

Assembling Intelligence: Transitioning from a Politics of Control to a Politics of Configuration

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Abstract

The concept of intelligence is deeply ambiguous and entangled with historical narratives of colonialism and eugenics. The contemporary understanding of intelligence still reflects such narratives: it is understood in human-centric terms, as a property defined by goal-oriented cognitive capacities. This leads to what we term a *politics of control*, which relies on historically established patterns of exclusion to establish political structures with colonial connotations. In response, this paper proposes an alternative framework called the *Assemblage Theory of Intelligence (ATOI)*. ATOI understands intelligence in terms of the dynamic relationships and activities within an assemblage, moving us from a *politics of control* to a *politics of configuration*. We illustrate ATOI by discussing the human-in-the-loop (HITL) methodology in AI development. Contrary to the dominant narrative, in which humans are seen as controlling the loop, we reconceive HITL as an assemblage in which human and machine elements configure and mutually shape one another.

Keywords: Intelligence, Assemblage Theory, Politics of control, Politics of configuration, Human-in-the-loop

Introduction

Technologies are often hyped in terms of intelligence: we speak of *smart cities*, of outsourcing *cognitive labour*, and of course, of artificial *intelligence* (AI). Sensing technologies are allegedly capable of detecting things humans cannot, algorithms structure the world more effectively than humans can, and Large Language Models (LLMs) generate text faster than humans write. Such technologies carry out many tasks that were previously done by humans and often do so in a more (cost-)effective manner. But is this the type of intelligence that we should be after? The carbon footprint of those technologies is often enormous and has a devastating effect on the Earth, and they can also be used to steer people's behavior. Being part of a world that is partly governed by technologies that are allegedly "intelligent" comes at a price.

Intelligence is typically viewed as an intentional, goal-oriented capacity of an agent to respond to environmental stimuli, typically involving information processing.¹ As we will show, such an understanding of intelligence opens the possibility for a politics of control: intelligence is considered the capacity to exercise power over passive objects or allegedly less intelligent subjects. As a result, these views embody narratives that enable and justify control and domination. In this paper, we develop an alternative approach to intelligence that problematizes such narratives. The goal of this approach is to enable a shift from a politics of *control* to a politics of *configuration*, making explicit that politics is a terrain of qualitative changes that materialise in the interactions between multiple agents.

We unpack the notion of configuration with the help of Manuel de Landa's work on assemblages, suggesting that we understand intelligence in terms of an *assemblage* and develop what we call an *assemblage theory of intelligence* (ATOI). An assemblage can be characterised as a heterogeneous whole with emerging properties, and is the result of the dynamic interactions between objects and bodies through which particular relations emerge.² The entity that results from these relations is an assemblage, a whole constituted by heterogeneous components that together constitute something new. This entity can, for example, be a city, an ecosystem, a social institution, or an ant colony. Under certain conditions, as yet to be specified in this paper, assemblages can be considered intelligent.

1 Shane Legg, and Marcus Hutter, "A collection of definitions of intelligence," *Frontiers in Artificial Intelligence and applications* 157, (2007): 17. <https://doi.org/10.48550/arxiv.0706.3639>; Robert J. Sternberg, *The Cambridge Handbook of Intelligence* (Cambridge University Press eBooks, 2019), <https://doi.org/10.1017/9781108770422>.

2 Manuel DeLanda, *Assemblage Theory* (Edinburgh University Press, 2016), 20–21

In line with other recent approaches,³ the starting-point of ATOI is that intelligence is neither a uniquely human capacity, nor is it something that can be attributed to individual agents. As DeLanda⁴ suggests that, within an assemblage, relations are mutually shaped, indicating the agents' capacities of constituting and influencing assemblages of which they are part. A politics of configuration aims at reflecting this structure, where agents contribute to the assemblage's activity while maintaining a degree of independence. Viewing intelligence as the expression of assemblages' behaviour is not new, and has already been implicitly suggested by DeLanda in his 1991 book *War in the Age of Intelligence Machines*⁵. In this work, DeLanda discusses the intelligence of the war machines and military apparatus, understanding it as a network of relations that uses input and feedback to produce action or output. However, the implications of viewing intelligence through assemblage theory and how this challenges the psychological and subject-oriented programs have not been explicated in detail. Moreover, by taking up DeLanda's suggestion, we believe that ATOI can contribute to the current critical literature on AI, because it specifies in what sense AI can be considered a social phenomenon.

Our paper is organised as follows: First, we provide a brief deconstruction of intelligence as developed within the science of psychology and show how it is embedded in a logic of control. Second, we provide a starting point for an assemblage theory of intelligence (ATOI) and specify the conditions under which an assemblage displays intelligence. Third, we illustrate the relevance of ATOI by discussing the case of the "human-in-the-loop" (HITL), a machine learning approach that has found extensive applications over the last decade. In conclusion, we suggest how ATOI helps move from a politics of control to a politics of configuration.

1. The Concept of Intelligence and its Political Implications

The concept of intelligence, and the way it is investigated scientifically, can be traced back to the emergence of psychology as a scientific discipline. The science began to be institutionalised at the end of the nineteenth century on the European continent, and somewhat later in the United States. The systematic investigation of intelligence has formed an important part of psychology since its inception. One of the first countries to

3 Hager Ben Jaffel et al., "Collective Discussion: Toward Critical Approaches to Intelligence as a Social Phenomenon," *International Political Sociology* 14, no. 3 (August 3, 2020): 323–44, <https://doi.org/10.1093/ips/olaa015>; Adam Frank, David Grinspoon, and Sara Walker, "Intelligence as a Planetary Scale Process," *International Journal of Astrobiology* 21, no. 2 (February 7, 2022): 47–61, <https://doi.org/10.1017/s147355042100029x>; Mirta Galesic et al., "Beyond Collective Intelligence: Collective Adaptation," *Journal of the Royal Society Interface* 20, no. 200 (March 1, 2023): 20220736, <https://doi.org/10.1098/rsif.2022.0736>.

4 Manuel DeLanda, *Intensive Science and Virtual Philosophy* (A&C Black, 2013).

5 Manuel DeLanda, *War in the Age of Intelligent Machines* (Zone Books, 1991).

establish a national research program for intelligence was England. This research into intelligence was closely connected to its colonial ambitions, related to the development of a taxonomy of the human race and national eugenics programs. These ambitions are clearly identifiable in the work of Francis Galton, a leading figure in psychology at the time, who, in his famous *Hereditary Genius* (1869), proposed the first empirical program of intelligence based on the assumption of hereditary characteristics. And, more than fifty years later, Carl Brigham's 1923 influential book *A Study of American Intelligence* attempted to establish a strong connection between intelligence and race in the USA. These views were not just academic in nature but also had a clear societal impact: Brigham was one of the developers of the American IQ test used for military and educational purposes, such as the recruitment of soldiers and the admission to Ivy League Universities.

The origins of the psychological concept of intelligence can be traced back to the Enlightenment and emphasise the importance of reason and individual rational judgment. Psychological research attempted to link such qualities to individual mental characteristics. It is here that we already see the intertwining between psychological research on intelligence and a politics of control. As Cave⁶ has argued, the colonial dominance of the West at the time was the result of scientific and technological superiority traced to the allegedly superior mental capacities of Western people. As a result, the concept of intelligence could be used to draw a hierarchical distinction between particular members of the human species (those living in the West) and others, and to legitimate a hierarchical model in which the white Western race appears superior. A similar logic was applied to the position of humans toward nature: based on their intelligence, humans could control other nonhuman entities and attempt to dominate nature, which is, for instance, exemplified in Francis Bacon's *Novum Organum* (1620). Haraway aptly characterised this tradition as assuming a "view from nowhere"⁷: it believes in the possibility that science can carve out a position outside the world being studied and manipulated. Within the context of psychology, the "view from nowhere" leads to a politics of control. Psychological research enables us to approach people as objects open to social engineering and experimentation, while at the same time appearing as a neutral description of reality, uncontaminated by political concerns.

Before the institutionalisation of the science of psychology, mental capacities were primarily understood in qualitative terms,⁸ meaning that at the core of the discussion were questions about what characteristics and qualities are needed to make appropriate judgments or to

6 Stephen Cave, "The Problem with Intelligence," *Proceedings of the AAAI/ACM Conference on AI Ethics and Society*, February 5, 2020, 29–35, <https://doi.org/10.1145/3375627.3375813>.

7 Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (January 1, 1988): 575, <https://doi.org/10.2307/3178066>.

8 John Carson, "Intelligence: History of the Concept," in *Elsevier eBooks*, 2015, 309–12, <https://doi.org/10.1016/b978-0-08-097086-8.03094-4>.

be a rational thinker. However, as a result of the increased institutionalisation of science and the focus on precise experimental measurements, a quantitative understanding of intelligence and its underlying mental characteristics emerged in the second half of the nineteenth century. This is exemplified by practices such as craniometry, which assumed a correlation between skull circumference and an individual's mental capacity. This quantitative understanding was further inspired by Darwin's evolutionary theory, which emphasised the importance of genetics and showed how specific qualities of species could be transmitted to their offspring.

This Darwinian framework gave rise to an obsession with heredity. By isolating the phenotypic characteristics believed to clearly identify the alleged superior characteristics of the white race, they could be passed on to the next generations.⁹ This view both legitimised and further perpetuated colonial dominance: it legitimised the position of colonial rulers and could contribute to increased political control by determining which characteristics—that underlie the allegedly superior mental capacities—could be transmitted to future generations. In other words, quantitative differences were used to justify qualitative differences. This program was further concretised at the beginning of the twentieth century when Theodore Simon and Alfred Binet formulated the idea of the "Intelligence Quotient" (IQ) and developed related metric scales aimed at identifying students in need of further educational support.¹⁰ Soon after, in England, Charles Spearman and Cyril Burt (1927) theorised the "g factor," a psychometric method intended to find correlations between different cognitive tasks and abilities that supported the IQ perspective, strengthening the view that intelligence is a quantifiable property of individual agents.¹¹ Nevertheless, as Gould¹² noticed, the two formed a tautological circle in which the IQ worked because of the "g factor," and the "g factor" was valid because of the IQ.

The psychological programs framed around heredity views with causal assumptions between genes and mental capacities were still present in the 1960s. The seminal study *Behavior Genetics*, by John Fuller and Robert Thompson, in which once again standardisation and psychometric¹³ comparison reinforced connections between scientific

9 Carson, "Intelligence: History of the Concept," 310.

10 Ekin Erkan, "Morphing Intelligence - From IQ Measurement to Artificial Brains," review of *Morphic Intelligence - From IQ Measurement to Artificial Brains*, by Catherine Malabou, *Chiasma: A Site for Thought* 6, no.1 (2020): 248–60. <https://ojs.lib.uwo.ca/index.php/chiasma/article/view/16868>.

11 Alain Desrosières, *The politics of large numbers: A history of statistical reasoning* (Harvard University Press, 1998); A. Alexander Beaujean and Nicholas F. Benson, "The One and the Many: Enduring Legacies of Spearman and Thurstone on Intelligence Test Score Interpretation," *Applied Measurement in Education* 32, no. 3 (June 17, 2019): 198–215, <https://doi.org/10.1080/08957347.2019.1619560>.

12 Stephen Jay Gould, *The Mismeasure of Man* (Turtleback Books, 1996).

13 For the influence of brain metrology on the history of AI that is relevant for the second part of this essay, see Simon Schaffer, 'OK Computer,' in Michael Hagner (ed.), *Ecce Cortex: Beiträge zur Geschichte des modernen Gehirns* (Wallstein Verlag, 1999), 254–85

research and a politics of control, coining a theory of the mind that supported social hierarchical structures with implications beyond psychology as an academic field.¹⁴ It was not until the beginning of the 2000s that this genetic determinist paradigm was weakened, when the Human Genome Project revealed the minor influence of genetic coding, which weakened the determinist paradigm.¹⁵ At the end of the twentieth and beginning of the twenty-first century, the eugenic connotations in the research program of intelligence have been further flattened as a result of new neuroscientific findings in epigenetics and neuroplasticity, the opening of consciousness studies, as well as an increasing focus on cognitive psychology.

These new research lineages have been effective in weakening the epistemological approach to intelligence as originally formulated, but still struggle to articulate the normative impact of psychological research on intelligence. This seems to be not only a problem of intelligence but of psychology more in general. Only recently have colonial legacies been explicitly addressed within the field by questioning methods and practices.¹⁶ Intelligence in this sense is still connected to practices of social engineering, for example, in educational contexts where psychology is often used to legitimate a particular politics of control.

Recent literature shows that genetic determinism, which was so prominent in early theories, is no longer explicitly endorsed.¹⁷ Moreover, recent discussions have expanded

14 Gerd Gigerenzer, "From Tools to Theories: A Heuristic of Discovery in Cognitive Psychology," *Psychological Review* 98, no. 2 (April 1, 1991): 254–67, <https://doi.org/10.1037/0033-295x.98.2.254>. It is relevant to notice how this characterisation of the psychological program of intelligence was highly influential in shaping the early years of the establishment of Artificial Intelligence as a field. This is relevant to consider for the second part of this essay. For a deeper connection between psychology and AI in the 1960s, you can consult: Jonathan Penn, "Inventing Intelligence: On the History of Complex Information Processing and Artificial Intelligence in the United States in the Mid-Twentieth Century," PhD Thesis, University of Cambridge, 2020

15 Erkan, "Morphing Intelligence - From IQ Measurement to Artificial Brains."

16 Polli Hagenars, "Decolonising Psychology: Reflections on Continuing Myopia," *Psychology and Developing Societies* 35, no. 1 (March 1, 2023): 7–21, <https://doi.org/10.1177/09713336231157831>.; Sunil Bhatia and Kumar Ravi Priya, "Coloniality and Psychology: From Silencing to Re-Centering Marginalized Voices in Postcolonial Times," *Review of General Psychology* 25, no. 4 (September 27, 2021): 422–36, <https://doi.org/10.1177/10892680211046507>.

17 Sternberg, *The Cambridge Handbook of Intelligence*.; Zuowei Wang, Benjamin Katz, and Priti Shah, "New Directions in Intelligence Research: Avoiding the Mistakes of the Past," *Journal of Intelligence* 2, no. 1 (March 7, 2014): 16–20, <https://doi.org/10.3390/jintelligence2010016>.; Fabio Andres Parra-Martinez, Ophélie Allyssa Desmet, and Jonathan Wai, "The Evolution of Intelligence: Analysis of the Journal of Intelligence and Intelligence," *Journal of Intelligence* 11, no. 2 (February 14, 2023): 35, <https://doi.org/10.3390/jintelligence11020035>.

to include non-human entities as part of the field, such as animals¹⁸ and plants,¹⁹ and even materials.²⁰ These new discussions can be seen as an attempt to abandon the political program under which intelligence was developed. However, changing its epistemological dimension or extending it to non-humans is insufficient to address deeper ontological and normative issues. In this sense, while contemporary approaches reject genetic determinism, they are still highly neuro- and cognitive-centric, framing intelligence as a property that can be attributed to individual agents.²¹ This is to say that the validity of intelligence in the first place, as a particular set of mental capacities modelled on human archetypes, is not questioned; thus, by positively valuing intelligence, its implicit narratives still confer the possibilities of hierarchical distinctions supporting forms of politics of control and echoing residual elements of methodological solipsism.

2. Assemblage Theory: From Control to Configuration

In the above section, we have shown how the psychological understanding of intelligence takes part in a broader politics of control. By modelling intelligence on the alleged superiority of a selected group of humans, it could be mobilised as a controlling device. The assemblage theory of intelligence developed in this section is an attempt to circumvent this model. Our starting point is that intelligence is neither a uniquely human capacity nor is it something that can be attributed to individual agents. Rather, intelligence is the result of different entities interacting with one another. From these interactions, something novel can emerge, which is why we take intelligence essentially to be a productive form of associative activities. Our account enables us to embed intelligence into a politics of configuration rather than a politics of control.

18 Louis D. Matzel and Stefan Kolata, "Selective Attention, Working Memory, and Animal Intelligence," *Neuroscience & Biobehavioral Reviews* 34, no. 1 (July 15, 2009): 23–30, <https://doi.org/10.1016/j.neubiorev.2009.07.002>.

19 Stefano Mancuso and Alessandra Viola, *Brilliant Green: The Surprising History and Science of Plant Intelligence* (Island Press, 2015); Anthony Trewavas, "The Foundations of Plant Intelligence," *Interface Focus* 7, no. 3 (January 6, 2017): 20160098, <https://doi.org/10.1098/rsfs.2016.0098>.

20 Laura Tripaldi, *Parallel Minds: Discovering the Intelligence of Materials* (MIT Press, 2022). It is worth briefly expanding on Tripaldi's notion of intelligence for the context of this paper. Her formulation of intelligence offers a compelling non-anthropocentric and non-hierarchical interpretation of the notion. However, while intriguing, her conceptualisation moves from a material ontological formulation towards a social application. ATOI, in this sense, does the opposite. Without undermining materiality, ATOI starts from a socio-ontological basis, moving to a material application. An extensive discussion between the two views is out of the scope of the current work; nevertheless, while sharing motivation, it was important to briefly mention the two different starting positions of each perspective.

21 Gerd Gigerenzer and Daniel G. Goldstein, "Mind as Computer: Birth of a Metaphor," *Creativity Research Journal* 9, no. 2–3 (April 1, 1996): 131–44, <https://doi.org/10.1080/10400419.1996.9651168>.

A politics of control refers to qualitative relations that enable hierarchical change, favouring the expression of certain elements over others. As we have illustrated, the psychological program of intelligence is an example of such a political narrative because those agents considered to be intelligent have more space for expression compared to those who are subject to social engineering and experimentation. In contrast, a politics of configuration is concerned with the qualitative changes that allow entities to express their capacities to shape relations, contributing to the expression of a social whole while maintaining a degree of independence.

A preliminary formulation of this idea can already be found in Deleuze's essay *Postscript on the Societies of Control*.²² Since entities are non-stable unities but are necessarily fragmented and divided, the potential to resist a politics of control through reconfiguration is always (latently) present. As Deleuze points out, a politics of control is in fact a particular configuration. For instance, corporations can enact a politics of control by prioritising certain fragments of labour and knowledge based on statistical data and workers' performance and use these fragments to install a particular hierarchy. However, within this fragmentation, assemblages also offer an alternative form of political organisation. This is because assemblages are fragmented wholes that display unity in particular events but lack a uniform essence. A politics of configuration attempts to capture this organisation where elements participate in the expression of the assemblage without being rigidly bound to a particular enactment.

ATOI is then the characterisation of the sense in which assemblages can be considered intelligent, and it opens up ways to imagine the relevance of psychological research on intelligence beyond social engineering and political control. ATOI is grounded in DeLanda's assemblage theory. Philosophers of technology do not often discuss DeLanda's work. However, we hold that his philosophical project is relevant to both understanding the material conditions that give rise to intelligence and enabling the imagining of novel configurations of assemblages. Building on the work of Deleuze, assemblage theory starts from the premise that reality is best conceived as an interplay of dynamic processes that cut across the nature-culture divide and other dualisms.²³ These processes give rise to constitutive wholes out of which particular entities emerge.²⁴ DeLanda terms these constitutive wholes *assemblages*. Similar to Deleuze, DeLanda maintains that reality emerges from the interactions of objects and bodies that constitute particular relations.

22 Deleuze, Gilles. "Postscript on the Societies of Control," *October* 59, (1992): 3–7. <http://www.jstor.org/stable/778828>.

23 Arjen Kleinherenbrink, "Metaphysical Primitives: Machines and Assemblages in Deleuze, DeLanda, and Bryant," *Open Philosophy* 3, no. 1 (January 1, 2020): 283–97, <https://doi.org/10.1515/opphil-2020-0103>.

24 Thomas Nail, "What Is an Assemblage?," *SubStance* 46, no. 1 (January 1, 2017): 21–37, <https://doi.org/10.1353/sub.2017.0001>.

The entity resulting from such relations is an assemblage, a whole constituted by heterogeneous components that result in something new that cannot be reduced to its individual components.

There are three main reasons why assemblage theory offers a good starting point for developing an alternative account of intelligence. First, assemblage theory recognises that entities are not stable objects remaining unchanged over time but are the result of historically contingent interactions. Second, there is no a priori hierarchy inscribed in assemblage theory, such that each assemblage has a similar ontological status regardless of what kind of entities are constitutive of it and constituted by it. Third, the theory is not interested in the properties of the entities composing the assemblage, but rather, the focus is on the relations that constitute the assemblage, thus shifting the locus of investigation from the entity to the relations that the entities create. These three points align with the scope of the paper, suggesting an interpretation of intelligence that allows for a politics of configuration, viewing intelligence as a process resulting from interactions between entities.

2.1 An Assemblage Theory of Intelligence

Having introduced these basic features of assemblage theory, it is now possible to offer a critique of a hierarchical understanding of intelligence oriented towards political control. Assemblage theory reveals how various elements, such as political systems, data collection and institutionalisation, ideological narratives, psychometric design, social practices, human heterogeneity, scientific programs, economic interest, ideas of supremacy, and colonial discourses, coevolve to create hierarchical narratives of intelligence that justify political control. For instance, these relational dynamics are evident in the 1924 US immigration restrictions, which assumed genetic inferiority among immigrants.²⁵ The US establishment's justification for adopting this policy was the reduction of intelligence to a genetic property.²⁶

This example illustrates how a politics of control operates: it finds expression under a tautological form supported by two operations, a reduction and a naturalisation. Specific properties have been selected according to the archetype of a particular group (reduction) and are anchored in a single medium of transmission, the gene (naturalisation). The result that follows is the justification for mechanisms of exclusion. To avoid such mechanisms, an account of intelligence should acknowledge the diversity of the entities by which relations are formed. Adopting this perspective implies that intelligence becomes a concept that

25 Gould, *The Mismeasure of Man*.

26 Manuel De Landa, *A Thousand Years of Non-Linear History* (New York: Zone Books, 1997).

accounts for the shaping capacities of its elements in the form of distributed agency.²⁷ Therefore, instead of viewing intelligence as a property, as the idea of IQ suggests, it is more appropriate to view it as a process that results from the relationality of heterogeneous entities. Intelligence, then, is not something to be attributed to particular entities but instead something that manifests in the actions that take place between entities that give rise to activities on the level of the assemblage as a whole.

Now, in what sense, can intelligence be understood from the perspective of assemblage theory, such that it need not result in a politics control? Here, DeLanda's work is insightful. His major philosophical project concerns the establishment of a philosophical view based on processes of self-organization. He extensively uses the concept of assemblage to conceptualise how fragmented elements can crystallise into (temporally) wholes through bottom-up trajectories. To understand assemblages in DeLanda's terms, a number of steps need to be taken.

The first step in this regard is to determine the identity of a particular assemblage. For DeLanda, the identity of an assemblage is determined by the parameters that "specify the environmental factors that affect the phenomenon"²⁸ and are central in providing temporal stability in the assemblage. DeLanda²⁹ introduces two types of parameters that are indicative of identity: territorialization and coding. The first parameter refers to the boundaries of the assemblage. These boundaries might change over time and space; thus, what is important is to consider the process of homogenization and the degree of impermeability, as reflected in how the assemblage reacts when objects are removed or new ones are added. As an illustration, let us consider a city such as London. The city was founded as a Roman military camp, and over the centuries it has evolved into the multicultural metropolis of today. During its expansion, the city has absorbed villages surrounding it that have become its neighbourhoods. Territorialization captures this process, illustrating the trade-off between homogeneity and heterogeneity within the assemblage.

The second parameter to consider in an assemblage is coding and refers to the role of the expressive components in fixing the identity of the whole.³⁰ Language is a classic example. This is because it has a clear expressive role that gives continuity to the members of the assemblage. For instance, we can consider a local dialect that gives access to a semantic dimension—symbolic systems of local traditions and stories situated within that specific place that would not be accessible in other ways if not through the dialect. Therefore, we

27 Ian Buchanan, "Assemblage Theory and Its Discontents," *Deleuze Studies* 9, no. 3 (August 1, 2015): 382–92, <https://doi.org/10.3366/dls.2015.0193>.

28 DeLanda, *Assemblage Theory*, 19.

29 DeLanda, *Assemblage Theory*.

30 DeLanda, *Assemblage Theory*.

see that the coding parameter is twofold. It gives the entities composing the assemblage an identity to the outside while also providing a semantic dimension within the assemblage.

However, to make assemblage theory relevant to understanding intelligence, the identity parameters alone are insufficient. We also need to introduce qualitative variables that are indicative of intelligence. Identity and intelligence share connecting points, but while identity accounts for the change and continuity of assemblages over time, intelligence is a qualitative characterisation of assemblages' activity, where activity is a historically contingent event that emerges from the assemblage's processes. DeLanda takes inspiration from Deleuze³¹ when characterising the assemblage's activity qualitatively and maintains that understanding the activity of a particular assemblage should be guided by three basic questions: Who? What? How?

Let us briefly illustrate the two parameters and the three questions through the example of smart cities.³² A smart city can be seen as an assemblage composed of technology and infrastructures, human populations, social institutions, biological actors, cultural sites, regulatory frameworks, and environmental factors. All these components interact dynamically, contributing to the creation of emergent activities in the city. Technologies collect and analyse data; the infrastructure provides the operational network; human populations and social institutions provide and respond to data while forming the city's governmental bodies; and biological actors, cultural sites, and environmental factors generate data and shape the city's life expression. The city's activities emerge through data collection and analysis, public participation, environmental and biomonitoring, city operations, and proactively responding. The smart city has boundaries, enclosed by the surrounding landscape (territorialization), and it has recognisable expressive components such as architectural style or infrastructure (coding). The smart city generates actionable insights that are intensively supported (what?), proactively responds to internal changes of its elements (how?), and processes diverse interactions while maintaining a degree of independence from specific elements (who?). For instance, in the mobility systems of a (smart) city, where flows sustain movement, horizontal relations are the freedom of mobility of individual agents, and regulatory norms allow for coordination and organisation at an assemblage level.

Within ATOI, the three questions are translated respectively as variability, referring to which entities take part in the assemblage (i.e., who); reproducibility as what is needed in terms of intensities—for example, energy or fuel—to make the assemblage activity occur (i.e. what); and adaptability as accounting for all the possible set of relations that can occur between the assemblage's element (i.e., how). In other words, the three questions

31 Gilles Deleuze, *Difference and Repetition* (A&C Black, 2004).

32 Yu-Shan Tseng, "Assemblage Thinking as a Methodology for Studying Urban AI Phenomena," *AI & Society* 38, no. 3 (June 1, 2022): 1099–1110, <https://doi.org/10.1007/s00146-022-01500-4>.

serve to inquire about who is taking part in the assemblage activity, what sustains its existence, and how the relations are configured to allow the activity to occur. Intelligence then refers to specific activities that result from the interplay between the assemblage's elements, qualitatively captured by the three questions. These can be transformed into assemblage elements, namely adaptability, reproducibility, and variability. These three elements aim to capture horizontal relations between components, vertical relations between the whole and its components, and flow relations. In ATOI, intelligence is both about the role of the assemblage components and the assemblage's independence from specific components, thus contrasting cognitive approaches to intelligence that tie it back to individual agents. The activities of the assemblage, then, can be framed as historically contingent collective processes. Given that all assemblages are viewed as individual entities with equal ontological status irrespective of dimension, shape, or function, and that they are dynamic wholes composed of heterogeneous objects exhibiting emergent properties, we arrive at the following definition of intelligence: *intelligence refers to the productive activities of an assemblage in terms of reproducible, adaptive variations*. This definition implies that intelligence is an open concept contextually dependent on the individuation of the single assemblage. Moreover, it emphasises the mutual reactivity of relations within the assemblage, acknowledging the transitory stability of its activity.

Assemblage theory systematises the interactions between different entities. This implies a connection to politics, as politics can be broadly understood as the domain concerned with relations that bring about qualitative change. Moreover, assemblage theory rejects formulating a politics of control that is tautologically structured by operations of reduction and naturalisation. On the contrary, because assemblage theory posits the historical contingency of objects, a flat ontology, and distributed forms of agency that give rise to emergent properties, it offers an appealing framework for understanding politics in terms of configuration. This perspective implies a relational system where multi-directional forms of agency are recognised through shaping processes. In this context, politics provides a structure to the assemblage, while assemblages acknowledge a distributive form of agency. This reciprocity between parts³³ is evident in the way agency and structure mutually constitute each other, and, as DeLanda suggests, "transcending the duality of agency and structure."³⁴ Going back to the above example of smart cities, this can be seen as the participatory role of citizens, where their agency provides data to the system, and in exchange, the structure is open for citizens' response. Configurations thus become political structures where components' expressivity and transformative processes are central, yet components maintain some degree of independence by forming external relations.

33 Manuel DeLanda, *A New Philosophy of Society: Assemblage Theory and Social Complexity* (A&C Black, 2006).

34 DeLanda, *A New Philosophy of Society*, 2.

To summarise, in ATOI, intelligence emerges as a qualitative dependent variable from assemblages' activity. It questions the intensive flows that support the assemblage, takes independence from individual specific objects, and accounts for all possible changes in the sets of relationships. From an ATOI perspective, intelligence is not considered in terms of individual properties, rejecting possible archetypes, reductions, and naturalisation, but rather in terms of what the relations within the assemblage enable. This allows for shifting from a politics of control, where hierarchical structures of power find justification, to a politics of configuration, where what matters is the disposition of relations, their mutual reactivity, and enabling spaces of mutual production.

3. Artificial Intelligence and the Human in the Loop

In this section, we mobilise ATOI to discuss our case study: machine intelligence systems, particularly the human-in-the-loop (HITL) methodology in artificial intelligence (AI). AI is a complex object of study. For the context of this essay, we have decided to focus on AI's "super accuracy" in data analysis because it is generally considered to be the hallmark of AI's intelligence.

3.1 Super Accuracy and Politics of Control

AI's super accuracy is often used to legitimise the trustworthiness of its output. In other words, because AI is super accurate in analysing data, its output must be true, and because its outputs appear trustworthy, AI is super accurate. However, this is a tautological fallacy, resembling a politics of control, and is impossible to prove correct. Here, we can compare the argumentative structure that legitimates the psychological program of intelligence with the politics of control it gives rise to. Recall that a politics of control is based on two operations: a reduction and a naturalisation. In the case of AI super accuracy, reduction takes place through the simplification of the causal claim in data operations, whereas anthropomorphising AI leads to naturalisation. In what follows, we illustrate both aspects.

The work of Campolo and Crawford³⁵ is a useful starting point for questioning AI's super accuracy. The authors caution against drawing analogies between human cognition and AI and question the justification for portraying AI systems as exceeding human capabilities. They argue that rather than a form of intelligence, whatever this might mean, AI operates through the execution of complex statistical modelling, where, often, the data in place is detailed information about people's lives or social contexts.³⁶ Nevertheless, the language

35 Alexander Campolo and Kate Crawford, "Enchanted Determinism: Power Without Responsibility in Artificial Intelligence," *Engaging Science Technology and Society* 6 (January 8, 2020): 1–19, <https://doi.org/10.17351/ests2020.277>.

36 Campolo and Crawford, "Enchanted Determinism."

often used to describe the incredible algorithmic capacities of pattern recognition enchants and anthropomorphises AI. Thus, we see that fallacies that open to control politics start from the construction of narratives, opening to a second legitimisation circle of intelligence, in its artificial form, as a conceptual tool for building devices of societal control. The issue is that training the systems through data embedded into political and societal meaning also implies transmitting and reinforcing what the data signifies. Nevertheless, the political significance of the data are often overlooked,³⁷ and the same goes for the causal mechanisms within the AI systems, which are often opaque or are not transparent otherwise.

A good example of AI's super accuracy being ingrained in a logic of control can be found in a recent paper³⁸ that explores the use of deep learning models to predict emotional states from facial expressions in real-time. Using large datasets of facial images, the deep neural network outperformed human participants in identifying emotions such as frustration, excitement, and doubt. The model achieved an impressively high accuracy rate—98.7% in some cases—leading to widespread claims of the AI's superior emotion recognition abilities. However, much like earlier examples,³⁹ the paper was unable to explain the causal mechanism behind the high accuracy, particularly considering the complexity of human emotions expressivity and the limitations of categorising them in fixed facial features. Although statistically impressive, challenges in detecting the causal component are present due to the system's opacity. Nevertheless, this does not prevent making claims about AI's super accuracy.

This example illustrates how “claims about rates of accuracy tend to displace causal scientific explanations,”⁴⁰ which aligns with Campolo and Crawford's critique. Moreover, we see that a significant issue with the super-accuracy process is that the data's contextual features are not accounted for. In other words, the training data sets become political because they represent the social world, and by AI processing it, the data that embodies political meaning gains legitimisation due to the AI's “super accuracy.”⁴¹ During the elaboration processes, data is detached from its context, thus losing its meaning, and only reattains a particular meaning by providing a given output. The issue is that semantic

37 Päivi Seppälä and Magdalena Małecka, “AI and Discriminative Decisions in Recruitment: Challenging the Core Assumptions,” *Big Data & Society* 11, no. 1 (March 1, 2024), <https://doi.org/10.1177/20539517241235872>.

38 Lanbo Xu, “Dynamic Emotion Recognition of Human Face Based on Convolutional Neural Network,” *International Journal of Biometrics* 16, no. 5 (January 1, 2024), <https://doi.org/10.1504/ijbm.2024.10063905>.

39 Yilun Wang and Michal Kosinski, “Deep Neural Networks Are More Accurate Than Humans at Detecting Sexual Orientation From Facial Images,” *Journal of Personality and Social Psychology* 114, no. 2 (February 1, 2018): 246–57, <https://doi.org/10.1037/pspa0000098>.

40 Campolo and Crawford, “Enchanted Determinism,” 12.

41 Campolo and Crawford, “Enchanted Determinism.”

detachment is hidden in the algorithm processing, but the possibility of formulating causal claims is still present. The risk is that, as AI applications in society increase, the data they generate has real-world meaning; they reflect the values and biases of the society in which they are embedded⁴². Again, we see tautological reasoning in place: while the data is transformed, their meaning is not. Instead, it is made more legitimate by the AI's "super accuracy." This suggests a politics of control operating a dualistic distinction between the data and the context in which it is embedded.

3.2 AI as Configurative Assemblage

ATOI offers a different analysis of AI's super accuracy, because it considers the outputs and performances as an activity emerging from an assemblage, enabling us to think about it configuratively. To do so, we should first understand the historical trajectory of AI and especially that AI is to a large extent modelled upon the game of chess. Ensmenger⁴³ examines the analogy—advanced by AI practitioners since the 1970s—that positions chess as to AI what *Drosophila melanogaster* (fruit flies) is to genetics: an experimental model for the development of foundational theory. In other words, whereas *Drosophila* has been used empirically for revealing genetic mechanisms, chess has similarly been instrumental in advancing the understanding of intelligence. However, Ensmenger shows that, even though the analogy holds at first glance, the critical review of the two fields shows a different use of the two experimental models. In the case of *Drosophila*, science and organism were mutually constitutive: genetics was reconfigured to meet theories and methodology suited for *Drosophila*, and *Drosophila* as a species was reconfigured as a technology producing new knowledge about complex biosystems. Similarly, this was the case with AI and chess, which redefined what it meant to be an intelligent chess player.⁴⁴

Nevertheless, the similarities fall short when looking at the productive continuities of the two experimental models. For instance, while *Drosophila* has shown to be a flexible experimental technology whose model could be used across various research programs in genetics, chess did not have such continuance⁴⁵. A possible answer for this is that focusing on chess "distracted researchers from more generalizable and theoretically productive avenues of AI research."⁴⁶ This, however, implies questioning deeper aspects, such as how to make theoretically productive outcomes for software research semantically

42 Yarden Katz, *Artificial Whiteness: Politics and Ideology in Artificial Intelligence* (Columbia University Press, 2020).

43 Nathan Ensmenger, "Is Chess the *Drosophila* of Artificial Intelligence? A Social History of an Algorithm," *Social Studies of Science* 42, no. 1 (October 14, 2011): 5-30, <https://doi.org/10.1177/0306312711424596>.

44 Ensmenger, "Is Chess the *Drosophila* of Artificial Intelligence?"

45 Ensmenger, "Is Chess the *Drosophila* of Artificial Intelligence?," 24.

46 Ensmenger, "Is Chess the *Drosophila* of Artificial Intelligence?," 7.

continue. In this sense, thinking in assemblage terms is crucial, as software is an object sitting between computing technology, social relationships, organisational politics, and personal agendas⁴⁷. As a result, software becomes difficult to situate historically and geographically. This becomes immediately tangible when asking ChatGPT where it is located. It generates the answer:

I don't have specific coordinates as a singular entity because I can distribute across multiple servers and data centers worldwide [...] the specific server handling your request could vary each time [...] so that than having a fixed set of coordinates, my presence is distributed and dynamic within the cloud infrastructure.

This ephemeral description is misleading because it focuses exclusively on operational activities and data operations. However, these data operations cannot be semantically relevant without a context. To transform ideas into action, all software, including AI, must necessarily become embodied: operating on specific computing systems and in specific socio-technical environments.⁴⁸ From an assemblage perspective, this becomes a question of its identity and stability. In other words, the operational activity of AI needs to be semantically continuous with the data (coding parameter) and physically and spatially bounded (territorialization).

Moreover, introducing assemblage perspectives also entails accounting for how AI shapes the mutual relations between algorithms and users: algorithms are influenced by users as much as users are coded as data points. In this operation, matter and form are inseparable, making the context situated within the elements. At the basis, elements' agency is a continuous process of interaction, finding expression in specific points—for example, in the interface where the algorithm and user meet, becoming visible. The suggestion that assemblage theory offers in reading AI's super accuracy is that, rather than being enchanted by the data operations, it is first important to understand the system fragmentation, that is, where the system is (territorialization) and how this is expressed by it (coding). Super accuracy becomes the assemblage's activity and results from the configurations of relations by means of which causal mechanisms are distributed within the assemblage.

In summary, by reviewing the historical comparison between *Drosophila* for genetics and chess for AI as experimental models, we see that, as suggested by Ensmenger,⁴⁹ the analogy

47 Nathan L. Ensmenger, *The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise* (MIT Press, 2012).

48 Matteo Pasquinelli, *The Eye of the Master: A Social History of Artificial Intelligence* (Verso Books, 2023).

49 Ensmenger, "Is Chess the *Drosophila* of Artificial Intelligence?"

does not hold. The issue is that for the latter, there is no continuity in expressing the contextuality into which the developed algorithms were embedded. To overcome this, we have proposed reading AI and, more generally, software as assemblages, where elements shape each other by being part of the assemblage and by expressing contextual continuity within spaces of interaction.

3.3 Assembling intelligence in the HITL

From an assemblage perspective, AI is more than just algorithms performing data operations. It is about politics and social control, whereas the system architecture mimics social context, configuring space, time, relations, and operations.⁵⁰ Under this view, the metrology of intelligence played a major role in social and racial segregation, which now operates within AI for controlling labour, for example, establishing social and epistemic hierarchies.⁵¹ In other words, AI is, at first, a socially contingent phenomenon: human designers who train and refine the algorithm encode their situatedness into the algorithmic world. The same goes in the other direction: the algorithm acts as a transformative agent, shaping the elements of the assemblage by influencing the type of labour, training, skills, and knowledge users need to acquire to interact with it, or by making the algorithm relevant in different societal contexts. Under this view, a politics of configuration helps understand how AI assemblages emerge by establishing relations between different fragments.

Let us make this description more concrete by focusing on the Human-in-the-Loop (HITL) case. HITL is a relatively new methodology that has found momentum in machine learning in the last decade. The HITL approach has found application in a variety of domains, ranging from medicine to autonomous vehicles, and from image recognition to natural language processing⁵². At the core of HITL is the idea that humans should be integrated into algorithm training to improve efficiency beyond random selection by identifying the most critical data for the AI model.⁵³ Thus, one of the major research trends in the HITL field is to study how humans learn and how they integrate similar processes into algorithm development. Such ideas can be traced back to the middle of

50 Pasquinelli, *The Eye of the Master: A Social History of Artificial Intelligence*; Min Kyung Lee et al., "Working with Machines," *Conference: CHI '15 Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, April 17, 2015, 1603–12, <https://doi.org/10.1145/2702123.2702548>.

51 Luke Stark, "Algorithmic Psychometrics and the Scalable Subject," *Social Studies of Science* 48, no. 2 (April 1, 2018): 204–31, <https://doi.org/10.1177/0306312718772094>.

52 Xingjiao Wu et al., "A Survey of Human-in-the-loop for Machine Learning," *Future Generation Computer Systems* 135 (May 18, 2022): 364–81, <https://doi.org/10.1016/j.future.2022.05.014>.

53 Chelsea Chandler, Peter W Foltz, and Brita Elvevåg, "Improving the Applicability of AI for Psychiatric Applications Through Human-in-the-loop Methodologies," *Schizophrenia Bulletin* 48, no. 5 (April 14, 2022): 949–57, <https://doi.org/10.1093/schbul/sbac038>.

the 1980s, with publications by Valiant⁵⁴ and Angluin,⁵⁵ who suggested simulating the learning processes that take place in a classroom, where a student (the algorithm) asks the teacher (the human) to give explanations about examples, represented by categorising and labelling data.

The narrative of the politics of control is embedded in the design of technological systems, as HITL exemplifies. It is conceptually based on a tautological argument: reduction as seeing the human in control, and naturalisation as viewing the human in control due to its unique characteristics of being intelligent, thus situating the human-user hierarchically above the algorithm. In this sense, the human is seen as a “guardian” of the loop, implying control and a top-down relationship. However, this hierarchical understanding does not hold up upon closer scrutiny of the idea of a loop. When this idea is taken seriously, the human user and the training algorithm are positioned horizontally, co-shaping each other through mutual interaction. This shifts the understanding of HITL from a purely human-centred process to one of mutual influence, in which humans and algorithms transform each other through interaction.

The HITL structure is designed such that humans can act at crucial decision points in the system, but this does not necessarily imply that humans control it. Nevertheless, the approach has been shown to increase the “super accuracy” of algorithm development.⁵⁶ Thus, our critique is not of its technical utility but of its philosophical implications. We hold that on a conceptual level, HITL is more accurately conceived under the terms of a configurative structure rather than control, a view that highlights how humans and algorithms dynamically interact, transform, and co-shape each other in the assemblage.

The next question, then, is how exactly the intelligence of HITL must be understood. In what follows, we analyse the activity from the perspective of ATOI and attempt to account for elements’ expressive capacities, thereby offering a reading in which intelligence is not a property of the HITL but rather manifests in the activities resulting from the assemblage’s relations. The first step in illustrating how ATOI applies to HITL is to identify the assemblage’s activity. In HITL, this is the development of super accuracy. Super accuracy becomes a qualitative characterisation of the assemblage’s structure through which activity and contextualization find expression in the identity of the assemblage. Although in the HITL, the identity is provided by the specific organisation of the system by means

54 L. G. Valiant, “A Theory of the Learnable,” *Communications of the ACM* 27, no. 11 (November 5, 1984): 1134–42, <https://doi.org/10.1145/1968.1972>.

55 Dana Angluin, “Queries and Concept Learning,” *Machine Learning* 2, no. 4 (April 1, 1988): 319–42, <https://doi.org/10.1023/a:1022821128753>.

56 Eduardo Mosqueira-Rey et al., “Human-in-the-loop Machine Learning: A State of the Art,” *Artificial Intelligence Review* 56, no. 4 (August 17, 2022): 3005–54, <https://doi.org/10.1007/s10462-022-10246-w>.

of introducing a human supervisor in the algorithmic system. However, the activity and contextualization of the system cannot be reduced to the presence of this supervisor, which is why an anthropomorphic reading of HITL is misleading.

From an ATOI perspective, activity and contextualization define the structure and the assemblage's identity. Thus, it is important to consider the two parameters, territorialization and coding, to point to the activity's boundaries and expression. The activities of HITL are physically embodied in a material infrastructure on which the algorithm and data run, as well as in the bodily presence of the human user. The activity under scrutiny guides the attention to what is relevant to include. Therefore, from the human-user's perspective, what is relevant is how they take on the role of a technician or developer. In other words, the human is part of the assemblage to the extent to which it is configured to interact with the loop, for instance, by developing relevant programming skills. In this sense, we can point to a first insight that ATOI shows, namely, that in the HITL, not all humans can interact with the assemblage, but only specific humans that are configured in a relevant way with the activity of the loop, both as developers or as data sets to exploit.

Having introduced ATOI's parameters to HITL, we now move forward by introducing the three variables: reproducibility, adaptability, and variability.

3.3.1 Reproducibility

Reproducibility refers to the flows needed to sustain HITL activities. These flows can be material (e.g., the energetic components needed for the assemblage's operations) and social (e.g., the presence of specific institutional, educational, and economic conditions). The HITL is an assemblage of heterogeneous elements all connected through intensities. For super accuracy, this refers to how the elements flow: computing technology and human users, energy and economic infrastructure, and the transmission of knowledge and practices must interact to reproduce the activity. Reproducibility shows a space of dependency, because to perform certain activities, the assemblage necessarily depends on externally originated flows. Thus, from an ATOI perspective, reproducibility points to the agency and necessity of these external flows within the HITL. A concrete example is the dependency of the HITL on the electric grid and on material transformation for producing the electricity needed to sustain and reproduce the assemblage, or the economic flow that sustains the development of specific HITL assemblages.

Moreover, flows bring specific qualities to the assemblage. For example, if the funding source is military or medical, the financial flow alters the qualitative nature of the HITL system. While this might not directly affect quantitative aspects, such as accuracy rates, it would still influence overall activities. In military applications, financial flows from defence budgets prioritise HITL systems designed for threat detection and targeting.

This can lead to a specific form of territorialization, where the system becomes narrowly focused on military objectives, reducing its deployment to broader applications, similar to the example of chess previously illustrated. Additionally, financial flows can dismantle assemblages; for instance, government budget cuts in healthcare could halt the development of HITL systems for medical applications. Thus, we see how, from an ATOI perspective, assemblages' flows possess agency that characterises the identity and reproducibility of the loop. Therefore, flow operationalisation becomes a structural component that directly composes the HITL activity.

3.3.2 Adaptability

Adaptability aims to overcome anthropomorphic narratives by suggesting that within the HITL, as it indicates, all elements can lead to relevant changes. Adaptability refers to the assemblage's flexibility in responding to internal changes. This involves questioning how horizontal relations between entities converge in producing activities exhibited at the assemblage level and accounting for ongoing changes. In this sense, adaptability is connected to stability and transformation.

To illustrate stability, consider the application of HITL in a medical context. One of the issues that HITL wants to solve in using AI technologies in the medical field is that the algorithm is not limited to producing medical images, but also enters the diagnostic process⁵⁷. Diagnosis is inherently complex because it relies on interpretation, where each radiologist's inductive reasoning and personal experience are key for an accurate diagnosis.⁵⁸ Thus, the HITL needs to adapt and establish relationships that account for the radiologist's abilities while simultaneously overcoming biases that lead to over-reliance.

On the other side, transformation can be illustrated from a cultural perspective. For example, well-known linguistic terms such as "spam" and "memes" that are now part of the daily vocabulary of the internet have originated in diverse cultural settings - comedy entertainment shows the former, biological research the latter - before becoming ways of reasoning that have grafted the internet culture. Similarly, the HITL can lead to new vocabulary to designate particular interactions within the system that would not be possible without configuring the elements in the first place.

From these two examples, we can see how adaptability is the variable that captures the

57 Filippo Pesapane, Marina Codari, and Francesco Sardanelli, "Artificial Intelligence in Medical Imaging: Threat or Opportunity? Radiologists Again at the Forefront of Innovation in Medicine," *European Radiology Experimental* 2, no. 1 (September 29, 2018): 35, <https://doi.org/10.1186/s41747-018-0061-6>.

58 Pesapane, Codari, and Sardanelli, "Artificial Intelligence in Medical Imaging: Threat or Opportunity? Radiologists Again at the Forefront of Innovation in Medicine," 35.

challenge of aligning horizontal connections to the assemblage activity. Further, this becomes a matter of stability, as horizontal changes produce certain activities, as well as being able to alter the assemblages by absorbing changes within their identity.

3.3.3 Variability

Lastly, variation refers to maintaining autonomy between the assemblage and its elements. As DeLanda⁵⁹ implies when talking about military apparatuses, intelligence lies not in the machines but in the networks of relations that produce activity. In this sense, variation underscores the importance of focusing on the assemblage rather than on specific individual elements that compose it. Looking at HITL in the medical field, if the system were relying on a specific and unique radiologist who would be the only one able to interact with the algorithm, or if the system were entirely dependent on a specific algorithm, then the assemblage as a whole would exhibit dependency towards one or more of its elements. This can potentially open the risk of hierarchy as the non-substitutive component would be the pivotal element of the system, and the risk of drawing the assemblage towards extinction if the component is removed from the HITL due to it not being replaceable. Thus, variation points to the importance of the assemblage's emerging properties and how these have a degree of autonomy from specific individual components.

By applying ATOI to the HITL, we see that super accuracy is not a property; it rather becomes an emerging activity open to its surroundings and produced by flows, horizontal linkages, and distributed and adaptive forms of agentic interactions. Therefore, we face the impossibility of saying who controls the loop; instead, the suggestion is that being in the loop opens to configurative forms of being due to mutual shaping and transformations, rejecting tautological forms of control. This view can be seen as a counternarrative to how AI is being depicted as the ultimate technological achievement, making the case that intelligence captures social processes materially constituted and expressed through relationality and forms of organisation.

4. Conclusion

The notion of intelligence is widely used to describe both the workings of technologies and the capacities of human beings. The alleged intelligence of technologies is modelled on a particular understanding of human intelligence, namely one that is understood in terms of goal-oriented cognitive capacities traceable to properties of a cognitive agent. This understanding of intelligence has a rather particular history, closely linked to Western colonial ambitions. As a result, it introduces a hierarchy between Western people and

59 DeLanda, *War in the Age of Intelligent Machines*.

other people, between humans and other animals, and between subjects and objects. This hierarchy, in turn, gives rise to a politics of control: the idea that entities that lack certain capacities of Western humans can be legitimately dominated and used to satisfy specific demands. We have objected to this view, not only because it has undesirable implications, but because it presupposes that intelligence is a property that can be isolated, located in specific entities, and precedes any kind of activity.

In response to the properties' view of intelligence, we developed ATOI. At the heart of ATOI is the idea that intelligence is not a property that can be ascribed to an isolated entity but instead manifests in the *activity of assemblages*. In DeLanda's interpretation of assemblage theory, reality does not consist of a set of well-delineated entities but rather is populated by dynamic interactions between different types of bodies that cling together. What clings together and attains a relative stability can be called an assemblage. Activity takes place on the level of the assemblage and not on the level of the bodies that constitute it. Hence, any understanding of intelligence that ascribes it to individual bodies is inevitably doomed to surpass the phenomenon. Underlying the politics of control, then, we encounter a view of intelligence that is grounded in an ontological error.

ATOI evades this error by specifying intelligence in terms of three qualitative variables of assemblages: reproducibility, variability, and adaptability. Reproducibility refers to the connections between the different elements within the assemblage and the internal flows between them that are needed to reproduce similar outcomes. Variability implies the assemblage's relative autonomy from its components, such that its agency is irreducible to the workings of a particular component. Adaptability captures the assemblage's flexibility in responding to internal changes in the elements that constitute it. Together, these variables specify the relations that take place within the assemblage. The extent to which the assemblage displays intelligence, then, results from its internal configuration through which the different elements become well-attuned to one another. ATOI's qualitative specification of intelligence disconnects it from the narrative of a politics of control because it breaks with the idea that intelligence introduces a hierarchy between different types of entities. Simply put, in ATOI, intelligence is irreducible to the properties of a particular entity but emerges from a particular configuration of different entities that are interacting. This, then, enables us to move from a politics of control to a politics of configuration.

Our discussion of HITL illustrates this shift. We focused on a particular aspect that AI is typically lauded for: its alleged super-accuracy in recognising patterns in data relative to a particular goal, such as predicting emotional states on the basis of facial recognition. As we showed, this 'super accuracy' is typically taken to be the result of the specific properties of algorithms that are then taken to be indicative of intelligent activity. However, given that algorithmic processes are often opaque and may contain certain biases that lead to

inaccuracies, researchers have suggested that human beings must act as decision-makers at crucial points: they need to guard the loop, as it were. The implicit suggestion here is that humans can place themselves outside of the algorithmic loop because of them having certain intelligent properties. These properties, then, are thought of as effectively enabling the control of algorithms, which is necessary for the proper guidance of AI.

From the perspective of ATOI, assigning humans a specific position within the algorithmic loop is naïve at best. This is because, when AI is understood as an assemblage, there is and cannot be a particular entity that is in control of the loop. However, in the absence of the possibility of being a guardian, there can still be a relevant place for humans within an AI assemblage. But this is because they are partly constitutive of the assemblage's particular flow, without the assemblage being completely determined by the particular human component. Our analysis of HITL showed (1) that the idea of super accuracy based on particular characteristics of components within an assemblage is misguided, and (2) that when taken seriously, the idea of the loop implies the impossibility of stepping out of it. Reading the HITL from a configurative perspective using ATOI has shown how computer system architectures embeds political significance, as the (conceptual) structure shapes how elements and agencies are expressed.

Arguably, our discussion of ATOI and its implications has been somewhat limited. This is, firstly, because we had a limited focus on the case of HITL. This is just one particular example of an assemblage that may display intelligent behaviour under certain parameters. Everything can be viewed as an assemblage, ranging from beehives to cities to the Earth at large. In each of these assemblages, the particular relations constituted by human elements are different, as is the extent to which the identified parameters of intelligence concretely manifest. Secondly, the exact nature of what we termed a politics of configuration can be specified in more detail.

At the start of this paper, we suggested that living with “intelligent technologies” can come with a price. However, it is one thing to maintain that a shift towards a politics of configuration is desirable, but another thing to suggest what kinds of configurations are favourable and how such favourable configurations can materialise. Leaving behind the ideas that configurations fall within the sphere of human control, and that particular properties legitimate certain entities being in control and legitimise the reliability of outcomes, at least helps specify the conditions under which intelligence can manifest. However, it remains an open question what price different assemblages are likely to pay, the extent to which the configuration of one particular assemblage might come at the expense of another, and why certain assemblages might go extinct. It is precisely because of this uncertainty that a call for humility is needed, and to disconnect intelligence from colonial narratives that highlight human uniqueness.

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