model of *Man* as a 'drama' of scientific discovery that stages the racialised body as a problem of nature or what he describes as the divine abandonment of black existence. For the racialised 'God', he exclaims, 'is not on [their] side'.[66] As result, Fanon argues, that science enacts new modes of perception in racialised environments, organised around the provenance as substitute for the colonial imaginary. These modes extend into the construction of secular normalities, as well as pathological alienation. Still, Fanon is careful to suggest that the complexities of the black object relation are too often supplanted by concepts of racial transcendence and race 'consciousness', as Fanon describes. In this way, perception suspends the black body as already situated at the intersection of phenotype and the call of the *interpellator* (white child).[67] [68]

Here, Fanon attempts to highlight the distinction by returning to the visual. Throughout the text he uses visual metaphors to illustrate how his own experience as a black man is organised around the

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[66] Fanon, Frantz. *The Fanon Reader: Frantz Fanon.* Edited by Azzedine Haddour. London: Pluto, 2006.

[67] Darby, Phillip. 'Doing the Postcolonial Differently', In *Postcolonialism and Political Theory*, edited by Nalini Persram. Lenham: Lexington Books, 2007.

[68] Judith Butler describes Althusser's act of interpellation as a way of 'staging the call' for the individual to turn around and respond to oneself and the environment. This staging, however, is not an event, but an act of being 'deliteralized'. It is a demand to align oneself with the law and proclaim in self-ascription 'Here I am!'. Butler goes on to explain that the turn is act conditioned by the conditions of the voice, as well as the responsiveness of the one responding to the law. Butler writes:

> But where and when does the calling of the name solicit the turning around, the anticipatory move toward identity? How and why does the subject turn, anticipating the conferral of identity through the self-ascription of guilt? What kind of relation already binds these two such that the subject knows to turn, knows that something is to be gained from such a turn? How might we think of this "turn" as prior to subject formation, a prior complicity with the law without which no subject emerges?.. The turn toward the law is thus a turn against one- self, a turning back on oneself that constitutes the movement of conscience.

fantasy of the white child. This is articulated clearly in his oft-cited passage: 'Mama, see the Negro!

I'm frightened!'.[69] The passage is widely viewed as the foundation of Fanon's schema of

enumeration and theory of race as a discourse that continually reifies the categorisation of the

black body. While evidence points to Fanon's often uncomfortable and pessimistic images of

blackness in the text, the resultant alienation is also seen to be elective by prioritising external

perceptions of the black body, and any resultant psychic negation, over a more affirmative view of

blackness.

I want to centre the above provocation as a foundation to think through Fanon's commitment to

psychic actualisation, and what this might mean in contemporary machine learning as an organising

practice of social fragmentation and organisation. More so, I want to investigate new ways to

consider how individual and collective consciousness is generated within inequitable relations,

particularly as they collide with enumerative organisations of the social.[70] In many way, my journey

throughout this dissertation is similar to Fanon's. I seek to engineer pathways of awareness and

discovery with a firm aim to uphold the dignity and totality of any form of being that is hindered by

the unyielding devices of perception and exploitation; or as Ziauddin Sardar notes, to embark on a

work that unfolds as an imminent experience that envisages a different world.[71] I attempt to map

this territory in the chapters to follow. At this juncture, it is worthwhile to further develop Fanon's

pathological schema. First, I discuss Fanon's critique and revision of Hegel's master-slave dialectic.

Hegel was central to Fanon's thoughts on the relation between the colonised (slave) and coloniser

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[69] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 109.

[70] Ibid.

[71] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

(master), which he claims falsely reinforces perceptions of the racialised as subservient and without affirmative agency. Having established Fanon's revision of the dialectic, I move on to the development of the epidermal schema, which Fanon adopts from Maurice Merleau-Ponty's *coporeal schema,* to reconsider the genesis of the body within colonial ecologies. After establishing the external form of the black body, I turn to Fanon's development of black interiority. Here, noting the specificity of the black psyche, Fanon makes use of Freudian and Lacanian psychoanalytics to expose the negation of black being, and therefore the necessity to construct a new perception of species.

1.3: Fanon's revision of the master-slave dialectic

As described, this section begins with Fanon's engagement with Hegel and the master-slave dialectic. The master-slave dialectic, presented by Hegel in *The Phenomenology of Mind* (1807), was an important work for Fanon, particularly in its intellectual description of the origin and dynamics of oppression.[72] In the text, Hegel argues that *Man* becomes conscious of himself through a desire for recognition by the Other. Those who are recognised but do not recognise others become the master; and, those who recognise without being recognised become the slaves. Not only does the master gain recognition, through the slave, he also reduces the slave to an object of his own will. According to Hegel, the slave, on the other hand, gains a sense of self through labour, at the bequest of the master. Yet, the relationships is not a convivial story for the master, who is alienated by his distance from labour and, as result, loses his means of transforming the world and himself. The slave—as object—reflects the master's perception of his own humanity, not to mention the master's inability to attain self-actualisation. On the other hand, through his struggle for recognition,

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[72] Hegel, Georg Wilhelm Friedrich and J. B. Baillie. *The Phenomenology of Mind.* London: Digiread, 2009.

and detachment from the fear of physical death, the slave gains the means to resist the master and transform his own humanity.

Self-consciousness is, in this way, a dynamic, intentional, presupposing interconnectedness, reinforced and confirmed by the struggle for recognition. The master-slave relation, as the most primitive of intersubjectivity, emerges as a complex array of transcendental forms — a phenomenon that Hegel characterises as a 'battle for recognition' in *The Phenomenology of Mind*.[73] Although, here, the human becomes conscious of the self through desire, the subject also asserts itself as the centre of the relation. The human is, however, abstracted by the transcendental forces of life, maintaining a distance from the phenomenon of the world and their own self actualisation. In this sense, to gain recognition is to overcome the battle of superiority over nature as the contestation of will. Here, freedom remains a construct of the rational, a notion that enunciates the binary between mind/body, human/nature, and so on.[74] In Hegel's reading of slavery, the slave lacks the courage to resist tyranny in an open contest, and can achieve freedom only through discipline, work ethic, and Christian forgiveness.[75] The impact of the dialectic is what Sarah E. Chinn describes as 'the abstraction of the body into a collection of measurable functions' that render it legible as a sign of 'something else, not itself: patterns, qualities, trends, predictable processes'.[76]

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[73] Hegel, Georg Wilhelm Friedrich and J. B. Baillie. *The Phenomenology of Mind*. London: Digiread, 2009.

[74] Young Joseph. 'A Reversal of the Racialization of History in Hegel's Master/Slave Dialectic (Douglass's 'Heroic Slave' and Melville's 'Benito Cereno', in *Race and the Foundations of Knowledge: Cultural Amnesia in the Academy, ed.* Joseph Young and Jana Evans Braziel. Chicago: University of Illinois Press, 2006.

[75] Ibid.

[76] Chinn, Sarah E. Chinn. *Technology and the Logic of American Racism: A Cultural History of the Body as Evidence*. London: Bloomsbury Publishing, 2000, 5.

Hegel, as with Freud, had for the most part ignored the specificities of oppression in European colonisation and slavery. Hegel had also assumed that the master held a superior position in the master-slave relation. In the chapter entitled 'The Negro and Hegel', in his text *Black Skin, White Masks*, Fanon — greatly influenced by Jean-Paul Sartre — adopts the Hegelian master-slave dialectic as a paradigm to examine the contemporary relationship between white (masters) and black (slaves). However, Fanon rejects the abstract relation set forth by Hegel's universal approach and re-articulates the dialectic to account for the immediate conditions colonialism.

Fanon is critical of Hegel's positioning of the slave as cowardly and subservient. Fanon instead favours accounts of the slave as self-affirming, even if alienated under the conditions of the master-slave dialectic. Fanon argues that the experience of black people in relation to whites excludes any ontological neutrality. In other words, black people are always already objectified under the gaze of the 'white other'. As such, they do not maintain the same subjective position to reciprocate the gesture of looking upon and abstracting the white body. The lived experience of the black individual is not a typical Hegelian dialectic between Self and other, but instead a concealment of very specific inequitable relations constructed in the operations of fabricated histories, narratives, and patterns of oppressive colonial ideologies. As Fanon articulates: 'For not only must the black man be black; he must be black in relation to the white man.'[77] Within the Fanonian dialectic, the black individual 'outlaws any ontological explanation' the ontological refusal of black realities. The black subject is self-objectifying in confrontation with their psychic dislocation from the category of human. Fanon describes the perils of his own self-ascription as such:

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[77] Chinn, Sarah E. Chinn. *Technology and the Logic of American Racism: A Cultural History of the Body as Evidence.* London: Bloomsbury Publishing, 2000, 92.

I was responsible not only for my body but also for my race and my ancestors. I cast an

objective gaze over myself, discovered my blackness, my ethnic features… Disoriented,

incapable of confronting the Other, the white man, who had no scruples about imprisoning

me, I transport myself on that particular day far, very far, from my self, and gave myself up as

an object.[78]

Fanon's clinical observations of shattered psyches, as in his work in Algeria, emphasises his self-identification with the dimensions of Europe's colonial assaults. Although Fanon draws on Hegel to engineer a new mode of recognition, he remains optimistic that the black subject's dignity and self worth can be gained through a social relation that instead prioritised reciprocal recognitions of difference that resist 'savage struggle[s]' for recognition.[79] Otherwise, as Fanon proposes, one becomes steeped in wretched servitude and objecthood.

1.4: A new corporeal schema

For Fanon, the master-slave dialectic is actualised in a *corporeal schema*. Here, Fanon extends the conversation to include Maurice Merleau-Ponty. Merleau-Ponty's *corporeal schema* refers to the body's relation to the historical world. Although Merleau-Ponty subscribes to a synergic and pre-dualistic relation between the body and world, he affirms that the corporeal schema lies in between the body and external environments. This is what generates communication between the self and the other. This mode of communication is where the body and external world re-order each other in a 'perpetual contribution' of reciprocal exchange.[80] This exchange embeds the body

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[78] Ibid.

[79] Bulhan, Hussein Abdilahi. *Frantz Fanon and the Psychology of Oppression*. PATH in Psychology. New York: Plenum Press, 1985, 101

[80] Merleau-Ponty, Maurice. *Phenomenology of Perception*. Paris: Éditions Gallimard, 1945, 100.

into a cultural-historical context that is open to being disrupted and transformed. For Fanon, however, the cultural-historical context is not a universal ordering, or reciprocal exchange. The exchange is regulated by the circularity of the psychic effects of colonial violence, and an experience specific to the colonised and racialised.

This necessitated a revision of Merleau-Ponty's *corporeal schema* (*schéma corporel*), in Fanon's view. Fanon insists that the colonised body is not a universal form, as Merleau-Ponty presumes, but is instead derived from a *historico-racial schema* and *racial* or *epidermal schema* that has woven black people out of a series of data comprised of a 'thousand details, anecdotes, and stories'.[81] The *historico-racial schema* draws upon the history of subjection (slavery, colonisation, police brutality, and so on) to establish the persistence of race-based violence as the subject of the white gaze. Secondly, the *racial* or *epidermal schema*, following Fanon, speaks to the sedimentation of an 'essence of blackness', or the construction of revisionist narratives. It is contended that blackness (or what it means to *be* black) is naturalised by white narratives, and imposed upon culture as scientific discourse, cultural procedure and legal practices.

In this way, it is difficult to imagine a history of the world detached from the history of racism, not to mention the role colonial imaginaries play in the organisation of interpersonal exchange. History, in this sense, is more so a confrontation with colonialism and the fragmentation of the black psyche than a continuity of unmitigated exchange. Nonetheless, any reciprocal exchange moderated by the colonial imaginary also opens the field exchange to alternative possibilities that alter the environment, as well as the body. The resultant epidermal process not only shapes the black sense

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81 Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto Press, 2008, 84.

of self, but presupposes the conditions for an affirmative black life.[82] Nonetheless, to see the black

body as 'human' under the categories of normality places the category of whiteness at the apex of

species, while relegating black sociality to psychosocial desire to be a subject other than itself, as

argued earlier in this chapter. Fanon writes:

> On that day, completely dislocated, unable to be abroad with the other, the white man, who
>
> unmercifully imprisoned me, I took myself far off from my own presence, far indeed, and made
>
> myself an object. What else could be for me but an amputation, an excision, a haemorrhage
>
> that spattered my whole body with black blood? But I did not want this revision, this
>
> thematisation. All I wanted was to be a man among other men. I wanted to come lithe and
>
> young into a world that was ours and to help to build it together.[83]

Ultimately, Fanon's — like Merleau-Ponty's — concept of the schema reveals the relation between

self actualisation, place and temporality. While Fanon's schema suggests a universal language of

control, historicity and phenotype, it also argues against the phenomenological reduction of black

lived experience. His primary focus is more so on the dampening of psychic potential when the

body is mediated through languages, perception and visual recognition. It is not surprising, then, that

he relies heavily on visual and artistic metaphors in *Black Skin, White Masks* to illustrate the psychic

effects of racial sorting and social categorisation.

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[82] For a thorough account of race and Fanon's epidermal schemata, see: Simone Browne, 'Digital Epidermalization: Race, Identity and Biometrics,' **Critical Sociology.** New York: Sage Journals, 2010, 36, 1, 131-150.

[83] Fanon, Frantz. *Black Skin, White Masks.* Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 112.

The emergence of the *historico-racial schema* brings forth the category of whiteness as the 'prototype' of the human species. As Lewis Gordon contends, the notion of what he calls *white prototypicality* — in which whiteness becomes the prototype for black desire — defines the perpetual struggle for black recognition.[84] Here, the black body is strained in its relation to the epistemic. This strain, according to Gordon, materialises when visibility and physiology becomes subjectivity itself.[85] Gordon argues that the prototype also challenges the concept of black subjective genesis by wedges the black body in between a crisis of fact, as the 'real' or authentic standard of being, and lived experience. As such, within the epistemic relations of this categorisation, the prototype symbolises both a historical and technological concept of sociality.

According to Diana Fuss, the black's desire for the white Other coincides with the white 'protean imaginary'.[86] In her essay entitled 'Interior colonies - Frantz Fanon and the politics of identification', Fuss argues that white protean imaginary has come to legislate the category of human. It is also the measure against which the human species gains full, or even partial, cultural significance. Furthermore, Fuss notes that although identity has a temporal and spacial structure, the idea of a universal mirror image is challenged by the key signifiers of racial difference.[87] In this way, the black individual resides at the periphery of the normalised category of *Man* — a process that is enacted through systems of enumeration under colonial operation.

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[84] Lewis R. Gordon, "Is the Human a Teleological Suspension of Man? Phenomenological Exploration of Sylvia Wynter's Fanonian and Biodicean Reflections," 4. http://www.lewisrgordon.com/selected-articles/existentialism-phenomenolo/chapter10--is-the-human-a.pdf

[85] Lewis R. Gordon, "Is the Human a Teleological Suspension of Man? Phenomenological Exploration of Sylvia Wynter's Fanonian and Biodicean Reflections," in *After Man, Towards the Human: Critical Essays on the soul of Sylvia Wynter*, ed. by Anthony Bogues. Kingston: Ian Randle, 2006.

[86] Fuss, Diana. "*Interior Colonies: Frantz Fanon and the Politics of Identification.*" Diacritics 24, no. 2/3 (1994),19.

[87] Ibid.

When social space takes shape within the larger cultural context of colonial expansion and imperialism, historical identification is supplanted by the construction of normalised colonial histories. While colonialism works to suspend spatial and temporal mobility (in both its physical and psychosocial sense), it also operates by regulating the boundaries of cultural knowledge. The implication is an immediate and devastating exclusion from the freedoms of movement afforded to white privilege under colonial rule, in order to ensure that blacks are sealed into a 'crushing objecthood' under normalised logics of relation. Here, the oppressor enacts procedures by which the racialised see themselves as neither 'I' nor 'Not I'.[88] At the same time, Fuss reminds us that while the imaginary may signify white protean development in the non-black other, the black is fragmented and objectified into an objecthood. Fuss writes:

> Black may be a protean imaginary other for white, but for itself is a stationary 'object'; object hood substituting for true alterity, blocks the migration through the Other necessary for subjectivity to take place… the black man begins and ends violently fragmented.[89]

Fuss draws her argument from Fanon's account of his own internal position as nonbeing:

> Sealed into that crushing objecthood, I turned beseechingly to others. Their attention was a liberation, running over my body suddenly abraded into nonbeing, endowing me once more with an agility that I had thought lost, and by taking me out of the world, restoring me to it. But

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[88] Ibid.

[89] Ibid.

just as I reached the other side, I stumbled, and the movements, the attitudes, the glances of the other fixed me there, in the sense in which a chemical solution is fixed by a dye. I was indignant; I demanded an explanation. Nothing happened. I burst apart. Now the fragment have been put together again by another self.[90]

Fanon's accounts are further complicated by what he considers to be an abandonment of any consideration of black existence within ontologies of being. Fanon argues that the perceived 'flaw' in black being 'outlaws any ontological explanation' of black existence.[91] He writes: 'The black man has no ontological resistance in the eyes of the white man', he argues, 'Ontology — once it is finally admitted as leaving existence by the wayside — does not permit us to understand the being of the black man'.[92] As Fanon observes, the psychoanalytic interpretation of the black psyche emphasises prolonged flaws in black being that are reinforced by the instrumentalisation of normality.[93] A primary premise of psychoanalytic study is that human behaviour is located is an internal problematic for individuals. In other words, behaviour is located 'within' us.[94]

Nonetheless, for Fanon, psychoanalysis has failed to trace the processes by which our current epistemic systems have come to represent how humans are perceived, and perceive themselves, within the deeply contextualised Eurocentric paradigm. The primary concern of Fanon's thesis is the

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[90] Fuss, Diana. "*Interior Colonies: Frantz Fanon and the Politics of Identification.*" Diacritics 24, no. 2/3 (1994), 19.

[91] Fanon, Frantz. *Black Skin, White Masks.* Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 110.

[92] Ibid.

[93] Gaines, Stanley O. 'Perspectives of Du Bois and Fanon on the psychology of oppression', in Gordon, LR. and Sharpley-Whiting, TD. (eds.) *Fanon: A critical reader.* New York, Wiley-Blackwell, 1996. 24 - 33.

[94] Schellenberg, James A. *Masters of Social Psychology.* Oxford University Press, 1979.

discontinuity of the racialised human, as an integrated yet excluded, category of species; and the

establishment of the non black other as the prototype of the ideal human, and subsequently a

perception of humanity as if it were a purely natural organism in continuity with organic life.[95] Still,

the resultant crisis of this deductive 'truth' starts at the specificity of black psychic fragmentation,

specifically the psychosocial alienation of the black subject, and the self-justification of the disciplines

of science in the solidification of the human sorting. I discuss the specifics of this ontological

abandonment in the next part. For now, there are key similarities between Du Bois's and Fanon's

prioritisation of self actualisation as a form of alienated and fragmentation of the black psyche.

Both Fanon and Du Bois's accounts of the phenomenological experience of anti-black racism are

essential components to their critique of philosophies of the being. In Du Bois's analysis, he

illustrates the concept of *double consciousness,* a recurring themes throughout his work, particularly

in his attempts to re-position the freed American slave from within the Hegelian problematic.[96] For

Du Bois, the former enslaved is confronted with a duality of existence comprised of the historicity

of violence and subjection and the potential of newly emerging modes of exchange. Du Bois sees

value in the latter as a potential path of self-actualisation. He, however, shifts the focus of

perception away from the white gaze (a schematic of oppression that he relegates to the present,

as informed by consistency of racialisation), and onto the potentiality of self-formation, which he

articulates within the terms of prototypicality. He advocates for a black sense of self modelled after

what terms the 'prototypes of culture' or what he considered exemplary forms of labour and

representation. For instance, the teacher, preacher, intellectual, labourer and bourgeois black that

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[95] Wynter, Sylvia. *No Humans Involved: On the Blackness of Blacknuss.* Hudson, Publication Studio Hudson, 2015.

[96] Hubbard, Dolan. 'Introduction' in *The Souls of Black Folk: One Hundred Years Later.* Columbia: University of Missouri, 2006.

can culminate into new models of self-determinism. In doing so, he suggests that blacks can make new claims for recognition by revising normative premises of social value.

In doing so, Du Bois argues, the black can free him- or herself from the continual hold of slavery and white oppression. Du Bois alerts us to the gift of 'second sight' that the black individual attains when they are confronted with the question of their position within the human category, and the ways in which the code of race is integrated into central cultural beliefs, as well as the psychological basis of racialised individuals. This 'gift' of second sight, Du Bois proclaims, 'only lets [the Black American] see himself through the revelation of the other world', which he describes as a 'peculiar sensation' or 'double-consciousness' that manifests itself as a subjective generation irreversibly bonded with the view of one's self through the eyes of others in conditions dominated by Jim Crow and the 'colour line'. Accordingly, the 'measuring' of one's 'soul' (as an American and a Negro [sic]), is an unreconcilable coagulation of an inwardness comprised of two souls and two 'thoughts'.[97]

Robert Gooding-Williams posits that the Du Boisean second sight can be distinguished from the more general Hegelian framework in that it instead characterises the black individual's capacity to see what is not visible with an extra-sensory perception of history, as well as the present conditions of anti-black racism. With a second sight, the Black individual has a heightened view of Du Bois calls 'the other world', which is a view of themselves through the gaze of whiteness.[98] In this sense, Gooding-Williams argues that blacks are 'gifted' with the white's perception of them — which itself

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[97] Du Bois, W.E.B.. *The Souls of Black Folk.* Chicago, A. C. McClurg & Co., 1903.
[98] Ibid.

is deeply distorted by racism.[99] Nonetheless, Gooding-Williams argues that this 'gift' also constitutes an internal striving or desire to be the white Other. It also fosters the black's own self-contempt and presumed inferiority. In other words, for Du Bois and Fanon the black psyche articulates more than just a stationary living organism that can be reduced to biological classification, but stages the problem of black psychic development as a problem of the *sociogenic* organisation of social exchange — a point I discuss in more detail later in the next chapter.

At this juncture, the goal of this part of the chapter is to elaborate on the set of discursive conditions that inform Fanon's engineering of the black psychic position. I have shown that this position, as an organisation of perception, resists generality, and is instead articulated from within the specificities of racialised experience. While Fanon stages this psychic problematic as one of alienation, he is careful to prioritise the reciprocality of desire as a meta-organisation of spatio-temporal structures. These desires of self and other do not give way to self-determination, but are always already in conversation with universal prototypes of being. Fanon encloses these dynamics into the term *sociogeny*. In the opening chapter of *Black Skin, White Masks*, 'The Negro and Language', Fanon defines *sociogeny* as a 'sociodiagnostic' reality that accounts for the consistency of the black man's alienation.[100] *Sociogeny*, he writes, is the product of social and economic realities whose outcome is the *epidermalisation*, or the internalisation of the colonial subject's inferiority complex. Fanon proposes the concept of *epidermalisation* to illustrate the objectification of the

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[99] Gooding-Williams, Robert. *In the Shadow of Du Bois: Afro-Modern Political Thought in America*. 1. Harvard Univ. Press paperback ed. Cambridge, Mass.: Harvard Univ. Press, 2011.

[100] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 13.

black colonial subject. *Epidermalisation* is a way of thinking about the racialised body as object, or as it experiences 'being through others.'[101]

Thus far I have addressed the specifics of Fanon's assessment of black exteriority, or how the external black body is formed in relation to the colonial imaginary. However, Fanon does not conclude his evaluation at the external form of being. As a practicing psychiatrist, the internal is of central importance to Fanon. Although he situates the internal/external relation within the mind/body dialectic (indicating his commitment to contracting revisions of representation as opposed to to subverting it in its entirety), he does prioritise the cyclical (and I would argue parasitic) relation between external formations of being and psychic development. Nonetheless, like the external, Fanon believes that the problem of black interiority is rooted in the ontological refusal of black life, or what he calls an ontological 'flaw'.

As with his previous revisions, Fanon is uncomfortable with offering critique without a potential solution. Here, the solution for the interior is rooted in the psychoanalytic framing of the concept of ontogeny. I will briefly describe the basis of this problem for Fanon before extending the discussion to the relation between ontogeny and his warning against black psychic fragmentation.

1.5: Black mirrors and the problematic 'I'

In *Black Skin, White Masks*, Fanon states that 'Man's tragedy, Nietzsche said, is that he was once a child'. Nonetheless, he reminds us that 'we cannot afford to forget that... the neurotic's fate remains in his own hands'. For Fanon, this fate is not one of self determination. He writes: 'For the black

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[101] Ibid., 109.

man' he argues, 'there is only one destiny. And it is white.'[102] While it is important to note that Fanon does not explicitly describe his patients's childhoods, he does pathologise the presupposition of illness within the black body. Fanon's own efforts to reconcile the colonised individual and racialisation is materialised in psychosocial studies of oppression, as well as resistance. This potential action is theorised to derive from the internal self to confront the particulars of external colonial environments. Fanon asserts that the individual must end their own internal colonisation in order to be 'cured' form the embodied effects. Otherwise, they will continue to be consumed by repressed anger, resentment and aggression brought on by colonial operations. Here, in following Sartre, the individual can authenticate a being that is no longer condemned by race, and is therefore freed and disalienated from a position of shame.

Fanon's 'radical humanism' is largely a reaction to existentialist accounts of transcendental subjectivity and the systematic totality of knowledge.[103][104] Although this humanism is motivated by a re-thinking of the specificity of racialised phenomenon, his broadening of German ideology assumes the philosophical goal of opening up the mundane world to the immediacy of colonial power. Yet, his psychosocial reversal of the theoretical gaze carried out by phenomenological reduction seeks a positive negotiation with what Husserl calls the 'natural attitude', which prompts us to believe in an existence of the world that is an 'absolute and concrete stream of the

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[102] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 13.

[103] Fanon, *Frantz. Black Skin, White Masks*. New ed. Get Political. London: Pluto-Press, 2008.

[104] Haddour, Azzedine, ed., *The Fanon Reader*. London: Pluto Press, 2004.

experience' of the transcendent'.[105] This goal is accomplished by problematising the development of the 'I' within a transcendental genesis that governs both life and individuation of the subject. More so, the emergence of structuralism in the late 40's and early 50's provided Fanon with an opening to insert the specificity of the colonial subject into consideration of subjective genesis, namely be drawing upon structuralist psychosocial framings developed by Jacques Lacan.

It is tempting to pull away from the 'I' for fear of a return to structuralism and therefore an anthropocentric view of the world; however, the emergence of structuralism provided Fanon with a discourse that could better account for to the 'fact of blackness' — which, Fanon argues, is the fundamental realisation that the black body is both generated and self-generates outside of the discursive concept of human. Drawing from Lacan's lectures on the mirror phases, Fanon situates the black individual's desire for the white gaze as a problem of the ontological structure of the world. Through the gaze, the individual's desire for recognition by the Other, as well as for that which the individual supposes the Other desires or lacks. Moreover, the dependence on the other for recognition is responsible for the structuring of the individual's own desires, as well as their own cognitive drives. This is to say that the object of desire is the object of something other than the self, which drives the individual towards mis-recognition of their own sense of being and belonging, along with that of the Other. Accordingly, the individual is self-alienated and anxious in a desire to be the non-black Other, as previously argued in this chapter.

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[105] Husserl, Edmund. *Psychological and Transcendental Phenomenology and the Confrontation with Heidegger (1927-1931): The Encyclopaedia Britannica Article, the Amsterdam Lectures "Phenomenology and Anthropology," and Husserl's Marginal Notes in Being and Time, and Kant and the Problem of Metaphysics.* Translated by Thomas Sheehan and Richard E. Palmer. Edmund Husserl Collected Works, v. 6. Dordrecht; Boston: Kluwer Academic Publishers, 1997, 167.

This is not to say that the black body, in its alienness and alienation, does not emerge in parasitic co-operation with the modes of violence and racial categorisation. Fanon is pointing towards the genesis of the psyche as a reciprocal organisation of formal human categories, which is evidenced by the undeniable reality of the specificities of black being. The denial of black reality gives the mirror stage its ontological misdirection. Lacan posits that the imaginary structuring of ones conception of reality results in a 'permanence of I' that alienates and prefigures the subject into a fictional image of themselves.[106] Lacan uses Lévi-Strauss's notion of the effectiveness of symbols to discuss the gravity of the specular image as the threshold of the visible world in our daily experiences.[107] The resultant psychosocial experience confines the black subject into a permanent fragmentation that is always already lacking in a desire for the transcendent, which under colonialism acts as the category of white gaze. In other words, the perception of the self and world is crucial to understanding the fragmentation of the psyche, not to mention perceptive boundaries of the environment. This imaginary also produces fragmentations and inconsistencies that generate internal conflict.

Still, Fanon's use of Lacan's lectures raises questions about the significance of symbolic function. For instance, it prompts us to think about the relationship between Lacan's 'veiled faces' and W.E.B. Du Bois's famous metaphor of the veil, introduced in the first chapter 'Of Our Spiritual Strivings' in *The Souls of Black Folk*. According to Du Bois, the veil is word by all African-Americans as a visual manifestation of the 'colour line'. Du Bois argues that the *veil* is a specific view of the word held by all African-Americans that is vastly different than that of whites are points at which the mimetic

[106] Lacan, Jacques, and Bruce Fink. *Ecrits: The First Complete Edition in English*. New York: Norton, 2006, 80.

[107] Zafiropoulos, Markos. *Lacan and Lévi-Strauss or the Return to Freud, 1951-1957*. CFAR Library. London: Karnac, 2010.

facts of a subject's relationship to the other can be understood as a double or heteromorphic identification.

Du Bois seems to suggest that role of race in the subjugation of the black body is a precondition of the relation between black life and the reduction of life chances. However, for the purposes of this thesis, I focus on the underlying notion that race, although preconditioned, is an external catalyst to the present and future potential of the internal psychic development of the black individual, which Du Bois underlines clearly in *The Souls of Black Folk*.[108] Nonetheless, a key point here is the emergence of a methodology that works through the contradictions of race as a conflict of the internal. Du Bois writes:

> Throughout history, the powers of single black men flash here and there like falling stars, and die sometimes before the world has rightly gauged their brightness… the black man's turning hither and thither in hesitant and doubtful striving has often made his very strength to lose effectiveness, to seem like absence of power, like weakness. And yet it is not weakness, — it is the contradiction of double aims.'[109]

Although few would situate Du Bois directly in line with pathology, his ontology shares a relation with concepts put forward by Fanon, who also attempts to reconfigure the the composition of the body 'in the middle of a spatial and temporal world'.[110] The treaties requires the interruption of the

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[108] Du bois, W.E.B. Du Bois. *The Souls of Black Folk*. Chicago, A. C. McClurg & Co., 1903.

[109] Ibid., 3

[110] Gaines, Stanley O. '*Perspectives of Du Bois and Fanon on the psychology of oppression*', in Gordon, LR. and Sharpley-Whiting, TD. (eds.) *Fanon: A critical reader*. New York, Wiley-Blackwell, 1996, 24 - 33.

pre-constitution of space and time and the construction of the black body to align the black subject with a more adequate account of their lived experiences. Fanon relies upon visual representations and technology to craft his de/re-construction as a series of conscious self-determining gestures that situate the black body in a relation with the construction of techno-social processes. However, for both Fanon and Du Bois, the individual is the dominant agent in the process of self-actualisation. Their theories of self-determinism are radically optimistic in that they suggest that transient and external logics of race be cast aside internally to reveal the true opacity of the black subject: 'I want to world to recognise, with me, the open door of every consciousness'.[111]

The tensions between the internalisation race and conditioning oneself to re-construct the internal relation deepens Fanon's formulation of space and time — as well as the fragmented self — as inhabiting neither position. His stance suggests that subject formation that instead oscillates between these positions, resisting what Homi Bhabha describes as a 'tradition of representation that conceives of identity as the satisfaction of a totalising, plenitudinous object of vision'.[112] In other words, beneath Fanon's schema of visibility is a process of ongoing self-making built upon the efficacy of black consciousness, where the relationship to modes of visibility is in relationship to the production of the self.

What becomes of the symbolic 'I' if its origin is co-identified with an already autopoietically grounded *sociogeny*? The 'I', enacted under these terms, over-determines life and death as a performance that is inscribed under the ownership of knowledge and selection. Any coherence

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[111] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 232.

[112] Bhabha, Homi K. *The Location of Culture*. Routledge Classics. London; New York: Routledge, 2004, 40-65, 46.

here mis-state the conditions for the development of the 'I', which is embedded — under the Lacanian framework — as an a priori enclosure of pathological lack. Here, the psyche is no more than an untenanted vessel of colonial occupation to be shaped and re-formed at the will of any 'I' that represents itself as dominant in the construction of learning. I attempt to answer this question in Chapter 6. For now, I argue that the enactment of black life within the *sociogenic* context is dulled under the totalising conditions of race.

As argued, Fanon contextualises the problem of *sociogeny* from within the specificity of colonialism. However, I question the consistency of *sociogeny*. In other words — if we are to return to the ontological problem of origin — then how might this coincide with other forms of episteme? Ultimately, I ask if *sociogeny* is specific to colonial contexts, or is it part of a larger consistency of enumeration and anti-black racism?

In the next section, I attempt to further unravel the conditions that situate the problem of *sociogeny* as always-already in conversation with psychic development. I show how the origination of the notion of sociogeny is a direct response to the biological nature of being in itself, and the evolutionary theories that reinforce psychic categorisation.

1.6: The problem of ontogeny

The problem of the psyche, here read as the back psyche, can be found within the failure to de-centre the European white male as the basis of study into the evolution or genesis of species. As mentioned, the flaw has had a profound effect on field of perception and the organisation of difference in the production of knowledge. I also illustrated how closely intwined the spatio-

temporal ordering of species is itself a function of psychic genesis. Fanon further situates this flaw

within the problem of ontogeny in the psychoanalytic context. Fanon points to Freud's fusion of

psychoanalysis and biological evolution, in particular, to discuss the the misdirection of the

ontogenic principle. Freud's theories on ontogeny have been heavily influential in the field of

psychoanalysis, not to mention biology, botany and genetics.[113]

Although largely critical of anthropomorphism, in *Introductory Lectures* Freud centres the human

psyche by establishing psychic development as a function of empiricism, more specifically Charles

Darwin's theories of evolution. I discuss Darwin (particularly his connection to Francis Galton,

eugenics and life philosophy) in Chapter 3. For now, Freud largely believed that although the human

is not at the centre of the universe, the species does has a biological value its psychic delusions of

power leading to psychological fragmentation. Freud comes to terms the self-important human,

which he generalises as the megalomanic individual. The megalomanic individual is in a crisis of full

expression, which Freud argues can be negotiated within psychoanalytic therapies. Nonetheless, for

Freud the role of psychoanalysis — as a science — is explicitly tied to the biological development

of the psyche and therefore the individual and species. It is in this crucial relation between the

psyche and science that Freud emphasises the role of empiricism in aiding the psychiatrist in their

role as mediator between the megalomanic individual and the external environment.

Freud found particular value in Darwin's theories of evolution, specifically the biological principle

that 'ontogeny recapitulates phylogeny' — which he argues provides a method by which

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[113] Taylor, Chloe. "Fanon, Foucault, and the Politics of Psychiatry." In *Fanon and the Decolonization of Philosophy*, edited by Elizabeth A. Hoppe and Tracey Nicholls, 55. Lexington (Rowman & Littlefield), 2010.

psychoanalysis can gain a more complete understanding of the human psychic development.[114]

The principle stipulates that as an individual is developed through a series of stages that are then duplicated, or recapitulated — contributing to the overall historical evolution of the human species. For instance, the outdated thought that embryonic gill slits in humans can be seen as a recapitulation of early humans or so-called lower life forms. As such, the gills are thought to indicate the biological truth of individual evolutionary development, as well as the lineage of human evolution. Freud used this now disputed scientific assumption as the basis of his theories on the origin of religion.

It has been argued that Freud's extrapolation of these methods into psychoanalytic theory is largely a self-supported assumption. For instance, M. Kathryn Armistead has written extensively on Freud's misuse of recapitulation to establish misguided links between primitive 'savages' and patient neurosis, as well as the development of the child. Armistead points to the first documentation of the 19th century law (ontogeny recapitulates phylogeny) by German zoologist Ernst von Haeckel. Armistead notes that although Haeckel and others documented apparent visible similarities in comparative forms, these theories were adopted in psychology, sociology and education theories without verifiable evidence to support the thesis. According to Armistead, Freud's adoption of the principle, and application to psychoanalysis, rests on a set of assumptions that were then naturalised into social science. Freud's self-assumption further systematised psychoanalysis as a function of

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[114] 'Ontogeny recapitulates phylogeny' is a 19th century scientific law documented by German zoologist Ernst von Haeckel. See: Searle, G. R. *Eugenics and Politics in Britain: 1900-1914*. Leyden: Noordhoff International Press, 1976

physiology and the biological. Armistead notes that for Freud, 'the mind, whether conceived of as conscious/unconscious or ego/superego/id was always a product of the brain'.[115]

It is here, within the mode of discursive self-assumption, that Fanon situates his critique of Freud and Darwinian evolution. As he states: 'philosophy has never saved anyone… Although I had more or less concentrated on the psychic alienation of the black man, I could not remain silent about certain things which, however psychological they may be, produce consequences that extend into the domains of other sciences'.[116] Fanon is adamant that scientific assumptions, like Freud's and Darwin's, are symptomatic of the larger ontological misdirection that prioritises the white male subject as the basis from which all other phenomenon are measured and calculated. And although ontology in practice might proclaim the equality of man, it also employs justifications for the 'extermination' of those categorised outside of the white European male.[117] Ontology on this account dismisses the specificities of *phylogenic* process, which for the black and racialised is disproportionately affected by an array of racial inequality.[118]

Although some psychoanalytic studies, particularly those by Nisbet and Ross for instance, are critical of psychoanalytic theories that reify their own biases, and in turn substantiate scientifically reinforced stereotypes, psychoanalysis have been for the most part silent on the *sociogenic* effects

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[116] Fanon, Frantz, Charles Lam Markmann, and Paul Gilroy. *Black skin, white masks*, 2017. http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1519421, 35.

[117] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 18.

[118] Cloë Taylor, ''*Fanon, Foucault, and the Politics of Psychiatry*'', in *Fanon and the Decolonization of Philosophy*. Lenham: Lexington Books, 2010.

of economic and political life on the disparities of African-heritage people.[119] The exclusion

constitutes what Ralph Cintron terms discourses of measurement, or what Laura Doyle shows to

be a constructed hierarchy in science and nature that 'while seeming to privilege the organic world

… insidiously turn that domain against itself, using it to give evidence of supremacy of mind and of

the race and sex most skilled in the arts of the mind (including, in a circularly self-authorizing move,

the scientific arts)'.[120]

Conclusion

In this chapter I have argued that Fanon's notion of *sociogeny* is in conversation with wider

discourses in psychoanalysis and metaphysics. In the next chapter, I discuss how, by drawing on the

notion of *sociogeny* Sylvia Wynter uncovers key connections between black psychic development

and the instrumentalisation of the colonial imaginary.

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[119] Gaines, Stanley O. '*Perspectives of Du Bois and Fanon on the psychology of oppression*', in Gordon, LR. and Sharpley-Whiting, TD. (eds.) *Fanon: A critical reader. New York, Wiley-Blackwell*, 1996. 24 - 33. See also: Nisbett, Richard E., and Lee Ross. *Human Inference: Strategies and Shortcomings of Social Judgment. The Century Psychology Series.* Englewood Cliffs, N.J: Prentice-Hall, 1980.

[120] Cintron, Ralph. *Angels' Town: Chero Ways, Gang Life, and Rhetorics of the Everyday.* Boston, Mass: Beacon Press, 1999; Doyle, Laura. Bordering on the Body: *The Racial Matrix of Modern Fiction and Culture. Race and American Culture.* New York: Oxford University Press, 1994, 7.

Chapter 2: Sociogeny and the Bioepistemic Order of Being

Introduction

In the previous chapter, I outlined Fanon's notion of *sociogeny*. In the terminology of Fanon, *sociogeny* is the origin or genesis of a being as a result of social factors, like colonialism and racism. Fanon uses the idea of *sociogeny* to challenge the canonical narratives of the Anglo-European invention of *Man*, which he articulates as a problem of anthropological humanism and the institution of colonialism.[121] The Anglo-European *Man* is felt to be incommensurate to Fanon's idea of a radical new humanism that can sustain life beyond history as a discipline racist hierarchy. As Kara Keeling argues, for Fanon, once a society has been colonised, ontology is 'unattainable' — meaning that 'blackness' cannot contain a consciousness that is self-certain, independent, and self-contained. In other words, 'blackness' is contaminated in Fanon's view as something that does not originate within itself. 'Blackness' is instead a condition derived from 'whiteness'.[122] As mentioned in Chapter 1, Fanon places particular emphasis on the role scientific knowledge plays in the segregation of space and the discretisation of human relations. Fanon makes a substantial claim: 'There is of course the moment of 'being for others', of which Hegel speaks, but every ontology is made unattainable in a colonised and civilised society'.[123]

Given, we might think of ways Fanon's process of alienation and scientific augmentation of racial difference might instead mirror what Luciana Parisi describes as 'an irreversible transformation

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[121] Marriott, David. *Inventions of Existence: Sylvia Wynter, Frantz Fanon, Sociogeny, and "the Damned".* In The New Centennial Review. 11. 45-89. 10.1353/ncr.2012.0020. 2012, 3.

[122] Fanon makes reference here to Hegel's ontology, specifically the chapter 'Lordship and Bondage' in …

[123] Fanon, Frantz. *Black Skin, White Masks.* Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 109.

defined by the way in which rules are immanent to the infinite varieties of quantities that they attempt to synthesise'.[124] A transformation by which race, as a mechanism of control, does not merely operate across networks of cognition, but through the affective enveloping of sensations, in addition to cognitive function.[125] How might we then use this synthesis to account for the internal problematic of the mythical and alienated racialised individual? How might the relation between enumeration and the technical object shift the ontological understanding of black sociality? In other words, how do we resolve the contemporary problematic post-Fanon?

The provocation prompts consideration of the *spatio-temporal* organisation of contemporary society. If — within the schematic of *sociogeny* — the radicalised body is disassociated by the consistency of race substance; if the black body is comprised of a 'thousand details, anecdotes, and stories'[126]; if this body is organised under the terms of 'History' and 'Truth'; and, if this 'Truth' is instrumentalised as a justificatory act, then what remains of the racialised body in the contemporary big data and epistemic processes?

This question hints towards contemporary epistemic operations — operations that, once enacted, can subsume the phenomena of existence into consistent organisations of discrete data. By this I mean, operations that are designed to accumulate, fragment, organise and classify then organise phenomena under illusive, yet universal, authorities of scientific knowledge. More so, I question

[124] Parisi, Luciana. *Contagious Architecture: Computation, Aesthetics, and Space. Technologies of Lived Abstraction*. Cambridge, Massachusetts I London, England: The MIT Press, 2013.

[125] Clough, Patricia Ticineto, and Craig Willse, eds. *Beyond Biopolitics: Essays on the Governance of Life and Death*. Durham: Duke University Press, 2011, 163-176.

[126] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 84.

contemporary operations that materialise into 'new ways of seeing' and, in particular, increase the capacity for pejorative judgement. Here, I immediately turn to the instrumentatlisation of data in contemporary culture, namely our relationship with 'Big Data' and machine learning. In Part 5, I provide greater detail on the motivation behind my enquiry into the collision between *sociogeny* and machine learning. For now, it is useful to describe how this relation might be articulated as the limit of the colonial imaginary.

Kara Keeling, for instance, argues that Fanon's concern with the ontological predicament of the Black man is an epistemological limit that positions the every day experiences of the colonised as a spatial-temporal coordinate onto which 'the Black' and 'the White' are projected.[127] Keeling writes:

> That co-ordinate makes possible colonial discourse, colonial representations, and even colonial reality, but itself eludes representation by colonialism's structures. The spatio-temporal co-ordinates at which the Black's inferiority comes into being through the other is colonialism's foundation; yet, its particular spatial co-ordinates have been obliterated, universalized, and its specific temporal co-ordinates have become unknowable because Black's inferiority is constantly reinstated. The temporality of the colonial world thus shackles life to the past as a way of rationalising colonial existence.[128]

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[127] Keeling, Kara. "'In the Interval': Frantz Fanon and the 'Problems' Of Visual Representation." *Qui Parle* 13, no. 2 (December 1, 2003): 91–117. https://doi.org/10.1215/quiparle.13.2.91. 97

[128] Keeling, Kara. "'In the Interval': Frantz Fanon and the 'Problems' Of Visual Representation." *Qui Parle* 13, no. 2 (December 1, 2003): 91–117. https://doi.org/10.1215/quiparle.13.2.91. 97

Fanon's call for an 'unrepresentative (unproblematic) experience of the co-ordinate' highlights the (im)possibility of ontology to account for the black existence outside of the colonial relation.[129] Ontology is mis-directed by its presupposition of a universal consciousness, which as Fanon argues already excludes the origin of Black being. Here, Fanon asserts that the Black man has 'no ontological resistance in the eyes of the White man', even though both Blacks and Whites exist as 'problems' on the *spatio-temporal* site.[130]

Fanon's search for black individuation draws a psychic binary between bodies that are colonised, and those that are de-colonised.[131] I discuss the process of individuation in Chapter 7. At this juncture, his theories also preference the cognitive genesis of alienation as a function of external stimuli (in this case, that of the colonial imagination and teleological reason). The importance of Fanon's concept of Black being cannot be overstated. This leaves Fanon with a feeling of loss. He does not want to accept Hegel's theological understanding of human development, which he argues in 'On the Religion of the Greeks and Romans' endows 'every man with means and energies sufficient for his happiness'.[132] For Fanon, this is unthinkable within the *spatio-temporal* co-ordinates of the Black-White hierarchy. Instead, Fanon wants to imagine a relation outside of representation 'not simply to counter the ways history has been used to justify supremacist claims and effects, but to escape the normal teleological form of its writing'.[133]

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[129] Ibid.

[130] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 110.

[131] Fanon, Frantz. *The Wretched of the Earth*. Translated by Constance. Farrington. Penguin Books: Harmondsworth, 1967.

[132] Georg Wilhelm Friedrich Hegel, 'On...', as quoted in Kroner, Richard. 'Introduction: Hegel's Philosophical Development'. In Hegel, G. W. F. *Early Theological Writings:* Philadelphia: University of Pennsylvania Press, 1972. https://doi.org/10.9783/9780812206135.

[133] Fanon, Frantz. The Wretched of the Earth. Translated by Constance. Farrington. Penguin Books: Harmondsworth, 1967, 46.

As such, Fanon attempts to counter ontological arguments that do not recognise the binary Black-White relation, or the ways that 'race' is projected onto the colonial spatio-temporal grid. Under these conditions, he argues that we must contend with the continuing power of racial discourse, the epistemological organisation of society, and the resultant alienation experienced by colonised, as well as the coloniser.

2.1: 'Autopoetically' instituted being and 'lawlike' correlations

In her essay, 'Human Being as Noun? Or *Being Human* as Praxis? Towards the Autopoetic Turn/ Overturn: A Manifesto', Wynter posits that this co-ordinate is constituted by a 'lawlike correlation between our modes of knowledge production and the auto-institution of our social realities'.[134] In the text, Wynter elaborates on the legitimating structures of colonial hierarchies, and the 'indispensable condition of the formation and stable replication of each respective societal order', which is another component of the consequences Fanon describes.[135] Fanon depicts these conditions as dynamic and 'hellish cycle' or 'infernal circle' of anticipation and violence.[136] Similarly, Wynter posits that this *autopoetically instituted* living system frees human knowledge of its physical and biological realities, and substitutes them for order-stabilising and order legitimating codes of symbolic forms of life and death. As such, levels of human knowledge of the physical and biological are emancipated by epistemological processes that circulate in the *autopoietic* field of relation.

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[134] Ibid.

[135] Ibid.

[136] Fanon, Frantz. Black Skin, White Masks. New ed. Get Political. London: Pluto-Press, 2008

My ultimate aim in the pages to follow is to demonstrate how the circular structures of the colonial

co-ordinate are organised around the Anglo-European concept of *Man*. I argue that this *Man* is the

central node from which any apparent fluidity can be articulated in the colonial environment.

Nonetheless, I argue that it also demonstrates the necessity to re-instate the concept of *sociogeny*

to reveal what Keeling argues is the possibility of extending the 'problem' of the white-black binary

into discourse that can work critically beyond representation.[137]

Since Fanon's sociogenic schematic, and the re-emergence of ontological question of the post-

human, black study has returned to the colonial *episteme*, and the correlation between data, the

history of racial coding and invention of the other. Sylvia Wynter, in particular, introduces the

concept of the *bioepisteme* to further elaborate on the problem of Fanon's *sociogeny*. While Fanon

articulates the problematic as one of form, Wynter extends the critique to consider the ways in

which substance is anterior to the categorisation of race. This race substance, as she describes, is a

circular and self-justificatory process enacted by categorisation and the production of scientific

criteria.[138] Wynter goes a step further, however, to describe the role enumeration has played in the

construction of the concept of *Man*.

She uses the construction of *Man* to return to the question of origin and being, which she argues

are still mediated by a prolonged 'eugenic decent' that has legitimised the ontological and

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[137] Keeling, Kara. "'In the Interval': Frantz Fanon and the 'Problems' Of Visual Representation." *Qui Parle* 13, no. 2 (December 1, 2003): 91–117. https://doi.org/10.1215/quiparle.13.2.91. 97

[138] Wynter, Sylvia *"1492: A New World View,"* in *Race, Discourse, and the Origin of the Americas: A New World View*. Washington: Smithsonian Institution Press, 1995.

hegemonic social status of the global middle classes.[139] I discuss eugenics in more detail in Chapter 3 For now, Wynter argues that the instrumentalisation of the fictive concept of *Man* is enacted by the *colonial episteme,* which functions in a similar way that, for instance, the European feudal systems served to verify the truth of the divinely ordered aristocracy. As Wynter describes, this system not only concretised the caste system but also the theological categories that functioned as primary modes of knowledge production. Wynter argues that although previous feudal systems were disrupted by the humanist revolution in fifteenth century Europe (in rejection the divine ordering of knowledge), the primary function of the category continues to preside over the principles of human variation today, shifting the method of calculation from the lay appraisal of the particular to mass abstraction of human behaviour into the pre-emptive logics of universal control. In other words, it is within the terms of enumeration that the social and pathological modelling of the human has replaced the divine will and, as such, the amplification of Euro-centric systems 'truth', global order and reason.

As Wynter and Fanon posit, race substance has become a recurrent and consistent process. It results from an irregular series of affect, lodged in a 'certain uncertainty' within the universal concept of human.[140] As such, the diagnosis of black alienation is, as Fanon argues, a *sociodiagnostic* phenomenon that can neither be reduced to biochemical processes nor 'escape human influences'.[141] To engage further with the black individual, ontology must not only de-centre the white subject as a transcendental ego, but articulate a new mediated consciousness that auto-

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[139] Wynter, Sylvia "*1492: A New World View,*" in *Race, Discourse, and the Origin of the Americas: A New World View*. Washington: Smithsonian Institution Press, 1995.

[140] Ibid.

[141] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

designates a reality that synthesis the actualisation of the self with the production of the social. My aim here is to investigate how *sociogeny* becomes an illusive concept in the colonial organisation of space and time. I situate this dynamic in what Sylvia Wynter argues is a dynamic site of empirical ordering, or what she characterises as an *autopoetically instituted* living system.[142]

For Wynter, the colonial relation is a product of an extensive network of data extracted from the site of the colonial co-ordinate. It comprises what she calls the *bioepisteme*. The *bioepisteme*, according to Wynter, is an example of an *autopoetically instituted* living system that enacts the replication of social orders of reality through data and the production of knowledge. Humberto Maturana, Francisco Varela and Ricardo Uribe developed the concept of *autopoiesis* to explain the phenomenon of living organisms and their cognitive capacities.[143] An *autopoietic* system is an enclosed and autonomous system that distinguishes living and non-living systems. It describes living organisms as 'self-producing' and the nature of perception and intelligence as subject-dependent. It presents a process of production that generates its components in recursive re-creation of the self. An *autopoietic* system is realised in a particular structure and is independent of its environment.[144]

A key component of *autopoiesis* is the relation Maturana, Varela and Uribe establish between closed recurrent systems and cognition. In general, cognition refers to the assimilation and use of knowledge, and as such is limited to beings with complex nervous systems.[145] Although research on

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[142] McKittrick, Katherine, ed. *Sylvia Wynter: On Being Human as Praxis*. Durham: Duke University Press, 2015.

[143] Maturana, Humberto R., and Francisco J. Varela. *Autopoiesis and Cognition: The Realization of the Living*. Boston Studies in the Philosophy of Science, v. 42. Dordrecht, Holland; Boston: D. Reidel Pub. Co, 1980.

[144] For a detailed description of Maturana and Varela's concept of autopoiesis, see Mingers, John. "The Cognitive Theories of Maturana and Varela." *Systems Practice* 4, no. 4 (August 1991): 319–38. https://doi.org/10.1007/BF01062008.

[145] Mingers, John. "The Cognitive Theories of Maturana and Varela." *Systems Practice* 4, no. 4 (August 1991): 319–38. https://doi.org/10.1007/BF01062008.

cognition has advanced significantly, Maturana, Varela and Uribe believe that both cognition and perception are linked in the operation of the nervous system, which is realised through the *autopoiesis* of the organism. The survival of the organism, as an *autopoietic* system, depends on a cycle of recurrent interactions that produce knowledges of the relation, including the interaction between discrete entities within the closed system. In other words, as Maturana et. al. describe, the organisation of cognitive systems define domains of relation knowledge as well as action are made possible.[146]

By applying an autopoietic schema to the colonial imaginary, Wynter grasps the layered patterns of global knowledge systems, such as colonial and imperial expansion, which function as *perceptual categorization* systems to produce cultural and political ideologies.[147] Wynter surmises that the enactment of the code of what constitutes colonised life — or the descriptive statement of the individual's body — functions at the level of the psyche or soul entangled with society's systems of learning. It is believed that these codes must necessarily correlate or even determine the study of nature and the terms of *autopoiesis* and social praxis themselves.

Wynter also associates the construction of *autopoietic* social praxis with the instrumentalisation of science. To do so, she turns to the *episteme* — a scientific terms also adopted by Foucault in *The Archaeology of Knowledge* to describe the coexistence of a set of relations that form the conditions of possibility (or knowledge) in a given historical period.[148] Foucault initially restricts the *episteme* to

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[146] Maturana, Humberto R., and Francisco J. Varela. *Autopoiesis and Cognition: The Realization of the Living*. Boston Studies in the Philosophy of Science, v. 42. Dordrecht, Holland; Boston: D. Reidel Pub. Co, 1980.

[147] Marriott, David. *Inventions of Existence: Sylvia Wynter, Frantz Fanon, Sociogeny, and "the Damned"*. In The New Centennial Review. 11. 45-89. 10.1353/ncr.2012.0020. 2012, 3.

[148] Foucault, Michel. *The Archaeology of Knowledge.* New York: Routledge, 2002, 211.

the distribution of scientific knowledge as a mode of power, but expands the concept in later writings to account for other knowledges produced outside of science that remain invisible, concealed or 'epistemological unconscious'.[149] As Foucault has shown, the *episteme* operates under discrete forms of mundane practices and solutions. Furthermore, the *episteme* is a means by which the Other is not only brought into being, but made visible as difference in itself. Here, the Other embodies the normalising forces of power — in this sense instrumental reason, which is executed under the democratisation of calculus. By this, Foucault means the integration of dynamic modes of ordering and organisation in society, which are reinforced through the production, dissemination and enforcement of rhetorical truths.

2.2: Wynter's re-enactment of who we are

Winter builds upon the connection between *biopolitics*, Fanon's parallel work on surveillance, and Membe's thoughts on *necropolitical* sorting, within the context of what she terms the *bioepisteme*. Wynter uses the notion of the *bioepisteme* to confront specific moments in history, namely the drafting of fictive narratives concerning human origin — which she argues was produced by humanists during the Renaissance. The narratives, or a 'heresay' as she characterises it, reinforced ideas of *ethonophenotypic* sorting amongst people.[150] Wynter describes the consequences of *ethonophenotypic* sorting as a *eugenic descent*, or the legitimisation of hegemonic social standards. I discuss Sir Francis Galton and the emergence of eugenics in Chapter 3. For now, Wynter argues that this standard is an 'icon of an ostensibly pre-selected genetic value differential between *human*

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149 Sandiford, Keith Albert. *Theorizing a Colonial Caribbean-Atlantic Imaginary: Sugar and Obeah*. Routledge Research in Atlantic Studies 5. New York: Routledge, 2011.

150 McKittrick, Katherine, ed. Sylvia Wynter: On Being Human as Praxis. Durham: Duke University Press, 2015.

heredity variations, the representation of *eugenic descent* on whose basis the global middle classes legitimate their ontological hegemonic social status'.[151]

Wynter classifies the *biopistemic* under four schema: the *biocosmogonic,* the *sociohistorical*, the *political*, and the *salvific*. These *bioepistemes*, are articulated in the coding, or 'prescriptive sociogenically' encoding of slave and colonised bodies, and in the regulation of their movement.[152] Here, she returns to the question of origin by drawing parallels between fictive narratives of human history and the emergence of the humanities as a research discipline during the Renaissance. Its most significant byproduct was the invention and valorisation of the secular concept of Man. The humanities then emerged as a damaging orthodoxy in the nineteenth and twentieth centuries into what Wynter describes as 'the ossified Scholastic orthodoxy of medieval LatinChristian Europe's order instituting/order legitimating theologically absolute answer' to the question of origin.[153] As such, the secular Man was substituted for a new concept of secular being that was a separate and distinct from the ideal medieval Christian subject.

Wynter argues that although previous feudal systems had been disrupted by the humanist revolution in fifteenth century Europe (in rejection of the divine ordering of knowledge), the primary function of the divine category of being continues to preside over the principles of human variation today — which shifts justifications for classification away from the secular enterprise and replaces it with divine will as a proxy for Euro-centric systems of 'truth', global order and reason. A

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[151] Wynter, Sylvia. *No Humans Involved: On the Blackness of Blacknuss*. Hudson, Publication Studio Hudson, 2015, p.51-52.

[152] Wynter, Sylvia . 'Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto', 69.

[153] Ibid.

divinely ordered aristocracy emerged from this order and later, which concretised into caste

systems.[154]

Nonetheless, through the origin of teleological classification, Wynter searches for a possible opening

to historical concepts of being. She posits that any attempt at situating being must emerge from

outside of intra-Western terms, which has already solidified its ideas of origin and prototypical

distinction. She describes this revised narrative as a *plantetarily extended story* that exceeds the

limits of Renaissance Humanism, as well as humanism's resurgence as an institutionalised and

biologically absolute expression of neoliberal fundamentalism.[155] Her ultimate aim is to illuminate

the distinction between the colonised being, as such, and the discursively produced depiction of

ethnophenotypic people as not human or nonbeings. The theoretical distinction seeks to separate

the *being* of *being human* from the invented concept of *being human* established under the terms of

the fictive *Man.*

Here, *Man* plays a central role in establishment of the instrumental sanctioning of the Other.

Wynter argues that this ultimate mode of Western being — a mode of non-otherness based on

race — generates additional forms of subtypes that are logically measured, ranked, and bifurcated

based on any *ethnophenotypic* distance from the normalised models of Western culture. For

instance, the construction of the lower social classes as measured against the middle classes; non-

heterosexuals against heterosexual standards of behaviour; female bodies in comparison to males,

and so on. These organising principles are instrumentalised through 'law-like dependable' effects that

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[154] Wynter, Sylvia. 'Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto'.

[155] Ibid.

produce what Fanon observed as an autophobic organisation of behaviour in his black patients.[156]

The behaviours are regulated collectively on the levels of affect, perception, action and cognition.

Wynter writes at length:

> The central mechanism at work here… was and is that of *representation*. Its role in the process
> of socialization, and therefore, in the regulation both at the individual and at the collective levels
> of the ensemble of behaviours—affective, actional, and perceptual-cognitive—is central. For it is
> by means of the strategies of representation alone that each human order and its culture-
> specific mode of empirical reality can be brought into being as such a 'form of life' and third
> level of human, and therefore languaging existence.[157]

For Fanon, Wynter writes, this empirically derived self plays a central role in the constituted criteria
of being identified through the *autopoietic* order of colonialism. It also gestures towards the
colonised psyche, which experiences the self 'as if' it were actually genetically inferior. She writes:

> For it is on the template of these marks/criteria and the governing codes of symbolic life
> and death… which they express, that all individuals can alone be socialized as the condition
> of their realization not only as culture-specific subjects, but also as ones able to experience
> themselves as symbolically conspecific with the other members of the 'we' with whom they
> are narratively/linguistically bonded as they are biologically programmed to be.[158]

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[156] Fanon, Frantz. *Black Skin, White Masks.* Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

[157] Wynter, Sylvia "1492: A New World View," in *Race, Discourse, and the Origin of the Americas: A New World View.* Washington: Smithsonian Institution Press, 1995, 45.

[158] Ibid., 45-6.

Here, Wynter points to Fanon's dispute with liberal humanism and the premise of *bioepistemic* human development as a natural organism or as an autonomously regulated being. It is by the means of this strategy that the process of socialisation and regulation of the ensemble of behaviours — both at the individual and collective levels — become central to the ordering of human and culture-specific modes of empirical reality. The process of discretisation of the black body into accumulations of calculable elements is intrinsic to the formation of an empirical reality as a political project of visibility.

The critique is centred on the Western adoption of the metaphysics of substance, which Wynter articulates as the 'projection of the Aristotelian concept of bynature difference between its own 'Western humanity' as the ostensible embodiment of the normalcy of being secularly human'.[159] She draws on Judith Butler's critique of gender, where Butler argues that Otherness emerges when we enact the nouns *man* and *woman* as abiding substances. Butler states that these substances are produced by the fictive and compulsive ordering of attributes into a coherent gender sequence.[160] If these coherences are nothing more than 'contingently created through the regulation of attributes', then Butler posits that any ontology of substance is itself an 'artificial effect'.[161] Wynter's adoption of this point of reference extends the artificiality of regulated attributes into the substances of class, sexual orientation and race ontology. Her claim is sustained by the creation of what she describes as eugenic/dysgenic selection.[162] The coherence of racialised attributes, what I

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[159] Sylvia Wynter, '*Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto*', 4.
[160] Ibid.
[161] Sylvia Wynter, '*Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto*'
[162] Sylvia Wynter, '*Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto*'

call the *fictive substance of race*, links the dynamic instrumentalisation of coherence found in the biopistemic to the 'discursive negation of co-humaness'.[163]

Under these conditions we might also think of negation as a process of *white prototypicality*.[164] Lewis Gordon defines *white prototypicality* as a standard that epitomises whiteness as the ideal form of species, and therefore the prototype for black being.[165] Gordon turns to Wynter's interpretation of Fanon to illustrate the pathological strain blacks experience under the epistemic relation and the dialectic of recognition, which fully materialises once being is substituted for visibility and physiology.[166] He writes:

> [Blacks] thus live with the knowledge that the world is larger than the white one, and they know that the ascription of being is not granted to that wider world — that world of, as it were, dark matter — but they also know that they live in that world, it is their lived experience. Whiteness exemplifies a kind of blindness. It is a patronising view of blackness as a limit, a limit of being, a point of lack.

Gordon posits that blacks become narcissistic when confronted by their own self-image in relation to the standard model of white representation, which also reinforces the black's desire to be and

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[163] Sylvia Wynter, '*Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto*', 4.

[164] Lewis R. Gordon, "Is the Human a Teleological Suspension of Man? Phenomenological Exploration of Sylvia Wynter's Fanonian and Biodicean Reflections," in *After Man, Towards the Human: Critical Essays on the soul of Sylvia Wynter*, ed. by Anthony Bogues. Kingston: Ian Randle, 2006.

[165] Lewis R. Gordon, "Is the Human a Teleological Suspension of Man? Phenomenological Exploration of Sylvia Wynter's Fanonian and Biodicean Reflections," in *After Man, Towards the Human: Critical Essays on the soul of Sylvia Wynter*, ed. by Anthony Bogues. Kingston: Ian Randle, 2006.

[166] Ibid.

behave as a white person would. Furthermore, Gordon suggests that, as a fiction of ideal being, *white prototypicality* also lodges the black psyche into a crisis of the 'real', which is their perception of experience, and the imaginary, which is how blacks are perceived by others.

2.3: Psycho-affective perception and non vertical judgements

Although Wynter grounds her search for being in an *autopoetic* struggle for recognition, she suggests that any fictive construction of substance is also a self-programming schema that enacts a symbolic set of behavioural instructions.[167] As Wynter argues, these instructions are not purely operational, but are *psycho-affective* in that they form a cognitive closure around the fictive modes of kind.[168] The cognitive closure expresses the boundary of the *we*. In other words, it defines the referent of *we* as that which is not the Other — the '*they* and *not-us*'.[169] As such, it magnifies the specificities of kind, including the symbolic operation of life, death, belonging, and the preservation of such. In reference to Althusser's *Ideology*, Wynter contends that what we know as humans and how we experience our environment is framed by the *sociogenic* code. This means that our knowledge of 'reality' of the *autopoetic* living system, as well as the coordinated behaviours, enacts a 'perceptual categorisation system' that is incompatible with the way reality is viewed outside of the genre-specific viewpoints.[170] Furthermore, Wynter argues that bodies within any autonomously functioning *autopoetic* living system typically have no direct 'cognizing' access outside of the terms of the system.[171] In other words, by creating the higher level of the Divine, subjects are rendered

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[167] Sylvia Wynter, '*Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto*', 4.

[168] Ibid

[169] Ibid., 43

[170] Ibid., 45-46

[171] Ibid., 72

ignorant of higher level systems of knowledge. Here, the subject can only perceive what is enacted in relation to other secular beings.

2.4: Fanon's adoption of the Gestalt

Another way to think though the maturation of the psyche and the perception of self-image is through Fanon's engagement with the Gestalt. As mentioned in Chapter 1, with the Lacanian notion of the mirror phase the child's perception of themselves is experienced as a fragmentation of the self in reflection to the wider world around them, which can be perceived but not directly accessed. In other words, as Lacan describes: the comparison allows the child to 'anticipate in a mirage the maturation of his power [which] is given to him only as *Gestalt*, that is to say, in an exterior its in which this form is certainly more constituent than constituted'.[172]

In psychology, *Gestalt* (translated from German as a 'pattern', 'figure' or 'organised whole') is described as 'a configuration or pattern of elements so unified as a whole that it cannot be described merely as a sum of its parts'.[173] Put another way, *Gestalt* refers to the perception of objects whose parts are registered separately, but as a whole exceed the composition of its parts. *Gestalt* can also be conceived of as a cognitive mapping or imaging of oneself in relation to what we experience as the external environment. This is referred to as the *imago*. As Mollerup outlines: Gestalt principles make use of the Law of Prägnanz (German for 'pithiness'), which states that the mind refines what it actually sees to create order in our impression and understanding of the

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[172] Jacques Lacan, *The Seminar of Jacques Lacan: Book XI The Four Fundamental Concepts of Psychoanalysis,* Ed. Jacques-Alain Miller, Trans. Alan Sheridan, 1981, 503.

[173] WordWeb English Dictionary and Thesaurus.

unstructured world.[174] Mollerup also references the law of closure, where the mind replaces what seems to be missing, but connecting visual fragments into a composite.

In terms of visual perception,[175] the concept of figure-ground organisation is central to *Gestalt*. In short, figure-ground organisation is a type of perceptual grouping that is necessary to recognise objects. It is also known as identifying a f*oreground* or *figure* from a *background*. As such, in the *Gestalt*, perception is the relation between figure and background. The relation is causal, meaning that any variation in the figure will cause a topological variation in the perception of the ground. It is also reciprocal in that any variation in the background will result in an altered perception of the figure. The brain uses perception to decide which attribute in the visual field which items are the figure and which are the background. In this sense, it is not unusual for the brain to alternate between perceptions of the figure and perceptions of the background.[176] In these terms, our brains assign meaning to certain attributes in the visual field, which are linked to our perception of the inner world (*Innenwelt*) and outer world (*Umwelt*). The segregation of attributes helps us distinguish between attributes, as well as classify and organise them into coherent visual scenes. Put simply, in

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[174] Mollerup, Per. *Data Design: Visualising Quantities, Locations, Connections*. London, UK; New York, NY, USA: Bloomsbury Academic, an imprint of Bloomsbury Publishing Plc, 2015.

[175] In machine learning, computer vision techniques draw on Gestalt psychology to formalise figure-ground organisation. The process helps facilitate perceptual groupings of data in artificial visioning systems. In computer vision, figure-ground organisation refers to the detection of objects in an image, differentiating these objects from the background, and grouping contour elements into two-dimensional shapes (2D) that represent three-dimensional (3D) objects. It begins with an algorithmic interpretation of shapes, sizes and colours of objects, and then applies the simplicity principle to recover the 3D shape. While it is recognised that 3D objects are conceptually complex, it is also known that objects never produce identically shaped retinal images. For instance, a table and a chair will never produce the same 2D retinal images, regardless of viewing direction. Each 2D retinal image would then be unique to a specific object; and therefore, any 3D shape can be recognised from its 2D representation. Computer vision is derived in part from the recognition that human observers cannot reliably reconstruct, or recognise, surfaces from depth cues. Although computer vision shares this impossibility, its primary task is to simulate the cortical architecture of human neurological function to fill-in details of 3D objects across regions that are missing in localised vision cues. This is traditionally attempted by Bayesian techniques and other computational approaches. I speak more on Bayesian techniques in Chapter 4.

[176] In computer vision, the direction of the vision region is known as 'border ownership' that determines any veridical correlation between object shape, size or luminance and perception. See: *Computer Vision: From Surfaces To 3D Objects.*

the *Gestalt*, what we see visually is not necessarily all that can be perceived. To perceive an objects

is, therefore, also the act of translating an object into perceptual attributes, such as shapes, sizes, and

colours.[177] In the absence of unequivocal cues, it also brings forth any discontinuities in attributes or

any disparities in depth, which can be interpreted as difference.[178]

Our non-veridical perceptions, in this sense, do not depend on any concrete sense of reality to

make decisional judgements, even if the attributes perceived change over time. Following Merleau-

Ponty, the *percept*, or the representation of what's is perceived, is the simplest form of visual

interpretation.[179] Merleau-Ponty writes that the percept 'is the simplest sense-given available to us'

and is therefore 'the very definition of the phenomenon of perception'.[180]

For Fanon, the *eugenic descent* Wynter describes, is specific to his own descent under the gaze of

whiteness. As discussed in Chapter 1, Fanon challenges Merleau-Ponty's notion of the *corporeal*

schema. He substitutes it with his own schemas — the *historical-racial schema* and the *epidermal*

racial schema, the latter being the immediate materialisation of blackness in perception. Fanon's

critique of the *corporeal schema* is that it does not account for the disparities in experience that are

brought about by racism and the historical perception of Blacks by Whites. Fanon deploys the

concept of e*pidermalization* — the interlacing of the *historical-racial schema* and the *epidermal racial*

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[177] von der Heydt, Rüdiger. "Contour-, Surface-, Object-Related Coding in the Visual Cortex". In Tyler, Christopher W. *Computer Vision from Surfaces to 3D Objects.* Boca Raton, Fla.: Chapman and Hall/CRC, 2011.

[178] Ibid.

[179] as quoted in Somers-Hall, Henry, and Canadian Society for Continental Philosophy. "Deleuze and Merleau-Ponty: The Aesthetics of Difference." *Symposium* 10, no. 1 (2006): 213–21. https://doi.org/10.5840/symposium200610115.

[180] Ibid.

schema — to describe the phenomenon of racism and psychical anti-black racism as a problem of the primacy of vision. Fanon describes his own descent under *epidermalization*:

> I had to meet the white man's eyes. An unfamiliar weight burdened me. In the white world the man of color encounters difficulties in the development of his bodily schema ... I was battered down by tom-toms, cannibalism, intellectual deficiency, fetishism, racial defects ... I took myself far off from my own presence ... What else could it be for me but an amputation, an excision, a haemorrhage that spattered my whole body with black blood?[181]

Here, Fanon reminds us that perception is the site where the black body is brought into the figure of the colonial imagination.[182] In a direct critique of *Gestalt*, however, Fanon asserts that the colonial perception is neither reciprocal nor reversible. Under colonialism, the object of blackness can be simplified, fragmented and brought into view. However, Blacks cannot equally bring the non-Black other into any visible coherence. Pathologically, the resulting inequity blocks Blacks from experiencing any direct view of the organising principles of physiology, which is external and inaccessible to their perception. Keeling argues that although Fanon tries to move beyond the world of perception in *Black Skin, White Masks* towards a phenomenon of Black experience, he remains fixated on re-locating black being outside of the visual field. Keeling writes:

> This coordinate is always present in colonial reality, authorizing the continued existence of 'the Black' and 'the White' and posing a constellation of difficulties for the thinkers and

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[181] Fanon, Frantz. *Black Skin, White Masks.* Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

[182] See: Low, Gail Ching-Liang. *White Skins/Black Masks: Representation and Colonialism.* London; New York: Routledge, 1996.

makers of Black identity and culture. Those difficulties derive from the way that the spatio-temporal co-ordinate of colonization and enslavement is precisely what 'the Black' indexes. But, it is also what must be wrenched upon and destroyed in order to liberate 'the Black'. Within Fanon's framework, that co-ordinate remains inaccessible. (For him, it is repressed.) Ontology thus becomes unthinkable... The event of colonization and enslavement marks the violent creation of an antimony that is ceaselessly projected onto the world at the expense of 'Being'.[183]

Nonetheless, Fanon seeks to interrupt the temporal cycle of colonialism by disrupting the internal experience of the co-ordinate.[184] To do so, Fanon must shatter the formal legitimacy of the spatial-temporal co-ordinate, and in doing so open perception to alternative forms of representation.

2.5: From figure-ground to the color line

If we are to accept this major proposal, and ignore the parasitic relationship between historical moments of extreme anti-black violence and present perceptions of black skin, where some objects — such as the black object — are regulated more heavily under the categories of race, then we would have to take Merleau-Ponty's treatment of the Gestalt in *Eye and Mind* at face value. We would also have to accept the neat placement of the phenomenology of perception within the logics of the category, and take as absolute the proposition that 'if another's body is not an object for me, nor mine an object for him, if both are manifestations of behaviour, the positing of the other does not reduce me to the status of an object in his field, nor does my perception of the

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[183] Ibid., 97

[184] Ibid., 97.

other reduce him to the status of an object in mine'.[185] In other words, as Henry Somers-Hall describes in his analysis of Merleau-Ponty, the concept of depth and space is where the composition of difference is formed.[186] In his treatments of Cezanne and Klee Merleau-Ponty makes clear that these differences are rendered visible by the lines that are formed in space.

Conclusion

In this chapter I have given an overview of Sylvia Wynter's intervention into *autopoietic* concepts of being. Wynter intervenes in the *sociogenic* ecology to specify the elements of operation that surround the ontological abandonment of black existence. In the search for black individuation, it is useful to consider the grounds for existence in the Fanonian thesis. As Wynter argues the Fanonian search for black genesis is always-already mediated by an active ontological invention guided through the principles of empiricism as well as the colonial imaginary. The immediate consequences are two-fold. First is the outcomes of an individuality that is pre-figured and over determined by a recurrent *autopoietic* relation. Secondly, is the assumption that the *bioepistemic* principle precedes the individuation of the *ethnophenotypic* being as an observable truth, guided by the grounds a-historical perception which, as has been outlined, inscribes *ethnophenotypic* being into a recurrent *sociogenic* bodily schema.

As shown, she finds a pathway through the early invention of the unattainable concept of Man. This figure was first invented as the ideal form of being before being discursively bifurcated into a secular form of human and an ultimate authority, which is the Divine. The resultant order of

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[185] Merleau-Ponty, Maurice. *Phenomenology of Perception.* Paris: Éditions Gallimard, 1945, 100.

[186] Somers-Hall, Henry, and Canadian Society for Continental Philosophy. "*Deleuze and Merleau-Ponty: The Aesthetics of Difference.*" Symposium 10, no. 1 (2006): 213–21. https://doi.org/10.5840/symposium200610115.

knowledge materialised into new colonial perception articulated as an 'order-stabilising' practice.

One of the primary functions of this practice was to secure the secular Man's position at the apex

of species. The epistemic framework also opened the field of relation to more discrete forms of

human classification. With the white Anglo-European Man at the apex of species, the non-white

other was relegated to lower statuses of existence, which served as a justificatory mechanism for

further regulation of the lower humans. In this way, the Keeling's visual of the dynamic *spatio-*

temporal co-ordinate draws parallels with the Divine organisation of the social. It furthermore re-

instated the power of the oppressor in a cyclical process — a power that was reified with each

instance of epistemic violence.

If we build upon Wynter's diagram of human classification — where the species is classified as

either rational or irrational (or 'selected/dysselected', as Winter argues) — then the field of relation

is also open to the rejection of 'ideological unveiling' of racial dominance which over-represents the

genesis of being as always-already delineated by European male perception and division along the

colour line.[187] Instead, an opportunity unfolds to challenge both the symbolic ordering of

phenotype, as well as the Hegelian dialectic of recurrent associations, as I mentioned in Chapter 1.

How do we put forward a conditions of possibility for what is activated in modes of being?

I elaborate on these proposals in Chapter 6. For now, I argue that prior to reaching any

comprehensive methodology, we must come to terms with the impact enumerative principles have

had on the contemporary *episteme*. In the next chapter I argue that the colonial *bioepisteme* is

symptomatic of a larger regime of enumeration that has amplified into individual and collective

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[187] Wynter, Sylvia. "Unsettling the Coloniality of Being/Power/Truth/Freedom: Toward the Human, after Man, Its Overrepresentation—An Argument," *CR: The New Centennial Review*, vol. 3, no. 3 (2003): 257–337.

adoption of data as empirical reality. I turn to three major shifts in enumerative logics that set the

conditions for eugenic hierarchies.

I begin with the emergence of data aggregation in 17th century Europe, and the amplification of

categorical hierarchy that operates through and beyond colonial representation to reveal the

primacy of enumeration in colonial logics. I consider the emergence of amateur data aggregation

and the role of symbolic mathematical functions in the ordering of social bodies prior to the advent

of modern computing. I begin here to illustrate the intensity of classificatory operations.

With the new power of data and classification, more haptic and intuitive scientific observations

were substituted for symbolic representations of the world. As such, mathematics gained more

social, economic and political relevance, as they could subsume the contingency of observation into

patterns that simulated time and day to day behaviours. Mortality indexes and statistical models like

the Guassian or Normal Distribution curves are examples of these operation. In later

developments, symbolic representations gave way to mathematical logics as moral sciences that

positioned statistical formulae as basis of social rule sets, which were then measured against

religious and political moralities and reinforced by data. Having dissected this brief genealogy of

symbolic classification, I will conclude the next chapter by building an association between early

data and statistical practices to contemporary machine learning.

Chapter 3: Statistical hierarchies and bio-evolutionary justifications

This chapter of the thesis is an excavation of statistics. The aim of this chapter is to demonstrate that what we know today as 'Big Data' is part of a longer genealogy of data and statistical practices. The ultimate goal is to gain greater insight into the conditions the might have informed the *bioepistemic* relation.

As I show in Chapter 2, the *bioepistemic* relation has had a profound impact on practices of racial sorting, or what Wynter calls the *eugenic descent*. In this chapter, I argue that prior to the question of the *bioepistemic* and the naturalisation of *sociogeny*, the conditions for e*thnophenotypic* sorting were already set forth by early advances in statistics. I contend that *ethnophenotypic* sorting is part of a larger system of spatio-temporal control enacted through statistical correlation. The ultimate aim is to map a critical genealogy of enumeration logics that have informed the colonial relation to categorisation as established thus far.

While this chapter is not meant to be a complete mapping of statistics, or the history of quantification, I do emphasise what I argue are key moments in the enactment of statistics for social organisation. To do so, I address three major paradigms that are relevant to these factors. First, I consider the emergence of data accumulation in Anglo-European practice from amateur to institutionalised administrative techniques. I argue that as these data practices emerged, they were also formalised into state and military operations. I describe how the instrumentalisation of data developed into a science of morality, while producing empirical justifications for social sorting. Lastly, I trace then link between human sorting and the production of the secular prototype of *Man*.

In section 1, I briefly describe the early emergence of statistics.

Part 1: Early data as a public enterprise

It is widely thought that our present desire for data finds it origin in contemporary modes of computation, namely machine learning, deep learning and artificial intelligence technologies. To the contrary, the conditions for these technologies and their operational capabilities were set forth by Anglo-European fixations on classification, data aggregation and mathematics, driven by the ideology of the Enlightenment. While early data practices emerged largely from amateur interests in the quantification of living phenomena, prior to the institutionalisation of data, many of these activities were limited to small statistical tables, or what were called 'life tables' with little or no specific aim. These tables were primarily kept for private research purposes, with no explicit application for institutional use.[188] Early amateur interests in data also coincided with shifts in public fascinations with new scientific advances in the fields of astronomy, geometry, optics, music and mechanics. I discuss these amateur interests below.

For now, with the aid of these disciplines, data offered clues that could potentially explain the origin of both natural and social phenomena. With new ways to understand the world, data became the *de facto* mode of insight into observable reality and scientific falsification. What emerged was not only the rationalisation of patterns found in natural phenomena — which would later birth movements in cybernetics and new logical visions of the world — but the potential for data to also

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[188] Hacking, Ian. *The Taming of Chance*. Ideas in Context. Cambridge [England]; New York: Cambridge University Press, 1990.

illuminate patterns of social behaviour. With this new insight, knowledge derived from data became a social and political reality. I describe these types of political realities in Part 1 of this section.

3.1: From amateur interests to state secrets and colonial optimisation

The etymology of the word *statistics* is illustrative, particularly considering that it derives from from the same root as the word for *state* from the Latin *status*, meaning 'manner of standing, position, condition'.[189] This reflects the origin of statistics as a process of data manipulation already subsumed in the logics of administration. According to Ian Hacking, in his careful case study of the rise in statistical methods *Taming of* Chance (1990), 'every state… was statistical in its own way'.[190] So much so, that by the late 17th century, European colonial nations had already begun collecting survey and census data on their respective colonies to aide in the facilitation of local resource extraction.

Although some colonial territories administered their own data processes to evaluate resource metrics, for colonial nations the physical body as resource and labour was as crucial to the optimisation of colonial capital expansion as non-human material properties. More so, colonial capital expansion relied upon the universalisation of these processes to optimise resource production. Colonial expansion was supported by the work of empiricists who believed that data could provide direct experiences and engagements with distant territories, as well as provide a

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[189] The tradition of 'university statistics' can be traced to German philosopher, economist and statistician Gottfried Achenwall in his *Staatsverfassung der Europäischen Reiche im Grundrisse* (Constitution of the Present Leading European States, 1752). Achenwall, is widely credited as the founder of statistics or *statisticum* in his constitution of national agricultural, manufacturing and commercial conditions. Others, however, claim that although we owe the word 'statistics' to Achenwell, the techniques were based on the findings of 17th century English economist William Petty with his use of mathematical methods in political economic analysis, also known as political arithmetic. See: Wood, Michael. *Making Sense of Statistics: A Non-Mathematical Approach*. Nachdr. Palgrave Study Guides. Basingstoke: Palgrave, 2004, and Hacking, Ian. *The Taming of Chance*. Ideas in Context. Cambridge [England]; New York: Cambridge University Press, 1990.

[190] Hacking, 16.

universal language of enumeration to help engineer and facilitate logistics. The maximisation of capital depended upon the *ethnophenotypic* sorting of colonised bodies, as I described in Chapter 2. The theories of philosopher Gottfried Wilhelm von Leibniz, empiricist A.C. Crombie and others, whose work systematically correlated biological phenomena with mathematical logics and patterning, assisted, if even implicitly, in enacting this use of data.

In the next part, I argue that the facilitation of colonial expansion were set forth by important moments in the history of data accumulation. To start, I give a brief summary of the links between the history of biological data accumulation and the development of military secrets, and the administration of populations.

3.2: Leibniz, state power and the emergence of the black box

For insight into the historical ecology of data, I turn to Leibniz. Leibniz's prolific summaries of data, as well as his differential calculus for the study of applied mathematics. His *law of continuity* and *transcendental law of homogeneity*, stated in his 1710 text entitled *Symbolismus memorabilis calculi algebraici et infinitesimalis in comparatione potentiarum et differentiarum, et de lege homogeneorum transcendentali* — although not fully implemented until the 20th century — established a heuristic, or intuition-based, approach to the study of human behaviour and quantifiable universality.[191]

In the text, Leibniz formulates a theory of universality that later proposed (in this instance to the Prussian Empire around 1685) a centralised branch of government that could accurately estimate

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[191] Judea Pearl defines heuristics informally as a popularly known set of rules, educated guesses, intuitive judgments or simply *common sense.'* More formally, Pearl elaborates on heuristic learning as 'strategies using readily accessible though loosely applicable information to control problem-solving processes in human beings and machine.' See: Pearl, Judea. *Heuristics: Intelligent Search Strategies for Computer Problem Solving.* The Addison-Wesley Series in Artificial Intelligence. Reading, Mass: Addison-Wesley Pub. Co, 1984.

population phenomena based on aggregated birth and death data. He envisioned an office that was flexible enough to serve several interests of the state, including military, civil, mining, forestry, police, and so on.

As Hacking reminds us, the enumeration of population phenomena is a key factor in Leibniz's work. After all, Leibniz's proposal to the state was predicated on his belief that the true measure of state power resided in its population — not as a mechanism of democratic agency, but in the form of the quantification of this agency for state control. Under this rubric, Leibniz conceived that the measurement of state prosperity, and and thus the maintenance and expansion of power, was measurable by knowledge as a problem of data. In other words, in order for a state to prosper it must produce and maintain a continual stream of insight on the behaviours of both human and non-human resources. This knowledge had to be flexible enough to account for the particulars of contingent phenomena. For example, surveys of the number of males in the population to forecast potential military power, harvest forecasting to predict military food supplies, and observable phenomena. This is no better illustrated than in contemporary practices that assign birth and death records to national numbers, which are centralised and correlated with other government interests, like taxation, insurance, and consumer records. These data create national profiles that, unlike earlier practices, do not require the individual to be present to be accounted for. Instead, statistical citizenship leaves trails of behaviours aggregated into tables (today, databases) for future use in forecasting relationships between mobility and state determined best practices.

The importance of Leibniz's concept is in its capacity to statistically associate biological phenomena with capital and state value. Fundamental to Leibniz's proposal is the ability to observe, as well as

act on any insights derived. In this way, Leibniz's theory can be thought through as an early mode of data-driven population governance. While these concepts were not actualised until much later, Leibniz's interest in enumerative logics eventually materialised into early census and classification tables. By 1730, Leibniz's classification tables gave rise to more official, administratively sanctioned data science.

As Hacking suggests, although it originated in the practices of amateurs, data emerged as a political strategy. Data informed ideas of optimisation and the stabilisation of contingency, as much as they did secrecy as forms of power and surveillance. For instance, Leibniz believed that if populations can be represented as measurements of state power, then the similar observations can be made by the enemies of a government, as well. Thus, data aggregated by the state needed to be secured and protected. Here, the potential for reconnaissance equated the abstraction of data with proprietary insight and state secrets, enacting an early form of black box military processes. As such, data were

used to stabilise social systems as well as administrative and military processes.[192] In the next

section I explain how simple population surveys developed into a cultural and political phenomena.

Part 2: Race, correlation and realism

3.3 Difference and the Divine

By the 18th century, population surveys had become a phenomena of their own. Not only had

they risen in popularity within governance, but they were published widely in private and

commercial sectors, as well. It was widely believed that natural phenomena, like sickness and death,

were contingent phenomena and not pre-emptive clauses; nonetheless, statistics were still

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[192] Also at stake is the ease at which the moral and political economy have manoeuvred between lines of mathematical logics. For instance, consider the Prussian military general and strategist Carl von Clausewitz's rational calculus of war termination, where he argues that: 'Since war is not an act of senseless passion but is controlled by its political object, the value of this object must determine the sacrifices to be made for it in magnitude and also in duration. Once the expenditure of effort exceeds the value of the political object, the object must be renounced and peace must follow'. What is particularly interesting about Clausewitz's theory is not so much its provocation of a moral means to war, but the scale at which war is carried out, not in strength or even violence, but the calculation of political will. For Clausewitz, war is no more than the larger magnitude of a duel, a one-to one confrontation, where the immediate aim is to incapacitate an opponent in order to prevent any resistance. In other words, war is a direct confrontation between two discreet elements, the victor of which is the one able to use the relationship between their differences to invoke submission, compliance or surrender.

Clausewitz argues that 'countless duels go to make up war', but the operation of war is more than the magnitude of force of one aggregate against another equal, less than or greater sum. The calculation of war exceeds the relation between the immediacy of incapacitation and the magnitude of force required to do so. Instead war is, as he writes: 'an act of force to compel our enemy to do our will'. Here, force is a certain self-imposed, imperceptible imitation of the self to voluntarily submit to the other, an act of *chi*, as Isabelle Stengers illustrates, as an 'energy' that supersedes violence, instead gaining the upper hand through manipulation and enticement. As with *chi*, what Clausewitz has done is articulate a calculus of difference, a political object, where the imposition of force can be used as a means of self-suppression. In this way, the enemy is no longer its own object or valid in its own objectives, but representative of a function of force in queue for political optimisation should an opponent need any form of implicit or explicit control. It is worth quoting Clausewitz at length:

> If the enemy is to be coerced you must put him in a situation that is even more unpleasant than the sacrifice you call on him to make. The hardships of that situation must not of course be merely transient-at least not in appearance. Other- wise the enemy would not give in but would wait for things to improve. Any change that might be brought about by continuing hostilities must then, at least in theory, be of a kind to bring the enemy still greater disadvantages. The worst of all conditions in which a belligerent can find himself is to be utterly defenseless. Consequently, if you are to force the enemy, by making war on him, to do your bidding, you must either make him literally defenseless or at least put him in a position that makes this danger probable. It follows, then, that to overcome the enemy, or disarm him-call it what you will-must always be the aim of warfare.

understood as a science that could enabled the estimation and forecasting of these observable processes.[193] Desrosières argues that keeping records on baptisms, marriages, burials and other characteristics and life phenomena is linked to concerns with determining individual identity, thus existence, as a state subject for judicial and administrative means.[194] The 'explosion' in data aggregation, as Hacking describes it, multiplied exponentially into a myriad of subclassifications of both living and non-living phenomena, such as animal live stock and commercial infrastructure.[195]

One of the most significant of these types of study was conducted by German demographer Johann Peter Süßmilch. Like Leibniz, Süßmilch used parish records to investigate gendered birth occurrences. In *The Divine order in the circumstances of the human sex, birth, death and reproduction* (1741) Süßmilch outlines the discovery of what he believed to be a linear ratio between male and female birth rates. Although natural child birth was generally thought to be a contingent phenomena, Süßmilch argued that child birth was instead the work of the Divine. As such, any patterns found within the process of birth could be reflected — with confidence — by a mathematical representation. Using these logics, Süßmilch concluded that males were not only born at a higher rate than females, but the number of future births could be forecast as Divine will. These data were then localised to correlate birth rates amongst various geographic locations. Süßmilch correlated these data into a general principle of morality that reduced the contingency of child birth into a theory of Divine provenance. Cities and territories with high birth rates were seen as more favourable by God, and therefore of higher social order than populations with lower birth

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[193] Hacking.

[194] Desrosières, Alain. *The Politics of Large Numbers: A History of Statistical Reasoning.* Cambridge, Mass.: Harvard University Press, 2011.

[195] Hacking.

rates. Süßmilch's principle was reinforced by earlier postulates by Scottish mathematician and physician John Arbuthnot, who in 1710 uncovered similar regularities in male and female birth rates. As with Süßmilch, Arbuthnot attributed his correlatives to provenance. Hacking argues that these correlatives reflect early tendencies to conflate data with justifications for the establishment of social hierarchy — a convention that Kant would later adopt to elaborate on his own theories of birth and death as justifiable 'conformit[ies] to the laws of nature'.[196]

Data analysis was also enacted to justify the construction of race as a natural phenomena. Aside from tables on birth, death and mortality, data was also recorded on racialised physiological, perceptual and cognitive markers, such as skin colour, cognitive image recognition, and head shapes. I speak more on this later. For now, it is important to mention that the first tables on immigration, emigration, nationality and race were created in 1745, after the publication of *The Divine order in the circumstances of the human sex, birth, death and reproduction*. The tables aligned with anthological travelogues based on empirical observation of indigenous populations.[197]

By 1900, the enthusiasm for race classification had exploded into methodologies in philosophy and the human sciences aimed at demonstrating racial hierarchy. In many cases, biological data was correlated with patterns found within natural phenomena. Data also strengthened Anglo-European ideas of racial superiority as a natural, and thus Divine, process of evolution. Zuberi argues that one of the most provocative examples of racial classification is the *Great Chain of Being (or 'ladder of being')*, a strict medieval catalogue of hierarchal structures of all matter and life thought to be

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[196] Hacking, 18.

[197] Barkan, Elazar. *The Retreat of Scientific Racism: Changing Concepts of Race in Britain and the United States between the World Wars*. Cambridge; New York: Cambridge University Press, 2000.

decreed by God.[198] The chain uses a Platonic and the Aristotlean concept of *Historia animalium* to vertically stack the material universe, starting with God as the perfect being, and descending downward to angels, demons, astrological matter, kings and queens, and on to commoners, animals, plant life, and so on. The 'links' in the chain were subdivided into further categories, with Humanity as an intermediary between spiritual beings and physical objects. Under this premise, humans were thought to posses the powers of reason and imagination similar to the Divine. Within this sorting of knowledge, humans were further sorted by wealth and social status. For instance, those with the highest status, such as kings and queens, were ranked higher than, say, servant or slave. Therefore, kings and queens were closer to the Divine, than other humans were. As such, those on the lower end of the spectrum, such as the servant or slave in this case, were ranked just above the 'highest' ranking beast, which was the ape. Humans were also thought to possess other attributes, such as sensation, which in the Divine sense gave humans access to all things knowable. Nonetheless, humans are still bound by the physical forms of the body and organs, which under the schematic created a tension between Divine forms of knowledge and what was thought to be the human's lower animalistic nature.

With the Divine order in place, any sorting of lower-ranked humans, such as the Africans or Hottentots — including their segregation, extraction, displacement, ownership or disposal — could be justified as both natural and mathematically sanctioned. In addition, colonial administrators and the publics could be relinquished from any direct accountability for their action. Paradoxically, as quasi-humans, the Hottentots were thought to still maintain a sensory and imaginative view of the

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[198] Zuberi, Tukufu. *Thicker than Blood: How Racial Statistics Lie*. Minneapolis: University of Minnesota Press, 2001.

world. However, their rationality and reason was limited by what was believed to be their

predominant animalistic nature.

Racial hierarchies were exacerbated by 18th century developments in evolutionary theory in

biology and social statistics. As Zuberi writes: 'When the Great Chain of Being no longer carried

the weight of legitimacy, science came to the rescue.'[199] Zuberi makes reference to Swedish natural

historian Carolus Linnaeus, who was one of the first scientist to formulate an empirical order

human populations.[200] Linnaeus's tables, *Systema Naturae* (1735), correlated physiological data on

human populations with animal species. Although Linnaeus did not explicitly rank species in a

hierarchal scale, he did suggest, aesthetically, that the Hottentots did not derive from the same

origin of species as Anglo-European people.

Linnaeus's charts had a great influence on research in evolutionary theory. For instance, Jean-

Baptiste de Monet de Lamark adopted Linnaeus's chart to develop a theory evolution based on

heredity or the inheritance of acquired characteristics, dismissing the role of random biological

variation. Lamark's study had an impact of its own, particularly through the work of Thomas R.

Malthus, who in 1789 applied characteristics of survival to population growth phenomena. Malthus

argued that population growth can be controlled strictly on the basis of statistical evidence.

Furthermore, he argued that populations growth was a geometric phenomena, while resources,

such as food, grew arithmetically. Malthus's theory was consequential to public and administrative

views on poverty and homelessness. Malthus drew upon earlier work in evolutionary theory to

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[199] Zuberi, 19.

[200] Zuberi, 19.

reinforce the naturalisation of the poor as a postulate of social patterning and, thus, Divine

provenance. With the poor relegated to a lower category of human — at a greater distance from

God than the more wealthy — then any attempt to aide the poor under the postulate would be a

rational act against God.

In Part 2, I turn to the enactment of provenance and the search for origin in practices of social

sorting.

3.4: Vitalism and origin of species

Charles Darwin challenged Lamark's theory in his 1859 text *On the Origin of Species by Means of*

Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. Although *On the Origin*

of Species was not a complete rejection of Lamark, Darwin did combine Lamark's theory with the

work of Malthus. By doing so, Darwin prioritised the act of survival as the primary motivation for

evolutionary development. Darwin applied the concept of natural law to observational patterns of

species survival. This later developed into his well-known thesis on natural selection and inter-

species competition.

In many ways eugenics originated with Charles Darwin, whose concern with natural processes

developed into the notion that humans are part of a larger system of organic life, and are subject

to the same natural processes of evolution, growth and decay. Darwin believed that this

characteristic is essential to the development of new subjects. G. R. Searle writes argues that 'the

hypothesis of natural selection was bound to raise in many people's minds the possibility that, as

rational beings, men might learn to control their evolution; in place of the blind processes of natural

selection'.[201] The deliberate effort to 'improve' the species was, in this way, a profoundly ambitious

project that had to align with the problems being experienced by various industrial and political

institutions. Searle notes that in Britain, in particular, eugenists asserted that it was possible to apply

the physical sciences, such as biology, to enhance national power and national regeneration — a

proposition that directly applied the laws of the physical sciences to the engineering and

organisation of the human species. Although ideas of race perfection were seen as universal

properties in the first instance, the notion of regeneration relied heavily on the control of

hereditary markers that were viewed as undesirable. In other words, as Searle states, eugenists

thought it possible to 'breed out' certain grave hereditary ailments in the same way biologists had

learned how to breed various fungi and diseases out of wheat.

By promoting the application of science evidence to human evolution, eugenists were able to

support claims of racial inequality under the notions of heredity and deniability for a utopian future.

This materialised into the application of intelligence tests (which I go in more detail below),

involuntary sterilisation, and engineered relationships between 'desirable' men and women to

preserve hereditary lines. Since black children were thought to lack physical, mental and

temperamental balance, miscegenation, in this sense, was seen as a racial error that could be

corrected through the encouragement of racial segregation.[202]

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[201] Searle, G. R. *Eugenics and Politics in Britain: 1900-1914*. Leyden: Noordhoff International Press, 1976, 4.

[202] Searle.

Notable theorists such as Hume, Paley, Rousseau adopted Darwin's thesis for further inductive studies of human social behaviour. These theories made significant contributions to the establishment of individualist ideologies, as well as *laissez-faire* political structures.[203]

3.5: The wretched of the stars, and the *eugenic descent*

I return to value and the racialised body shortly. For now, it is my intention to show first, how the conditions for the racial sorting were already set forth in the establishment of statistics as a viable tool for social inquiry. Secondly, I seek to demonstrate how the limits of calculation cannot be understood outside of the connection between racial sorting, social welfare and the development of statistical applications. We can think of this relation as illustrative of what Ian Hacking describes as 'enduring ways of thinking' that have impacted philosophical understandings of mathematics.[204] For instance, Hacking uses A.C. Crombie's text *Philosophical Presuppositions and Shifting Interpretations of Galileo* as an example of the reliance on '(a) the simple postulation and deduction in the mathematical sciences, (b) experimental exploration, (c) hypothetical construction of models of analogy, (d) ordering of variety by comparison and taxonomy, (e) statistical analysis of regularities of populations, and (f) historical derivation of genetic development'.[205] He highlights these paradigms to note an important shift in social frameworks that increasingly rely upon reasoning to establish scientific method. This matrix of knowledge production, as Hacking argues, has given rise to the false idea that information on population phenomena can be accurately evaluated through symbolic sampling, as opposed to the exhaustive census work that had been attempted prior.

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[203] Zuberi.

[204] Hacking, .

[205] Hacking, 6.

The techniques were amplified by the work of Lambert Adolphe Jacques Quetelet and André-Michel Guerry. Quetelet and Gerry hypothesised that independent human phenomena behaved with the certainty of astronomical phenomena — a process that simulated the rotation of the Earth around the Sun.[206] As result, human behaviour was bound to astronomical causality, as universal constants. As with the stars, any deviations from derived human constants of behaviour were deduced as perturbations to naturalised events that, once settled back into an equilibrium, could be returned to previously normalised patterns. In other words, the hypothesis aligned contingent and chaotic phenomena with a statistical order. The data, however, were actionable in their capacity to infer future social behaviour based on historical and present observation.[207] From the technology, prototypical behaviour emerged as a mode of population control, mediated through what German mathematician Johann Carl Friedrich Gauss termed the *homme type* or the 'average man.'[208]

According to Hacking, Quetelet's primary emphasis was instead on the codification of phenotypical phenomena, particularly race, in as much as race is extends beyond the biological and into moral substance.[209] Hacking writes:

> Where before one thought of a people in terms of its culture or its geography or its language or its rulers or its religion, Quetelet introduced a new objective measurable conception of a people. A race would be characterized by its measurements of physical

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[206] Hacking.

[207] Ibid.

[208] Ibid.

[209] Ibid.

and moral qualities, summed up in the average man of that race. This is half of the beginnings of eugenics, the other half being the reflection that one can introduce social policies that will either preserve or alter the average qualities of a race. In short, the average man led to both a new kind of information about populations and a new conception of how to control them.[210]

Here, Quetelet uses basic statistical probabilities to construct a matrix of phenotypical characteristics. Interestingly, Quetelet had little interest in deriving numerical averages of phenotypical factors such as height and weight (this would be the equivalent of preempting an individual's rate of childbirth at 2.2 children or that an individual might marry 1.6 times). The primary function of the matrix was to identify a casual relationship between an array of unique, yet arbitrary, properties, such as human chest size to vegetable harvest and poetry, and moral attributes.

Using the logics of astronomical discovery, Quetelet hypothesised that any departures from normalised patterns of heretical development were disruptions in the natural trajectory of evolution. More so, he believed these differences would (or could) be naturally de-selected. Alternatively, any conformity to normalised attributes would be naturally selected for both survival and superiority among its species. As Hacking writes:

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[210] Hacking, 107.

Quetelet had *made* mean stature, eye-colour, artistic faculty and disease into real quantities. Once he had done that … deviation from the means was just natural deviation, deviation made by nature, and that could not be conceived of as errors'.[211]

Despite the explicitness of Queteletian theories here, the robustness of his methods have been called into question. Doubt was already being cast on Quetelet's claim that a coefficient could be established to express the relationship between small samples and large data sets. Dutch official Baron de Keverberg heavily criticised ideas that a single law of population estimates in the Netherlands, for which Quetelet had attempted, could be applied to the entire population. De Keverberg's criticism concerned the heterogeneity of the population and the complexity of factors determining the attributes studied. In short, de Keverberg did not believe generalisation could be achieved by using complex systems.

Quetelet's distributions, although rigorous in their creations, did not test data for goodness of fit. In other words, through Quetelet's proofs, linear relationships are established based on a scattered set of binomial data points. This relationship produces a mean, average or nominal of all of the collected data. Theoretically, this line can be extended into infinity with any future data points predicted to fall within its reach. However, the linear relationship is never an exact match, only an estimation based on a 'best fit' of all of the data points. The linearity visualises certainty onto uncertain distributions.

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[211] Hacking, 113.

Mitigations of uncertainty in complex systems were further formalised by Siméon Denis Poisson. Since the institution of jury trials in 1789, lawmakers had become increasingly frustrated with error in jury decision. Error in judicial processes had serious consequences, as an innocent person found guilty could be wrongly sentenced to death and executed. The elimination of error proved difficult as the guilt of the accused is often uncertain, not to mention the fallibility of jury decisions is often present. In settling these concerns, Poisson's experimentations with jury decisions led to his 1837 book, *Law of Large Numbers*, in which he theorised a constant law of the same name. Poisson drew on Bernoulli's 'law of large numbers', in which the probability of an event happening in one way or another converges towards a normal law, given the number of runs of the experiment increases indefinitely.[212] Poisson, in following Condorcet and Laplace before him, applied the technique to generalise jury decisions. In other words, the Law of Large Numbers applies statistical tests to deduce rare events, like jury decisions, into probabilities of certain outcomes. Whereas Quetelet's distributions had not considered variation, Poisson's proofs made it possible to incorporate variability into generalisation. His contributions were furthered by his formulation of generalised linear regression models, or what is known as *Poisson regression*, that allowed for errors in models of count data other than normal distribution.

The debate finds its foundation in ideas of a constant cause as a principle for creating equivalencies which allow events to be aggregated, giving the appearance of contingent evidence functioning through a more general law.[213] Nonetheless, Desrosières maintains that Poisson still maintained consideration of the subjective by viewing probabilities as degrees of belief or judgements by

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[212] Korb, Kevin B., and Ann E. Nicholson. *Bayesian Artificial Intelligence*. 2nd ed. Chapman & Hall/CRC Computer Science and Data Analysis Series. (Boca Raton, FL: CRC Press, 2011), 6.

[213] Desrosières.

rational individuals. Pearson rejected the idea of causality in favour of contingency.[214] Adopting

perspectives by Quetelet and Galton, Pearson placed emphasis on the asymmetries of

mathematical representations. The representations provided methods to find fits for skewed (or

abnormal) curves, attesting to an underlying homogeneity and constant cause. Although highly

contested at the time, Pearson's incorporation of antirealist knowledge into the interpretation of

statistics enabled him to rearticulate cause as necessary things that exist because they are needed.

He was also to account for turns to mathematical law by interpreting symbolism for a mental

shorthand or expediency available when necessary. Desrosières argues that Pearson's departure

from his contemporaries was in his attempt to capture both realist positions at certain moments

and degrees of nominalism when discovery inside of larger systems are needed.[215]

3.6: Race and capital value

It is worth extending this argument into further considerations on the intersection of statistics,

capital and their relation to the human in terms of risk and value. Here, I draw attention to early

measurements of mortality, and how certain populations were understood by the rate of births

and deaths. Of note are the collections of English demographer John Graunt, who, in *Natural and*

Political Observations on the Bills of Mortality (1662), recorded weekly causes of death in London.

Graunt drew on existing weekly Bills of Mortality in attempt to create a formal system of pre-

emption to combat the spread of the bubonic plague. Graunt's system was never fully realised, but

would later inspire the development of William Petty's concept of 'political arithmetic', a technology

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[214] Ibid.

[215] Desrosières.

that developed into new risk assessment methods in the insurance industry.[216] In this context data became an increasingly important form of capital gain.

While Graunt inspired new interests in observing populations and natural events, these phenomena were interpreted into weights and measures before being aggregated into empirically-supported determinancies. Interestingly, he and Petty's approximations were hybrids of public and private information. For instance, burial statistics were posted publicly, yet were compiled based on proprietary government surveys of various towns. This 'political arithmetic' became particularly useful for hypothesising the structure of families and households. Political formulations were outside of academic interests, as had been common in statistical development in Germany by Cornring, Achenwall, Schlözer and their contemporaries.[217]

Whereas early statistical research in Germany was isolated within logical descriptions of governance, researchers in England added practical methodologies for solving social problems. Desrosières remarks that Graunt and Petty, as a tradesman and doctor, mathematician, and member of Parliament, respectively, were not in the role of research, but as 'expert with a precise field of competence who suggests techniques to those in power while trying to convince them that, in order to realize their intentions, they must first go through them'.[218] In other words, these men articulated a formal language by which the state could use data to derive hypotheses to pre-empt individual and social phenomena.

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[216] Hacking.

[217] Desrosières.

[218] Desrosières, 24.

Political arithmetic, in England specifically, was symptomatic of larger ideas of liberal governance that discouraged direct statistical engagements with individuals as 'utterly ruining the last freedoms of the English people'. [219] Instead, the racial calculus and operation of political arithmetic, as Saidiya Hartman states, further develops epistemologically based cycles of finance and capitalisation.[220] One such example I turn to is the performative artwork of American artist Nona Faustine, whose biographical images — here from her series 'White Shoes' — explore how her own body and the body of other women are represented by the media and capital. The main subject of the images are her literal bare body, removed of cover. She is shackled on an auction block dressed in only white shoes. She remains at the intersection of important sites in New York where concentrated activities of the slave trade took place.

Here, Faustine invites a critical reflection on the history and present trajectory of slavery, while making visible, through the presence and non presence of her body, racialisation as the base material of currency in Anglo European ideology. If, under this premise, we are to take Du Bois at face value and consider the double consciousness of the racialised individual, then we are immediately confronted with the fragmentation of black genesis as a tension between what is made visible as blackness or black non being — which Sylvia Wynter (following Fanon) argues is already owned by ontology as a problem of bioepistemic compliance, and the regime of prototypical capital existence. The fragmentation immediately enacts an a priori dissonance between the perception of black life as life as as such in as much as this life articulates a formative system of

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[219] 1753 Whig party response to a population census, as quoted in Desrosières, 24.

[220] Hartman; J. Beller

material and abstract value. In other words, black being as risk distances being-as-self-constituted variability from the illusionary prototypical image of social and financial value.

If we return to Fanon's primary critique, then money, as Jameson conceives of it, is misdirected as having a universal imposition on the individual, as the function of capital is predicated on the establishment of some living beings as value/non value or human/non human. In this way, the fact of money is the fact of black existence. Blackness is money in the eyes of capitalist society; and, as such, does not just impose an inequitable commodification of black being, but also gains a specific power in its capacity to modulate from a specificity of individual black life (as a contingency of speculative risk) to more generalised perceptions of black sociality (as political preemption). What is made visible, here, is not blackness as such, but the regulatory capacity of power enacted through enumerated life. Given, I return to the extension of measurement to the quantification of life and death. In Chapter 2, argued that Mbembe's concept of *necropolitics* is an important contribution to the discursive understanding of *spatio-temporal* segregation. In the next section of this chapter, I show how *necropolitical* power is enacted through statistical reason.

In Parts 3 and 4 I continue the discussion of race and capital, and the emergence of eugenic sorting.

The idea is challenged by what Prigogine and Stengers describe as a vision of nature that is undergoing a radical change toward the multiple, the temporal, and the complex.[221] As the terms of capital depart from the derivation of value as a direct engagement of the body with the techniques of labour practice into technological ecologies, they emerge even more explicitly as

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[221] Prigogine, I, Isabelle Stengers, and Alvin Toffler. *Order out of Chaos: Man's New Dialogue with Nature*, 2017.

adaptive modes of information exchange that, unlike predominant belief, are indifferent to the specificity of the body. However, it is specific only in as much as the racialised body can be abstracted into quantifiable forms of data and preemption, which continues today to be defined as social value in capital processes.

With the search for genesis subsumed into the logics of enumeration and the simulation of hierarchy, the black body is brought into visibility, in as much as it was individualised into forms of political, scientific and financial investment. Alessandra Raengo has written extensively on the value of the black body under the regime of risk and capital speculation. Raengo argues that blackness emerged in the Anglo-European concept of being as a mode of currency, or a type of money.[222] Following Raengo, if we are to even begin to critique modern forms of capital, then we must take into account that what we know as blackness and the black body (the black female body, in particular) is always-already contaminated by political, social and financial images of monetary value and investments. As such, it is incredulous to study any forms of enumeration (today in terms of machine learning and automation) without returning to the black body or what it means to be a body itself.

Central to the argument of my thesis is what Raengo describes as 'the ontological scandal perpetrated by slavery' — a scandal which, according to Raengo is 'repeated with each instance of alienated black labor, each time blackness functions as a physical or abstract commodity. And with each repetition, they continued to be reified'. Raengo's provocation presupposes that the commodification and financialization of the black female body is as relevant today as it was prior to

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222 Raengo, Alessandra. "Reification, Reanimation, and the Money of the Real." *World Picture* 7 Distance (2012). http://www.worldpicturejournal.com/WP_7/Raengo.html.

the slave trade along the Middle Passage. Black females, as such, embody the consistency of capital mutation and adaptation to extract value.[223]

As Ian Baucom argues, the Atlantic slave trade was not merely a cycle of forced extraction of material flesh and physical labour. The enslaved body was subsumed into the logics of risk and insurance premiums by ship captains and credit companies. These individuals and institutions used bills of credit and financial markets to speculate on the death of illness of slave cargo. Raengo asserts that 'the corporation is historically an artificial person, but one that is deeply intimate with the biological body of the slave'.[224] The violence dissolved the Anglo-European image of the physical presence of the enslaved into speculative value. In this way, the enslaved black body was conceived of as a 'real' existence only in as much as these individuals could be underwritten as profit and capital gain. In reference to Baucom's work, Raengo argues that 'in the financial milieu of the Black Atlantic, *race is a form of appearance of capital*' precisely because the slave became a form of money.[225] Raengo elaborates:

> The change in the scale of economic transactions occurring across the Atlantic and unfolding over much longer periods of time made necessary a series of epistemological changes, namely the formation of what Baucom calls an epistemology of "theoretical realism" whereby imaginative or speculative entities produced by social agreement, such as the insurance value of a slave cargo, could be granted a "real" existence.[226]

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[223] Raengo.

[224] Ibid.

[225] Ibid.

[226] Raengo.

The emergence of this (in)direct mode of calculation, and subsequent structures of political arithmetic, found their voice in Britain after the massacre aboard the slave ship *Zong*. The *Zong* departed the coast of Africa in 1781 with 470 slaves. The ship, overcrowded to maximise profits, became stranded in what is known as 'the Doldrums', an area of the ocean with little or no wind. Many of the crew and slaves succumbed to disease and malnutrition as the ship rested in the still waters. Up to 17 crew and over 50 slaves perished. Within a week, the remaining crew, under the direction of captain Luke Collingwood, jettisoned 132 ill, yet living, slaves overboard. Another 10, fearing the injunction, threw themselves into the water. The massacre is believe to be motivated not only by death, at the expense of those not valued as entirely living to begin with, but by the protection of capital gain. Upon its arrival at Jamaican coast, the ship's owner, James Gregson, filled an insurance claim to recuperate the monetary value of the 'lost' cargo, arguing that there was not enough water aboard the *Zong* to sustain all of its cargo. Underwriter Thomas Gilbert unsuccessfully disputed the claim by arguing that the *Zong* still had 420 gallons of water on board when it arrived at its destination.

The *Zong* massacre illustrates the extent to which enumerative logics are enacted in the refusal of black life and the violences placed upon of the object of blackness. Although the massacre catalysed public outcry that eventually led to the abolition of the British slave trade, judicial and parliamentary debates further detached the black body from the right to life and sociality, but considered the legal precedent and procedures for underwriting human capital instead of the criminality of Collingwood and Gregson. Nineteenth-century legal discourse surrounding slavery reflected the fragmented presence of the enslaved. In this way, Raengo argues that:

The body of the slave is also tied to different conceptions of time: it can represent a unit of currency or a commodity in the present, but it can also offer an investment and, therefore, a financial return in the future… [reinforced by] the fact that the slave is at the same time a person and a thing, an object of property but a subject of sentiment, a monetary value (in an insurance contract, for example) and a laboring tool (in a cotton field), immobile (like real estate) but obviously mobile (and potentially fugitive) as well.[227]

How, then, can we articulate the necessity of creating new trajectories in the human sciences (as well as science and technology studies) that can account for emergent systems of enumeration. More so, when individual and collective genesis becomes a protean derivative of the living against abstract probability — where the writing of a symbolic language of culture is predicated on a calculus of value and deterritorialisation of the black body as both political and capital risk — where does the footprint of blackness surface as information itself, a technology of being, that actualise as a dissonance between self-genesis and prototypical formations of being as always already a function of black non being?

Donna Jones argues that life, organised under these terms, 'has now becomes nothing more interesting than a specific kind of information in an information age' that enlist vitalist frameworks for the reduction of genesis to the level of empiricism.[228] Despite attempts to reveal the mysteries of life as preemptive provenance and empirical law, Jones argues that discourse has instead

[227] Raengo.

[228] Jones, Donna V. *The Racial Discourses of Life Philosophy: Négritude, Vitalism, and Modernity*. New York; Chichester: Columbia University Press, 2012.

remained opaque to actual human conditions. In this way, Jones posits that technologies that enlist

life into quantitative modes of knowledge production remain distant to both lived experience and

the role of vitalist methods in the reproduction of race. The impasse is lodged in a discursive

dissonance between the vital and non living forms encapsulated by Aristotelean logics. Jones's

careful mapping of the question of genesis, or what Aristotle calls a *vital force*, reveals the logics of

provenance and empirical distinction. *Bioepistemic* discourses empty the natural world of animation,

spontaneity, and purpose; and in doing so inscribe *prototypicality* and polarity in formalised

inscriptions of being. The Cartesian logic imparts a fictive reality comprised of moving forms in

space that are animated not by an underlying essence, but mechanistic patterns delivered through

the natural law where 'the actions of a people are mediated by the culture that they themselves

have created, they exhibit a heightened form of freedom from natural mechanical causality that a

purposive organism exhibits in its life activities.'[229]

In the next section of this part of the chapter I provide a brief outline of how mathematics were

used to establish a symbolic language of normality, particularly in the subsumption of behavioural

phenomena into statistical reason.

3.7: Pathology, normal distributions and prototypical space

Johann Gauss's contributions to the field of mathematics are of equal importance when we

consider the social impact of the naturalisation of normalised standards through prototypical logics.

Gauss's development of the *normal distribution curve (or Guassian/bell curve,* for its shape) collated

random data into a visual representation of their spatial distances from a normalised average,

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[229] Jones.

represented as a straight line superimposed on the set of chaotic data. The graph is predicated on a

mathematical principle that most data tend to organise around a set of central values, bringing

order to what seems like the chaos of unstructured properties.

As a technique, the Guassian curve not only subsumed the contingency and independence of living

factors into a visual representation of averages, but it also simplified the logics of eugenics with a

universal representation of normality, whereas any individual deviation from the average

characteristics of being — or Anglo-European males — could be articulated as their naturalised

distance from the *prototypical* ideal of *Man*.

The theory assumes an equivalence between ideal representations of species and statistical

averages — challenging notions of data, agency and the weaponisation of mathematics in discursive

justifications for the reduction of life as functions of normalised pattern. Importantly, the theory was

also applied to phenotypical attributes. While 'there is no continuous passage away from the norm',

Hacking writes, 'if there is, it is to be corrected, the contractor reprimanded, the workman

dismissed'.[230]

For now, from F.-J.-V. Broussais's principle of the 'normal state' (which represented non-inflamed

states of organs) to Auguste Comte's assessments of certain mental states as more normal over

others, concepts of normality produce social and scientific understandings of abnormality as

attributes to be eradicated, corrected or manipulated into standards of purity and recurrent return:

'The normal ceased to be the ordinary healthy state; it became the purified state to which we

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[230] Hacking, 165.

should strive, and to which our energies are tending. In short, progress and the normal state became inextricably linked'.[231] For Comte, however, 'progress is nothing but the development of order: it is an analysis of the normal state'.[232] As such, Comte's positivism established a social and political framework for the instalment of normality as the metaphysical presence perfection, from which all others could be measured and corrected.[233] Comte's alliance with normal distributions informed subsequent disciplines, like sociology.

For instance, Émile Durkheim sought to improve upon the preservation of good health by institutionalising normality as a function of observable social behaviour. Durkheim would later apply Galton's symbolic language to collective human behaviour. In his 1893 text *The Division of Labor in Society,* Durkheim writes: 'The only characters transmitted regularly by heredity in a given social group are those whose reuniting sets up the average type'.[234] Durkheim was picking up on the empirical scaling of species variation articulated by Sir Francis Galton. For Galton, normalities were something to be improved upon, as ameliorations of the averages of human condition. There was an epistemological character to the understanding of being that constitute a framework of normality as the antithesis of error, devaluing the capacity of deviation to individualise into contingent forms of being and becoming. Measures of deviation allowed individuals to be classified in regard to mean attributes. This is, however, where Galton and Quetelet's theories of species diverge.

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[231] Hacking, 168.

[232] As quoted in Hacking, 168.

[233] Hacking.

[234] Desrosières, 124.

Instead of a law of normal distribution and error, Galton emphasised a newly constructed language of human scaling based on theories of species deviation, variability and survival. However, the juxtaposition of this research with that of his first cousin, Charles Darwin, and contemporary Quetelet, resulted in symbolic languages focused on laws of species adaption, specifically biological improvement. Unlike Quetelet, who viewed the normal distribution of human characteristics as a result of a large number of variable, independent and indescribable causes, Galton based his assertions on the presumption that species variability was a hereditary characteristic. His formulations led to new mathematical laws of regression and standard deviation still in use today. According to Alain Desrosières, this marked the end of attempts to eliminate species deviation in favour of a greater focus on the statistical means of human attributes, premised on evolutionary survival and symbolic ordering.

Nonetheless, Galton's interest in social ordering extended from physiological characteristics to individual and collective conditions, as a function of heredity. In his book *Regression towards Mediocrity in Hereditary Stature* (1886), Galton circumvents the economic, social and political forces that (re)produce poverty in late 19th century London in favour of empirical data. For instance, he compiled social data on poverty into statistical tables (or 'poverty tables'), which scaled individual economic status according to a series of arbitrary indicators such as standards of living and profession. The correlations were later projected onto a matrix of social aptitude that defined civic worth as functions of genetic character. These precedents would later inspire empirical scales of human intelligence, such as Binet-Simon's intelligence quotient, Spearman's general intelligence tests for individuals, and intelligence quotients (IQ).

Classification allows for direct linkages between statistical reduction and a priori knowledge of social factors. Explicitly articulated within the foundations of classification are divisive labels, like race. It was in this context that research by medical statistician William Farr articulated a close relationship between national, tribal, or family group. For Farr, race was linked by inheritance or customs rather than skin colour. Farr argued that 'men [sic] have the power to modify their race', and as result formed conceptualisations of races as distinct cultural groupings based on measurables governed by statistical laws. Farr's work later inspired Sir Francis Galton, known as the father of social statistics, and Karl Pearson in the advent of eugenics as a scientific discipline.

Zuberi writes that numerical analysis of race-based characteristics are inextricably linked to applied statistics, particularly within histories of eugenics. Eugenics used statistical method to rank humans on the basis of certain morphological characteristics and social measures. These histories formed ambiguities that underlie the racialisation of statistics and, as Zuberi notes, are reminders of the logics of mathematical processes within the social. Zuberi raises questions about social difference and deviations from within statistical logics employed onto biological frameworks. In his careful analysis of statistical reason, *Thicker Than Blood: How Racial Statistics Lie* (2001), he quotes Galton:

> No more than there is equality between man and man of the same nation is there equality between race and race. This differentiation of men in physique and mentality

has led to the slow but still imperfect development of occupational castes within all civilized communities.[235]

Zuberi finds, at minimum, an immediate concern with Galton's formulae, particularly the genetic indefensibility and principles of eugenics. Zuberi notes further that a de-racialised perspective has great potential for helping increase understandings of variations within populations. He writes:

> If we deracialize our analysis we could examine the cultural, biological, and social factors that affect population differences without the mystery of race. If race is not biological, then it is not a good proxy for understanding biological processes. If race is, as I have argued, a signifier for the impact of racial stratification, then we may well learn much by developing better measures of social and economic processes.[236]

More attention is given to the intersection of biological sorting and statistical classification later. For now: It is clear that critical evaluations of statistical processes are intertwined in evaluations of forces that extend throughout milieus of social relation. The impact of statistical theory is not without complication and remains short of critical assessment beyond causal theory.

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[235] as quoted in Zuberi, 27.

[236] Zuberi, 142.

3.8: Objective frequencies or transcendent law?

Whether statistical correlations should be interpreted as objective frequencies of a constant law, or as magnitudes of subjective belief is a matter of contention.[237] Probabilities are formulated in terms of measures and integrals, making them part of modern logical analysis.[238] Probabilities are used to capture any structured or unstructured pattern found within the data. As such, the technique is explicitly connected to the ways realities are constructed about the role of the individual within the whole and whether the complexity of large individual attributes can be understand from within a universal law and taxonomy. Brian Massumi adds perspective on the affirmative characteristics of deviation:

> Rather than analyzing the world into discrete components, reducing their manyness
> to the One (=Two) of self-reflection, and ordering them by rank, it sums up a set of
> disparate circumstances in a shattering blow. The modus operandi of nomad
> thought is affirmation, even when its apparent object is negative.[239]

Desrosières argues that: 'the aim of statistical work is to make a priori separate things hold together, thus lending reality and consistency to larger, more complex objects. Purged of the unlimited abundance of the tangible manifestations of individual cases, these objects can then find a place in

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[237] Darwiche, Adnan. *Modeling and Reasoning with Bayesian Networks*. Cambridge; New York: Cambridge University Press, 2009.

[238] Itō, Kiyosi. *Introduction to Probability Theory*. Cambridge [Cambridgeshire]; New York: Cambridge University Press, 1984.

[239] Massumi, Brian. *A User's Guide to Capitalism and Schizophrenia: Deviations from Deleuze and Guattari*. A Swerve ed. (Cambridge, Mass: MIT Press, 1992), 6.

other constructs, be they cognitive or political'.[240] Commenting on the Borges and animal

taxonomy, Foucault writes:

> there arose in its wake the suspicion that there is a worse kind of disorder than that of the
>
> *incongruous*, the linking together of things that are inappropriate; I mean the disorder in
>
> which fragments of a large number of possible orders glitter separately in the dimension,
>
> without law or geometry, of the *heteroclite*… in such a state 'laid', 'placed', 'arranged' in sites
>
> so very different from one another that it is impossible to find a place of residence for
>
> them, to define a *common locus* beneath them all.[241]

Structural questions derive from questions of logics and their roles in uncertain relations. Changing

these symbolic gestures can change the relations of various factors to each other. The studies in

question position power into hidden relationships between the 'two dimensions of knowledge and

action', that oscillate between reflections on progress and generation of knowledge for power and

control.[242] As Foucault reminds us that 'it is not simply the oddity of unusual juxtapositions that we

are faced with here. We are all familiar with the disconcerting effect of the proximity of extremes,

or quite simply, with the sudden vicinity of things that have no relation to each other; the mere act

of enumeration that heaps them all together has a power of enchantment all its own'.[243]

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[240] Desrosières, 236.

[241] Foucault, xix. Emphasis in original

[242] Ibid.

[243] Foucault, Michel. The Order of Things: An Archaeology of the Human Sciences. Repr. Routledge Classics, (London: Routledge, 2007), xvii.

Conclusion

This brief analysis has attempted to illustrate how the logics of enumeration have come to inform the *biospeistemic* frames through which we conceive of and understand humans and the genesis of being. While the above historical record places more hermeneutic manipulations of data at the forefront of data science, formulations of hierarchal species and prototypical human averages continue to influence contemporary computational logics. For instance, Dietterich notes that to describe a computer system, it is necessary to begin by viewing it as this *idealized rational agent*. To explain its behaviour, goals and beliefs can be attributed so that the behaviour is rational. By rational it is assumed the agent possesses the ability to perform a set of actions and and the capability to choose which actions will lead to one of its goals, at which point the agent will select this action. These goals and ideas make up the agent's 'knowledge'. By applying principles of rationality, future actions of the agent can be predicted, provided the goals and knowledge have been given. And, as Dietterich illustrates, if this agent is a computer, the goals and knowledge must be input into the system.

Nonetheless, the ultimate aim is to demonstrate the scale at which scientific and discourses in the human sciences embed symbolic mathematical reason into the construction of ambient logics as justification for human sorting and vertical ranking. That said, to better understand how this problematic might function today, it is necessary to frame both the ontological and functional operations of contemporary enumerative systems, as well as their impact on racialised body. In the next chapter I turn to machine learning as an individuated example of the logics of enumeration and categorisation by describing its intersection with discourse and symbolic-based reason. I then investigate how this collision of symbolic social engineering and machine learning technology

continues to mediate the attempted reduction of black life. I argue that his process itself enacts a

form of techno-social control that is *bioepistemic*, as well as pathologically informed.

Chapter 4: Machine learning and contemporary spatio-temporal order

Introduction

Part 1: Data and machine learning defined

In Chapter 3, I argued that what we know today as 'data' is part of a wider historical practice of discretisation, accumulation, and sorting. I questioned whether our present obsessions with data are unique to the conditions of contemporary culture. To gain insight into this question, I excavated the genealogy of statistics. There I found evidences of a wider logics of enumeration that in many cases operated on levels that ranged from the philosophical to the social, economic and political milieus.

While some early data and statistical practices may have been motivated by amateur interests, as these methods gained popularity, they were appropriated and instrumentalised by various modes of power. Once utilised in these spaces, data and statistics became administrative tools for the purposes of management, regulation and behaviour pre-emption. As I also argue in Chapter 2, if we think of the early instrumentalisation of data as an epistemic mode of operation, then they support Wynter's claim that the modern *episteme* (or *bioepistemic)* has played a central role in the production of racial sorting, or what Wynter calls the *eugenic descent*.

In this chapter, I return to the *bioepistemic* to consider how *spatio-temporal* ordering might operate within or alongside contemporary machine learning models. I do not imply that machine learning has altered the *bioepistemic* relation in any way, or that machine learning has amplified or disrupted colonial operation. These claims warrant further investigation. For now — in the space of this thesis

— my aim is to reveal the logics underneath machine learning research. My goal is to demonstrate

how what we know as machine learning can sometimes be used as a *model* for scientific use, and at

other times as *algorithms* for operational purposes.[244] My aim — given the roles of *bioepistemic*

epidermalization (Wynter/Fanon) and *white prototypticality* (Gordon) in organising space and time

— is to understand what capacities machine learning has to reinforce or reinstate the colonial

imaginary. As Adrian Mackenzie argues, 'Machine learners today circulate into domains that lie

afield of the eugenic and psychology laboratories, industrial research institutes, or specialized

engineering settings in which they first took shape'.[245] My ultimate aim, however, is to think through

the ways machine learning might add plurality to *sociogenic* representation — which might bring us

closer to the 'radical humanism' that Fanon argues necessitates a break from colonial

representation.

In this way, machine learning can be understood as a device that operates within a relation of

bioepistemic ordering and forms of *prototypicality*. Despite these impositions, I contend that any

articulation of colonial logics mediated by machine learning are symptomatic of a larger logics of

enumeration that can be disrupted by shifting the ontological relation between race and the

machine. I discuss the possibility of this gesture in Chapter 4. For now, I uncover machine learning in

order to build a foundation upon which its potential can be re-articulated to break racist spatio-

temporal environments. This, I argue, opens the wider symptoms of the human-techno relation to

alternative ontologies that exceed either representation or determinant genesis. I argue that

machine learning constitutes a wider transindividual relation that is simultaneously and mutually

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[244] Mackenzie, Adrian. *Machine Learners: Archaeology of a Data Practice*. Cambridge, MA: The MIT Press, 2017.

[245] Mackenzie, 1.

constitutive of the individual and collective genesis. I propose this as a method to account for the

simultaneous and mutually generative articulation of difference as affirmative psychic genesis.

Creating a society free of violences and racial segregations does not rely solely on revealing the

problems at hand. Neither does it depend on the independent deconstruction of existing relata to

unpack the intensity of social quantification or inequitable correlation. Alternative ways of living can

emerge if we commit ourselves to the reframing of the question of machine learning as one that is

always-already informed by racial classification and pre-emptive sorting. This does not require the

disillusionment of retrospective occurrences of violences at the output of a learning algorithm, or

an externally driven ethical framework to establish workable boundaries. A commitment to the

eradication of racism and other violences supersedes any efforts here, which begin with an

integrated awareness of the symptoms of social ordering and the reinstatement of colonial power.

As I will argue in this chapter, machine learning is not a new technology, but emerges from many

fields of classification with various genealogies. Nonetheless, today — as machine learning and deep

data are embedded into systems of governance — interests in social engineering remain informed

by enumerative logics that are underlined by mathematically organised data. These logics articulate

an insatiable drive to order and formalise social processes or, as Michel Foucault states, to: 'tame the

wild profusion of existing things' in 'our age-old distinction between the Same and Other'.[246]

In the pages to follow, I take the definition of machine learning as a point of departure. First, I take a

deep look into the specificities of machine learning, including the trajectory of its role as a

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[246] Foucault, Michel. *The Order of Things: An Archaeology of the Human Sciences*. Repr. Routledge Classics. (London: Routledge, 2007), xvi.

technology in the social milieu. I note the ambiguity of contemporary definitions of machine learning, as well as various modes of rationality that presuppose its capacity to categorise data and derive knowledge of the world. I examine the origins and related subfields of machine learning study in an attempt to establish their importance to contemporary applications and socio-political frameworks, before moving on to artificial neural networks. I contend that, as dynamic nonlinear machine learning models, artificial neural networks might articulate new ways of represented pre-established spaces of relation. In doing so, I question what potentials exists within their forms of reason.

I summarise the main components of machine learning models in the following parts of this chapter.

4.1: Using a non-mathematical approach

In the following sections, I have intentionally chosen to discuss the mathematical and computational specifics of machine learners using a *non-mathematical* approach. Following Michael Wood, I argue that a *non-mathematical* approach is a methodology by which it is not necessary to understand or gain a significant knowledge of mathematics, or to engage with the social and political implications of mathematics-based operations.[247] Therefore, I do not intend to make deep elaborations on the mathematical theorems that inform machine learning algorithms; neither do I not presuppose any understanding of mathematics by the reader. What few mathematical formulae or equations, proofs, or algorithmic code that is presented

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[247] Wood, Michael, *Making Sense of Statistics: A Non-Mathematical Approach,* Pelgrave, 2003.

below are only present in instances where their visibility is necessary to increase overall understanding.

4.2: What is machine learning?

Despite common misconceptions, machine learning is not a 'new' or recent technology. As I show throughout, what we know as machine learning today emerges from a number of distinct techniques, including artificial intelligence, pattern recognition, computer science and statistics. The statistical and algorithmic techniques that make up machine learning add to the richness of the field, yet obscure any definitive definition or understanding of its origins. I will speak more on the subtleties of these aspects in the sections to come.

For now, machine learning has set the groundwork for advanced computational operations. Like other data and learning technologies, machine learning is of great interest to both government and commercial institutions, not to mention the activities of novice practitioners of all levels that experiment with the technology. Machine learning is recruited to address a wide range of desires, both materially and computationally, in a number of applications, such as online search engines, mobile apps surveillance, weaponised and recreational drones, border-control systems, genetic sequencing, health diagnosis, financial markets, city planning and manufacturing automation, and so on.

Definitions of machine learning are broad and varied. If a commonly accepted definition of machine learning can be articulated, then it can, in general, be defined as the study of data-driven methods designed to simulate, understand, and aid in human and biological information processing tasks. For

instance, Tom Mitchell describes machine learning as a class of programs that improve through

experience, and in doing so encompass types of problems that require sophisticated solutions.[248]

David Barber, on the other hand, notes that the function of machine learning is not to mimic in

exact replica of complex environments, per se. Instead, machine learning seeks to enhance human

decision making through the rapid retrieval and processing of information into hypothetical and

sometimes practical outcomes.[249] At the level of operation, machine learning can also be described

as 'the acquisition of structural descriptions from examples' — these 'examples' being data 'training

examples' which then facilitate the algorithm's ability to reach expected conclusions when given

new data.[250]

These definitions are amongst many that treat machine learning as a scientific or statistical

technique, rather than an assemblage of human-related technical, social and economic forces.

Recent engagements with machine learning, however, question whether these techniques can be

understood in isolation. For instance, Adrian Mackenzie situates machine learning as both the 'who'

and 'what' of the technology.[251] Mackenzie is critical of machine learning discourse that is purely

operational. Instead, he argues that the term *machine learning* should be revised in discourse to

include human-related elements, including the role of the coder or engineer. He describes his

recommendation — what he calls *machine learners* — as a term that 'refers to both humans and

machine or human-machine relations'.[252] Mackenzie's aim is not to insert more critical thought into

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[248] Mitchell, Tom M. *Machine Learning*. New York: McGraw Hill, 2017.

[249] Barber, David. *Bayesian Reasoning and Machine Learning*. Cambridge; New York: Cambridge University Press, 2012.

[250] Witten, I. H., Eibe Frank, and Mark A. Hall. *Data Mining: Practical Machine Learning Tools and Techniques*. 3rd ed. Morgan Kaufmann Series in Data Management Systems. Burlington, MA: Morgan Kaufmann, 2011, xxiii.

[251] Mackenzie.

[252] Mackenzie, 6.

machine learning research, which he argues can be thought through as a problem of *positivity*, a term he borrows from Foucault. In the chapter entitled 'Rarity, Exteriority, Accumulation' in *The Archaeology of Knowledge* (1972), Foucault uses the term *positivity* to designate an approach to discourse that excludes any relations that lay underneath basic levels of operation and formal logics.[253] Mackenzie uses *positivity* as a critique of existing machine learning discourse that he argues views machine learning as a practice that is distant from any social, economic or political forces that contribute to its production. He writes:

> Viewed from the perspective of control, and how control is practiced, machine learners perpetuate and epitomises the 'control revolution (Beniger 1986) that arguably has, since the late 19th century, reconfigured production, distribution, consumption and bureaucracy by tabulating, calculating, and increasingly communicating events and operations.[254]

More so, machine learning is underwritten by a set of propositions and symbolic functions that delimit a 'positivity of knowledge', both defining the position of the subject and disseminating any knowledges derived from this position.[255] If these knowledges are articulated as an unmitigated discovery of hidden relations, coded into machine learning, then they invert the relationship between the assignment of proposition and the positionality of the subject. Mackenzie quotes Foucault:

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[253] Foucault, xvi.

[254] Mackenzie, 7.

[255] Mackenzie, 6.

If a proposition, a sentence, a group of signs can be called 'statement,' it is not therefore

because, one day, someone happened to speak them or put them into some concrete form

of writing; It is because the position of the subject can be assigned.[256]

It is difficult to find a discourse on machine ethics, data politics or textbooks on machine learning

technique that do not invert this relation. Most texts take the proposition, or a group of machine

learning operations as the point of departure. As result, the proposition that comprise machine

learning —that are machine learning — are taken as a priori to any impositions on the subject

position. To the contrary, what Foucault illuminates is how subject generation and positioning are

already predicated on the power and capacity to assign certain subject values as a priori forms of

knowledge.

I provide a deeper discussion of the relation between machine learning, power and black being

specifically in Chapter 6. For now, I return to the specificities of machine learning techniques in an

attempt to unpack the means by which Foucault's assertions are carried through. I start with a brief

description of how machine leaners are trained to automate or self-learn. I then discuss the

relationship between machine learning, statistics, pattern recognition, and artificial intelligence,

before moving on to the construction of machine learning models in Part 2, and the relation

between computer science and artificial neural networks in Part 3.

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[256] Foucault, Michel. *The Archaeology of Knowledge.* New York: Routledge, 2002, 107., as quoted in Mackenzie, 179.

4.3: What is data?

Operationally, machine learning models are comprised of a number of algorithms, which are themselves an array of step by step mathematical instruction. I discuss some of these algorithms in the sections below. For now, the function of machine learning algorithms is to 'learn' from input data. In many instances, machine learning algorithms are assumed to derive knowledge or patterns from structured and unstructured data that is often presumed 'raw' and uncompromised.[257] If, in some cases, engineers are aware of the various fallibilities in input data, they rely on the mathematics that underpin machine learning to mitigate and 'clean' any suspected data. Importantly, machine learning objectives are driven by computational processes that best fit data to established (or unspecified) hypothesis. These hypotheses might be specified by engineers or, in the case of advanced machine learning models like artificial neural networks, might function as part of own computational understanding of the surrounding data. These inferences are sometimes heuristic, or based on observable data patterns as well as any prior knowledge held by engineers. In other instances, they are inferred from computational perceptions of the environment.

Many machine learning models rely on data mining techniques, even though machine learning and data mining are driven by separate research aims. In contrast to machine leaning models — which use data classification techniques to classify and pre-empt patterns in the data, Abu-Mostafa et. al. note that data mining as a field places less emphasis on pre-emption. Instead, they note that the primary concern for data miners is data analysis and data-driven insights, which can be used to support visualisation, structure discovery, and online updating, to name a few.[258] Researchers Yaser

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[257] Gitelman, Lisa, ed. *"Raw Data" Is an Oxymoron.* Infrastructures Series. Cambridge, Massachusetts; London, England: The MIT Press, 2013.

[258] Abu-Mostafa, Yaser S., Malik Magdon-Ismail, and Hsuan-Tien Lin. *Learning from Data: A Short Course.* S.l.: AMLbook.com, 2012.

et al state that to a large extent, data mining is equivalent to learning from data, and can be viewed as 'the extraction of implicit, previously unknown, and potentially useful information from data'.[259] Data can then form baselines from which statistical usefulness can be expressed.

To better understand machine learning operation, it is also helpful to define the term 'data', as it can be taken for granted that what we have come to know as data is a part of a longer genealogy of knowledge production. The word *data* is defined as an item of factual information derived from measurement or research. *Data* derives from the Latin *datum*, meaning 'a given'. In engineering, however, datum refers to a fixed reference point on a co-ordinate system. On the other hand, In *Raw Data is an Oxymoron* (2013), Lisa Gitleman argues that *data* connotes arbitrary yet scaled values.[260]

These values are predicated on a system of feedback between a single or multiple recorders and readers — either of which can be human or machine. According to data scientists Cathy O'Neil and Rachel Schutt, data are entities that represent 'traces of the real-world processes, and exactly which traces we gather are decided by our data collection or sampling method… Once you have all this data, you have somehow captured the world, or certain traces of the world.'[261] Data

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[259] A relational database is a collection of tables, comprised of attributes and records or rows, each of which is assigned a unique identifier. See: Abu-Mostafa, Magdon-Ismail, and Lin; Han, Jiawei, and Micheline Kamber. *Data Mining: Concepts and Techniques*. 2nd ed. The Morgan Kaufmann Series in Data Management Systems. Amsterdam; Boston: San Francisco, CA: Elsevier; Morgan Kaufmann, 2006.

[260] Gitelman.

[261] Schutt, Rachel, and Cathy O'Neil. *Doing Data Science*. First edition. (Beijing; Sebastopol: O'Reilly Media, 2013), 19.

represents a collective body of information incorporated into exchanges of knowledge, understood by both its recorder and reader.[262]

Data are delineated by three types of information and knowledge production. First, raw (or unprocessed) data refers to the collection of numbers and characters. Raw data are basic primitive bits of information about the world that are accumulated and stored in databases.[263] As mentioned above, these data are then analysed typically through a multi-stage process. Examples include *field data*, which are raw data that are collected from uncontrolled environments; and *experimental data*, which are raw data that are generated in laboratory conditions for scientific experimentation. Once accumulated, these data become *processed data* that can be used as new input data for subsequent iterations of machine learning training. This is achieved by generalising classifications of previously unknown data structures or patterns. Data can also be used indiscriminately, meaning that it is not limited to a single research environment. In other words, data accumulated in one research context can be used in another.

If data are the building blocks in machine learning models, then information are the structures and motifs that are constructed based on the segregation of unique attributes. This implies that data are collective as well as malleable in their relation with their human and machine counterparts. This is an important distinction since data is often communicated as if they are distinct from human phenomenon, isolated from the production of human-machine knowledge. In his treatise *Data*, a subject discussed extensively in the first six books of *The Elements*, Euclid defines a datum as a set

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[262] Although often conflated, data is distinguished from information. While data is viewed as entities that constitute a set of qualitative and quantitative variables, information, on the other hand, is a set of patterns or regularities that string together data from the world.

[263] Gitleman.

of parts (or relations) within a whole.[264] According to Euclid, not all parts must be known to determine the values of their parts, or relation to the whole. Eves writes that data in the Euclidean argument 'could be useful in the analysis that precedes the discovery of a construction or proof'.[265] However, to avoid circularity, Euclid is aware that a starting point must be established before any determinations of unknown parts can be established.[266] For example, given a triangle with a side of unknown length, the length can be determined by fixing the remaining values with a set of assumptions. These assumptions might include geometric dimensions and angle degrees.

In Euclid's formal case of circularity, the straight line can be articulated as a relation with a point that cannot be imagined in space without a description of its magnitude. For Euclid, the circumference of a circle — on the other hand — imagination is predicated by intelligence prior to any conception of magnitude. Euclid's explanatory causes are important in the development of mathematical proofs, as they define a nominal definition of position, perception and scale. While a line, circle or other geometric shape may be described aesthetically (using terms for colour, shape, and so on — which form the basis for spatial position and topological mappings), for Euclid they are instead explanatory and relational structures specified as internal terms of similarity, or 'things among themselves'. Importantly, their relation is defined (and refined) by way of propositions.[267]

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[264] Euclid. *Thirteen Books of the Elements 3, 3*. Translated by Sir Thomas L. Heath. Dover Publications, 2013.

[265] Eves, Howard Whitley. *An Introduction to the History of Mathematics*. 6th ed. The Saunders Series. Philadelphia: Saunders College Pub, 1990.

[266] For a detailed history of Euclid and Euclidean geometry, see: Burton, David, *The History of Mathematics: An Introduction,* New York: Mcgraw-Hill, 2011.

[267] For a detailed explanation of Euclid's formal cause of circularity, see: Beards, Andrew. *Method in Metaphysics: Lonergan and the Future of Analytical Philosophy*. Lonergan Studies. Toronto; Buffalo: University of Toronto Press, 2008.

Propositions, as Burton argues, reveal the fragility of Euclid's proof and the nature of problem

solving within mathematics.[268] The assumed values (or axioms or postulates), from which all other

statements are deduced, are considered 'logical consequences' that produce self-evident truths.

Burton argues that these axioms are more so the 'rules of the game' that are 'the foundation on

which the whole body of theorems rests'.[269] On the other hand, Matthew Fuller and Andrew

Goffey posit that while axioms are assumed initial conditions, they also reveal the ways in which

value distributions become habits that are underlined by relationships of power — that

furthermore divorce the 'irreducibly constitutive role of machines, techniques, or technologies' from

new opportunities for experimentation.[270]

Brian Massumi articulates this concern as a *command paradigm* that approaches knowledge as if we

were somehow outside of the body, looking in.[271] According to Massumi, data enters into a

virtuality of the corporeal experience. It serves as a projection of the body into an anticipation it

cannot yet reach. Within this frame, data is a projection of the future onto the present — a

predictive mechanism in its capacity to articulate the necessity for the next outcome. Anticipation

of this capability doubles onto itself into what Massumi describes as a process that conceptualises

the body as 'already on the move to a next, at the same time as it is doubling over on itself,

bringing its past up to date in the present, through memory, habit, reflex, and so on'. In other words,

data is only locateable in its ability to reveal the body's response to its classification. Projection of

the data is itself then a return of experience onto relations of the present. This provides a

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[268] Burton, David M. *The History of Mathematics: An Introduction.* 3rd ed. Dubuque, IA: Wm. C. Brown, 1995.

[269] Burton, 141.

[270] Fuller, Matthew, and Andrew Goffey. *Evil Media.* Cambridge, Mass: MIT Press, 2012.

[271] Massumi, Brian. *A User's Guide to Capitalism and Schizophrenia: Deviations from Deleuze and Guattari.* A Swerve ed. Cambridge, Mass: MIT Press, 1992.

fundamental opportunity for the expression of the body to be re-incorporated back into the corporeal in anticipation of the next move, toward a more complete individuation. This will be discussed further in Chapter 6.

In the next part of this chapter, I turn to specifics elements that comprise machine learning as an operation of classification. I briefly summarise some of the key components of machine learning technologies, as they relate to the genealogies of various fields which have informed the practice.

4.4: How to train machine learning algorithms

Most approaches to machine learning are organised around a two-step process: learning (or training) and classification. In the learning step, algorithms are coded to accumulate and 'learn' from training data. Training data typically consist of tuples (also known as samples, examples, instances, data points, or objects), which are multi-part and ordered data structures. Tuples constitute database records, and are derived, initially, from previously aggregated data sets, such as UCI Machine Learning Repository. Tuples are also assigned to output classes. Once a tuple has been given an identity (or a specific class), it is referenced by the algorithm as input data. The algorithm is then instructed to output the tuples into classes that match their initial designations. For instance, an input tuple labelled 'house' should match the output classification record 'house'; a 'motorcycle' to 'motorcycle'; a 'pedestrian' to 'pedestrian'; and so on. The success of this operation determines the learning capability of the algorithm, which is fed multiple tuples multiple times until a desired rate of successful classifications are achieved.

Researchers use various types of training methods, depending on performance objectives. In supervised learning, tuples are 'supervised' or forced into appropriate output classifications, as described above. On the other hand, in unsupervised learning (or clustering), output classes are left undetermined. Instead, the algorithm is instructed to iteratively make best guesses until it learns the initial class of the tuples. Unlike supervised examples, unsupervised examples must be generalised, as desired classifications cannot be preempted. This is beneficial for problems where it is necessary to group (or cluster) similar examples, where it is necessary to determine the distribution of certain attributes within a data set (in density estimation), or to map highly complex data onto two- or three-dimensional spaces for visualisation and graphic interface. They can also provide deeper insights into general database records, as well as provide a condensed representation of data, again for use in visualisations.

The conditions of some phenomenon are too complex to be solved by traditional approaches. In instances where learning examples are too complex, too expensive, or in cases where the methods for producing desired classificatory outputs are contingent or unknown (for example, determining the probability of credit card defaults or repayments prior to a decisional classification: 'approved' or 'denied'; or classifying which citizens might develop sympathies for radicalism, etc.), the algorithm must learn to adapt to contingency without precise or known variables. However, according to Han and Kamber once, once the algorithm is trained in a contingent environment new rules can be established to classify similar phenomena.[272]

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[272] Han, Jiawei and Kamber, Micheline. *Data Mining: Concepts and Techniques.* Burlington, Mass: Morgan Kaufmann Publishers, 2000.

Another popular type of learning is reinforcement learning. Reinforcement learning is a beneficial technique for use in instances where decision-based actions are desired. Here, learning algorithms discover the most optimal outcome by trial and error, in contrast to a defined set of outcomes in supervised learning. However, complications arise when output quality can only be assessed indirectly or longitudinally before any clarity of results can emerge. If the classifier has a high success rate, then it is used on future unknown (or previously unseen) data. For example, data from previous loan applications or repayment histories can be centralised and used to determine risk on new or future applications, even if the applicant has had no previous accounts at the specific financial institution.

Han and Kamber note that continuously valued (or ordered) attributes are also useful in learning tasks where preemption is preferred over classification. For instance, when financial institutions desire to control potentially negative risk outcomes. These institutions can use continuously valued learning algorithms to mitigate risk by determining or preempting a threshold or 'safe' amount of money to loan an applicant. In this way, to learn in machine learning is an attempt to champion the economy of risk. It is also an attempt to preempt subjective formations of being in as much as the corporeal body, inclusive of its movements and behaviours, can be translated into a body-as-risk capital.

Notwithstanding, accurate performance is difficult to replicate outside of controlled environments. In controlled environments, algorithms rely on training data. In controlled environments, performance accuracy is likely to be higher than real-time results. To avoid overfitting, so-called independent training tuples are selected at random from the general data set. Machine learning

researchers note that 'overfitting' (or equally 'underfitting') the data can cause poor performance. Researchers rely on the 'goodness' of statistical fits, or how well a supervised learning algorithm can approximate or map a target function for output variables based on input variables. Typically, machine learning algorithms approximate target functions from noisy data.[273] Overfitting occurs when target functions are modelled too well. Models are sensitive enough to recognise noise, which is thought to negatively impact performance. Underfitting, on the other hand, occurs when the learning algorithm can neither model the training data or generalise new samples for data representation and classification.

4.5: Statistical patterns as fields of relation

To enable data representations, like spatial, temporal, multimedia or textual data, statistical pattern recognition approaches are applied for classification. Pattern recognition is concerned with the discovery of regularities in data, which are then classified into discrete categories. R.A. Fisher suggests that the first recognised pattern recognition algorithm emerged in 1936, with the goal to build an autonomous machine that could process a variable set of input data and generalise them into a patterned output.[274] In pattern recognition models, tuple classifications are known in advance, which are sometimes specified after initial training and inspection. As in machine learning, pattern recognition models are crafted around dynamic rule sets. Pattern recognition may also utilise machine learning approaches to optimise the function of adaptive models; and in many cases tuples are condensed and simplified to increase algorithmic efficiency and processing speeds.

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[273] In machine learning, targets or target attributes are correctly answered when the model accurately maps the input data to the desired output or prediction.

[274] Fisher, Douglas H. "Knowledge Acquisition Via Incremental Conceptual Clustering." *Machine Learning* 2, no. 2 (September 1, 1987): 139–72. https://doi.org/10.1023/A:1022852608280.

An essential function of pattern recognition is the ability to make 'nontrivial' pre-emptions on new data sets. Data can also be modulated between black box patterns (structures are incomprehensible and thus hidden from view) and transparent box patterns (which reveal explicit structures). It is assumed that key insights can be inferred from either method. However, computer science researchers Jiawei Han and Micheline Kamber note that not all inferences are of interest to researchers.[275] They argue that this raises serious concerns for data mining, and that for a pattern to be 'interesting', it must generate knowledge to that satisfies the following criteria: (1) the pattern is easily understood by humans; (2) it is valid on new or training data with some certainty; (3) it is potentially useful; and, (4) it is novel. Han and Kamber's appeal to interest as insight reveals the fragility of machine perception as a function of human desire and expectation. Han and Kamber blur the relation between human and machine as an activity of self-interest diluted under the logics of comprehension. What, then, is the position of the human if she is actual only in as much as she is of interest in relation the potential usefulness of pattern? What remains of the stochastic amplifications of her genesis when the conditions of her individuation are estranged from their intersection and interrelation?

If we can conceive of a field of relation that emerges at the intersection of her pre-individuated being as a signal that contributes to the overall pattern of existence (or what the Humanities might call Intersectionality), then I consider how Stochastic Pattern Theory (SPT) might attempt to formalise this collision into machinic perceptions of complex phenomena. SPT is an approach to the analysis of 'real-world' signals in the environment using probability models. SPT models replicate the look and feel of real signals. SPT champions David Mumford and Agnès Desolneux draw on Ulf

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[275] Han and Kamber.

Grenander's work in Elements of Pattern Theory (1996) to argue for a move away from traditional

methods in pattern recognition to account for what they call meta-characteristics.[276] These meta-

characteristics are motivated by the identification of cross-signal patterning that correlate distinct

patterns or signals with either within a single system or multiple systems. Mumford and Desolneux

argue that by modelling the cross-pollination of distinct attributes, one can derive practical insights

from what may initially appear to be noise or variability, which can then be re-articulated as training

tuples for new stochastic models. This approach is applicable to facial recognition and other

algorithms where a recognisable pattern is desired. Nonetheless, stochastic distortions are difficult

to trace. For instance, when assigning a smile, grin, or grimace to an individual's face. Namely, pattern

recognition researchers use machine learning techniques to increase the field of vision by

subsuming movement, or the contingency of variation, into a comprehensible generalisation. A

powerful component of this method is its sensitivity to the relations between seemingly

independent objects.

As argued in Chapter 2, the visibility of the body-as-risk is dependent upon the modulation of that

body as a particular instance of calculation, as well as the simultaneous subsumption of the

particular into a universalised pattern of behaviour and risk. In this instance, the normalised pattern

takes on the role of a threshold value by which the terms of access are both regulated and

enforced. This abstraction (and equal particularity) distances the body from actual corporeal being

and abstracts it into a body-as-risk and capital value. Here, the body is visible only in as much as it

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[276] Mumford, David, and Agnès Desolneux. *Pattern Theory: The Stochastic Analysis of Real-World Signals*. Applying Mathematics. Natick, Mass: A K Peters, 2010.

subscribes (willingly or not) to the objectives of capital growth, as such.[277] Whereas these terms were most readily negotiated on the level of the body — the *bioepistemic* transfer of labour, death and violence as risk itself — machine learning has re-articulated the means by which capital and the logics of colonialism move further into the means of discrete efficiency. That said, it is no coincidence that machine learning is put into use as the mediator between capital, the body (as actual whole), and the discrete, as the operation of patterning is embedded within the foundation of machine learning research.

Although machine learning researchers use statistical methods, they emerged as distinct techniques. In the next part I discuss the genealogy of both fields, along with the similarities and differences between them.

4.6: From statistics to contemporary machine learning

It is difficult to validate where machine learning begins and the field of statistics ends. It is widely accepted that both techniques developed in parallel. Nonetheless, it is generally agreed that statistics is a continuum of techniques that emphasise data analysis, machine learning is open to 'big data' approaches. As with some statistical tools, machine learning also adopts methods for probability modelling (which I will discuss later in more depth), as well as symbolic reasoning. This is an important relation since, as discussed in Chapter 2. The emergence of epistemic logics by way of

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[277] Recent advances in machine have led to increased concerns over the impact machines will have on workers and working environments. As machines learn to perform more complex tasks, questions arise as to what roles machines will play in future decisions making, in both enterprise and everyday environments. Despite the recognised benefits of AI and automation on productivity and in reduced human toil, issues arise over how the accelerated growth of machine capabilities and automated work environments might result in increased job loss, or the so-called 'hollowing out' of what we know as work today. As result, more medium and low skilled jobs are at risk of being made redundant by automated processes. It is estimated that within two decades 60% of the work currently being performed will be entirely replaced by machines. Others argue that because machines lack the ability to tackle simple human tasks, we should shift our focus towards ways to gain the highest value from human-machine interaction.

statistical analysis forms the conditions for the classification of the black body as less than human, or

non being. Nonetheless, before I discuss the implications of machine learning in contemporary

bioepistemic landscapes, it is important to describe the close relation between statistics and

machine learning, as well as the specificities of how machine learning, on the level of the algorithm,

interacts in the techno-social ecology.

As mentioned, research in statistics and machine learning emerged in parallel, even though they are

practiced today as distinct techniques. In the 1984 text, *Classification and regression trees*, prominent

statisticians Leo Breiman, Jerome Friedman, Charles J. Stone, and R.A. Olshen introduce a technical

schematic for the generation of decision trees for example problems.[278] In the 1970s and 1980s,

computer science researcher J. Ross Quinlan was also actively designing a system to infer

classification trees from data examples. Although the researchers produced their work in near

isolation, and only became aware of each others' work many years into their research, many of

their methods for data classification (for example, decision trees, regression, K-nearest-neighbor)

were proposed as possible solutions to example problems in both disciplines.[279] Today, the same

advanced classification methods are used extensively in statistics and machine learning research. For

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[278] Breiman, Leo, J. H Friedman, Richard A Olshen, and Charles J Stone. *Classification and Regression Trees*. Boca Raton: Chapman & Hall, 1998.

[279] Statistical methods are typically delineated into five major categories of problems: regression, classification, supervised learning, unsupervised learning, and reinforcement learning. Regression is used to simplify complex data to express any mathematical relationships between two variables. From a learning perspective, regression helps simplify assumptions about mathematical structures, as well as any underlying generative processes within the data (for instance, a hidden relationships between two variables). In mathematics,, a variable is an alphabetic character that represents a number, or the value of the variable, which can be either arbitrary, unknown or not fully specified. By treating variables as if they were explicit, determined numbers one is allowed to solve a range of problems with a single computation. In basic mathematics, a simple problem can be solved by replacing the variable with the respective coefficient of the equation. In more complex computations, however, variables are symbols that represent mathematical objects which can each be either a single numeral, a vector or matrix, which carry their own set of complex computations reduced to a single alphabetic character.

instance, Stone's and Olshen's regression is the most commonly used method in statistics as well as many machine learning algorithms.[280]

While research in statistics and machine learning share some common methods, others are used interchangeably within both fields of research. For instance, in both statistics and machine learning, relationships between data populations and samples are modelled using symbolic mathematics. Nonetheless, statistical methods do sometimes enlist machine learning methods to test learning outcomes. Likewise, standard statistical techniques are applied to machine learning examples as data visualisations, attribute selections, and as methods for discarding outliers and simplifying statistical deviations. For example, machine learning models utilise both univariate and multivariate statistical methods, which are processed through complex algorithmic structures. These structures rely on abstract assumptions that are materialised into rule sets and circular input data for the purposes of knowledge production and computational insights. Furthermore, machine learning algorithms do not make assumptions about probability distributions. Instead, they rely on more inductive approaches to research. Machine learning seeks to build and iterate or adjust parameters in real time. Still, Han and Kamber argue that it is often unrealistic and inefficient for systems to generate all possible patterns, so user-provided constraints and assumptions are seen as sufficient for search. These methodologies attempt to classify important indicators based on a given set of input variables. A classification problem can then be used to establish a set of 'tree structured' rules, from which decisions can be derived.[281] When the desired output consists of one or more

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[280] Breiman, Olshen, and Stone.

[281] Classification problems are cases where the aim is to assign each input data to one or more of a finite set of pre-determined categories. Depending on the problem, classification can be either: (1) those that produce accurate classifiers, or (2) those that uncover the predictive structure of the problem.

continuous variables, the problem is labelled as regression. The robustness of these so-called

decision trees is based on their ability to predict the 'class' of sets of measurables.

Additionally, Breiman et. al. note that classifiers are not created informally, but are instead based on

historical data and subjective experience. In their treatment of regression trees, the authors use

data on biological phenomenon as learning samples to infer patterns within previously derived data.

They use the example of a doctor who, through experience, is certain that an elderly patient with a

heart condition can be safely classified as 'low risk' if the person also has low blood pressure.

Likewise, the residents of Los Angeles can be sure that a single hot day is likely to be followed by

another. Although the researchers base their hypothesis on actual biological and social

phenomenon, these patterns are mediated through data and mathematical formulae. For instance,

Breiman et. al. describe the phenomenon as extraction of certainty within an otherwise chaotic

system. In reference to patterning, they state that learned sample 'consists of data on N cases

observed in the past together with their actual classification' or put more formally, as written by

Breiman et. al.:

A learning sample consists of data: $(x, j), ... ,(x_n, j_n)$ on N cases, where

$x_n \in X$ (denoting that x is within the set of natural numbers X)

and $j_n \in \{1, ... , J\}$ (denoting that j is within the set of natural numbers 1 to J), where

$n = 1, ..., N$

The learning sample is then denoted by

$L = \{(x_1 , j_1)\}, ... , \{(x_n, j_n)\}$

The symbolism — even visually — is extraordinary in its reliance on historical data to imply a continuum of learned patterns in the future, which themselves are universalised into a generic relation between actual past events and determinant repetitions. According to Konrad Becker, classification is an assemblage of relations between general and universally objective attributions and subjective meaning. I argue that this assemblage also produces its own bioepistemic reason that is obscured behind naturalised proofs. The tension challenges how we relate to data as the intermingling of the actual techno-social self and the scientific imaginary.

Becker argues that classification is not a sufficient strategy to discover actual accessible interrelations, yet it it provides a conceptual space for knowledge production.[282] According to Becker, these knowledges can reveal unseen problematics in the relations between humans and machines from within the sphere of unstructured data. Nonetheless, Becker warns that knowledge mapping can be mistaken for what he terms 'transient social fictions' that obscure facts, especially in terms of cultural difference. 'It happens time and again,' he notes, 'particularly in relation to race, gender, social institutions, and any other domains where there is a vested inters in the making of realities'.[283]

Still, despite the symbiosis of statistical approaches and machine learning, Witten et. al. distinguish machine learning as a process that digs through landscapes of available data in search of new

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[282] Becker, Konrad. "The Power of Classification: Culture, Context, Command, Control, Communications, Computing." In *Deep Search: The Politics of Search beyond Google*, edited by Konrad Becker and Felix Stalder. Innsbruck; Piscataway, N.J.: Studien Verlag, 2010.

[283] Becker.

hypothesis, whereas statistics in most instances sets out to prove the hypothesis.[284] As mentioned, early machine learning algorithms aimed to learn representations of simple symbolic functions, which were then verified by experts. The intent was that the methodology would output a hypothesis that executed the correct or consistent classification of learning data. Consistent hypothesis, particularly verifiable ones, were problematic in that they relied on representations that may not have been computationally simple or easily verifiable. Secondly, training data often contained amounts of noise. It is this deviation from useable training data that this dissertation finds concerning, particularly in statistical efforts to normalise data deemed to diverge from the target function, or solution. I will speak more on this later. At this junction, it is necessary to continue on an elaboration of machine learning technologies and their practical applications in the social.

Generalisation is defined as the successful categorisation of data training sets. However, generalisation is challenging in practical, as data sets are far too vast and variable. Furthermore, training inputs might only represent a small fraction of all possible data available. The ability to generalise is central to recognising patterns within the data, and is seen as necessary to make sense of aggregated information. One such application is face detection in high resolution video streams. Here, the computer must handle large amounts of data in numbers of pixels per second, input them into a complex pattern recognition algorithms, and subsequently categorise the output. The feasibility of this operation depends on a number of variable factors, such as hardware limitations and system parameters that affect computational speeds. Bishop cautions against the discarding of pre-processing information that is important to problem solutions.[285] The removal, either accidental

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[284] Witten, I. H., Eibe Frank, and Mark A. Hall. *Data Mining: Practical Machine Learning Tools and Techniques*. 3rd ed. Morgan Kaufmann Series in Data Management Systems. Burlington, MA: Morgan Kaufmann, 2011.

[285] Bishop, Christopher M. *Pattern Recognition and Machine Learning*. Information Science and Statistics. New York: Springer, 2006.

or intentional, can reduce the overall accuracy of the system. However, research has shown that by making use of unsupervised methods as opposed to supervised data sets, learning can produce accurate facial recognition with high levels of sensitivity to non-targeted objects.[286]

Cristianini and Shawe-Taylor argue that as machine learning practitioners become increasingly interested in the particular roles of training data, quality becomes more difficult to measure in the field, leading to a deeper problematic.[287] For instance, even if a hypothesis can be found, it may not make correct classifications of unseen data. For this reason, attempts at optimising the learning algorithm are made to more closely class, or generalise, data not found in the data set. Generalization, in a sense then, is a search for a 'best' match according to a set of examples. Cristianini and Shawe-Taylor note that shifting the focus of machine learning to generalisation removes the need to view hypothesis as correct representations and instead as problems of optimisation. The shift reduces the potential of hypothesis exploration by simplifying the satisfaction criteria for successful learning: if the hypothesis produces the right output then it satisfies the generalisation criteria, which then becomes a functional measure by which certain data is classified as opposed to only description of it's classed set. Cristianini and Shawe-Taylor write that 'in this sense the criterion places no constraints on the size or on the 'meaning' of the hypothesis — for the time being these can be considered to be arbitrary'.[288]

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[286] Bishop.

[287] Cristianini, Nello, and Shawe-Taylor, John. *An Introduction to Support Vector Machines: And Other Kernel-Based Learning Methods. Cambridge*; New York: Cambridge University Press, 2000.

[288] Ibid, 4.

Despite the above, generalisation should not be disregarded entirely as it aides in the reduction of large rule sets. In this context, generalisation helps reduce error and redundancy, thereby increasing overall efficiency and decreasing processing times and operating costs. The fact that the algorithm is based on statistical limits is seen to motivate algorithms to optimise within certain parameters. However, the approach loses robustness in that the algorithm is only as good as the results that motivate its optimisation. Researchers argue that the strength of this paradigm is in its reliance on proven statistical science and not on previous heuristic approaches that may be based on 'misleading' intuition. Of primary importance are attempts at scaling complex data sets, which range from small academic data sets to large so-called 'realistic' data comprised of hundreds of thousands of examples.

In the article 'The Rise of Big Data', Cukier and Mayer-Schoenberger suggest that aggregating large amounts of data are preferable over smaller samples, and that by accepting the 'messiness' of data and 'giving up' on known causes, sampling error is not only reduced, but insignificant. They argue that sampling error in big data sets is like sign posts for a truth, since the immensity of the data set is so that it encompasses all possible occurrences. Statistically speaking, they start from the assumption that 'N=ALL'. To the contrary, O'Neil and Schutt remind us that samples never contain everything that is available, regardless of size, and are 'often missing the very things we should care about most.' O'Neil and Schutt use a counter-example of election polls. They illustrate that even if absolutely every person who leaves a polling station were sampled, it would fail to capture the decisions of the people who decided not to vote that day. They warn that paradigms of omnipresent data collection exclude the voices of people who don't have the time, energy or access to cast their votes. They warn that these people then become invisible to the process,

skewing the results. These importance of these exclusions may not be apparent when considering, say, Netflix recommendations. They could, however, produce more significant consequences in other context, such the impact early preemptions may have on late voters.

Under the assumption of ubiquity, data is often translated as being objective or 'speaking for itself'. O'Neil and Schutt note that working from within this assumption can lead to false beliefs about actual social practices and may lessen the impact of other discriminatory forces that inform observed patterns. In other words, they write explicitly that, 'ignoring causation can be a flaw, rather than a feature. Models that ignore causation can add to historical problems instead of addressing them. And data doesn't speak for itself. Data is just a quantitative, pale echo or the events of our society.'

In summary, while these statistical methods enrich the field of machine learning, they are also fragile to the domains of racial and other forms of human difference.[289] Problematically, classification problems are pre-emptive and solution based. They are an efficient means of predicting the behaviour of a computer system. Yet, they remain unresponsive to the fragility of their previous knowledge frameworks. Paradoxically, even though knowledge derived from classification is known to be incomplete on every level of description, it is widely thought that knowledge should not be suppressed. Furthermore, any observable gaps on the level of description are at best approximations that are inadequate indicators of concrete classification.

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[289] Langley, Pat. "The Changing Science of Machine Learning." *Machine Learning 82, no. 3* (March 1, 2011): 275–79. https://doi.org/10.1007/s10994-011-5242-y.

In the above I argued that there is an inherent relation between the fields of statistics and machine learning, in an attempt to build a continuity between the epistemic logics emerging from the heightened interest in statistics and data in the seventeenth century, as I argue in Chapter 3, and prevalence of machine learning research today. In the next section, I unravel an obscurity in the primary aims of machine learning research, including the lack of an agreed-upon definition of the discipline. My goal is to further establish a dissonance between the logics of machine learning knowledge as a representation of the actual (and more so as an agent of the scientific imaginary), and the operation of these logics as always already conditioned upon machine learning's sensitivity to the various aims of the discipline.

4.7: Establishing initial conditions

As shown above, it is difficult to distinguish between machine learning and statistics since both fields use — not to mention share — similar techniques. However, machine learning also has a lengthy relationship with artificial intelligence (AI) research. In fact, machine learning was not only considered a sub field of AI, prior to emerging as a solidified body of research around the mid-1980s (although it is largely considered to have also derived from computer science and cognitive science disciplines), machine learning was also a key technique in the overall development of AI. What distinguishes machine learning from AI, however, is a split in research aims. Unlike machine learning, as Pat Langley explains: 'artificial intelligence and cognitive science were showing little interest at the time [mid-1980s] in learning-related issues'.[290] AI and cognitive science emphasised more logic-based forms of knowledge production to derive measures of simulated intelligence. Early machine learning, on the other hand, was characterised by an emphasis on

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[290] Langley.

symbolic representations, such as mathematical logics and rules, and decision trees. Still, although

machine learning has moved away from its original research focus, it remain a sub-domain of

artificial intelligence until 2000, by which time it had fully separated from its parent discipline.

Today, although machine learning is considered a distinct body of research, a definitive definition of

the field is elusive. This is because machine learning approaches vary according to research and

industry aims. Notwithstanding, Carbonell, Michalski and Mitchell state that many machine learning

techniques reside within by three broad principles: (1) the underlying learning strategies used; (2)

the representation of knowledge acquired by the system; and (3) the application domain of the

system.[291] Langley, on the other hand, defines machine learning by its historical trajectory. He notes

three major paradigm shifts in machine learning research that have altered the discipline and its

relationship to knowledge production.

According to Langley, early learning tasks prioritised transparency and clarity in learning methods,

which were thought to open methods to experimental replication. He also outlines two more

major shifts in subsequent research methodologies: First, early machine learning adopted an

informal approach to small data sets. In early paradigms, such as explanation-based learning and

theory revision, researchers preferred using fewer training data sets, while also limiting the use of

background knowledge to drive the learning process. Researchers attempted to solve more

complex problem sets (in more unstructured systems) by distancing the learning process from a

reliance on input data and human expert knowledge. In doing so, artificial self-learning could mimic

[291] Carbonell, Jaime G., Ryszard S. Michalski, and Tom M. Mitchell. "An Overview of Machine Learning." In *Machine Learning: An Artificial Intelligence Approach*, edited by Ryszard S. Michalski, Jaime G. Carbonell, and Tom M. Mitchell, 3–23. Berlin, Heidelberg: Springer Berlin Heidelberg, 1983. https://doi.org/10.1007/978-3-662-12405-5_1.

the cognitive capabilities of humans, more closely. Langley argues that a shift toward self-learning required a more formal approach that emphasised machine optimisation and performance in specific complex systems. This methodology is still in use today, where it finds practical value in a variety of scientific domains, particularly in poorly understood domains where humans previously lacked the knowledge needed to design more complex algorithms (such as facial recognition), as well as domains that required different scales of adaptability to dynamic contingency — for instance, in self-driving automobiles (although, they are also confined by rule based logics), search engines and automated manufacturing settings.

As mentioned, although machine learning algorithms depend on data, previous advancement in research were limited by the availability of data sets. However, early research accelerated with increases in the volume of accessible and open data sets.[292] By 1987, with the availability of more open access data, research accelerated beyond pure experimentation. Researchers were no longer limited to experimenting with small self-aggregated data sets with pre-defined learning problems, but could mine more extensive unstructured data. Researchers could derive their own learning examples to test the capabilities of more dynamic learning algorithms. Prolific data mining activities increased the ambitions of research activities.

For instance, in 1987 former University California, Irvine PhD student David Aha aggregated vast amounts of data into what became known as the UCI Machine Learning Repository. The repository was not only open source, but was also simplified, easier to measure against learning examples, and easily accessible via FTP. Langley argues that although data accessibility contributed to

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[292] Langley.

advancements in machine learning research, it also resulted in the oversimplification of learning research, enacting an over-reliance on component learning algorithms, as well as an increase in research conducted in isolation from wider, more large-scale intelligence systems.

Consequently, machine learning was seen less as an exploratory science than as a strictly performance-based method for data classification. By the mid-1990s machine learning had completely withdrawn into more 'complex' tasks like multi-step reasoning, heuristic problem solving, and language understanding that had defined earlier movements. This new direction was thought to foreclose on initial exploratory methods. For prominent researchers, like Herbert A. Simon, performance is measured by classificatory accuracy and the efficiency at which algorithms could solved defined problem sets.[293] Thereafter, machine learning research was seen as providing little value if not aligned with 'effective' (read measurable) learning performance. Under this new objective, analysis was carried out in a number of ways, which typically involved worst-case scenario and systems error rate analyses and assessments of reaction times. In all, these methods suggested new ways of structuring learning problems.

Machine learning research, as such, was centred around three primary methods: (1) task oriented studies, or the engineering approach. Here, the development and analysis of learning systems was in improving performance in a predetermined set of tasks; (2) cognitive simulation, with an investigation of computer simulation of human learning processes; and, (3) theoretical analysis, or the theoretical exploration of the space of possible learning methods.[294] Under this rubric, early

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[293] Simon, Herbert A. 'Applications of machine learning and rule induction', Communications of the ACM, 38, 11, 1995.

[294] Carbonell, Michalski, and Mitchell.

researchers sought to scientifically prove the validity of computational learning problems. The

primary aim was to assess whether or not a specific learning problem was desirable for further

investigation. Researchers adopted informal exploratory approaches to analysis by using innovative

methods to demonstrate possibilities of learning outcomes, similar to the methodologies of the

amateur statisticians mentioned in Chapter 3. More specifically, however, the overall determinant of

a successful outcomes were measured by the algorithm's ability to learn through data and human-

aided exploration.

Whereas earlier analytic logics were underwritten by knowledge-based expert systems, the above

factors were later thought to be best achieved by measuring the algorithm's performance with

practical and real-world problems. In his signature work on learning and decision trees, 'Induction of

decision trees', early machine learning researcher J. Ross Quinlan details the discipline's initial

reliance on known or explicit data sets to drive system outcomes. These systems typically required

an immense number of rule sets to establish the learning environment and develop a context by

which performance could be measured. Quinlan notes that despite the volume of rule sets

necessary for training, computational limitations in a way forced engineers and specialists to code

environmental rule sets by hand.[295] Quinlan uses Feigenbaum's description of early research as a

'bottleneck' in the operation of expert systems, which Feigenbaum later argued could be more

readily solved if the discipline shifted its focus to strategies of machine performance, rather than

exploratory capability.

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[295] Quinlan, J. R. "Induction of Decision Trees." *Machine Learning* 1, no. 1 (March 1, 1986): 81–106. https://doi.org/ 10.1007/BF00116251.

Quinlan believed machine learning was far more than a craft or praxis. He thought the capacity of machine learning would be more fruitfully realised if it were trained to explicate knowledge as a method for computational learning. In the 1980s research on machine learning diverged from symbolism and representation to include methods in pattern recognition, as well as probabilistic and instance-based representations. I will speak more on these later. For now, these methods included the incorporation of ideas borrowed from the fields of pattern recognition, which had already been developing methods on statistical based performance.

According to Quinlan, application domains, also known as evaluation environments, find validity in applied areas (or statistical spaces that involve classification).[296] Domains are characterised by levels of representation acquired through decision rules or 'trees'.[297] These systems are rudimentary and lack the expressive power of more complex systems, like semantic networks or other first-order representations. For this reason, they are considered less capable of learning in more dynamic and contingent ecologies. Furthermore, decision trees require inductive methods to generate hypotheses. Here, domains are seen as sufficient enough to produce knowledge by aligning problem solving with pre-defined practical applications. Less considered is the reduction of the conditions for decision, which in the falsification of hypothesis assume a certain passivity of dynamic phenomenon and autopoetic systems. The domain is presupposed as an always already closed environment. Whereas, any derivation of knowledge by artificial decision is statistically moderated by technological efficiency. In other words, decision tree systems function in isolation, giving the appearance of autonomy.

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[296] Quinlan.

[297] Decision trees are defined as 'graphical representation of a decision table showing possible paths and actions if different conditions are met'. See: Daintith, John and Wright, Edmund. *A Dictionary of Computing*. Oxford: Oxford University Press, 2008.

As such, an impasse developed between early analytic and heuristic ambitions and more performance-driven praxis that could self-infer classifications from training examples. Consequently, design technique shifted from praxis as enrichment to praxis as performance, which meant the operation of the algorithm was deemed successful, only in as much as it could accurately regurgitate any given training data — much like the shift in aims in early statistical data aggregation. Dynamic mathematical formulae, championed by Leibniz and later augmented by the work of George Boole and others, helped researchers develop a universal language and formalised set of rules that could obviate the necessity of human participation in the computational process, increase efficiency, and relinquish the bottleneck problem. Leibniz, in particular, invented differential calculus under the principles of logical additions, subtractions, multiplications and divisions into an arbitrary form of potentials — methods from which artificial intelligence would capture in its simulation of neural activities.

In this regard, Mitchell raises a number of questions about machine learning: (a) What algorithms exist for learning general target functions from specific training examples?; (b) How much training data is sufficient?; (c) When and how can prior knowledge held by the learning algorithm guide the process of generalising from examples?; (d) What is the best strategy for choosing a useful next training experience, and how does the choice of this strategy alter the complexity of the learning problem; (e) What is the best way to reduce the learning task to one or more function approximation problems?; and, (f) How can the learning algorithm automatically alter its representation to improve its ability to represent and learn the target function?

Mitchell's questions are interesting to consider given the import role of the epistemic in the

sociogenic and the *bioepistemic* relation (see Chapter 2). This is especially so if machine learning can

be linked to the initial conditions (perhaps also the *prototypicality*) from which knowledge is derived,

mediated and distributed. This is further complicated by Gandy's claim that 'we are just beginning

to understand how much initial positions play in the ways our lives develop'.[298]

To add clarity to machine learning's role in establishing initial conditions — what I define as the

points from which machine learning algorithms classify, recognise patterns, and pre-empt — I detail

how machine learning models are constructed based on a set of starting assumptions; and how

these assumptions can sometimes remain hidden from view in the final outcome. In the next

section, I turn to the role of modelling in statistics and early machine learning research. First, I return

to the role of modelling in the field of statistics prior to more advanced types of computational

modelling, such as machine learning. My aim is to reveal how complexities in probability-based

modelling are intensified when we consider the growth of statistical and machine learning methods;

and how these methods inform the conditions for empirical judgement.

Part 2: Modelling and play

Modelling is a central function of the machine learning process, as described above. A model, in one

sense, attempts to capture phenomenon by simulating and pre-empting the organisation of

assumed partially-independent entities in a closed system. Models use statistical techniques such as

the Bayesian probabilities to identify correlations between system attributes, structures and

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[298] Gandy, Oscar H. *Coming to Terms with Chance: Engaging Rational Discrimination and Cumulative Disadvantage.* S.l.: Routledge, 2016.

visualisations. Modelling begins with an explicit set of assumptions, yet it is often mediated by a

combination of mathematical methods, including heuristic intuition and scientific experience.

Potential applications for machine learning models are broad, and vary depending on the research

problem. To define a machine learning problem, I refer to Tom Mitchell's definition of learning.

Mitchell defines machine learning as:

> A computer program is said to learn from experience E with respect to some class of tasks
>
> T and performance measure P, if its performance at tasks T, as measured by P, improves with
>
> E.[299]

Here:

Task (T) might be the desire to classify a tweet that has not yet been published based on the

probability it will be retweeted.

Experience (E) would be the full canon of tweets on a single user account, some of which have

been retweeted and some not. Finally,

Performance (P) would indicate the accuracy of the classification or the number of tweets on the

the user account that are corrected predicted to be retweeted.

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[299] Mitchell.

Machine learning algorithms are optimised to solve these types of problems, which can range from increased computational efficiency to economic, social or political desires. For instance, an online retailer may desire to increase sales by identifying which of its present or future customers are likely to purchase certain goods or not, or when they are likely to make a present or future purchase, if ever. A bank may want to gain a deeper understanding of its customers to pre-empt which of them are most likely to default on a loan or credit card agreement. Once classified they can then be segregated by risk and higher or lower interest rates. A judicial committee concerned with recidivism may want to make parole decisions based on the probability a convicted person will become a repeat offender. Or, a police agency may attempt to optimise the distribution of police cruisers based on the probability a neighbourhood will yield lower crime rates based on police presence.

Here, we can see how the notion of algo-ritmo comes to fruition. Dixon-Román writes:

> Regardless of the degree of human subjectivity behind the code for this algorithm, it is the case that the performative act of this algorithm can be a powerful force in shaping and disciplining the flesh. In this example, algo- ritmo quite explicitly disciplines the flesh and designates humanity into full humans and nonhumans.[300]

Dixon-Román continues:

> As an immanent act beyond human intervention, algo-ritmo is a performative force that may do more than simply reify 'difference.' With the ubiquity of algorithms in society, algo-

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[300] Dixon-Román, 489.

ritmo has the capacity to reconfigure the boundaries of 'difference' as well as further

magnify the sedimentation of 'difference.'[301]

Here Dixon-Román points to the magnification of human difference as not simply the reification of

difference, but also a re-configuration of the ontologies of the human in relation to digital

technology. This re-organisation of digital architecture has profound implications for the racialised

ecologies.

In the next part of this chapter, I return to the machine learning algorithm as a model of distinction.

4.8: Machine learning models

O'Neil and Schutt argue that the differences between statistical modelling and machine learning

reflect cultural differences in the approach to research. For instance, statisticians consider variables

in regression models as having 'real-world' meaning, defined as being relevant to the research

problem. In contrast, computer scientists or artificial intelligence engineers may use machine

learning algorithms to interpret parameters for the optimisation of cluttering, classification and

prediction.[302][303] O'Neil and Schutt also note that statisticians are interested in capturing variability

or uncertainty by providing confidence intervals and posterior distributions. Machine learning

algorithms, like k-means or k-nearest neighbors, share no such notion of confidence and

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[301] ibid.

[302] Schutt and O'Neill.

[303] At its simplest, an algorithm is a set of rules or computational steps to follow to accomplish a task. Luciana Parisi has shown, however, that algorithms are not simply instructions to be performed; they are performing entities, or 'actualities that select, evaluate, transform, and produce data' that expose the internal inconsistencies of rational systems of governance. See: Parisi, Luciana. *Contagious Architecture: Computation, Aesthetics, and Space*. Technologies of Lived Abstraction. Cambridge, Massachusetts | London, England: The MIT Press, 2013.

uncertainty. [304] Lastly, O'Neil and Schutt describe the role of statistical models as making explicit assumptions about data processes in learning which parameters should be eliminated or kept as part of the system, namely through use of probability functions. What O'Neil's and Schutt's analysis reveals is the contrast between assessing uncertainty with limited levels of confidence and building models to predict with little or no concern for uncertainty in the data.

However, the distinction between more heuristic types of modelling and computationally-based models may not be as clear as O'Neil and Schutt suggest. Newell and Simon state that 'neither machines nor programs are black boxes; they are artefacts that have been designed, both hardware and software, and we can open them up and look inside. We [computer scientists] relate their structure to their behaviour and draw many lessons from a single experiment… to demonstrate statistically that it has not overcome the combinatorial explosion of search in the way hoped for. Inspection of the program in the light of a few runs reveal the flaws and lets us proceed to the next attempt'.[305]

Models rely on consistency, as well as stable operation. By stable, data consultants Gordon S. Linoff and Michael J.A. Berry refer to the model's ability to successfully pre-empt structured training data, as well as any unstructured or unknown phenomenon it may encounter.[306] A model's stability is informed by three primary edicts: First, Linoff and Berry assert that models are most relevant in

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[304] For a deep analysis of k-means and k-nearest neighbor methods, see Sweeney, 2002; Mackenzie, 2017.

[305] Newell, Allen, and Herbert A. Simon. "Computer Science As Empirical Inquiry: Symbols and Search." *Commun. ACM* 19, no. 3 (March 1976): 106. https://doi.org/10.1145/360018.360022.

[306] Linoff, Gordon S., and Michael J. A. Berry. *Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management.* 3rd ed. Indianapolis, IN: Wiley Pub, 2011.

'real world' situations that can 'effect change of some sort'.[307] The goal of design is not to produce the best possible model in a controlled environment, such as in a laboratory where the data can be overfit. Secondly, model design should remain sensitive to human programming errors.

Lastly, Linoff and Berry argue that models must remain temporally sensitive, since they are influenced by the temporal relationship between input data and forecasted values. Although models are trained on historical data, they may not be applicable for use in other time periods. Linoff and Berry write: 'While it is not a requirement that the future be exactly like the past, models work on the assumption that the past is a prologue to the future'.[308] As such, as Linoff and Berry argue, the best way to approach temporality is to train the model with input data aggregated as close as possible to the actual time of model implementation. Otherwise, the model's ability to estimate targets may be contaminated by mis-aligned variables. For example, input data might represent the exact time a consumer begins a single transaction (or when they first land on the online retailer's website). Time, in these instances, starts from the moment of first entry or arrival until the designated target value is achieved (a customer completes a transaction, leaves the website, returns for another purchase, etc.). A total monetary amount spent, say, over the span of a year has a time frame of one year, starting from the original moment of inquiry or arrival. In this way, the time designation for the input is the same as that for the output: one year — a valuable insight for a marketing agency that wants to assess total spending or advertising exposure over a specified period of time.

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[307] Linoff and Berry, 156.

[308] Ibid.

However, some researchers argue that more incremental temporal procedures can produce greater results for pre-emption. Temporal-based methods, such as those introduced by Sutton, base performance longitudinally on changes in prediction over time, as opposed to more conventional methods that base learning success on accurate forecasting. Rather, temporal success predictions or temporal-difference methods derived by Sutton take a more incremental approach to assigning actual values to predictions in shorter intervals. The approach is useful in situations where insights with greater frequency are desired. For example, assume a weather forecaster wanted to make a daily prediction that rain might fall on the following Saturday. Using conventional approaches, the weather person would have to compare predictions made on each single day with the actual outcome for Saturday (Monday predicts 50 percent chance of rain on Saturday; Tuesday 75 percent, and so on). Here, the quality of the pre-emption is good only in as much as rain actually falls on Saturday. With temporal difference methods, actual results for each day of the week are analysed incrementally. Data on a particular day is compared not to the forthcoming Saturday, but to days similar to the present day, which are then used to increase the robustness of the overall model. Because predictions are made incrementally, they are easier and faster to compute, and as a result hold an advantage over other supervised learning procedures. The model can be updated daily or often in real time and the algorithm adjusted accordingly. Whereas the question of the weather may be 'Will it rain Saturday?' in conventional methods, with temporal difference methods forecasters can instead ask: 'What will the weather be on Saturday?'.

Still, temporality is where pre-emptive models and profiling models differ. While pre-emption models are organised around the difference between two points in time (input data/forecasted values), profiling models use the same temporal point for both input data and forecasted value.

Profiling models rely on static input data, such as demographic information (age, sex, geolocation, etc.), which are then constructed into a profile of that individual. Consumer surveys are a common example. In a consumer survey, unique demographic data is used to construct customer profiles which can then be acted upon. These data remains abstract and dormant in a database until it is either desired for use either as future insight for immediate capital gain or historical knowledge for present or future marketing and organisation. For instance, insurance companies may use survey data to indicate which premiums are assigned to which customer postal codes. An online retailer, like an airline company, may use profiling information such as Internet IP addresses to locate customers and allocate ticket prices according to times of year and customer demand.

Even so, pre-emptive and profiling models are both vulnerable to error. Linoff and Berry write that profiling is limited by its inability to distinguish between cause and effect, not to mention to any common demographic variables that may be hidden within the data. Linoff and Berry describe the example of a pre-emption that suggests men buy more beer than women do. The model assumes certain variables remain fixed while others vary in a unidirectional causality (men drink more beer), instead of alternative correlations that might suggest drinking is instead the cause of maleness. Taken unidirectionally, profiles can conflate social constructions with causality (car theft is higher in neighbourhoods with more young black male residents, therefore it is likely that young black males are car thieves). This raises questions about a reliance on the solidity of certain culturally produced phenomenon and how they inform an equally fragile causal relation, particularly considering the absurdity of opposing direction (young black males reside in neighbourhoods with high amounts of car theft, therefore it is likely that car thefts create more young black males).

The tensions illustrate an imbalance in research approaches and operational aims. They, nonetheless, constitute a series of human-machine relations that are fed back into the hierarchal organisation of social phenomenon. To illustrate this, I follow Mackenzie by questioning what systems are transformed when machine learning is generalised across various epistemic, economic and institutional settings.[309] Unlike Mackenzie, however, I question whether — in terms of the genesis of black being — epistemic, capital or institutional settings or the exclusive inscription of the categorisation of being human, are transformed at all in relation to the violences enacted upon the racialised being, or the regulation of back spatial movements. In the next section I discuss two types of modelling approaches, and how these approaches inform the shaping of subject spatial movements and categorical perceptions.

4.9: Early learning through play

As mentioned, machine leaning models produce statistically-based knowledges by mapping movement and the empirical relationships between particular entities (also known as agents) in complex environments, such as cities, landscapes, and so on. Models are most often trained in research settings (although recently some models are tested in actual public spaces). The type of agents may be selected at random, but they are typically prescribed depending on the research or industrial target. Agents are not limited to single persons, objects or entities. They can include homogenous or heterogeneous collectives, clusters or even environmental phenomenon. Agents are represented by description and coded to conduct a number of specific actions. For instance, they may be instructed to make autonomous decisions based on logical deduction; use decision-making to resemble practical reasoning in humans; combine deductive and other decisional

[309] See: Mackenzie.

frameworks; or, explicitly not use reasoning at all. These decisions can be made in either controlled environments or environments with various levels of contingency.

Agent-based models (or ABMs) are one type of approach to targeting based on agent manoeuvrability. ABMs simulate and predict the behavioural patterns of the semi-autonomous agents, who may learn, adapt or reproduce within the parameters of a predetermined rule set. Variable selection can also be determined based on historical agent performance. In other words, ABMs can use error to strengthen and systematically reveal which independent behaviours might correlate with larger patterned behaviour. Thomas Schelling's 'Models of Segregation' (1969) is one of the first functional ABMs, as well as one of the field's most controversial. Schelling designed the model to gain insight into the dynamics of racial segregation in urban areas in North American cities. Instead of using arbitrary parameters to establish his rule set, Schelling instead used a normalised set of classifications, such as sex, age, income, first language, colour, taste, comparative advantages and geographical location, which were assumed to be equitable relations among each semi-autonomous agents. The system contained an equal distribution of black (B) and white (W) agents, which were evenly distributed across the spatial grid. Once their starting points and attributes were randomly established, the agents were instructed to make a decision on the optimal place to move given their relationship to their nearest neighbour and the general surroundings, which Schelling classified under the parameters 'Contentment' and 'Neighbourhood'. The Black and White agents are governed a simple instruction: If the agent, in a neighbourhood with a radius of one agent, is content with a 50 percent mix between it and other Black and White agents adjacent to it, then the agent can remain stationary. If the agent exceeded the contentment threshold then it was allowed to move until it reached contentment.

The results of Schelling's experiment suggest that there are thresholds of contentment which justify self- segregation in heterogenous environments. For instance, a line of agents BBBWBWWW in a neighbourhood of radius one will re-arrange themselves to become BWBWBWBW after several iterations. However, if the neighbourhood extends to two of the same type of agents (BBWBWBBW), the outnumbered agent will surpass its contentment threshold and re-arrange. In other words, individual white agents, for instance, will surpass their contentment thresholds when there are too many black agents in its immediate surroundings. Alternately, black agents will surpass their contentment thresholds when there are too many white agents nearby.

In more recent computational interpretations of Schelling's model, algorithms determine whether or not agents are content or discontent with their locations.[310] If an agent is not content, the algorithm selects a new home or adjacent square for the agent. If the square is empty then the agent will move to this location. If not, the agent is forced to stay in place. The learning exercise adds relevancy to Fuller and Harwood's critique of reductive data practices. They write:

> The specific categories upon and through which segregation operates are described as if natural, not even worthy of equivocation as to their relation to social structure. The racism of the work is both that it operates by means of racial demarcation as an autocatalytic ideological given and secondly that it provides a means of organising racial division at a higher level of abstraction. To say that Schelling operates within an ideologically racialised frame is not to aver either way as to whether Schelling as a person is consciously racist, but

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[310] Fuller, Matthew and Harwood, Graham. *forthcoming*

that, in these papers, racial division is an uncontested, "obvious" social phenomena that can be reduced in terms of its operation to a precise set of identifiers and operations.

Fuller and Harwood point to the subtlety of essentialist narratives that dislocate human accountability in the abstraction of racialised computational logics and the invention of phenomenal justifications. 'Do we bear our cultural identities, the signs and symbols of our 'belongingness', like (as some would argue) indelible number-plates on our backs?', as Stuart Hall asks, 'or are the unities that cultural identities appear to constitute the result of what we might call a 'practice of narration', the invention of the cultural self, producing fixed belongingness in rather the way we construct, after the event, a pervasive, consistent biographical 'story' about who we are and where we came from?'[311]

Arthur Samuel's 'Checkers-playing Program' (1959) is one example. Checkers-playing Program is largely considered the first self-learning model, has greatly contributed to the early advancement of artificial intelligence and machine learning research. The model evaluates the dynamic spatial positions of individual entities on a designated grid, like pieces on a checkers game board. The pieces, however, are semi-autonomous and governed by a set of parameters that are dynamically modified with each move, depending on each piece's original starting position and their relation to other pieces on the grid. In other words, each piece moves based on its own parameters, which are also determined by the relation these pieces have with their surroundings. The program simulates both the movement and anticipation of relations within a closed space, where final outcomes are predicated on the unfolding of smaller discrete interactions. This 'learning procedure',

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[311] Hall, Stuart. *Cultural Identity and Diaspora: Identity: Community, Culture, Difference.* London: Lawrence and Wishart, 1990.

as Samuel calls it, is frequentative.[312] The model is further optimised with each iteration. In this way, any historical errors are beneficial to the final outcomes, as they provide specific insights into how the overall parameters can be adjusted to reach the original hypothesis. As Sutton and others note, the success of Samuel's program was in its capacity to self-learn to the point where it gained enough knowledge of the overall system to play against a human being.[313]

Similar to Samuel's Checkers-playing Program is Holland's 'Bucket Brigade' (1985), an adaptive system called a classifier system where conflict resolution is carried out by competitive action. Like Checkers, specific rules in the Bucket Brigade are dynamically adjusted with each iteration based on the movement of semi-autonomous entities within the overall system. They depend less on the final outcome, but more so on the relation between the historicity of movement, and the potential for future interaction. Unlike the Checkers-playing Program, however, rule sets within in the Bucket Brigade are modified based on numerical parameters. The rule sets are pre-assigned unique messages that are matched to a list. If a rule successfully 'bids' or matches its message with one on the list, it gains 'strength' and is awarded the right to post its message to the working memory data structure. Within the competitive structure, the rule set with the highest number of successful bids become active and is allowed to post its message to a new list, which is then used in the next round of the game. An active rule will lose strength, however, unless it can associate itself with other rules.

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[312] Samuel, Arthur L. "Some Studies in Machine Learning Using the Game of Checkers. I". In: Levy D.N.L. (eds) Computer Games I. Springer, New York, NY, 1988.

[313] Sutton, Richard S. "Learning to Predict by the Methods of Temporal Differences." *Machine Learning* 3, no. 1 (August 1, 1988): 9–44. https://doi.org/10.1007/BF00115009.

What's most significant about the Bucket Brigade is that it gives a competitive advantage to certain rule sets over others. The simple interplay of rule exchange builds a chain of rule invocations that are learned through an exchange of numerical insights, which are passed back and forth from one rule set to another. As such, only the strongest rules survive. Today, traces of strength-based learning are found in search algorithms that prioritise certain webpages based on popularity or current rankings, as well as user preference based on other pages. Strength can also determine recommendation functions that display outcomes based on prior user interests and the strength of other users' associative searches and purchases.

Support vector machines (SVM) are more advanced forms of modelling. As a specific type of supervised learning model, SVM are designed to analyse data using various machine learning techniques such as classification, regression and pattern recognition. One of the significant characteristics of SVM research is its shift away from previous emphases on probabilities. Instead, it focuses on representation and entity positioning within abstract space. Cristianini and Shawe-Taylor describe SVM as 'learning systems that use a hypothesis space of linear functions in high dimensional feature space, trained with a learning algorithm from optimisation theory that implements a learning bias derived from statistical learning theory.'[314] These representations are useful for visual graphics, since present input data can be mapped onto historical models to pre-empt future data trajectories, including any alignments or deviations from baseline behaviour.

Simply put, predetermined structure or pre-categorisation are not necessary for classification with SVM. Classification can be pre-empted based on a weighted similarities between attributes based

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[314] Cristianini and Shawe-Taylor, 7.

on any variability between these attributes and baseline normalities. In other words, entity

classification is determined by attribute similarity, regardless of any dissimilarities in other attributes.

Ultimately, SVMs learn through association and commonality outside of explicit historicity — as a

young child might. For instance, a newspaper article might be classified as similar to another if they

shared similar words or the same writing styles. A sports car might be distinguished from a family

sedan based on commonly shared attributes in the sports segment such as 'sporty' aesthetics, quick

acceleration, agility, and so on. If the family sedan, such as a Porsche Cayenne shares these attributes

it can be classified as a sports car. If not, it may be classified into another segment. SVM can also

cluster individuals based on abstract descriptions. For instance, an individual may be classified as a

potential threat if their gait of walk is aligned with behavioural markers that indicate stress, erratic

behaviour and velocity, which in terms of behaviour psychology may indicate a person highly

distressed and therefore suspicious depending on setting. Following this example, SVM are used in a

various surveillance applications, ranging from biometric emotion detection systems to facial

recognition. As such, SVM can pre-empt future behaviour, as well as distinguish between behaviours

that align with baseline normalities and those that deviate from the established range. Like ABM,

SVM can evolve through dynamic learning processes that enable it to update its historical

information and pre-emptions real time. This is significant considering the role modelling played in

the early developments of machine learning.

The logics of modelling force feed any variability in agent interrelation into empirical assumption

that are further regressed into probable facts and assurances. The groupings of certain peoples

around controlled substances, in this instance race, is troubling in as much as it exists as an exercise

of *sociogeny* and prototypically devoid of indeterminacy, historical (and present) cultural

organisations around racial hierarchies, economic and spatial weaponisation, and continual

objectives of colonial intent. Data and the phenomenon of being — as being-in-relation to race —

are simplified in the service of eugenic determinacy, further naturalising economic struggles for

mobility, racial aggressions, and self-segregations as a logical form of pleasure and happiness.

Nonetheless, there is a profound power in the act of modelling. Some modelling practices reinforce

the perceived divides between the universal substances of race and discursive understandings of

particular racialised operations. It also further detaches the genesis of inequitable relation from the

production of the machinic. As I argue in detail in Chapter 6, the full birth of the social is irreducible

to mathematical approximation. However, the limits of mathematics are its greatest asset when the

administration of power relies on universalism as a prototypical model, and the exclusion and

segregation of the Other to justify the creation of 'a patchwork of overlapping and incomplete

rights to rule'[315] to, as McClintock argues to invent race in the urban metropoles as the very self-

definition of the middle class as well as the very necessity for the policing of the 'dangerous classes:

the working class, the Irish, Jews, prostitutes, feminists, gays and lesbians, criminals, the militant crowd

and so on'.[316]

Some models have been widely criticised for reinforcing racialised perception. One of the most

controversial examples is a 1960s study conducted by criminologists Sheldon and Eleanor Glueck.

In their paper 'Predicting Delinquency and Crime', the Gluecks used variables such as age, IQ,

neighbourhood of residence to determine any possible correlations with behaviour patterns, like

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[315] Mbembe, Achilles. "Necropolitics." *Public Culture* 15, no. 1 (January 1, 2003): 11–40. https://doi.org/
10.1215/08992363-15-1-11.

[316] McClintock, Anne. *Imperial Leather: Race, Gender, and Sexuality in the Colonial Contest;* London: Routledge, 1995, 5.

family stability, affection and discipline in the home. The Gluecks concluded that based on these factors, some juveniles were more likely to become socially delinquent than others. Unsurprisingly, the study was met with considerable objection. Critics argue that the model ignores the social, political or economic conditions that might contribute to the correlations, and assumes an objectivity where none exists. The Gluecks insisted that their model was not meant to determine delinquency with any certainty, but it instead provided only probable insights based on the above factors. They also argued that although prediction tables should be flexible enough to accommodate the dynamic conditions of life, models are not designed to account for every variable influence possible. As Harcourt argues, random sampling is a tangible alternative to policing as it blinds justice to anything other than objective forms of pre-emption in the form of potential criminality.[317] Like Sheldon and Eleanor Glueck, Harcourt's assertion reinforces the illusion of objectivity as the condition for justice, and lessens the role of institutional racism and empirical justification play in the circulation and recirculation racialised subjects based on the similarity of characteristics.

If we return to Mackenzie to consider how to recognise ourselves as subjects of machine learning today then we might consider how the fictive substances of race and racialisation might be, for some beings, the localised individuation of the power-knowledge relation, a nuance left behind in his universal assessment. The provocation, however, isolates the composition of racial substance as that which exists outside of universalisation, to become the mundane ritual of racialised violence. Nonetheless, Mackenzie's text is an important intervention, as it makes apparent that the type of

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[317] Harcourt, Bernard E. Against Prediction: Profiling, Policing, and Punishing in the Actuarial Age; Chicago: University of Chicago Press, 2006.

world-making that machine learning algorithms are coded to enact are not limited to race or

difference, and are instead deeply embedded in the production of thought.

Although the mutable layers of power-knowledge are assembled in machine learning practice, they

are underwritten by the pre-emptive function of variation and probability distribution. In the next

part, I unpack probability functions as essential components of machine learning algorithms.

4.10: Distributed probabilities as the 'guide to life'

As Mackenzie writes:

> Machine learning reverse-engineers the invention of modern statistical thinking. It also takes
>
> back the 'real quantities' — probabilities — that modern statistics had attributed to the
>
> populations in the world and distributes them to devices, to machine learners that people
>
> then observe, monitor, and indeed measure again in many ways. The direct swapping
>
> between uncertainty in measurement and variation in real attributes that statistics achieved
>
> now finds itself rerouted and intensified as machine learners measure the errors, the bias,
>
> and the variance of devices. Although it relies heavily on probability distribution, machine
>
> learning is a fat-tailed distribution of probability.[318]

In *The Taming of Chance* (1990), Ian Hacking describes how theories of probability are thought to

have originated with Pascal and Fermat — interestingly, in studies on gambling risk — it was Laplace

who extended the theories to account for a universal base of reason. In his well known text,

Philosophical Essay on Probabilities (1795), Laplace introduced a formal rule of succession based on

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[318] Mackenzie, 106.

the contingency of jury decisions. The proposition incorporates historical data on historical juridical decisions to identify the probability that certain types of material evidences might or might not influence human perception and decision in the assignment of innocence or guilt. Laplace's theories greatly contributed to the construction of pre-emptive knowledge aimed at articulating a universal and achromatic symbolism of movement through the legal system.[319] Laplace writes:

> Given for one instant a intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it — an intelligence sufficiently vast to submit these data to analysis — it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes.[320]

According to Barber, Laplace's attempt regulates the dynamism of human decision-making, framing the understanding of life and human relation as a causal process of reason.[321] The early workings of the *bioepistemic* claim an ultimate de facto judicial independence from the complex links between the bodies that are shaped by the criminal justice systems and those that shape the system itself. The technologies of decision form a tactile obedience to the algorithmic process as the zone of exception, where power is turned away from discipline as such and placed into the mechanisation of judicial visions of order and compliance. This mathematical 'guide to life', as Bishop Butler

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[319] Marquis de Laplace, Pierre Simon, and Frederick Wilson. *A Philosophical Essay on Probabilities.* Translated by F.W. Truscott and F.L. Emory. (New York: JCosimo classics, 2007) 4; as quoted in: Hacking, Ian. *The Taming of Chance. Ideas in Context.* Cambridge [England]; New York: Cambridge University Press, 1990.

[320] Marquis De Laplace as quoted in Hacking, 12.

[321] Barber.

remarks, limits levels of complexity under the logics of objectivity.[322] As I argued in Chapters 2 and 3, the guide directs the conditions of criminal behaviour towards the (algorithmic) divine, or a release of what is deemed important and what is to be discarded up to a divine foundation articulated through the algorithm.

Nevertheless, the reach of Laplace's probability theory is further augmented by the regime of machine efficiency — for instance, Bayesian reasoning, which is a simple mathematical formula for the reduction of complex variation into symbolic representations of probable truths. Bayesian probabilities continually adjust variable estimates on the basis of dynamic observational assumptions by simplifying data into more manageable variables. Bayesian probabilities are particularly attractive tools for use in data-driven research, since they enhance computational speed while also optimising algorithmic power. For instance, today, Bayesian reasoning is an essential tool in machine learning research, which operates in highly complex and contingent environments.

Some researchers argue that problems arise when probabilities are viewed as objective and neutral intelligences, particularly when they are inferred from prior knowledges and hypothesis, which are driven by assumptions of impact and causality. Researchers contend that these assumptions carry no standard practice and can be infused with subjective biases which may influence important decisions, as well as the field of vision from which these decisions are derived. For instance, Oscar Gandy suggests that:

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[322] Butler, Joseph. *The Whole Works of Joseph Butler : New Edition, Complete in One Volume.* Amazon Media.

Assumptions about prior probabilities are made by members of juries, as well as by all

decision makers in the complex decision chain that begins with observation or surveillance

on the street. Assumptions include those made by the police officer whose decision to stop

the car was influenced by his beliefs about black drivers, as well as the prosecutor who

decides to seek a felony conviction based on his beliefs regarding the social impact of crack

cocaine. Their decisions are all influenced by their prior probability estimates.

Others, such as Darwiche, argue that while the chain of observation may appear to suggest that

degrees of belief are held primarily within the subjective, probability is that which instead governs

the construction of the subjective, as well as any perceived objectivity.[323] The impasse also reveals

important concerns regarding the extension of symbolic interpretation to phenomenon that can

not be be materially observed. All probabilities, according to Darwiche, are degrees of belief that

reflect a state of knowledge of the particular, and do not necessarily correspond to anything that

can be measured by a physical experiment.

In machine learning, probabilities raise additional concerns about scale. Large scale applications can

consist of hundreds or thousands of variable inputs, each holding their own margins of error.

Stacking these errors risks extending probabilistic determinations beyond what is justifiable.

Nonetheless, Abu-Mostafa, et. al. argue that a probabilistic view can produce satisfactory results

without assumptions outside of those produced independent of the hypothesis.[324] Advocates

assert that, in many cases, experts are trained to intuit forms of uncertainty present. They insist that

[323] Darwiche, Adnan. *Modeling and Reasoning with Bayesian Networks*. Cambridge; New York: Cambridge University Press, 2009.

[324] Abu-Mostafa, Magdon-Ismail, and Lin.

as long as engineers use the same distributions consistently for each problem set in each stage of learning, any prior knowledges are unnecessary to produce insight. They assert that debates on the subjective are mis-aligned with the aims of probabilistic learning, as probabilities are not expected to replicate target functions perfectly from their origin. Instead, they contend that probabilities are meant to approximate correlation in controlled environments, with an awareness that performance outside of the laboratory may vary.

To mitigate any discrepancies, Mostafa, et. al. argue, measures of error can be used to compensate for unknown variation. It is further argued that while Bayesian probabilities are premised on the selection of only some variables as material evidence, any adjustments necessary to compensate for error provides new evidence in support of new, more informed, hypotheses. Humean inductive reasoning prioritises the number of observable instances in establishing a relationship with the production of knowledge. For Hume, scientific judgement is based on the probability of observable outcome: the more instances, the more probable the predicted conclusion.

To the contrary, critics assert that the fragility of these types of Humean hypotheses originate in the priority they place on scientific judgement. Wood argues that without a more complete understanding of the role of the subjective within the determination of probabilities, they remain assessments of ignorance and judgement. Wood states: 'if, for practical reasons, samples are not selected randomly, the question then arises of whether they can reasonably be regarded as if they were selected randomly. This is a matter of judgement'.[325] The matter of judgement is what Gandy sees as the fundamental determinant of subject position. 'How we evaluate people, places and

[325] Wood, Michael. *Making Sense of Statistics: A Non-Mathematical Approach*. Nachdr. Palgrave Study Guides. Basingstoke: Palgrave, 2004.

things in terms of their departure from what we have defined as the norm,' Gandy states, 'is often a

fundamental determinant of the position they will come to occupy in still other distributions that

we have yet to consider'.[326]

Gandy is skeptical of mathematical applications that achieve a special statuses in the production of

knowledge, especially when these applications are used to determine subject positions based on

chance, risk and pre-emption. Gandy asserts that the use of mathematical tools has foreclosed

other traditional ways of revealing social problems and balancing competing interests — more so

when these tools become 'essential component[s] of any claim of expertise within the most

professional domains'.[327] Gandy describes this foreclosure as rational discrimination, or the sites

where social inequitability is determined by knowledges derived from empirical proofs.

Rational discrimination can be further conceptualised as a site of desire, I argue, or an encounter

that provides desire with a means to express itself as a site of *prototypicality*. What I suggest is that

although probability theory techniques are based primarily on estimates, they are thought to be a

viable alternatives to human knowledge.[328] Because the act of the category presupposes a

correlation between the significance of certain humans and a set of racial codes and standards,

carried through as racialised data, it adhere's the object's view to a pre-arranged set of possible

structures. The view devises relevant external information to establish equivalencies which are

grounded in the encounter between categories of race in order to be legitimated. Barber argues

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[326] Gandy.

[327] Ibid.

[328] See: Rob Kitchin. "Big Data, New Epistemologies and Paradigm Shifts." *Big Data & Society* 1, no. 1 (April 1, 2014): 2053951714528481. https://doi.org/10.1177/2053951714528481.

that these concepts are fundamentally important in contemporary machine learning research (which I will speak on later) and are necessary for computational literacy.[329] As Gandy suggests, we have come to trust these positions as authorities over other forms of intelligence, judgement and narrative.

Having staged the problematic of probabilities in machine learning, I elaborate on the close relation between machine learning, computer and cognitive science in the next section, Section 3: machine diagnosis. I start with the ongoing conversation between machine learning and computer science, before moving on to early research the has informed artificial neural networks, one of the most powerful and pervasive machine learning techniques. My intention is, again, to show the reciprocal relation between machine learning and other computational and statistical fields. My ultimate aim is to bring machine learning into view of their close relation to studies of cognitive function, and the mimicry of neural patterning.

Part 3: Machine diagnosis

4.11: Simulating the mind: computer science and neural networks

Similar in its relation to artificial intelligence and its adjacency to statistics, machine learning is also a subfield of computer science. As with machine leaning, definitions of computer science (sometimes called 'informatics') vary widely within research and industry. In the sciences, emphasis is placed on formal knowledge building. For instance, former Carnegie Mellon University Professors Norman Gibbs and Allen Tucker first defined the field of computer science as the study of algorithms, including their formal and mathematical properties, hardware realisations, linguistic structures, and

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[329] Barber.

applications. Still, early computer scientists Allen Newell and Herbert A. Simon see computer

science as an empirical discipline; or more specifically, a living machine that extends beyond the

experimental sciences.[330] For Newell and Simon — as with Gelenbe and Kahane — the study of

algorithms is both a technology and science.[331] Newell and Simon, however, see computer science

as an essential tool to deepen our understanding of nature. In this way, they argue that the field can

be viewed as the study of organisms rather than the study of code and mathematics. Gelenbe and

Kahane, on the other hand, posit that is closely aligned with natural sciences, such physics and

engineering. The purpose of the field, according to the researchers, is to build models that can form

relationships between observable phenomenon and scientific measurement; and ultimately

formalise 'the embodiment of concepts into [scientific] artifacts'.[332] Other ideas, such as those by

leading Genetic Programming researcher, Bill Langdon, are more obscure. According to Langdon,

deep learning genetic programming models excel at 'producing models that people can actually

understand'.[333]

The definition of computer science is equally as broad in industry applications. For example,

human-centred technology and information security specialist Angela Sasse defines computer

science in terms of its capital value. Derek Hill, founder and CEO of medical imagining company

IXICO, on the other hand defines the field by its computational efficiency, as well as its capacity to

solve difficult scientific and industry problems. Problems can range from system algorithmic

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[330] Newell and Simon, 19.

[331] Ibid.

[332] Gelenbe, Erol, and Jean-Pierre Kahane, eds. *Fundamental Concepts in Computer Science.* Advances in Computer Science and Engineering: Texts, v. 3. London: Singapore; Hackensack, NJ: Imperial College Press; Distributed by World Scientific, 2009.

[333] Genetic programming (GP) is a notable deep learning model. GP models use gene inspired or genetic algorithms to exploit data from specific biological and environmental contexts.

efficiency and hardware design to code and language execution. Computer vision,[334] facial

recognition, as well as speech and language processing, are key applications of computer science

techniques.

Most computer science models in both research and industry adopt deep learning approaches.

Deep learning, developed by computer scientist Geoffrey Hinton and colleagues from the

University of Toronto, along with Li Deng and Dong Yu of Microsoft Research, is a subfield of

machine learning concerned with neural network algorithms inspired by the structure and

operation of the brain. Andrew Ng, Chief scientist at Baidu and founder of Google Brain, describes

deep learning as 'our best shot at progress towards real AI', and as such the idea of deep learning is

to use brain simulations to make algorithms better and easier to use.[335] Whereas early neural

networks lagged behind SVMs in performance, according to Ng, larger, more efficient neural

networks can be trained due to faster computers and access to larger data sets.

I discuss neural networks in more depth below. For now, deep learning is a hierarchal feature

learner, meaning they can perform automated extraction from raw data. Using feature learning,

deep learning exploit unknown structures in input data in order to discover representations at

multiple levels. As such, deep learners can produce more nuanced and elaborate representations at

higher levels of abstraction than had been previously achieved. Importantly, automated feature

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[334] For more on computer vision, see: Fisher, R. B., Toby Breckon, K. Dawson-Howe, A. W. Fitzgibbon, Craig Robertson, Emanuele Trucco, and Christopher K. I. Williams. *Dictionary of Computer Vision and Image Processing*, 2014; Cootes, T. F., C. J. Taylor, D. H. Cooper, and J. Graham. "Active Shape Models-Their Training and Application." Computer Vision and Image Understanding 61, no. 1 (January 1, 1995): 38–59. https://doi.org/10.1006/cviu.1995.1004I; Potetz, Brian, and Tai-Sing Lee. "Scene Statistics and 3D Surface Perception." In *Computer Vision: From Surfaces to 3D Objects*, edited by Christopher W. Tyler, 1–24. Boca Raton, FL: Chapman and Hall/CRC, 2011.

[335] Institute for Pure & Applied Mathematics (IPAM). *Andrew Ng: "Deep Learning, Self-Taught Learning and Unsupervised Feature Learning."* Accessed April 2, 2018. https://www.youtube.com/watch?v=pfFyZY1RPZU.

learning allows the system to learn complex function mapping (of input data to target output)

directly from the unstructured environment, without relying completely on human intervention.

Google Brain is one of the earliest and most prominent examples of deep learning. Google Brain is

networked through over1,000 computers coded with over one million simulated neurones and

one billion simulated neural connections. Google Brain is used extensively throughout Google's

portfolio of products, and is used to accumulate and classify extensive amounts of unsupervised

user data, which can be shared between products and services. Strikingly, three days after its first

iteration Google Brain had mapped 10 million still images from YouTube revealing reoccurring

patterns of human faces, human bodies and cats. Researchers Quoc V. Le, et. al. note the model's

successful advancement of facial recognition and computer vision research. The team writes:

> Contrary to what appears to be a widely-held intuition, our experimental results reveal that
>
> it is possible to train a face detector without having to label images as containing a face or
>
> not. Control experiments show that this feature detector is robust not only to translation
>
> but also to scaling and out-of-plane rotation. We also find that the same network is
>
> sensitive to other high-level concepts such as cat faces and human bodies.[336]

In other words, what Google Brain learned was that it can learn without complete human guidance

or a priori structure. As apparent in contemporary digital culture, the sophistication of, and

consumer angst with, the expansive suite of products offered by Google, deep learning is a

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[336] Le, Quoc V., Marc'Aurelio Ranzato, Rajat Monga, Matthieu Devin, Kai Chen, Greg S. Corrado, Jeff Dean, and Andrew Y. Ng. "Building High-Level Features Using Large Scale Unsupervised Learning." *ArXiv:1112.6209 [Cs]*, December 28, 2011. http://arxiv.org/abs/1112.6209.

commercially viable solution. Similar to Ng's optimism, journalist Nicola Jones states that by brining

deep learning closer to what she describes as 'true artificial intelligence', Google Brain has enabled

a deep exploitation of non-AI tasks, as well as complex computational problems.[337] Jones and other

optimists overlook, even unwittingly, several consequences of commercial application. One, although

portions of the Deep Mind algorithms are distributed by Google in an open platform (Quoc V. Le,

et. al. make detailed accounts of their experiment for scientific repeatability and validation), the full

breath of the device is proprietary information owned and operated by Google. Secondly, as the

owner, engineers, marketers, and distributors of the device, the company determines which data

and learning features are most useful and relevant for users and consumers. Third, human users and

consumers are commercially and computationally valuable only in as much as our attributes and

behaviours can be exploited for learning and abstracted for classification. This raises significant

ethical concerns. I quote Mathew Fuller and Andrew Goffey at length:

> Being sophisticated today is about operating with media forms, techniques, and
>
> technologies that are excessively, absurdly, finalized as to purpose and utility, but whose
>
> seductive faces of apparent, personalized seamlessness, whose coded and codified
>
> bureaucratic allure, when regarded from the right angle, present multiple occasions (kairos)
>
> for crafty — and well-crafted — exploitation, provided that their sleek affection to
>
> affectlessness is probed for the energy it absorbs.[338]

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[337] Jones, Nicola. "Computer Science: The Learning Machines." *Nature News* 505, no. 7482 (January 9, 2014): 146. https://doi.org/10.1038/505146a.

[338] Fuller and Goffey,19.

Fuller and Goffey suggest that algorithmic utility, although promoted as necessary solutions to scientific problems, can articulate nothing more than a tendency to organise the mundane — which can produce less knowledge about the 'real world' than a video sharing service can reveal the mystery behind our obsession with cats.

It is apparent that machine learning and computer science share a similar set of problems, such as the limitations posed by computational efficiency. However, whereas machine learning diverges from computer science in terms of research aims, machine learning and computer science share a commitment to practical knowledge production and distribution. Although the success of these commitments are measured by their accuracy in uncontrolled real world environments, they lack transparency and reflexivity, which raise additional questions about the dissonances between automated approaches and the actual utility of scientific knowledge production.

Nonetheless, advances in deep learning techniques have helped accelerate the development of other techniques that benefit from its agility in contingent environments. The development of artificial neural networks is one example. In the final pages of this chapter, I take a deeper look at neural networks (or neural nets). Neural nets are an important device to consider within the context of my argument, as they emerge through the mechanistic ideas of brain mapping and cognitive simulation. I elaborate on this point below. For now, as mentioned, by the time artificial intelligence reached prominence in the 1950s, machine learning research had already played a central role in the development of AI technologies. Furthermore, with a greater understanding of the structure and functions of the brain — including the neurone and nervous system activity — research within artificial intelligence, psychology and cognitive science increased at an accelerated

rate. In AI, two classes of research emerged that are commonly distinguished today as 'traditional' AI and 'connectionism'.[339]

A central principle of connectionism is the description of mental phenomenon as a network of interconnected and relational, and discrete units. Connectionist approaches were previously known as parallel distributed processing (PDP). Much of this work was done in the 1970s and stressed the parallel relation between nature (specifically mental and behavioural phenomena). PDP's were directly influenced by early work on perceptrons (algorithms for pattern recognition) in the 1950s and 1960s. Perceptron theories by James L. McClelland and David E. Rumelhart demonstrated the robustness of nonlinear and multi-layer networks and their viability for a large number of applications.

From a connectionist perspective, neurones in the brain would represent a network of discrete homogeneous units, and the synapses would represent the energy transferring connections between them. Connectionist models are mutable, and change over time, as any unit in the network can be activated to perform specific functions. An artificial neural network is a common and frequently used connectionist model. Activations are distributed through the probability that a neurone will generate an action potential, or the potential of a specific neurone to excite or depress.

ANNs are common connectionist models. There are a number of different ANNs, such as recurrent neural networks, feedforward neural networks, and common gradient descent algorithms

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[339] Teuscher, Christof. *Turing's Connectionism: An Investigation Of Neural Network Architectures (Discrete Mathematics and Theoretical Computer Science)*. New York: Springer, 2002.

like backpropagation neural networks), yet they mostly follow two basic principles: that any mental state can be described as a dimensional vector with numeric activation values distributed over the network; and, 'memory' is generated by modifying the relational strength (or 'weight' — a simplified version of the synapse) between neurones. ANNs learning is controlled by a set of algorithms and learning rules, many of which are specifically focused on neuronal weight and vector activation. In contemporary artificial neural networks, the activation or sigmoid functions are weighted to simulate the 'energy' or information transfer between artificial neurones. Sigmoid functions introduce nonlinearity into the model through pattern classification, clustering and function approximation.

Cyberneticians Warren McColloch and Walter Pitts were greatly influenced by research on perceptrons. Although they were strongly discredited by prominent artificial intelligence researcher Marvin Minsky, McColloch (a neuro-physiologist and psychiatrist) and Pitts (a mathematician) advocated for connectionist approaches to neural systems. Although disputed, Margaret Boden argues that the historical relationship between computational intelligence and representations of mental phenomenon find their origins in McColloch's and Pitts's pivotal text, 'A Logical Calculus of the Ideas Immanent in Nervous Activity'.[340]

In the text, McColloch and Pitts argue that the binary quality of neural activity and the relations between neuronal units — their 'all or nothing' character — can be treated as a form of propositional logic.[341] The McCulloch-Pitts thesis finds that the behaviour of 'nets' are universal, as

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[340] McCulloch, Warren S., and Walter Pitts. "A Logical Calculus of the Ideas Immanent in Nervous Activity." *The Bulletin of Mathematical Biophysics 5*, no. 4 (December 1, 1943): 115–33. https://doi.org/10.1007/BF02478259.

[341] McColloch and Pitts.

well as stable in that 'for any logical expression satisfying certain conditions, one can find a net behaving in the fashion it describes'.[342] The assumption is that logical expressions can be applied to any universal condition, where the behaviour of one net comprised of discrete choices is replicated in another net under the same conditions.

Prior to McCulloch's and Pitts's search for a 'logic of the nervous system,' sciences of the mind were mere records of observed realities. McCulloch and Pitts, however, adopted what would later become known as connectionist ideas to posit that the structure of the brain, including the signal-distributing nervous system, is comprised of a closed system of elementary components. The neurones within this system follow binary 'all or none' rules of activation. As such, any brain activity, including perception, judgement, and knowledge accumulation and construction (what we think of as the 'mind') are also functions of binary logics. Importantly, the neural nets were theorised to incorporate a operational memory that loosely mimics that of the human brain. Today, ANNs like Google DeepMind's differentiable neural computer (DNC) extend this hope by pairing a neural net with a hybrid learning system that learns and forms 'memories' by attaching mapping targets to external memory banks.[343]

McCulloch and Pitts's work was profound in its switch from prior research approaches that focused primarily on records of observation to the notion that computation can, with regularity, represent physiological and mental phenomena as operational binaries.[344] Specifically, the logical description

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[342] Ibid.

[343] For more on differentiable neural computers and neural network memory, see: Engelking, Carl. "An Artificial Neural Network Forms Its Own Memories." *D-Brief* (blog), October 13, 2016. http://blogs.discovermagazine.com/d-brief/2016/10/13/artificial-neural-network-memories/.

[344] McCulloch and Pitts.

of mental atoms (or 'psychons') and their relation to neuronal pulses gained traction as a new

informational theory of science, which would later develop into cybernetic theory.[345]

As MacKenzie notes, the ideas renewed 'longstanding cybernetic hopes to being brains and

computation together in models of computational intelligence and agency'.[346] The McCulloch-Pitts

neural nets were to be important in the formation of several fields of study, including cybernetics,

computer science, artificial intelligence, cellular automata, robotics, and self-organising systems; and

the trajectory of experimental epistemologies that defined logical representations of perception

and rules for the dynamic mechanisation of mental states.

As nonlinear dynamical systems, cellular automata and neural networks are proficient at modelling

specific problems, including urban evolution,[347] bioinformatics,[348] and turbulence phenomenon.[349]

They also layer informational logics of certainty onto otherwise contingent and observational

phenomena, which are thought to be universal, relational with particularity, and repeatable on the

level of behaviour. As Ilachinski remarks, discrete models show that 'very simple finite dynamical

implementations of local conservation laws are capable of exactly reproducing continuum system

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[345] McCulloch and Pitts's theories resonated with John von Neumann, who in the 1940s designed an artificial computing network for automated evolutionary logic. The aim was to build a self-replicating robot from a vast number of parts. These parts (or cellular automata) would have to be spatially and temporally discreet, homogeneous, self-replicating, and evolve in parallel at discreet stages. The field of study also gained popularity with the idea of universality. It was believed that cellular automata (CA) rules could emulate a universal Turing machine, and therefore compute anything that is computable. Cellular automata are used today for inferential reasoning in neural networks.

[346] Mackenzie, 183.

[347] Batty, Michael. *Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals*. 1. paperback ed. Cambridge, Mass.: MIT Press, 2007.

[348] Xiao, Xuan, Pu Wang, and Kuo-Chen Chou. "Cellular Automata and Its Applications in Protein Bioinformatics." *Current Protein & Peptide Science 12*, no. 6 (September 1, 2011): 508–19. https://doi.org/10.2174/138920311796957720.

[349] Chen, Hudong, Shiyi Chen, Gary Doolen, and Y.C. Lee. "Simple Lattice Gas Models for Waves." *Complex Systems 2* (1988): 259–67.

behaviour on the macroscale'.[350] As Parisi reminds us: 'Rather than demarcating a simple opposition between theoretical and practical knowledge, … current computational practices reconfigure the relationship between reason and automation so that automation is no longer a reflection of a Cartesian dualism of mind and body… or of the Laplacian mechanization of the universe. One way of theorizing this order of continuity is to address the problem of the limit of computation deductive logic, and formal reasoning as an opportunity to rearticulate the ontology of number in terms of information processes'.[351]

Today, artificial neural networks stand at the helm of powerful and ubiquitous research and industry devices. Although artificial neural networks are loosely aimed at simulating the activities of the mind, I argue that they also constitute a new mode of machinic perception, that weaves the mind (and any pathological representation of it) into the logics of *bioepistemic* operation. What we witness in the bioepistemic is the captivation of dialectic forms of relation between the natural and artificial, the discreet and collective, or the ordered and chaotic, remain elemental referents in the formation of computational models. Within these regimes of abstraction and dynamic constriction, life is recast as that which can be collected, traced, and measured.

Given the above reverse engineering of machine learning, in Part 2 I describe some of the problems in the common approaches to machine learning research.

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[350] Ilachinski, Andrew. *Cellular Automata: A Discrete Universe*. Singapore; River Edge, NJ: World Scientific, 2001.

[351] Parisi.

4.12: Problems in approach: ethics, mimicry, and biology

While a significant portion of discourse is organised machine learner as an engineering device, bureaucratic operation, or — in the case of the human sciences — ethics or data politics, machine learning is often approached from either a technological or socially determinant point of view. For instance, textbooks and technical training manuals circumvent social contexts for more practical advise on coding techniques and algorithmic command structures, which are heavily dependent on computational expertise and material power.

In the human sciences, namely the emerging field of data politics and the digital humanities, humans are inversely prescribed as passive participants in illusive digital ecology that impose upon the subjectivity of individual and collective beings. Problematics are compounded when scientific and engineering specifications collide with public trust/distrust in data and automated systems that organise the complex realities of human relations (see the Introduction for a more detailed description of this). While the technologies illuminate sentient and computational concerns, they also unearth human-machine phenomenon that might otherwise remain hidden or obscured from vision. In this way, machine learners are as much relational as they are operative in the shaping of perception 'as if' they are direct simulations of sentient intelligences — as illustrated in desires for more 'natural' or sentient-like behaviours in speech generation/recognition, robotics, and artificially intelligences.

Johanna Seibt, Raul Hakli and Joana M. Nørskovs warn against the use of the 'as if' in computation, particularly when relations are quantified into measurable instances of human-

based sociality.[352] In this way, perceptions of the 'as if' delimit the machine by notions of what

it 'can do', which is measured by mimicry at the thresholds of human knowledge. The as if of

perception relies on a binary notion of classification: the machine 'is' or 'is not' human; the

machine 'can' or 'can not' do what a human does; or as Johnna Seibt is concerned with in her

article 'Varieties of the 'As If: Five Ways to Simulate Action'', can the machine — foremost —

be viewed from within human-machine interaction?[353] Furthermore, can simulation and

mimicry account for human perceptual phenomenon that might in one instance consider the

machine a friend, foe, colleague or neighbour, and in another — as data analyst Richard

Webber argues — a necessary component of political perception?[354] Adjacently, can ontology

articulate the full spectrum of machine perception?

Seibt argues that ethical debates on these matters are incomplete in their characterisations of

simulated interaction. These 'types of occurrences', as she describes them, are either compliant

with conceptual normalities or in line with theoretical distinctions between perception and

human-machine value. Ontology as such, she argues, is more precisely a tendency to place

value on the *how* of knowledge production and a performance of normative commitments. I

quote Seibt at length:

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[352] Seibt, Johanna, Marco Nørskov, and Raul Hakli, eds. *Sociable Robots and the Future of Social Relations: Proceedings of Robo-Philosophy 2014*. Frontiers in Artificial Intelligence and Applications, volume 273. Amsterdam: IOS Press, 2014.

[353] Seibt, Nørskov, and Hakli.

[354] Webber, Richard James, Tim Butler, and Trevor Phillips. ''Adoption of Geodemographic and Ethno-Cultural Taxonomies for Analysing Big Data.'' *Big Data & Society 2*, no. 1 (June 10, 2015): 205395171558391. https://doi.org/10.1177/2053951715583914.

From philosophical viewpoint it is a category mistake to assume that we can interact with

anything — whether robot or human — *as if* it were a person. 'Person' is not a descriptive

predicate designating a feature, but a declarative-ascriptive predicate designing a response-

dependent condition like 'red' or 'C#', with the distinctive difference that the response to

the item in question is not perceptual but normative— it is undertaking a commitment to

certain actions and omissions, in accordance with rights and obligations…When we call an

entity a person we thereby, in the performance of that utterance, take on certain absolute

normative commitments—in fact, to call something a person is to do nothing else but to

make these commitments… You cannot say 'It is as if I hereby promise you…' nor 'I

promise you somewhat…' . Similarly, if we treat some x as a person we are committed to

taking x *as* a person, which means that we interact with x as a person.[355]

Although the machinic is based on description and classification, there are other modes of logic

that that Seibt states is under-articulated in ontology. The tension is wedged in between

perceptions of what is constituted as psychic generation and what is an sufficient approximation of

the 'real'. At risk is the ontological veiling of complexity in favour of what Seibt calls *rudimental*

navigations that operate through the logics of rule-based procedures.[356] In order to develop a

more complete assessment of human-machine relation, she proposes a revision of ontological

descriptors to account for languages that do not contain terms mimic 'human mental states,

agentive goals, or social relations'.[357] Instead, Seibt advocates for more dynamic approaches to

human-machine relations that clarify the criteria from which data are assigned a specific set of

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[355] Seibt, Nørskov, and Hakli.

[356] Ibid.

[357] Seibt, Nørskov, and Hakli, 101.

actualities. One approach is to dislodge the ontological process from its roots in naturalisation, particularly from within the biological, and instead fill the breach with critique on how norms, taxonomies, and rules sets can change over time — or as I argue is always already in conversation with existing eugenic forms of scientific discovery and taxonomy.

Still, as Robert Brandom reminds us: 'description is [merely] classification with consequences, either immediately practical ("to be discarded/examined/kept") or for further classification'.[358] To dislodge sentient performances of normality, the classification might be inverted to describe entities not as actual, but as an iterative form of individuation. Here, the rule set is operative as an ordering function only in as much as it is self-aware of its own condition for the genesis of new emergent relations. Form a machine learner perspective, the task of science and ontology would merge into alignment with a relational process that, although in exchange with the biological and a priori classification, open to the potential for non-human forms of reason.

It also, as Seibt illustrates, enlists bifurcations into 'a gradual increase of the regulatory dependence up to normativity'.[359] However, as has been fruitfully demonstrated by Luciana Parisi through computation and the algorithm, Inigo Wilkins through financial markets, Beatrice Fazi via computational aesthetics, and others, there is no knowing how to establish the rule. Parisi has shown, in particular, that the 'actualities that select, evaluate, transform, and produce data' expose the internal inconsistencies of rational-based systems, particularly functional mechanisms that

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[358] Brandom, Robert. "How Analytic Philosophy Has Failed Cognitive Science." *Critique and Humanism 31*, no. 1 (2010): 151–74.

[359] Seibt, Nørskov, and Hakli.

advocate for the naturalisation of reason.[360] Oscar H. Gandy, Jr. also argues that attentions given to classification, in their namings as relevant/not relevant, criminal/innocent, or other binaries, are determined by problems assigned to each instance of their inquiry. In other words, taxonomies assign relations of power by associating rule-based logics and with specific edicts of normality.[361] The arguments call into question the fundamental logics of rule-based procedures, and offers new opportunities to re-assess the question of what actualities count as substitutes for computational reasoning. Given, normative forces can drive the production of knowledge by taking on new significances in the human-machine debate. How this value is utilised in machine learners further illuminates the role of the *episteme* in the politicalisation of research and the deployment of bureaucratic decision-making.

Conclusion

In summary, views of artificial neural networks as dynamic evolutionary computational representations illustrate the expanding capacity to model spatial and temporal phenomenon. Importantly, the mapping of perception and other phenomena of the mind as discrete and patterned regularities reinforces the logics of instrumental reason and the enumerative operation of organisation. This instrumentalisation of knowledge is part of a long history of delineating the particular as a parallel function of universal and evolutionary regularity.

Nonetheless, if the machine learning algorithm, written in code, operates (as engineered) to produce propositions that may take the form of knowledge, then how do we distinguish between

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[360] Parisi.

[361] Becker.

the historicity of enumerative reason and the longitudinal accounts of the attempted (and often

violent) organisation of the racialised data? Under what conditions, then, are we to refer to the

human in the machine-human relations, considering ontological exclusion of black being as category

of human itself? Finally, to what degree can critical though inhabit the scaling of race or the psychic

and collective genesis of the racialised body?

In the next chapter I introduce these tensions as problematics of power that underlines the

bioepistemic system of organisation and control. I consider how the idea of machine learning not

only guides the generation and re-generation of life by means of the discrete ordering of things, as

Foucault states, but how the *bioepistemic* distributes race and racialisation as functions of universal

patterning.[362] Here, I return to the ontological struggle with the prototype as an issue of

compossibility and differential reasoning.

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[362] Foucault, xvi.

Chapter 5: Simple substances, ideal things, and well-founded fictions

Introduction

At the end of Chapter 4 I argued that the generative boundaries of artificial neural networks, and the associative effects of the ideal model of universality, re-articulate the relation between the discrete stages of human individuation and the *bioepistemic* rules of emulation and *prototypicality*.

As shown in Chapter 2, to start here is to recognise that the perception of phenomena is, in many ways, linked to the sorting and regulation of spatial and temporal movement. The tension is situated within the *bioepistemic* logics of classification and species organisation, which work actively to (re)configure the schematics of local and global social apartheids (for more, see Chapter 2). As I have articulated throughout, *spatio-temporal* organisation is enacted on the register of scientific knowledge production. I argue that these knowledges, however, are generative modes of reason set forth by the relation between the continuous and the discrete (or — as I show in Chapter 1 — what Fanon describes as alienation). It is a helpful reminder that the amplification of these concerns are, even unwittingly, pushed forward by machine learning models that — in hopes of achieving a Turing complete system of human-machine interaction — turn to artificial means to simulate, replicate and exploit the workings of the mind.

To better understand the *spatio-temporal* positionality of the object (and the object of knowledge), I consider key moments in the development of calculus, before returning to their articulation in the operation of contemporary machine learning. Lastly, I remark on how this positionality challenges, and extends, the *biopolitical* as a distribution of power through machine learning.

5.1: Oresme, object positions and linear propositions

To address the *spatio-temporal* matrix I begin with calculus, the mathematical study of continuous change. Today, calculus has two primary subdivisions: differential calculus (concerned with rates of change) and integral calculus (which is the accumulation of rules to find integrals expressed symbolically). I discuss differential calculus in detail below. For now, I turn to the development of modern mathematics and science, as founded in a critique of Aristotle. My aim to think through these key developments as a foundation of logics upon which contemporary machine learning devices are built. To begin, I consider the influence of fourteenth century philosopher and mathematician Nicole Oresme.

I argue that since Oresme first introduced the straight line as a symbolic representation of the relation between time and spatial distance the discreet *spatio-temporal* object has been a problem of calculation and measurement.[363] Prior to, the symbolic function was only beginning to be understood, and therefore the languages were given more generally as a description of uniform motion over the traversal of intervals. Uniform motion was a principal concern for Aristotle, Autolycus, and Archimedes. Aristotle, in particular, was concerned with the relation between proportional distances and proportional time. Oresme, having studied Aristotle's Ethics, Politics, and On the Heavens and Economics, among others, formed a critique of Aristotle's ideas of motion, which Oresme later used as the basis for his developments in mathematics, philosophy and science.

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[363] Kirschner, Stefan, "Oresme's Concepts of Place, Space, and Time in His Commentary on Aristotle's Physics," *Oriens – Occidens. Sciences, Mathématiques et Philosophie de l'Antiquité à l'Âge classique*, 2000a, 145–179.

In his commentary on motion, Oresme diverges from Aristotelian physics by arguing instead that the physical place of any body is defined by the space this body fills or occupies.[364] For Oresme, space is not a substance or an Aristotelian accident, meaning it can not be wholly signified through language. Space is better understood metaphysically; not as a noun or pronoun, but instead an adverb like 'here' and 'there'. Oresme's view of space is closer to that of Newton's. For Newton, place or position is merely the approximation of substance. Oresme, however, extends Newton's theory to describe the origin of space beyond the world we experience, or the extra cosmic space. For Oresme, there exists an infinite void space in the extra cosmic, which he describes as God himself. This would become a defining feature of Oresme's philosophy of nature and development of mathematics.

Oresme also diverges from Aristotle on the concept of time. In Aristotelian physics, the passing of time is proof of the existence of motion. Time here is defined as the measure of motion between points before or after a specified origin. Time and motion, in this sense, are necessary and interdependent. Oresme, on the other hand, defines time as a continuous series of successive durations of things. This continuity of discrete durations are independent of motion (or *fluxus*). Oresme's duration, *duratio rerum tota simul*, is derived from the eternal relation with the Divine, and is therefore durable and consistent. As such, Oresme's *fluxus*, on the other hand, is also a universal expression of the Divine, and thus applicable to all concepts of change, a concept that would foreshadow what we know today as classical physics.

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[364] Ibid.

Oresme's re-articulation of Aristotle's concepts of motion were greatly influential in the developing field of mathematics. With the Divine in place, Oresme expanded his concepts to the positionality of discrete units in space. He used the rectangular coordinates latitude and longitude, and the resultant geometric figures, to distinguish between uniform and non-uniform distributions of values. Here, we can think of the change in velocity in relation to time, or the distribution of the magnitude of quantities in relation to things. From this starting point, Oresme devised his concept of uniform acceleration, which he represented with two-dimensional right triangles, as well as three-dimensional figures. This new measurable function of velocity and spatial distance helped form the basis of calculus, which made it possible to determine distances travelled, rates of speed or even transactions per second using symbolic representation. The calculus also provides a point of reference from which discreet values could be depicted and kinetically pre-empted. Oresme represented this function with the what we know today as the straight line.

The uniform line is important in the study of space, time and motion. If one wants to determine an object's rate of change or pre-empt its point of arrival, then all one needs to do is extract a section from a straight line, establish a trajectory, then divide the distance already travelled by the total length of time it took a object to get there. This means that the relation between the position of, say, point A and point B were no longer Aristotelian accidents, circumstances or coincidences; but representations of uniform and pre-determined relations between discrete things. However, to hold uniformitivity, velocity in traditional calculus must be constant, steady and unchanged. Otherwise, the trajectory would be a more of an approximation, or best guess interval. Here, motion is not only determinant, but any comprehension of this motion as such can be grasped through multiple, discrete and patterned — and therefore ordered — continuities. Things must, therefore, remain in

stable and homogeneous form; and their motion uniform and unmitigated, which poses a problem

for *spatio-temporal* pattern-learning dynamics.

I take a slight diversion in Part 3 to elaborate on the logics of relation and the Aristotle to A. N.

Whitehead. This diversion is necessary to provide further context to the debates above.

5.2: The logics of relation

To a large extent, the emergence of the logic of relations are divided into two periods of thought:

pre- and post- mid- nineteenth century. But where do we begin with relation, particularly given that

relation differs depending on how it is understood?[365] The philosophical basis of the ancient Greek

tradition, from Aristotle to the mid- nineteenth century, lie in attempts to locate external relations

ontologically.[366] In other words, the project of philosophy was to comprehend the ways things

(people, numbers, communities, objects, and so on) are described, or in particular, the ways two or

more things are related. Of concern were how these things, and the relations between them, might

account for difference.

To gesture towards the relation of and between things was to understand relation primarily from

the point of view of the object; or in many cases the object as an objective determination either

inherent in itself or attached to itself with respect to another[367]. The basis of this movement

remains tributary the assumptions made by Plato and Aristotle. Unlike Plato's view of relation

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[365] Gasché, Rodolphe. *Of Minimal Things: Studies on the Notion of Relation*. Cultural Memory in the Present. Stanford, Calif: Stanford University Press, 1999.

[366] Heil, John. "Relations." In *The Routledge Companion to Metaphysics*, edited by Robin Le Poidevin, 310–21. Routledge Philosophy Companions. London; New York: Routledge, Taylor & Francis Group, 2009.

[367] Gasché.

spelled out in *Theaetetus*, Aristotle's *The Metaphysics* elaborated on the specificity of the

categorisation of relations as *accidents*, or entities dependent on substances. In Aristotlean Logic,

substances are 'primary', meaning that there is a static basis which comprises reality, and which

exists separately from human perceptions, thoughts and conceptions of human subjects[368].

'Accidents' here are to be understood as characteristics (or attributes) that may or may not belong

to a (human) subject without affecting the essence of the subject[369]. The primary substance then is

distinct from (human) subjects who experience or perceive such an entity. In this way, the primary

substance can be thought of as an entity onto itself that exists as its own complete and individual

fact. Given then, according to Halewood, 'the task of science is to provide the correct attributes to

substance, and the task of epistemology is to account for how knowledge of the 'correctness' or

'incorrectness' of such attributes is possible.[370]

Considering that prior to *Metaphysics,* in his short treatise *Categories,* Aristotle made first attempts

to categorise relations on the basis of logic[371] by suggesting a methodology to explain the 'truth' of

relational events or situations (also called 'relational situations'), it is no wonder that the distinction

between things thought to be what they really are (primary substances) and their qualities or

characteristics (heat, height, weight, criminality, for example) would ground themselves in both

scientific and philosophical priority.[372] Although relations were thought to be one of the lower

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[368] Halewood, Michael. *A.N. Whitehead and Social Theory: Tracing a Culture of Thought.* London; New York: Anthem Press, 2011.

[369] Guthrie, William K. C., and William Keith Chambers Guthrie. *Aristotle, an Encounter.* Reprint. A History of Greek Philosophy, by W. K. C. Guthrie; Vol. 6. Cambridge: Cambridge Univ. Press, 1993.

[370] Halewood, 13.

[371] Or on the differences between statements containing 'relative' or relational terms and those containing 'absolute' or non-relational ones.

[372] Halewood.

types of categories (*summa genera*), it is worth remembering that Aristotle lists them as one of the

ten highest kinds.[373] And however fruitful efforts were to combine subjects and predicates together

to form simple propositions — what would later be defined as 'categories' or 'categorical

propositions' — these relations or accidents amount to properties, inhering in things, of being-

toward-another.[374]

Logics of relation exercised enormous influence during the Middle Ages, up until the late

fourteenth century. It was in medieval philosophy that relations became a central philosophical

issue; and terms for 'relations' (*respectus, habitudo, proportio, relatio*) concretised into a philosophical

understanding.[375] Although largely theologically motivated, medieval philosophers developed their

own conceptions of relational situations under these terms, specifically in the denial that relational

situations can be moulded onto the paradigm of *Categories*. If Aristotle attempted to define

relation from the object onward, or from the accident of and between objects onto

characterisation, then the medievalists attempted the inverse: to start from signification to work

towards an explanation of the relation therein. By the fourteenth century, however, the denial of

the existence of any discernible distinction between a substance and their accidents became

commonplace. The departure left open views of relations as being ontological grounded substances

themselves, that has had a profound influence on contemporary modes of technological

understanding. Moreover, Scholasticism defined relation as one of minimal things, or the least of all

beings, something tediously small, thus claiming, ontologically, little status compared to substance.

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[373] Aristotle. *Aristotle: Categories and De Interpretatione*. Reprint. Clarendon Aristotle Series. Oxford: Clarendon Press, 1994.

[374] Gasché.

[375] Gasché.

It is interesting to consider contemporary machine learning from this genealogy, or as a specificity of categorisation itself continually derived on the basis of infinitesimal attribute-dependent data. In machine learning, the subject is allowed to come into the corresponding relata as a monadic property or accident onto themselves. As like the Aristotelean substance, when two or more subjects are related, in machine learning their relation can be explained by monadic properties or 'accidents' present in the corresponding data as a natural and concomitant occurrence within the relata. A nuance machine learning perhaps brings into the debate is the position of the subject of enquiry, and more so the subject herself.

How these paradigms transfer into the logical domains and linger in modern thought is profound. According to Michael Halewood, the influence of Aristotlean Logic in contemporary conceptions of science and technology studies has had an enduring influence on notions of nature as 'inert, passive and dead'[376]. Citing Whitehead's critique, Halewood asserts that our modern scientific point of view arises from the 'slow influence' of Aristotle's Logic, which declares that rational and logical thought is based on, as well as expressed through, its simplest form. It has also fuelled a largely unquestioned acceptance that underneath any sense of awareness is a substratum, or sense of concreteness, on which scientific knowledge is or can be based. Halewood argues that this: 'leads to the conception that it is the attributes of matter rather than matter itself which are present to, and the basis for, human perception, knowledge and consciousness'.[377]

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[376] Halewood,10.

[377] Halewood, 11.

Halewood writes further that the problems associated with the above position are three-fold: First, the universe is conceived as divided into two distinct realms, that of substance and that of the qualities of substance which are separate and abstract from the substance itself. Second, the interconnection between individual entities of materiality cannot be either accounted for or allowed. Here, the relation between substantial things is disallowed, as each is conceived of as complete in itself. (Halewood argues that it is here that the description of facticity limits the description of entities as solitary, unrelated and situated as individual points in space and time, therefore making it impossible for information to pass between entities; or to account for any mode of dynamism). Third, Halewood states that the bifurcation of the primary substance from those subjects that experience the substance creates a gap in knowledge, where the primary substance becomes that which knows (the knower) and the subject that which is known. In other words, 'a gulf is thus created between the world-as-it-is and information about the world-as-it-is'.[378]

In the next part I return to machine learning. At this juncture, I elaborate on the potential connection between machine learning and the logics of relation.

5.3: A negotiation of value substances

The practice of machine learning then reveals itself as a negotiation within the parameters of substance values, the relation of and between subjects, and the calculation of their consequences as the problems set forth by the algorithmic model. The engineering community figures closely to the initial equation allied with the process of selection, and the modification of introductions, eliminations, couplings, and in turn consequences of 'accidents' in the relata. The practitioner

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[378] Halewood, 13.

employs what Stengers calls a *unilateral brutality* that is in direct opposition to the confrontation between the engineer and her equations, an adaptation of the field of analysis to include the engineers right to publish relationships as accidental, yet scientifically scrutinised, findings.[379]

Issues of uniform motion are fundamental concerns for contemporary machine learning researchers that measure success by predictive accuracy — a problem machine learning researchers are actively working to solve, particular in robotics and human-machine interface. According to Siddhartha Banerjee, a graduate researcher and project lead at Georgia Tech's School of Interactive Computing, learning dependent conditional random fields (LDCRFs), a type of temporal machine learning model, 'have hidden states, are useful in modeling unknown dependencies between what you observe and what you are trying to classify'.[380] Banerjee and his team are using machine learning to help robots make decisional interruptions of human behaviour, robots that are programmed to learn an work well in factories, as they describe, but less apt in more human-centred environments, like offices, schools, and homes.

A problem of relations arises when 'real world' environments are chaotic and nonlinear, with no explicit kinetic pattern. They are, in many senses, non uniform and unstructured, which makes targets, including accurate human-machine interaction, difficult to pre-empt. Associate professor at Georgia Tech's School of Interactive Computing James Hays posits that machine learning devices like deep learning neural nets are 'data hungry'.[381] Hays and his team of researchers are using deep

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[379] Stengers, Isabelle. *Cosmopolitics II*. Posthumanities 9–10. Minneapolis: University of Minnesota Press, 2010), 280.

[380] Becker, T.J. "The Minds of the New Machines." Georgia Tech Research Horizons, March 8, 2018. http://www.rh.gatech.edu/features/minds-new-machines.

[381] Becker.

neural net architectures for texture mapping and to generate realistic images from imperfect sketches. Their goal is to 'take bad drawings and produce good photos'.[382] Potential applications include architectural previews, product browsing for online shoppers, and police artist sketches.

Returning, Oresme's graphical representations of motion further informed developments in kinematics. They were highly influential for Galileo, as well as René Descartes for the development of his analytic geometry. It was Descartes who brought mathematics closer to the notion of continuity between discrete objects. For Descartes, however, continuity traverses from the symbolic into notions of the 'real' world around us. For Descartes, the continuity of real objects in motion are uniform phenomenon that can be represented visually as geometric objects in space and time. He argued that symbolic functions could not only represent kinetic phenomenon, but the representations themselves can be brought into visibility and abstraction as indications of the real. The postulate is that if a symbolic function can be represented as a visual representation, then a visual representation can (reciprocally) be represented by a symbolic function. Therefore, the visual representation, as the common link between the symbolic and real can be dispensed of all together, leaving a pure continuity between perception of the real and the symbolic function. Put another way, what is perceived as real can also be perceived as the calculable properties of the world around us, which are made visible by the laws of motion.

What remains, then, are not discreet objects that make up events or even the events themselves, but the symbolic functions of the events, which are comprised of smaller, infinitesimally discreet, behaviours. Experts in signal processing and machine learning, like Mark Davenport, state that in

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[382] Ibid.

order to combat these complex problems, the mathematics of algorithms need to be understood in order to identify potential shortfalls, which he defines as the 'significant gaps between the abstract problem formulation and what you encounter in a real-world application', which is also beneficial for research investigating advanced perception and control for autonomous land vehicles.[383]

These mechanisations involve difference as well as motion and computational decision, reducing phenomena such as emotions, motivations and objectives down to determinant actions that are conditional only in as much as the conditions can be derived from an assumed point of reference on the shared *spatio-temporal* co-ordinate. As such, one's road rage is no longer the metaphysical collision of a bad mood and someone else's bad driving, but nonlinear behaviour carried out by both individuals as discreet units that the algorithm must account for through computational decision-making — sometimes at a rate of millions of times per second. In other words, the graphical interface, and here texture mapping, forms an empirical bridge between perception of the real world and analyses of continuously variable quanta.

In the next sections I elaborate on concept of monadology. The goal is to unearth any connections that may exist between the problematic of discrete relations and the philosophy of mathematics.

5.4: A network of parts

I question how the problem of relation stated throughout this chapter might mirror Descartes' theories on mathematics and mind/matter dualism. For Descartes, the mind is merely an

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[383] Becker.

instrument that separates fact from fiction (the symbolic from the real) — a method that enabled

science to focus on matter (the body) as the subject of research, and keep the mind as an

instrument to ascertain truths in relation to the world. Descartes's materialism, or the view that

everything exists in physical form, is closely aligned to mental states and processes. Effectively, the

theory gives a formal justification to favour matter over the mind, as well as any phenomenon of

the mind such as precognition, superstition and astrology.[384] In contrast, Gottfried Wilhelm Leibniz

opposed materialism and Cartesian dualism. The mind and the physical form, for Leibniz, are two

distinct non-dualistic domains. In *The Monadology*, he argues that the mind — which includes

perception — cannot be explained mechanically, and thus cannot be physical processes.[385] He

writes:

> In imagining that there is a machine whose construction would enable it to think, to sense,
>
> and to have perception, one could conceive it enlarged while retaining the same
>
> proportions, so that one could enter into it, just like into a windmill. Supposing this, one
>
> should, when visiting within it, find only parts pushing one another, and never anything by
>
> which to explain a perception. Thus it is in the simple substance, and not in the composite
>
> or in the machine, that one must look for perception.[386]

Leibniz proposes that if one were to enter into a machine, they would only observe a network of

parts and the relation between them, from which no sufficient explanation of perception or

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[384] For a more detailed analysis of precognition, see: Amaro, Ramon. "Precognition." In *Posthuman Glossary*, edited by Rosi Braidotti and Maria Hlavajova, 365–67. Theory. London Oxford New York New Delhi Sydney: Bloomsbury Academic, 2018.

[385] Leibniz, Gottfried Wilhelm. *The Monadology.* New York: Prometheus Books, 1992.

[386] Ibid., 49.

thought can be deduced. Therefore, materialism can not explain what can not be proved to

materialise in physical form. Instead, perception and the mind must be one, single domain or

conscious being of 'I'. Since physical matter are not one, then they can not posses a unified mental

state of being. In Leibniz's interpretation, for something to be valid as a real being (substance), it

must be a single unity that is simple and indivisible. Matter can, however, be extended, and as such is

infinitely divisible. In contrast to materialism, bodies are aggregates and not substance, that must be

composed of real things, not 'phenomenon, lacking all reality as would a coherent dream'.[387]

Therefore, divisibility is equivalent to extension. This means that atoms, as he claims, are extended

beings since they are divisible; and, even if it were thought that atoms were composed of parts that

could not divided, they would still not overcome the fact that they are aggregates and therefore

not one true being.

Leibniz associates these perfect substances with the soul, and tells us that the aggregated

components of the body are 'first elements' or 'primitive unities' of the body.[388] The unities appear

to us as extensive corporeal phenomenon, although they are, according to Leibniz, 'well-founded'

phenomenon founded in a simple substance of real infinitesimally simple things. Leibniz articulates

the expression of this phenomenon as a pre-established harmony and perception becomes an 'act

of vanishing', such that each substance is programmed at the level of creation, where all actions and

natural states are executed in compliance with the laws of a single substance.[389] It is here that

Leibniz attempts to prove, mathematically, the conformity and coordination of the mind and body

[387] Ibid., 53.

[388] Ibid., 30.

[389] Ibid., 61.

in accordance with Divine intervention, which I argue in the next section has articulated itself as differential calculus and the solution for nonlinearity in contemporary machine learning.

In the next part, I elaborate on the concept of the differential, and the link between Leibniz's *preestablished harmony* and the aggregation of bodies of difference as extensions of the Divine. With differential calculus at the foundation of dynamic modelling systems, such as neural networks and other machine learning algorithms, I question under what circumstances the perception of race becomes an 'act of vanishing', where the process of racial segregation becomes no more than the mundane *spatio-temporal* organisation of harmonious bodies, modelled and coordinated under a simple substance and universal language.

5.5: Nonlinearity and Leibniz's act of vanishing

On his journey from Paris to Hanover in 1676, having spoken with his contemporary Spinoza 'several times and for very long', Leibniz elaborated on his treatise for the perfect being.[390] In the discussion, he aimed to settle the ontological contradiction of existence. The answer is simple, yet complicated. He argues that the aggregates of of any substance can be conceived of as a single 'I' in and of itself. These aggregates may be unique collections of simple 'perfections', as Leibniz calls them, and in relation to other unique aggregates, but remain extensions of the same coordinated substance of the Divine, 'which expresses whatever it expresses without any limits'.[391] In other words, these aggregated perfections — although discrete — contain an infinite number of formal rules and calculated coordinations. Despite this harmonious dance of the Divine, these perfections

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[390] Leibniz, Gottfried Wilhelm. *Philosophical Papers and Letters*. Edited by Leroy E. Loemker. 2. ed. Synthese Historical Library 2. Dordrecht: Kluwer, 1989.

[391] Leibniz, Gottfried Wilhelm. *The Monadology.* New York: Prometheus Books, 1992, 34.

maintain their differences in attributes, which for Leibniz opens up an infinite network of contingency set forth by the conditions of the single substance. Since these contingencies are at their simplest determinate, Leibniz takes a short cut to describe any incongruent relation between them as a compatibility only understood on the level of the single substance. As extensions of the single substance, they are compatible despite their apparent differences. Leibniz describes the issue of infinite difference as a problematic of *incompossiblity*.

In *Letters to Vernon, With a Note on the 'Justification of the Infinitesimal Calculus by That of Ordinary Algebra* (1702), Leibniz argues that to think through existence is to think through *incompossibility* — that is to think through the relation between incompatible aggregates is to think not of their incompatibility, but the magnitude of relation between them as a function of the pre-established harmony. Leibniz uses the kinetics of physical matter as an example. For instance, a grain of sand cannot pass through and divide glass. Equally, sand has an *incompossible* relation with the terrestrial globe since it can not pass through or divide it either. Similarly, the terrestrial globe with the outside universe. The grain of sand in this example is a simple substance, which in Leibniz's view extends in aggregate to make up glass as well as the terrestrial planet. In this way, any patterns or behaviours resulting from glass or on or by the terrestrial planet are extensions of the behavioural patterns of the grain of sand. The manoeuvres are, at the same time, relational and not fixed, but self-organising.

As a perfect harmony, *incompossibility* is thus an infinite coordination of Divine provenance that Leibniz defines as the 'best possible' relation between bodies. Mathematically, *incompossibility* as harmony would mean that any distinct variable X and Y, although contingent in themselves, are also

situated in an infinite number of pre-established relations that only needs to be discovered by science. As such, the perception of non-existence does not preclude the fact of its existence; and therefore any formal scientific reasoning of its existence can be taken, with confidence, as a real condition. Leibniz explains in terms of the straight line:

> Even if someone refuses to admit infinite and infinitesimal lines in a rigorous metaphysical sense and as real things, he can still use them with confidence as ideal concepts which shorten reasoning, similar to what we call imaginary roots in the ordinary algebra.[392]

Leibniz's claim is extraordinary, as it seems to immediately contradict his opposition to materialism. While Leibniz's monadic theorem attempts to explain variability as an organised system of relation, there is little justification for the assumption of a singular substance itself. In doing so, Leibniz asserts the single substance as the the precondition for imagination, while at the same time arguing that the imagination rests outside of empirical reason. However, he solves this conundrum by returning to the notion that all matter are necessarily extensions of the real. He writes: 'Even though these are called imaginary, they continue to be useful and even necessary in expressing real magnitudes analytically'.[393]

What remains is the pure first value, which is the relation of difference as change itself — a concept Leibniz articulate, mathematically, as the 'slope' or rate of change. According to Leibniz, any variability, as such, is scaled throughout the universe on orders of kinetic magnitude. We can

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[392] Leibniz, Gottfried Wilhelm. *Philosophical Papers and Letters*. Edited by Leroy E. Loemker. 2. ed. Synthese Historical Library 2. Dordrecht: Kluwer, 1989, 543.

[393] Leibniz, 543.

imagine the variability of a particular entity as a grain of sand that within it exists all perceived variability. When compared to, say, a single beach or the span of an ocean floor, this variability — according to Leibniz — can be imagined as inconsequential as it vanishes into the larger meta-kinetic system.

Adjacently, if an imaginary can be conceived, its empirical value is significant only in as much as it can be expressed as instrumental reason. This applies to the simple grain of sand, as well as any physical structure or assemblages, in between. As apparent, Leibniz's propositions differ from what he calls the 'ordinary algebra' made popular by Oresme, which relied on linear causality. They also find relevance in contemporary kinetic research, including cognitive science and machine learning devices like neural networks. Within Leibniz's legacy, if data can be conceived of as the simplest, indivisible body within a single substance, then any imagined associative aggregates or *incompossibility* amongst them, can be viewed as extensions of pre-established relations, that stand — in confidence — with universal patterns. Consequently, Leibniz substitutes the imaginary and any conception of the real for a differential calculus with self-defined magnitudes of relational importance.

At this juncture, I diverge to unpack the specificity of differential calculus. In mathematics, differential calculus is the study of the rates at which quantities change, or what is named their differential. The derivative at a chosen input describes the rate of change near that input value (at a specific point in space and time). This process of finding the derivative is called differentiation. Differentiation is an essential property of nonlinear problem solving. Geometrically, when the derivative (or the slope) is taken at a specific point on a continuous nonlinear curve, for a single real variable, it can determine

the best linear approximation that point. In mathematics, differentiation is known as reverse

integration, which allows one to solve a much broader class of problems based on the assumption

of an initial position and a confidence in imaginary generalisation of a moving body with respect to

time and acceleration. As the co-inventor of differential calculus (arguably, independent of

Newton),[394] Leibniz collapses the gap between 'real' dynamic motion and the symbolic

representation. In this act, any magnitude of incompatibility can be derived equally. Here, an act of

equality is equivalent to an act of inequality; a case of rest is a case of motion, and instance of

parallelism is also an instance of convergence.

Differential calculus is at the foundation of kinetic modelling in both physics and machine learning. In

fact, the derivative and differential process are integral are what enable neural nets to generate

patterns from colossal aggregates of infinitesimal data. Here, the rules of the finite are governed by

the idea of ideal abstraction, where the 'real' maintains its relevance only in as much as the real can

be imagined as a relation with the necessary expression of generalisation.

Again, according to Leibniz, our dynamic individuations are 'well founded fictions' that can, in theory,

be replaced by imagined quantities of change. The brevity of Leibniz's conundrum is contentious in

the ontological study of being. Deleuze, in particular, finds fault in Leibniz's concrete assumption of

difference and change. In his lectures on Leibniz, Deleuze asks us to:

> Understand that at this level, the notion of compossibility becomes very strange: what is
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> going to make me say that two things are compossible and that two other things are

394 Samuel, Clark, Leibniz, Gottfried Wilhelm. *The Leibniz-Clarke Correspondence: Together Wiith Extracts from Newton's Principia and Opticks.* Manchester: Manchester University Press, 1998.

incompossible? … What is this very unusual relation of compossibility? Understand that perhaps this is the same question as what is infinite analysis, but it does not have the same outline.[395]

Much of this 'strangeness' in Leibniz's universal theory of existence, I argue, is relevant to contemporary dynamic and generative machine learning models, like neural nets. Operationally, as mentioned, derivatives and differentials are crucial functions of any deep learning algorithm — ontological detail, I argue, is largely absent from textbooks, instructional videos and discourse on machine learners and data politics. It is mostly mute within within the study of black being, particularly within discourse on the detrimental effects data and algorithmic systems within the techno-social milieu of difference. Nonetheless, at the same time, Leibniz's contributions open further questions concerning the concept of *prototypicality*, if we can conceive of Leibniz's best fit analysis as an instrumental act of vanishing an assumed standard of being within calculation and reason. Here, our *spatio-temporal* position in the world extends beyond the hierarchal classification of being into a differential state of being, where the body of difference is not only fragmented into an alienable neurosis, as Fanon claims, but also becomes fragmented and of value only in as much as this being can be modulated between operations of accumulation, exploitation, and generalisation at the behest of scientific reason. This mode of existence is not merely one of dynamic positioning, but rather a matter of perception as method for empirical decision-making.

What are the implications of a techno-social that, as Foucault writes, 'simultaneously manifest and obscure empirical order wherever they posit themselves' — where the nonlinear relations that

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[395] Deleuze, Giles. "Lecture on Leibniz (Cours Vincennes)." Webdeleuze. Les Cours de Gilles Deleuze, April 22, 1980. https://www.webdeleuze.com/textes/53.

exist between bodies of difference or bodies outside of machine perception, or even the drama of

the mundane, are valued in as much as they can be optimised into discrete empirical

perceptions?[396] As the techno-social milieu gains increased abilities to not only capture discrete

motion, but simulate the discretisation of phenomenon into data hungry machine learning devices

— devices coded to simulate dynamic motion as ideal reductions — the genesis of human being,

being human, is at risk of becoming as as obscure as the square root of minus 2, a 'real' number

only in as much as it is a necessary representation for instrumentalisation and empirical reason.

Finally, when does an ideal type of body, a perfection by way of algorithm accuracy, serve as the

governance of individuation The implications of these 'well founded fiction' merit further scrutiny

and investigation.

Conclusion

As mentioned at the start of this chapter, kinematics increased in popularity through Oresme's

critiques of Aristotle, and further with Descartes's bridge between algebra and geometry. The

concepts, however, were limited by their dependence on linearity and continuity, even as they

brought rationalism into greater prominence in mathematics. Notable rationalist and contemporary

of Descartes, Gottfried Wilhelm Leibniz, built upon the centrism of linearity. Leibniz was the first to

see that linear coefficients were not confined to linear equations, and instead could be manipulated

and arranged into an array, or matrix.[397] Along with Boolean algebra and symbolic logic, Leibniz

developed differential calculus — disputably independent of Newton, as mentioned — which is a

more dynamic formulation of calculus. The differential is fundamental to the operation of any

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[396] Foucault, Michel. *The Order of Things*. (Taylor & Francis, 2005), 56.

[397] Bos, H. J. M. "Differentials, Higher Order Differentials and the Derivative in the Leibnizian Calculus." In *Archive for History of Exact Sciences*, Vol. 14. (Bos, 1973), 1-90.

machine learner, including neural nets. In fact, they depend on to dynamically pattern nonlinear data, as discussed throughout the chapter.

Having staged the ontological and operation problem of existence as a problematic of nonlinearity and compossibility; and in considering their relation to contemporary research in deep learning and neural nets, I question whether the subsumption of the particular into dynamic generalised patterns might articulate a further mode of power, and substantiate what Fanon states is 'nothing more nor less than man's surrender';[398] and how this surrender might lead up to what what Achilles Mbembe calls a calculus of *biopower*.[399] Although neural nets are claimed to be loosely based on philosophies of the mind, as shown in the previous chapter, they articulate a new way to view and imagine the *spatio-temporal* existence of the body. In the next chapter, I consider how these notions might collide into a *bioepistemic* regime of power, and ultimately the limitations of the *sociogenetic* relation under the terms of algorithmic nonlinearity.

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[398] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 22.

[399] Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008.

Chapter 6: Conclusion: Reverse engineering the future

The following is the concluding chapter of the thesis.

6.1: Reverse engineering, revisited

In the thesis I attempted to excavate several lines of thought. My aim was to expose the 'blueprint' of existing modes of epistemic operation, including the theoretical contexts that have enabled the production of these operations. For instance, in terms of the thesis, *spatio-temporal* ordering is the operation by which the colonial imaginary is distributed. In this way, the colonial imaginary is a logic of relation that is actualised into a 'blueprint' of *spatio-temporal* ordering. The blueprint includes the signs, symbols, rules and motivations behind the design of other people and places in the image of the colonial design.

The strategy of the 'blueprint' is part of the larger method of *reverse engineering.* The term *reverse engineering* originates from the field of mechanical engineering.[400] In mechanical engineering, *reverse engineering* can be described as the prediction of what a product or process should do, followed by modelling, analysing, dissecting and experimentation of its actual performance.[401] On the other hand, Frank Apunkt Schneider and Günther Friesinger define *reverse engineering* as the 'process of analysing an existing object or system by layout out its construction plan to then rebuild it in every

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[400] Friesinger, Günther, Jana Herwig, Symposium "Open. Dissect. Rebuild.," and Paraflows, eds. The Art of Reverse Engineering: Open - Dissect - Rebuild: [Based on the Symposium "Open. Dissect. Rebuild.", Which Took Place 2012 in the Context of the Paraflows Festival in Vienna]. Kultur- Und Medientheorie. Bielefeld: transcript-Verl, 2014.

[401] Kutz, M. (2007). Environmentally conscious mechanical design. Hoboken, N.J.: John Wiley & Sons.

detail'.[402] Schneider and Friesinger suggest that *reverse engineering* is a useful strategy to analyse

objects in fields outside of mechanical engineering. They argue that *reverse engineering* is a manner

of reconstruction that 'allows for modifications and adjustments to new demands and

requirements'.[403] It also signifies creative appropriation and the democratisation of knowledge to

enable further development of both the object.

I contend that colonialism is based on a principle of constant exploitation that is converted into

apparatuses and new systems of knowledge and organisation. Because the principle aim of

colonialism is to acquire power, it is advantageous for colonial systems to limit knowledge, regulate

possession, and control the distribution of goods and knowledge. As Fanon reminds us, they

possess the necessary military and technological apparatuses to enforce these limits. These

apparatuses are then instrumentalised until the colonial system is satisfied that any capital or

intellectual exchanges within it's proposed spaces of relation are conducted to the specifications of

the original colonial blueprint.

Schneider and Friesinger argue that *reverse engineering* can catalyse newly formed political

experiences that extend into 'the demand, the claim of the user to be able to open, to explore, to

modify according to one's own requirements'. [404] In this way, *reverse engineering* is a useful method

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[402] Schneider, Frank Apunkt, Friesinger, Günther. "Technology vs. Technocracy: "Reverse Engineering" as User Rebellion - Preliminary Thoughts on *paraflows* .7" in Friesinger, Günther, Herwig, Jana. Symposium "Open. Dissect. Rebuild.," and Paraflows, eds. *The Art of Reverse Engineering: Open - Dissect - Rebuild*: [Based on the Symposium "Open. Dissect. Rebuild.", Which Took Place 2012 in the Context of the Paraflows Festival in Vienna]. Kultur- Und Medientheorie. Bielefeld: transcript-Verl, 2014.

[403] Ibid.

[404] Fouché R. (2012). From Black Inventors to One Laptop Per Child: Exporting a Racial Politics of Technology. In: L. Nakamura and P. Chow-White, ed., Race After The Internet, 1st ed. London: Routledge, p 72.

to open, disassemble, and re-articulate colonial-based blueprints, such as *sociogeny*. It is also a beneficial approach to investigate machine learning, as it may excavate any potentially exploitative operations. As such, I approached the thesis from the perspective of *reverse engineering*, as a method of enquiry into the question of *sociogeny* and any operative functions it may have in machine learning algorithms.

6.2: Open and disassemble

In Chapter 1 I opened and disassembled Frantz Fanon's concept of *sociogeny*. The aim was to reveal the components and systems underneath the *sociogenic* concept, including Fanon's own motivations as its designer. My ultimate goal was to search for any abstract or material parts of Fanon's schematic that will allow me to answer the thesis research questions. My findings are as follows:

In his autobiographical work, *Black Skin, White Masks* (1951), Fanon posits that 'philosophy has never saved anyone'.[405] He argues that philosophy — particularly philosophy concerned with the metaphysical study of being — has instead dissociated itself from the lived experiences of the black man [sic]. As a practicing psychiatrist, Fanon was principally concerned with the psychosocial effects of this ontological abandonment. As Fanon posits, the ontological dissociation results in the negation of black existence. The dissociated individual is — as result — alienated by a dynamic internal cycle of inferiority and a desire to be the non-black Other.

Fanon attempts to revise the process of dissociation by proposing an alternative concept that he describes as *sociogeny*. *Sociogeny* — or the insertion of social factors in *ontogenic* systems — is in

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405 Fanon, Frantz. *Black Skin, White Masks*. Translated by Charles Lam Markmann. New ed. Get Political. London: Pluto-Press, 2008, 18.

direct conversation with Sigmund Freud's *ontogenic* theories of being. *Ontogenesis* in the

psychoanalytic context describes the development of whole organisms. According to Freud,

ontogenesis is not a pre-condition of childhood, but occurs during present every day life events.

However, the *ontogenic* process may result in a neurosis brought forth by phylogeny (or the

evolutionary relationship between biological species, including any characteristic similarities or

differences. Fanon argues that Freud's *ontogenic* process ignores the psychosocial effects of

colonialism, which Fanon argues, pre-conditions the black subject to neurosis. The black's direct path

to neurosis circumvents *phylogeny*. As result, *ontogenic* development for the black individual is

instead more accurately described as a *sociogeny.*

In Chapter 1 I also show that, for Fanon, the black's exclusion and resulting neurosis is also the pre-

condition for other metaphysical theories of being. Fanon finds cause here to again substitute these

theories for more inclusive concepts that account for black being. For instance, Fanon adopts

Hegel's master-slave dialectic as an entry into the self-conscious relation between coloniser and

colonised. In *The Phenomenology of Mind* (1807), Hegel argues that an individual becomes conscious

of himself in their desire for recognition by Others. In Hegel's schematic, those who are recognised

Others, but do not in turn recognise Others become masters. Alternately, those who recognise

Others without being recognised by Others become slaves. In this way, the master gains

recognition through the slave. He also reduces the slave to an object of his own will. On the other

hand, the slave gains recognition and a sense of self through their labour, at the bequest of the

master. However, the relationship is not only one of domination. According to Hegel, both master

and slave are alienated — the master by his distance from labour, and the slave through his own

inability to self-actualise. Self-consciousness is, in the Hegelian dialectic, a dynamic, intentional,

presupposing interconnectedness, reinforced and confirmed by the struggle for recognition. In the chapter entitled 'The Negro and Hegel', in his text *Black Skin, White Masks*, Fanon diverges from Hegel's master-slave dialectic. Fanon rejects Hegel's depiction of a passive slave that is objectified in the struggle for recognition. Instead, Fanon argues that the master-slave dialectic presupposes the objecthood of the slave — here, the colonised.

Fanon continues his survey of *sociogeny* by situating his revised master-slave dialectic within Merleau-Ponty's concept of the *corporeal schema*. The *corporeal schema* attempts to articulate the body's relationship with the external world. As Merleau-Ponty posits, the body and its external world are always already engaged in a 'perpetual contribution' of reciprocal exchange.[406] Put another way, just as the body re-orders the world, the word re-orders the individual body. The *corporeal schema* is situated in-between the body and external world, and is the mode of communication between them. This is how the body and external world exchange information. It is through the exchange with the external world that the body is embedded into a cultural-historical context. Merleau-Ponty argues, however, that the exchange can be disrupted or transformed.

As I argued in Chapter 1, Fanon states that the black body is lodged in-between the structures of history and the external world, which articulates itself as the 'truth' of human existence. Here, the exchange between the black body and the external world is communicated through a *historico-racial schema*. The *historico-racial schema* is a dualism, as in Merleau-Ponty's *corporeal schema*. However, Fanon writes that the black body is further fragmented by his neurosis. Whereas, the body of the *corporeal schema* is presumed whole and universal, the black body is instead bifurcated

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406 Merleau-Ponty, Maurice. *Phenomenology of Perception.* New York: Routledge, 100.

into an exchange with two distinct, but interrelated, schema. It is in communication with the

historico-racial schema that the black body their historical subjection in relation to the external

white world. Adjacently, the *racial* or *epidermal schema*, informs the black's essence of being, where

he can align his own consciousness with a external black cultural body.

As I have shown in Chapter 1, this is an important revision for Fanon. The *historico-racial schema*

allows him to argue that the genesis of black being cannot be separated from history. It is also in

continual exchange with the external non-black other. It is here that Fanon formulates the basis for

his claim that the black man can only be a black man in relation to the non-black Other, whose

operations are totalising and extreme.

The totalising nature of the non-black Other — the *prototypical* being — draws Fanon to the

structuralist psychosocial framings developed by Jacques Lacan. In his concept of the mirror stage

of childhood development, Lacan posits that the imaginary structuring of a being's conception of

reality results in a 'permanence of I' that alienates and prefigures the being into a fictional image of

themselves.[407] Lacan uses Lévi-Strauss's notion of the effectiveness of symbols to discuss the gravity

of the specular image as the threshold of the visible world in our daily experiences.[408] For Fanon,

the perception of the self and the external world is crucial to understanding the fragmentation of

the consciousness and the imaginary boundaries one puts forth in the environment.

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[407] Lacan, Jacques. *Ecritis*, New York: Routledge, 80.

[408] Zafiropoulos, Markos. *Lacan and Levi-Strauss or The Return to Freud (1951-1957)*. New York: Routledge.

Ultimately, Fanon concludes that the exclusion of black existence is systematically reinforced by empiricism and the distribution of empirical methods. Here, he returns to Freud's engagement with empiricism, and its impact on the psychic development of the individual. According to Freud, empiricism gives psychoanalysis its full expression. It is here, in the promotion of empiricism, that Fanon inserts the operational function of colonialism into the *ontogenic* concept. Having established the oppressor as the *prototypical* being, Fanon reminds us that colonial powers possessed the necessary military and technological apparatuses to enforce systematic exclusion of black individuals.

Because the principle aim of colonialism is to acquire power, it is advantageous for colonial systems to limit knowledge, regulate possession, and control the distribution of goods and knowledge. As Fanon reminds us, they also possess the necessary military and technological apparatuses to enforce these limits. These apparatuses are then instrumentalised until the colonial system is satisfied that any capital or intellectual exchanges within its proposed spaces of relation are conducted to the specifications of the original colonial blueprint.

Once fully materialised, Fanon argues that the justification for nonbeing opened a pathway to the capital exploitation of the colonised, which was enacted primarily through technical apparatuses, infrastructure, and the regulation of space and time. It is here that I argue that current technical apparatus, specifically machine learning, might reveal similar modes of exploitative operations. Having established the context of the thesis, I propose that we return to *sociogeny* and the human colonial relation to investigate the modes of operation found in machine learning.

In Chapter 1 I found particular interest in the link Fanon makes between the specificity of the black's perception of self in relation to the external world. Also of interest is how the non-black Other makes use of empiricism and empirical methods to reinforcement of their own senses of self in relation to Others. I posit that these observations provide a critical openings to consider how the metaphysics of being can account for more plural forms of existence. My aim is to consider how the black being gains access to the capacity to self-actualise outside of the gaze of whiteness. I argue that, although Fanon's schema is situated in a neurotic exchange, if seen along of Hegel, Merleau-Ponty, and Lacan — instead of in substitution to — then it might articulate the potential for multiple, inter-relational, perspectives to exist in the same *spatio-temporal* field of relation. I discuss this further in Part 2 of this chapter. For now, I continue my report on the disassembly of *sociogeny* in Chapter 2.

In Chapter 2, I aimed to discover how the non-black being — the *prototypical* white being — has come into existence in metaphysical ontologies of being. The enquiry led me to Sylvia Wynter's return to philosophies of origin, where she builds a critical link between the search for origin, the Divine, and the sanctioning of black dissociation.

In her essay, 'Human Being as Noun? Or *Being Human* as Praxis? Towards the Autopoetic Turn/ Overturn: A Manifesto' Wynter elaborates on the legitimating structures of colonial hierarchies, and the 'indispensable condition of the formation and stable replication of each respective societal order'.[409] Wynter draws on Fanon's depiction of black existence as dynamic and 'hellish cycle' or

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[409] Sylvia Wynter, 'Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto'. Durham and London: Duke University Press, 2015.

'infernal circle' of anticipation and colonial violence.[410] Wynter describes the genesis of this cycle as an *autopoetically instituted* living system that frees human knowledge of its physical and biological realities. In the *autopoetically instituted* system, human knowledge is substituted for order-stabilising and order legitimating codes of symbolic forms of life. In other words, human life is replaced by empirical forms of reality.

Autopoiesis, a term introduced by Maturana, Varela and Uribe, connotes a system that is capable of creating and sustaining itself. *Autopoiesis* is a symbolic view of the relation between an organism and its medium. The researchers posit that *autopoiesis* is a way of describing living systems. On a basic level, the notion of a*utopoiesis* involves an organised network of processes and the production of interrelated components. The components are continuously regenerated and transformed through an autonomous system of interaction. They also specify a topological arrangement.

An *autopoietic* system also extends to cognition. Maturana, Varela and Uribe theorise that cognition can be thought through as an *autopoietic* living system that is self-maintaining. In general, cognition refers to the assimilation and use of knowledge, and as such is limited to beings with complex nervous systems.[411] In this way, cognition can be adjusted by adjusting the internal parameters of the system. Furthermore, Maturana, Varela and Uribe argue that the relation between an organism — including cognition — and its medium is correlated through perception.

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[410] Wynter.

[411] Mingers, John. "The Cognitive Theories of Maturana and Varela". *Systems Practice*, 4, 4, 1991.

By applying the *autopoietic* schema to the colonial imaginary, Wynter attempts to demonstrate how certain forms of anti-black knowledges are constituted and self-maintaining. She situates her enquiry in the ontological question of origin, and the recurrent reinstatement of self-ordering and symbolic codes that constitute knowledge within this context. Her critique begins with the fictive invention of the Anglo-European *Man* as the apex of species. She describes the dissemination of these fictive narratives as a 'heresay' that reinforces self- justificatory acts of *ethnophenotypical* sorting of any being other than *Man*. Futhermore, Wynter suggests that colonialism functions as a recurrent self-maintaining system that enacts what she calls the *perceptual categorization* of *ethonophenotypic* people. The medium of *perceptual categorization* enables the management, organisation and regulation of racialised people.

An important finding in Chapter 2 is the link Wynter makes between the construction of perception and the empirical ordering of *ethnophenotypical* people. In terms of the thesis, Wynter's analysis provides a critical pathway that connects Fanon's articulation of recurrent anti-black perception and the construction of empirical realities. These realities substitute the more general concepts of the anthropomorphism for an illusive concept of the secular *Man*. Wynter situates *Man,* as well as the *ethnophenotypic* Other, in an *autopoietic* system of relation. This relation is communicated through perceptual organisation that, as Wynter suggests, is a symbolic representation of the Divine. She defines this process as the substance of race. Wynter's critique is centred on the Western adoption of the metaphysics of substance, which she articulates as the 'projection of the Aristotelian concept of bynature difference between its own 'Western humanity' as the ostensible embodiment of the normalcy of being secularly human'.[412] She draws on Judith

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[412] Sylvia Wynter, 'Human Being as Noun? Or Being Human as Praxis? Towards the Autopoetic Turn/Overturn: A Manifesto'. Durham and London: Duke University Press, 2015, 4.

Butler's critique of gender, where Butler argues that Otherness emerges when we abide by the nouns *man* and *woman* as abiding substances. Butler states that these substances are produced by the fictive and compulsive ordering of attributes into a coherent gender sequence.[413] If these coherences are nothing more than 'contingently created through the regulation of attributes', then Butler posits that any ontology of substance is itself an 'artificial effect'.[414] Wynter's adoption of this point of reference extends the artificiality of regulated attributes into the substances of class, sexual orientation and race ontology. Her claim is sustained by the creation of what she describes as eugenic/dysgenic selection.[415] The coherence of racialised attributes, what I call the *fictive substance of race*, links the dynamic instrumentalisation of coherence found in the *bioepistemic* to the 'discursive negation of co-humaness'.[416]

In this way, I draw closer to validating Fanon's claim that colonial perception is a discursive practice that is exclusive of black existence. Colonial perception is also self maintaining in its capacity to empirically self-justify. At this juncture, I turned to the nature of empiricism in both Wynter and Fanon's critique. Fanon references the empirical as a general mode of scientific knowledge production. He also stipulates that the apparatuses of empiricism, such as the assembly line and the discretisation of time, are appropriated to enact the management and organisation of space. These apparatuses speak to the materialisation of certain components and process. They are not, however, a sufficient account of the logics that enable the operation of empirical apparatuses. I argue that the empirical objects and processes that Wynter and Fanon describe are underwritten

413 Wynter.

414 Ibid.

415 Ibid.

416 Ibid..

by the accumulation, management and classification of data derived from the system of observation. This is an important claim since Wynter and Fanon are less explicit about the origin of empirically-enabled data. I posit that these data are a crucial component in the operation of colonial perception.

As such, in Chapter 3, I attempted to dismantle Fanon and Wynter's critique of empiricism by extending the debate to consider the genealogy of data. My aim was to reveal any logics of discrete classification, regulation and organisation that might mirror the colonial operations Fanon and Wynter describe.

In Chapter 3 I map early advances in statistics and data accumulation, particularly from within the natural sciences. I argue that these practices open critical pathways to the accessibility and potential applications of social data. I considered early movements in the philosophy of mathematics, particularly those that emphasise biological and social phenomena. Throughout the development of statistical modelling, natural events tended to generate symbolic or empirical shapes that were approximated by mathematical functions.[417] Examples of these were mortality indexes and formal models like the Guassian or Normal Distribution in mathematics. In later advances, however, symbolic representations were coincided with moral and religious idea. These practices materialised into a *moral science* that used the patterns found in biological data to justify the existence of the Divine. Knowledge of these patterns suggested a Divine providence expressed through mathematics. With a empirically reinforced providence in place, I demonstrate how the

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[417] Schutt, Rachel. *Doing Data Science*. Bangalore: Shroff, 2013.

ethnophenotypic sorting of the Other — and the violences that ensued — could be both justified and anticipated.

I argue that the genealogy of data accumulation and statistics is important, since it is widely thought that our contemporary desire for data finds it origin in contemporary data-driven techniques — namely machine learning, deep learning and artificial intelligence technologies. To the contrary, the conditions for these techniques, as well as their operational capabilities, were set forth by wider Anglo-European fixations on discretisation, patterning and classification. The genealogy also speaks to an overriding tendency to manage and regulate social movement with the assistance of data and the normalising logics of order.

Statistics, data and symbolic mathematical logics are the primary operational functions of machine learning. In Chapter 4, I extended the reach of the thesis to investigate machine learning as a contemporary system of discretisation, patterning and classification. I argued that what we know today as 'Big Data' is part of a longer historical practice of data accumulation. I questioned whether our present obsessions with data are unique to the conditions of contemporary culture? To gain insight into this question, I excavated the genealogy of statistics. There I found evidences of a wider logics of enumeration that in many cases operated on levels that ranged from the philosophical to the social, economic and political milieus.

While some early data and statistical practices may have been motivated by amateur interests, as these methods gained popularity, they were appropriated and instrumentalised by various modes of power. My goal — given the roles of *bioepistemic epidermalization* (Wynter/Fanon) and *white*

prototypticality (Gordon) in organising space and time — is to understand what capacities machine learning has to reinforce or reinstate the colonial imaginary. As Adrian Mackenzie argues, 'Machine learners today circulate into domains that lie afield of the eugenic and psychology laboratories, industrial research institutes, or specialized engineering settings in which they first took shape'.[418] In this way, machine learning can be understood as a device that operates within a relation of *bioepistemic* ordering and forms of *prototypicality*. Despite these impositions, I contend that any articulation of colonial logics mediated by machine learning are symptomatic of a larger logics of enumeration that can be disrupted by shifting the ontological relation between race and the machine.

In Chapter 4 I dismantled the mathematical functions behind machine learning, including its operational logics. I took the definition of machine learning as a point of departure. First, I noted a significant ambiguity — not to mention a variability — in expert definitions of machine learning. The ambiguity I observed in prominent definitions of machine learning was further complicated by a significant disparity in operational targets. The techniques, however, play a key role in deriving insights from data. These insights are often used for a number of commercial and institutional aims. While these aims motivate additional research in the field, few researchers question the origin of the mathematics underneath machine learning. In this way, as I argued, machine learning is often viewed as a functional tool, rather than a technique that derives from a larger trajectory of *spatio-temporal* organisation. This became apparent as I explored the origins of machine learning. There I found it difficult to delineate machine learning techniques from other computational and statistical techniques, such as artificial intelligence, pattern recognition, computer science, and deep learning.

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[418] Mackenzie, Adrian. *Machine Learners: Archaeology of a Data Practice*. Cambridge, MA: The MIT Press, 2017, 6.

As I argue in Chapter 4, combined these techniques can be viewed as more of a synergy of reciprocal influence than distinct fields of research.

Nonetheless, advances in machine learning techniques have helped accelerate the development of other techniques that benefit from its agility in data rich environments. Whereas most statistical — and early machine learning — techniques are useful in linear environments, they are less adept at classifying more nonlinear data structures. A data structure is a particular way of organising data so that it can be used more effectively. A data structure is said to be linear if the elements forms a sequence, such as an arrays, lists, and queues. In contrast, nonlinear data structures do not form a sequence, which makes the data more useful for binary trees. Binary trees, for example, are useful for forming data hierarchies, often in parent-child relations.

The principle idea of data structures is to reduce the space and time complexities of different tasks — space complexity being the total space taken by an algorithm with respect to the input size, and time complexity being the estimated time it takes for one iteration of an algorithm.

Artificial neural networks are powerful types of nonlinear machine learning model. Artificial neural network models are made nonlinear by the sigmoid or activation function. In biologically inspired neural networks, the sigmoid function is usually an abstract representation of the rate of neuronal firing activity, which is typically a binary process. In Chapter 4, I show how the sigmoid function is used to solve complex (nontrivial) problems, including machine perception. In machine learning, perception can be defined as the capacity to interpret data in a manner that is similar to the way humans sense and relate to the world. In biologically inspired neural networks, the sigmoid function

brings the model closer to performing this function. Neural networks are, therefore, better able to interpret visual input patterns than linear machine learning models. Neural networks serve as the basis of robot vision and autonomous land vehicles.

In calculus, a branch of mathematics, the sigmoid function is a differentiable function, meaning it is the derivative of a real variable exists at each point in a given domain. A derivative is a linear approximation that measures the sensitivity to change of an output value with respect to an input value. A differentiable function must be continuous. As such, a function is said to be continuously differentiable if the derivative is itself a continuous function.

An important discovery in Chapter 5 is the ontological origin of the differential function, which powers the sigmoid function and, therefore, artificial neural networks. As I show in Chapter 3, Leibniz not only formalised the correlation between biological phenomena and statistical patterning, I argue in Chapter 4 that he also created differential calculus. In Chapter 5 I also attempt to show the ontological motivations behind Leibniz's calculus. I argue that one of his most significant motivations behind differential calculus is the ability to create linear estimates of otherwise dynamic points in space and time. Leibniz's ontological concern is in the dynamic relation between the part and the whole in domains of space and time. In *The Monadology,* Leibniz rejects Descartes's materialism, or the view that everything exists in physical form. Descartes's principle favours matter over mind.[419] For Descartes, the mind is merely an instrument that the individual uses to ascertain truths in their relation to the world. For Leibniz, however, the mind and the physical form are two distinct non-dualistic domains. Leibniz argues that the mind — which includes perception — cannot

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[419] Leibniz, Gottfried Wilhelm. *The Monadology*. New York: Prometheus Books, 1992.

be explained mechanically, and thus cannot be physical processes. Instead, the mind and any

perception of the world must be one, single domain or conscious being of 'I'. He suggests that the

mind and perception are extensions of a single 'perfect' substance. In this context, any relation

between perception and the world — which he argues is also comprised of distinct parts - are also

extensions of a single substance. I elaborated on Leibniz's argument in Chapter 5. To summarise, an

important component of Leibniz's claim is his articulation of the relation between distinct parts in a

whole domain. Leibniz accounts for the relation between distinct parts (as well as their

characteristic differences) by arguing that — while appearing to be self-organising — are, to the

contrary, interacting in a *preestablished harmony,* which is set forth by the simple substance of the

Divine.

In this sense, the differential is an important invention in the history of philosophy, as well as

mathematics and machine learning. It substitutes individual difference for a symbolic language that

not only reduces interrelation to a single substance, but also situates any perceptual view of the

world, or any spatio-temporal arrangements within it, within a determinacy.

Here, I questioned how modes of nonlinear perception in artificial neural might rebuild the relation

between the colonial imaginary and the *bioepistemic* relation. I considered the following

provocation by Luciana Parisi. Parisi argues:

> Rather than demarcating a simple opposition between theoretical and practical knowledge,
>
> … current computational practices reconfigure the relationship between reason and

automation so that automation is no longer a reflection of a Cartesian dualism of mind and body… or of the Laplacian mechanization of the universe.[420]

If we consider Fanon's argument that the problem of black existence is a problem of perception, as well as ontological abandonment of black experience, then the differential can be understood as a device that operates within a relation of *bioepistemic* ordering and forms of *prototypicality*. In this way, Leibniz's proposal of a single monadic substance might be re-articulated as a substance the precedes any perception of difference. Consequently, any phenomena of black existence, as difference in itself, is predicated on the subsumption of that difference into a uniform 'harmony' of relation. If this is so, then how do we account for the immediacy of anti-black racism within domains of relation? Furthermore, if nonlinear machine learning models, like artificial neural networks, are informed by an ontological neglect of difference — which is materialised in differential calculus — then how does this change the terms of machine learning research? Ultimately, to what extent can black existence be dislodged from neurosis in domains where black life is mediated by machine learning algorithms?

This thesis is as an exploratory work that is informed by the relations between machine learning, mathematics and black experience. Accordingly, the thesis has sought to contextualise the foundation of these seemingly disparate lines of thought. It furthermore situates these thoughts in debates on the metaphysical study of being. The thesis is a point of departure for future research. The ultimate aim of the research is to provide a critical opening for future research methodologies in both machine learning research and the study of black people.

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[420] Parisi, Luciana. *Contagious Architecture: Computation, Aesthetics, and Space*. Technologies of Lived Abstraction. Cambridge, Massachusetts | London, England: The MIT Press, 2013.

In Part 3, the final parts of the last chapter of the thesis, I provide a brief framework for future research.

6.3: Rebuild

Throughout the thesis I have questioned whether it is fruitful to return to Fanon's thoughts to solve any contemporary problematics in machine learning research. I have argued that the concept of *sociogeny* remains unmitigated in machine learning research. As result, I contend that machine learning is vulnerable to similar, if not the same, substances of race that Fanon and Wynter warn about. Although the thesis is not a complete assessment of machine learning or metaphysics, it does indicate that the substance of race has a consistent presence in the ontological abandonment of black existence. As such, I contend that Fanon's ontology remains relevant for any study on race and machine learning.

As argued, the thesis does not attempt to decouple the immediate effects of anti-black racism from the day to day lived experiences of racialised individuals. To the contrary, I takes the position that these concerns can be, and some times are, mediated by machine learning algorithms. It also takes the position that, in order to break free from frameworks of representation, the relation between humans and machines must not be viewed from within the master-slave dialectic. To the contrary, it suggests that the emergence of machine learning is part of a larger relation of being. Here, human and machine are both individuated into distinct forms in a continual relation with one another.

6.4: From *sociogency* to *transindividual* blackness

As such, the thesis invites new plural modes of representation. It argues that an opportunity for these types of representations might exist in nonlinear machine learning models, like artificial neural networks. This is a key point of entry into future research. At this juncture, for this claim to hold, I argue that a return to Fanon's *sociogeny* is a return to the concept of *ontogenesis*. However, I posit that a more plural mode of representation is best situated outside of Freud's *ontogeny*, as well. Instead, I argue for a being that exists prior to knowledge. This being would prefigure the constitution of *white prototypicality*, and instead become an individual prior to the imposition of ontological truth and objective knowledge. Within this domain, black existence is not presupposed by oppression or the gaze of whiteness. It is a relation itself, to be manifested in the domain after it has self-actualised.

To think through black being in this way — as an ontogenetic phase being of existence prior to the racialised body — requires an alternative type of psychosocial relation that is materialised on unstructured ground. This relation precedes any presupposition or psychic perception of fragmentation or alienation in the *spatio-temporal* domain. Here, he relation would provide a perception of the self that is preconditioned with the capacity to align itself with a totality of being that is not exclusive of, but mutually constitutive of the lived experience of all humans.

6.5: Toward black psychic and collective genesis

This gesture would also require a reading of the senses that challenges the pathological spaces of lack and despair. Instead, a black psyche develops in affirmation of the present, past and future self. In Chapter 4 of *Psychic and Collective* Individuation (*Individuation psychique et collective*), 'Problematic

of Ontogenesis and Psychic Individuation', Gilbert Simondon posits that the relation to external

objects is a psychical genesis for the individual.[421] This psychical individual is parallel and expressive

of the operation of individuation. Nonetheless, while the expressive function — like a symbol —

references something anterior to individuation, it does not create meaning of signification. Instead,

its function is to carry meaning into presence. For Simondon, the individual's existence lies in

making actual the process of individuation or the signification of the relation between individuals,

while at the same time recognising that 'between individuals there is only signals'.[422] In other words,

as Scott posits, 'the individual is the phenomenal form signification assumes — it is what being

becomes in becoming-individuated.'[423] Scott continues: 'When Simondon speaks of individualization

it is the being of the individual as only ever a problem that seeks resolution, all the more difficult

because this incompatibility is internal and, indeed, prompts its own genesis'.[424]

As such, the individual becomes knowable at the precise moment it acquires phenomenal, or

spatial-temporal, being. The individual's genesis corresponds to the resolution of a problem which

could not be resolved as a function of anterior givens which did not have a common axiomatic: *the

individual is the auto-constitution of a topology of being that resolves an anterior incompatibility through

the appearing of a new systematic.*[425] Simondon's ontology of the psychosocial individual

complicates the genesis of the individual as they are confronted with the conditions of race. Again,

Simondon finds it problematic to approach the individual as the point of departure. The

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[421] Scott, David. *Gilbert Simondon's Psychic and Collective Individuation: A Critical Introduction and Guide*. Edinburgh: Edinburgh University Press, 2014, 77.

[422] Scott, 125.

[423] Scott, 94.

[424] Scott, 94-95.

[425] Scott, 126.

consequence is that if we start to think about the racialised individual from the point of view of the individual — or the articulation of race — then individuation is reduced to mere representation. Alternately, to reform our categories of relation and knowledge requires a radical reconception of what an individual is, as opposed to that individual being relegated to the process of being racialised.

This unity of internal (psychic) and exterior (collective) process of individuation is justified in the examination of the ontogenic conditions and circumstances that have solidified into normative social values. In other words, there is cause to understand the psychosocial conditions of racialised individual to extract normalised social structures, as well as distinguish between ontologies that start with the individual as a construction of these structures and the racialised body as a process of individuation made visible by the conditions of race and racism. Scott quotes Simondon:

> We cannot say that the concept of the 'pathological' is the logical contradictory of the concept 'normal,' for life in the pathological state is not the absence of norms but the presence of other norms. Rigorously speaking, 'pathological' is the vital contrary of 'healthy' and not the logical contradictory of 'normal' … Disease — the pathological state — is not the loss of norm but the aspect of a life regulated by norms that are vitally inferior or depreciated, insofar as they prevent the living being from an active and comfortable participation, generative of confidence and assurance, in the kind of life previously belonging to it and still permitted to others'.[426]

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[426] Scott, 109.

I argue that black culture must first be considered, prototypically, a communion of generative

individuals, as opposed to a static prototype of whiteness. Secondly, I seek to connect the process

of becoming black and the aesthetics of blackness as an operational mode of living. The individual

residing in a pre-existing milieu of cultural forces harbours an incompatibility with itself and its

surroundings. I find interest here in the ways in which black people hold the capacity for

ontogenesis or a self-creation within systems of identification and how this self-production assumes

an independent, do-it-yourself, status along lines of consistency. Third, this thesis seeks to

understand duress as an attractive force for collective consistency through which the latent

potential of black people is articulated. Simondon argues:

> In a theory of the phases of being, becoming is something other than an alteration or a
>
> succession of states comparable to a serial development. Becoming is in effect a
>
> perpetuated and renovated resolution, an incorporating resolution, proceeding through
>
> crises, such that its sense is in its center, not at its origin or its end.[427]

Following Simondon's development of the process of *individuation*, the individual is always

incomplete and finds themselves continually involved in new processes of becoming. The individual

already belongs to anything that contributes to establishing relations, including the relations with

oneself. Simondon moves a step further by theorising that the individual whilst in the process of

becoming is also involved in an operation by which other individuals form consistencies of

connection. This *transindividual* comes into view from successive operations of individuation. It is

within the framework of this operation that I conceptualise black peoples and black culture as

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[427] Simondon, Gilbert. "The Genesis of the Individual," in Jonathan Crary & Sanford Kwinter (eds.), *Incorporations* (New York: Zone Books, 1992, 223.

consistencies of relation. The emergence of blackness, therefore, articulates more than a group of people unified under a common feeling of discontent. Instead, black existence is developed through the process of being and becoming black.

Irigaray suggests that such a provocation would require a sharing of the social space that encourages the projection of a different human reality where one sees the other as irreducible to one's own experience.[428] Irigaray argues that this world is constituted through 'respecting the other within oneself, and not by projecting the totality of what exists outside of oneself,' — as systems of domination often do. What Irigaray argues for is a conviviality in excess of a passive acceptance of 'difference' that, as I argue, has failed to articulate itself within mathematical reason. In this way, the fundamental heart of the social is revealed in its most explicit realisation: that the conditions of the human reality are irreducible to the relation of the other. Being and becoming would then depend on, what Irigaray writes, our ability to achieve 'another world, another nature, and not on our transforming this world and our on nature'. It would also depend on the circumvention of reactionary postures by the operations of data that paralyse social relation. Simply put, the authenticity of the social would have to become an authenticity that is difference in itself.

My intention is to look beyond representation, as well as technological function, to think through the generation of black being and psychic development. If machine learning is the site of the fictive substance of race, then I suggest that this site is an amplification of conditions already present in the techno-human relation. More specifically, the seeming polarity between humans and data are symptomatic of a larger overlapping concern about the origination of black political subjectivity and

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[428] Irigaray, Luce. *Sharing the World: From Intimate to Global Relations*. London: Bloomsbury, 2008.

the trauma of colonialism and slavery. The overriding problematic is in the dependence on the presupposition of the master. The manner in which the problem of race and the technical apparatus is framed results from principles that begin with an observation of being that is anterior to the conditions that bring the individual into existence. The frame not only situates the black body in its present concreteness, but forecloses any turbulent iterations of being that have come to inform the network of relations between the black body and its environment. To do otherwise would move blackness towards a different sense of desire. This desire would pull away from a longing for the non-black Other that Fanon proposes. Instead, it is substituted for one that gains capacity in a return to its non essentialist origins.

It is this point of ontological departure that makes plausible what Bifo explains as the future existing only in the imaginary. If the black body does enter into a space of the imaginary to work through the immediacy of race and racialisation, then the future is collapsed into the present, not as a denial of hyperstition, but as a always already pre individuated potential for the dynamic generation of subjective futurity.

Furthermore, the impasse is one that does not discard Fanon, but works through the foundations of black representation to formulate a more self-affirmative and optimistic view of black life, or what Fred Moten calls a pre-op(tical) optimism in Fanon. Moten argues that: 'blackness has [traditionally] been associated with a certain sense of decay, even when that decay is invoked in the name of a certain (fetishization of) vitality'.[429] Consequently, as Moten argues, black life is driven towards what he calls a being-toward-death or a death-driven nonbeing within institutional

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[429] Moten, Fred. "The Case of Blackness." *Criticism*, vol. 50 no. 2, 2008, pp. 177-218. Project MUSE, doi:10.1353/crt. 0.0062.

discourse, as opposed to a more complete assessment of the impact of black psychic and collective generation, which is produced at the 'barbershop, the beauty salon, and the bookstore' and other important spaces where black culture is produced and developed. In other words, what we call black, the black body and blackness is more more closely aligned with the languages, discourses, debates and creative projects found in the every day making of black life than in the halls of academic and cultural institutions.

In other words, blackness is far more than the negation of the black experience under colonialism and racism. Fred Moten asks: 'if, as Frantz Fanon suggests, the black cannot be an other for another black, if the black can only be an other for a white, then is there ever anything called black social life?' In other words, does black life exist outside of representations of lack and decay? Can black life instead be viewed as generative, affirmative and fundamental to the cultural development of all life?

In Part 3.3 of this chapter I propose future research on black being and machine learning.

6.6: The black technical object

In terms of machine learning, what appears largely as an opposition between human and machine is in fact the effect is the capacity to imagine a being that is, on the one hand, recognised as an Other within the duress of historicity, while on the other hand is taken into account as presupposing the potential for self-determination. This being, like machine learning models, works through the particular (in this case duress) to emerge as autonomous in its logics of operation. I contend throughout that this convergence might articulate an alternative politics and black political subject.

Machine learning mediates more than any other technology the conflict of these two poles, although it is machine learning that also attempts to combine them. Machine learning, in this way, is the combination of the gaze of colonial enumeration and the individual that attaches an indifference to the mechanical gaze that records the its actions. Even as machine learning uses this double function of illumination to for the service of race, machine learning is nevertheless a process that can raise awareness of the capacity to mute the impression of categorisation and their normalising truth-driven forces. This is because although machine learning articulates the 'real', it is not bound to our present conceptions of reality or their corresponding racial structures. This gives machine learning, and the black psyche, leverage to play around with dissonances machine learning can create between the operation of the social and its pre-emptive interpretations. The power of contingency emerges in machine learning in the capacity to fail in the pre-emotion of the future. It can join the power of error with the power of mis-recognition of black life in computation to provide a series of provocations and patterns that at minimum distract the colonial paradigm in its obsession with truth. Equally, the black body retains the right to alter its relation with machine learning by dictating the terms under which data is input into the machine.

This does not, however, operate functionally, as data aggregation is powerful and ubiquitous, but it does provide capacity for expression that resides in the gaps of existing non-technical knowledge for the generation of new meaning. The move, however, necessitates a pathological viewpoint that resists the temptations of representation and revision in computational culture. To insert blackness into the machine is to first assume that the machine does not already understand the incalculability of black life, which is an affirmative assumption. But it also assumes that returning the mechanic gaze of the master will result in the machine's recognition of its value. This is, of course, an

extraordinary success within the pathological view of lack, but denies any other pathological framework that articulates a totality and self-actualisation.

In machine learning, this view assumes a self-centred consistency within machine learning function, as well as the capacity of data to extrapolate enough of black sociality to render the black body both visible and vulnerable to pathological fragmentation. Although predominant study of race and technology are aware of the social constructions of race, technology and the body, they run the risk of 'placing the individual into the system of reality', as Gilbert Simondon describes, while 'explaining the characteristics of the individual, without a necessary relation to other aspects of being that could be correlatives of the appearance of an individuated reality'.[430]

Here I argue that machine learning articulates its own genealogy and computational logics that necessitate a re-formulation of human relationships with data. Machine learning does not articulate data as either discrete or in between discreteness. Instead, machine learning operates within the capacity of its own computational reason, where data can either be discrete or in the process of discretisation (or both). For instance, in terms of neural networks data is modulated by activation functions. These functions self regulate their own sensitivities to environmental inputs, which reconfigures data at the level of the computation premises of prediction (re-hypothesising of the premises) within the boundaries of the network's specific computational logics. So, what might appear to be categorical output, is instead a dynamic relation that operates prior to discrete correlation and categorical output.

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[430] Simondon, Gilbert and Flanders, Gregory, '*The position of the problem of ontogenesis*'. Parrhesia (7), 2009, 4.

One goal is to understand how the black body operates at the intersections of history, speculation and technique. It is here, at the junction of encounter and experience, that Félix Guattari views the racialised group as assigning meaning. This meaning is a force that 'constitutes the seeds of the production of subjectivity', as 'we are not in the presence of a passively representative image, but a vector of subjectivation'.[431] It is through the meaning of backness that the black, brown and racialised individual creates a cohesion of (mis)representation, expounded by aesthetic markers, dynamic vibrations and cultural kineticisms often expressed as a sense of belonging.

Deleuze asserts that the individual is continually coded and recoded with a moral directive. Here, the black being becomes the primary agent in individual experiences of duress, understood as a relation of forces. This being also holds the capacity to diagrammatize their own subjective experience. They are, therefore, both internally constituted and regulated. Still, the abstract relation would seem to encourage a negentropic response by moving toward equilibrium, particularly in association with the efficiency of municipal jurisdictions. Negentropy is the measure of a reduction in entropy or increase in order. Negentropy thus gauges a system's perceived normality or stability. Attempting homeostasis implies movement toward system equilibrium, where a system evolves toward a stationary state described by the minimum entropy production. In our example here, police use of ABM to envision an environment without crime. Prigogine and Stengers argue, however, that entropy is constrained by the system's boundary conditions and any observed stability is taken for granted.[432] When a system's thermodynamic forces breach a threshold of linearity, the system gains sensitivity to fluctuation. The system then reacts (in varying degrees) in

[431] Bakhtin, Mikhail, Barthes, Roland, Guattari, Felix Guattari. *Chaosmosis: An Ethico-aesthetic Paradigm*. Australia: Power Publications, 1995, 25.

[432] Prigogine, Ilya and Stengers, Isabelle. *Order Out of Chaos: Man's New Dialogue with Nature*. London: Verso, 2018.

response to these fluctuations by challenging the certainty of order. In some cases, Prigogine and Stengers write, 'the analysis leads to the conclusion that the state is 'unstable'.'[433]

With this ontological starting point, we are faced with a rearticulation of the conception of race the black body, at once superseding the black relation to duress as one of what I am thinking through as technoresistance. However this technoresistance is not in the sense of refusal or compliance to capital or domination but a quantum generation of self that is a consistency in and of itself — able to thrive in both the relation of capitalism and simultaneously outside to the Anglo-European articulation of being and becoming. At the same time, the technoresistant body is a methodological project that makes use of the crisis of the black body in awareness of the network of relations that articulate what we know as sociality. To think through the technoresistant, however, is to think about contemporary ecologies of generative technical apparatuses such as machine learning, neural networks and large data systems. What does the black body mean within this relation, and likewise how does the perceptual articulation of the black body in terms of blackness unfold within the circumstances of futurity? This notion requires an altered relationship with the particular and the universal.

In this context, if additional research were to be conducted, I would be able to offer more insight into this proposal and the thesis of black individual and collective psychic genesis.

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[433] Prigogine and Stengers, 140.

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