MORPHING INTELLIGENCE: FROM IQ MEASUREMENT TO ARTIFICIAL BRAINS

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In her seminal text, *What Should We Do With Our Brain?* (2008), Catherine Malabou gestured towards neuroplasticity to upend Bergson's famous parallel of the brain as a "central telephonic exchange,"[1] whereby the function of the brain is simply that of a node where perceptions get in touch with motor mechanisms—the brain as an instrument limited to the transmission and divisions of movements. Indeed, drawing from the history of cybernetics one can trace how Bergson's 'telephonic exchange' prefigures the neural 'cybernetic metaphor.' It is elsewhere, however, that *What Should We Do With Our Brain?* finds its crux: inspired by Hegel's fundamental opposition between plasticity and flexibility ("[p]lasticity is the way in which time shapes or fashions us, constitutes our subjectivity and at the same time allows for resistance"),[2] Malabou invalidated the 'telephonic exchange' metaphor for failing to take into account synaptic and neuronal vitality. Bolstered by neurologist Marc Jeannerod's research in *The Nature of Mind* (2002), Malabou further demonstrated that the "cybernetic metaphor has also had its day."[3] The discovery of plasticity in brain function had ar-

1 Henri Bergson, *Matter and Memory* trans. Nancy M. Paul et al. (London: George Allen and Unwin, 1911), 10.

2 Catherine Malabou. "The Future of Plasticity." Interview by Kate Lawless. *Chiasma* 3.1, (2016), 99-108.

3 Catherine Malabou, *What Should We Do with Our Brain*, trans. Sebastian Rand (New York: Fordhan University Press, 2008), 34.

guably rendered physico-mathematical comparisons between the computer and brain obsolete. Malabou, accounting for suppleness, demonstrated that the human brain possesses a certain "margin of improvisation, of creation, of the aleatory"[4] that the cybernetic model simply could not account for.

New Wounded (2012) and *Before Tomorrow: Epigenesis and Rationality* (2015) found Malabou qualifying speculative realism vis-a-vis plasticity and staunchly adhering to the Kantian transcendental in a post-Deleuzian moment when the likes of Laruellean 'non-standard philosophy' and Quentin Meillassoux's 'contingency' veered sharply from Kant's transcendental deduction. However, while Kant still looms in Malabou's shadows, particularly via *epigenetic ontology* and the biologization of the transcendental, it is a former concern—the relationship between automaticity and (creative) autonomy—that she returns to in her newest book, *Morphing Intelligence: From IQ Measurement to Artificial Brains* (2019).

Recalling Hegel's assertion of "constant transformation,"[5] in a seminar on Malabou and the "commerce of being," Alexander Galloway once remarked that, given its marked position towards the universal, "the only true plasticity is the one that is changing into its opposite."[6] Consequently, just as plasticity speaks to an ethical imperative to change,[7] Malabou's intervention is equally morphological. In her newest text we find a profound admission: "I was indeed mistaken in *What Should We Do with Our Brain?*: plasticity is not, as I argued then, the opposite of the machine, the determining element that stops us from equating the brain with a computer."[8]

4   Ibid., 35.
5   G.W.F. Hegel, *The Philosophy of History*, trans. J. Sibree (London: Colonial Press, 1900), 121-122.
6   Alexander Galloway, "Catherine Malabou, or The Commerce in Being," *French Theory Today: An Introduction to Possible Futures* (class lecture, The Public School, New York, NY, October 25, 2010), 3. http://cultureandcommunication.org/galloway/FTT/French-Theory-Today.pdf. Retrieved on May 21, 2019.
7   Ibid., 5
8   Catherine Malabou, *Morphing Intelligence: From IQ Measurement to*

Why this marked and profound deviation from Malabou's initial riven opposition between the structural identity of cybernetic arrangements and the brain? For this, Malabou is partially indebted to historian David Bates' research on artificial intelligence, cognition, and epistemology as articulated in the anthology *Plasticity and Pathology: On the Formation of the Neural Subject* (2016). Bates inaugurates his chapter, "Automaticity, Plasticity, and the Deviant Origins of Artificial Intelligence," with the conviction that "[t]he contemporary brain is largely a digital brain."[9] Gesturing towards the field of computational developmental neuroscience and Donald Hebb's seminal theory of synaptic connections (the oft-quoted axiom that "neurons that fire together wire together"),[10] Bates demonstrates that the brain is figured as a learning machine that "automatically constructs, according to set algorithms, connective webs that are dependent on the specific 'experience' of the network."[11] Thus, the imbrication of automatism and plasticity does not robotize plasticity but, instead, unfetters mechanization from the bondage of structural determinism.

However, Malabou does not choose to pursue plasticity as the mediation between determinism/materialism and "pure freedom," or as a "negative transformation" of dialectic conjunctions between Marxist mutual relations.[12] Rather, her critical pursuit is in making sense of 'intelligence' as a descriptor for both machine and human intelligence. Given that today's neural nets, deep learning and predictive processing algorithms are increasingly attributed 'intelligence,' Malabou traces the term's historical use as

Artificial Brains, trans. Carolyn Shread (New York: Columbia University Press, 2019), 113.

9   David Bates, "Automaticity, Plasticity, and the Deviant Origins of Artificial Intelligence," in *Plasticity and Pathology: On the Formation of the Neural Subject*, ed. Nima Bassiri (New York: Fordham University Press, 2017), 196.

10   Carla J. Shatz, "The Developing Brain," *Scientific American* 267.3 (1992), 60–7.

11   Ibid., 197.

12   Catherine Malabou. "A Conversation with Catherine Malabou." Interview by Noëlle Vahanian. *Journal for Cultural and Religious Theory* 9.1 (July 2007), 13.

a scalar apparatus.

Malabou begins with IQ tests and metric scales, working up to an audit of today's synaptic chips. Unfurling the historical conflation between intelligence and genetic fate, Malabou reproaches the early construction of 'hereditarianism' in Alfred Binet and Theodore Simon's work on adaptive testing, reminding us how "[i]ntelligence tests thus became an instrument of biopolitics."[13]

In 1912, with psychologist William Stern's *Intelligenz-Quotient*, the term IQ appeared in the Anglo-American world.[14] In England, soon thereafter, Charles Spearman and Cyril Burt developed the 'correlational' method via the '*g* factor'.[15] Indeed, as psychometrics presented a particularized method for the measure of a dubious and unspecified 'genius,' in turn it sought to uncover a generalized 'intelligence' that was dismally plunged into irremediable ambiguity. This could be reduced to the reifying tautology that "'IQ works becomes it measures *g*,' and '*g* works because it legitimates IQ testing.'"[16]

Yet, as Malabou eruditely notes, the true biopolitical perversion dormant in Binet's metric scale is neither dependent on "g searching for itself," nor on the idea of an IQ score (initially founded as an innocuous "practical device").[17] Instead, no matter how it is defined, 'g' is propped up by a genealogical obsession with heredity. Malabou recounts how early IQ testing is responsible for transforming intelligence into something representable as "a single, scalable thing in the head called general intelligence"[18] and describes how its ideological appropriation resulted in eugenicist trajectories.[19]

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13   Catherine Malabou, *Morphing Intelligence*, 30.

14   William Stern, *The Psychological Methods of Testing Intelligence* (Baltimore: Warwick & York, 1912).

15   Charles Spearman, *The Abilities of Man: Their Nature and Measurement* (London: Macmillan, 1927).

16   Stephen Gould, *The Mismeasure of Man* (New York: W. W. Norton & Company, 1996), 294.

17   Ibid., 185.

18   Ibid.

19   Catherine Malabou, *Morphing Intelligence*, 32.

Admittedly, Theodore Binet, himself, declined to label IQ as inborn intelligence, greatly feared that his 'practical device,' if reified, could be used as an indelible label that postures towards self-fulfilling prophesies. Malabou notes that, despite Binet's benevolent intentions—to carve a guide for identifying children who needed help —he failed to recognize a veiled fallacy where that which is 'heritable' is trussed by inevitability.

Malabou meticulously maps how intelligence testing eventually found a theoretical home in behavior genetics. Following experimental psychologist Francis Galton's application of Darwin's natural selection to intelligence,[20] early 20th century researchers sought to establish direct causal relations between genes and behavior. When biologists John Fuller and Robert Thompson published their seminal 1960 study, *Behavior Genetics*, the field standardized the convention of dissecting human behavior alongside the core traits of "intelligence, aggression, addictive behavior, and homosexuality."[21] Such psychometric comparisons reinforced theoretical, economic and ideological connections between behavior genetics and a burgeoning eugenics movement while initiating the enterprise of dissecting behavior *a posteriori*.

By the mid-1960s a theoretical consensus emerged wherein genetic determinism subsumed the development of a total causal phenotype. It was not until as recent as 1994, when psychologist Richard Herrnstein and political scientist Charles Murray published *The Bell Curve: Intelligence and Class Structure in American Life*, that the intelligence quotient was popularized as a barometer informed by both hereditary *and* environmental factors.[22] Thus, the '*g* factor' was eventually disrobed, revealed as a scientific hoax. Paradoxically, in fact, it was the Human Genome Project's revelation of 'noncoding' DNA that revealed how "everything was not writ-

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20   Francis Galton, *Hereditary Genius: An Inquiry Into Its Laws and Consequences* (London: MacMillan and Co., 1869).
21   John L. Fuller et al., *Behavior Genetics* (New York: John Wiley & Sons, 1960).
22   Richard J. Herrnstein and Charles Murray, *The Bell Curve: Intelligence and Class Structure in American Life* (New York: Free Press, 1994).

ten in DNA sequences even at the molecular and cellular level,"[23] sounding the death knell of the genetic determinist paradigm.

Malabou deftly uncovers the scientific backbone of eugenics to demonstrate how the science of policing "gives way to spying, which, in turn, gives way to cybernetics,"[24] developing a line of complicity between techniques of intelligence assessment and today's 'intelligent machines.' Mehdi Helhaj Kacem once justly praised Malabou for her fascinating coincidence of the ontological/transcendental with the "crudest empiricity,"[25] and *Morphing Intelligence* is by no means an exception. Just as she refuses "separating mind and brain,"[26] Malabou has, in her "heretical appropriation of Heidegger,"[27] also tied being with event, cognition with causality. In *Morphing Intelligence*, we see Malabou's unique ability to mend empirical studies and neuroscience with biopolitics, Hegelian dialectics and Kantian transcendentalism, weaving an elaborate, albeit coherent, arachnean matrix.

Within contemporary continental thought, Malabou upends philosophy's espousal of an exclusionary relationship between science and art, or between science and ideology. Thus, Malabou's bricolage-methodology is evident in *Morphing Intelligence*, as she anchors her critique of intelligence in historical instances of biology while withdrawing from biologism. In comparison to her many philosophical colleagues and predecessors, Malabou provides a singular style and approach to the philosophical dimensions of scientific knowledge, making use of its insights without rejecting or falling prey to them. In this light, Malabou may quite possibly proves herself as the post-continental philosopher *par excellence*, retaining her Derridean poetic roots while gesturing towards analytic Anglophone philosophy's penchant for empirical modeling (illustrated in her instrumentalization of neurobiology and John

23   Catherine Malabou, *Morphing Intelligence*, 60.
24   Ibid., 47.
25   Mehdi Belhaj Kacem, *Transgression and the Inexistent*, trans. P. Burcu Yalim (London: Bloomsbury Academic, 2017), 211.
26   Catherine Malabou, *The New Wounded: From Neurosis to Brain Damage* (New York: Fordham University Press, 2012), xiii.
27   Medhi Belhaj Kacem, *Transgression and the Inexistent*, 211.

Dewey's pragmatism).

Malabou's approach demonstrates the challenge of situating 'intelligence' as an object of unambiguous empirical study. Almost impossible to define univocally, 'intelligence'—in its most pernicious expropriation—has been used to constitute genetic pre-destinations and legitimate dangerous social hierarchies. Perhaps Edgar Morin best abridged intelligence, remarking that "[i]ntelligence is not only what tests measure; it is also what eludes them."[28]

In problematizing intelligence as strictly empirical and biologically determined, Malabou also troubles the traditional distinction between intelligence and intuition rife in the continental philosophical tradition. This division is perhaps best exemplified by Bergson's analysis of intellectual measurement magnitudes in his appeal to intensity, and intensity *alone*.[29] Malabou characterizes this fetid standstill as little more than provincialism: "[a]fter Bergson, no truly new argument was offered to counter intelligence as defined by psychologists and biologists, including the most recent cognitivist version [....] it is seriously outdated and is not productive."[30] Echoing Georges Canguilhem, Malabou castigates psychology's instrumentalist regard for intelligence, since it is able to measure *only* the human ability to "become an instrument."[31] Malabou contends that Alfred Binet (who heavily critiqued Bergson) had it right—intelligence is constituted by intensities *and* qualities.

Appealing to Hume via Deleuze's *Empiricism and Subjectivity* (1977), Bourdieu's physiological description of intelligence as 'conditionability' also proves to be helpful: "to speak of dispositions is simply to take note of a natural predisposition of human bodies, the only one […] that a rigorous anthropology is entitled to assume, a conditionability in the sense of a natural capacity to

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28   Edgar Morin, *La méthode 3. La connaissance de la connaissance* (Paris: Seuil, 1986), 75.
29   Henri Bergson, *Time and Free Will: An Essay on the Immediate Data of Consciousness* (Mineola, NY: Dover Publications, 2001).
30   Catherine Malabou, *Morphing Intelligence*, 39-40.
31   Ibid., 44.

acquire non-natural, arbitrary capacities."[32] Bourdieu's theory of epigenesis by synaptic stabilization, whereby brain development continues long after birth and is largely dependent on environmental and cultural input, challenges innatism. How does this fact arm Malabou's notion of "programmable and programmed plasticity"?[33] The mediation of the physical states of the brain are closely connected to the social posture of the body. Such is the role of 'habitus,' which "restores to the agent a generating, unifying, constructing, classifying power, while recalling that this capacity"[34] is that of a socialized body.

Socialization is the bright beacon of Malabou's optimism— she points to synaptic chips, both synchronic and diachronic, endowed with their own plastic form of intelligence. Indeed, the plastic autonomy of artificial intelligence means that "[m]achines will invent epigenetic (self-)manipulation."[35] Does the death of the author/birth of the scripter have a cybernetic future? If so, Malabou presents us with a means by which intelligent machines can not only reinvent themselves but also cast the descriptor 'intelligence' of its static mold.

Shifting from the more marked political-economic exigencies of *What Should We Do With Our Brain?*, *Morphing Intelligence* motions towards a variegated pragmatic terrain. For instance, Malabou lifts John Dewey's assertion that intelligence is opposed to automatism and that there is an initial "social incorporation of the subject" destined to be "invested in by the cogs of power" while, simultaneously, "freeing itself from this grip through the 'method of intelligence.'"[36] In singular fashion, Malabou pits Dewey practical inscription of time against Bergson, for whom duration is solely the companion of intuition. With the help of Dewey's automatism—whereby "[i]ntelligence is able to interrupt its own routine

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32   Pierre Bourdieu, *Pascalian Meditations* (Palo Alto: Stanford University Press, 1997), 136.
33   Catherine Malabou, *Morphing Intelligence*, 91.
34   Pierre Bourdieu, *Pascalian Meditations*, 136-137.
35   Catherine Malabou, *Morphing Intelligence*, 90.
36   Ibid., 101.

without becoming anything other than an automatism"[37]—Malabou is able to conceive of intelligence within a collective social domain, disentangled from the wraithlike coercive machinery of biopolitics.

Malabou demonstrates that, consequently, it is automatism that allows plasticity to occupy the intersection between the brain and cybernetic arrangements. Given the relationship between computer logic and postmodernity,[38] the enumerative stasis of Big Data has dominated cultural discourse, which has focused on the decentered, networked tenets of the global present. Citing sentiment analysis, data-mining sociality,[39] and "instant revisionism"[40] evinces the erosion between the "real and the virtual."[41] However, Malabou provides a new model of contingency: that of the neuro-computer and the "plastic brain," where the "brain and computer have a reciprocal and 'mirroring' relationship."[42] Importing the resistance of automatism to itself (automatism's "immanent contradiction," able to "survive its own traumas"),[43] Malabou illuminates conditions beyond the rigid functional mechanisms of the database, honing in on that which is creative and unpredictable (rather than predetermined and calculable).

Malabou, the keen historian, uncovers that this determinability is, in fact, dormant in cybernetic historiography. American pragmatist William James once wrote that "[p]lasticity, in the widest sense of the word, means the possession of a structure weak enough to yield to an influence, but strong enough not to yield all at once."[44] Hence, the paradoxical power of "cybernetic plastic-

37   Ibid., 108.
38   Lev Manovich, "Database as Symbolic Form", *Convergence: The International Journal of Research into New Media Technologies* 5 (1999), 80-99.
39   Mark Andrejevic, *InfoGlut: How too Much Information is Changing the Way We think and Know* (Abingdon: Routledge Press, 2013), 88.
40   Bruno Latour, "Why has Critique Run out of Steam? From Matters of Fact to Matters of Concern," *Critical Inquiry* 30 (Winter 2004), 230.
41   Sherry Turkle, *Life on the Screen: Identity in the Age of the Internet* (New York: Simon & Schuster, 1997), 39.
42   Catherine Malabou, *Morphing Intelligence*, 115.
43   Ibid., 117.
44   William James, *The Principles of Psychology* (Boston: Harvard Univer-

ity" resides in its fragility.[45] Stimulated by James' passages on the rigid machine mediated by the open-ended, adaptive structure of the organic nervous system, W. Ross Ashby sought for a machine endowed with regenerative plasticity, or the brain as "error-controlled regulator."[46]

Equally invigorated by neurophysiologist Charles Sherrington's work on neural integration and environmental milieu—particularly how the machine's "threshold of reaction" is sensitively attuned to reaction via its environment[47]—Ashby hoped to construct a machine whose determinate structure was capable of reorganization. Alan Turing's notes on an 'infallible' machine, simultaneously 'intelligent' in its "departure from the completely disciplined behavior involved in computation […] which does not give rise to random behavior, or to pointless repetitive loops,"[48] demonstrate the viability of mechanical pathology and regeneration, which Canguilhem neglected in "Machine and Organism."[49] Delineating a collective closure between cybernetics, pragmatic ethics, and genetic structuralism, Malabou arrives at a working definition of intelligence as "that which opposes the power of the automatism to the automatism of power,"[50] accounting for both sapience and machine intelligence.

Malabou therefore asserts the power of the plasticity of automation, buttressing Simondon's declaration that "the human being is a rather dangerous automaton, who is always risking invention," corresponding to the automaton's operation behind a

sity Press, 2007), 64

45   Catherine Malabou, *Morphing Intelligence*, 117.

46   W. Ross Ashby, *Mechanisms of Intelligence: Ross Ashby's Writings on Cybernetics*, ed. Roger Conant (Cambridge, MA: Intersystems Publications, 1981), 190

47   Charles S. Sherrington, *The Integrative Action of the Nervous System* (New Haven, CT: Yale University Press, 1906), 309.

48   Alan Turing, "Computing Machinery and Intelligence," *Mind* 49, (1950): 459.

49   Georges Canguilhem, "Machine and Organism" (1947), in *Incorporations*, ed. Jonathan Crary and Sanford Kwinter, trans. Mark Cohen and Randall Cherry (New York: Zone Books, 1992).

50   Catherine Malabou, *Morphing Intelligence*, 101.

veiled "margin of indetermination."[51] Malabou's distances herself from the qualification between machine and organism that Kant voices in "The Critique of Teleological Judgment," where Kant makes the formative distinction that, in a machine, parts exist *for* the other but not *because* of the other.[52] For Kant, the human, in contrast, possesses intentionality in its transformational energy, using it to propagate itself (Kant echoes this position in the "Critique of Aesthetic Judgment" when writing on art). Malabou compels us not to choose one 'ideal' model within the brain/machine dialectic but, instead, to embrace the simultaneity of epigenetic becoming fostered in the espoused tension of 'artificial' and 'natural' intelligence. A poetic paradox transpires with the 'digital brain,' resting on its margin of indeterminacy, as "[t]o be intelligent is to look from many sides simultaneously."[53]

Drawing on the plasticity of technical intelligence and developmental psychologist Howard Gardner's theory of multiple intelligences (linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal),[54] Malabou determines that the problem of intelligence can no longer be circumscribed by psychology, biology or cybernetics, or some definite 'super-science' comprising them all. Given this plurality, Malabou also points to Pierre Lévy's concept of 'collective intelligence,' to synthesize an understanding of intelligence in ultimately social terms, rested on the "new type of materiality" prompted by the technologically reconfigured "virtual community."[55] Lévy demonstrates how internetworked data can "provide the technical infrastructure for the collective brain or hypercortex of living

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51   Gilbert Simondon, "Chapters 1 and 2" in *On the Mode of Existence of Technical Objects*, trans. Ninian Mellamphy. (London, Canada: University of Western Ontario, [1958] 1980), 3.

52   Immanuel Kant, *Critique of Judgment*, trans. J.H. Bernard (New York: Hafner Press, 1951), 22.

53   Catherine Malabou, *Morphing Intelligence*, 109.

54   Howard Hardner, *Frames of Mind: The Theory of Multiple Intelligences* (New York: Basic Books, 1983), 44.

55   Catherine Malabou, *Morphing Intelligence*, 124.

communities."[56] Using her amended model of plasticity, Malabou affronts the internal dialectical opposition between autonomous and automatic intelligence, engaging the tension between "a uniformization and normalization of behavior versus equality and the sharing of intelligence."[57]

Concerned with the future of education and the proliferation of 'neuroknowledge' barometers, Malabou asks us whether 'collective intelligence' can be "distributed among the different fields of knowledge without reestablishing new hegemonies and new centers?"[58] Progressing through this line of questioning, Malabou tarries the field of future studies, questioning our possible technological and intelligent futures. Examining both technophobic and technophilic fantasies of future intelligence, Malabou ultimately opts for a model of horizontal intelligence wrested from biological determination and the particularly vocal technopolitical hysteria voiced by today's tech corporations and their reactionaries.

For Malabou, both fantasies of a fixed horizon of intelligence and delusions of an autonomous community of machines (for good or ill) are simply not viable. 'Automatic creation,' on the other hand, is, although this venture will solely be capable of a "political platform and ethical texture" if we endow it with one.[59] Malabou calls for decisional "intersubjectivity,"[60] or transparent and communal legislative advancements regarding algorithmic development that are voted upon by the masses, rather than covertly decided on by the same tech companies that these decisions benefit. This necessitates a kind of human transformation to accompany an epochal plasticity of laws, ethics, and mentalities.

While *Morphing Intelligence* provides a keen revision to the exclusively 'human' terms of plasticity proposed in What Should we do With our Brain?, it also presents a new fulcrum with which to

56   Pierre Lévy, *Collective Intelligence: Mankind's Emerging World in Cyberspace* (Cambridge, MA: Perseus Books, 1999), 9-10.
57   Catherine Malabou, *Morphing Intelligence*, 128.
58   Ibid., 128.
59   Ibid., 161.
60   Ibid., 162.

re-perspectivize 'intelligence,' both human and machine. Thomas Nagel once anchored the epiphenomenal qualia of subjectivity within consciousness, eloquently destabilizing materialist proclivities in philosophy of mind. [61] In parallel, Malabou extends an irreducibly creative and aleatory subjectivity to machine intelligence. Citing algorithms that are implicated in qualitative activities such as artistic creation and improvisation, as exemplified by AlphaGo—the 'deep learning' machine that won the 2016 world Go championship—Malabou identifies the subtlety of algorithmic calculation today as the capability of "simulating noncalculation."[62]

In *Morphing Intelligence*, Malabou eruditely maps imperatives appropriately situated within contemporary sociopolitical discourse. In April 2019, the European Union published "Ethics Guidelines for Trustworthy AI," legislating a set of requirements that AI systems need to meet in order to be deemed above suspicion.[63] Following San Francisco's recent decision to ban local police agencies from using facial recognition technologies, Sense-Time, China's most profitable artificial intelligence start-up company, has called on governments to establish new regulations for facial recognition systems instead of banning them all together. Such contentious judgments, equally embroiled with human rights and algorithmic programming, will become increasingly critical for public involvement. *Morphing Intelligence* gestures towards the eminent legislative and ethical concerns framing a participatory digital democracy, bioethics, surveillance and the dangers of a divided transhumanist universalism permeating our not-so-distant future.

61   Thomas Nagel, "What Is It Like to Be a Bat?", *The Philosophical Review* 84.3 (1974), 435-450.

62   Catherine Malabou, *Morhing Intelligence*, 148.

63   Maroš Šefčovič, "Ethics Guidelines for Trustworthy AI," (2019), https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai. Retrieved May 24, 2019.