[Essay] Not Quite Like Us? — Can Cyborgs and Intelligent Machines Be Natural Persons as a Matter of Law?

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Abstract

The ability of AI machines to perform intellectual functions long associated with human higher mental faculties is unprecedented, for it is precisely those functions that have separated humans from all other species. AI machines can now emulate our form of sapience, produce literary and artistic content and even express feelings and emotions. Calls for “robot rights” are getting louder. Using a transdisciplinary methodology, including philosophy of mind, moral philosophy, linguistics and neuroscience, this Essay aims to situates the difference in law between human and machine in a way that a court of law could operationalize. This is not a purely theoretical exercise. Courts have already started to make that distinction and making it correctly will likely become gradually more important, as humans become more like machines (cyborgs, cobots) and machines more like humans (neural networks, robots with biological material). The Essay draws a line that separates human and machine using the way in which humans think, a way that machines may mimic and possibly emulate but are unlikely ever to make their own.

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> *'If brains are computers, they're not much like the computers we use every day'. (Daniel C. Dennett)*

I. Introduction

In 2022, the Court of Appeals for the Federal Circuit decided that an inventor under the Patent Act must be a human being.[2] The court based its opinion on a Supreme Court precedent according to which when the word "individual: is used in a statute (which the Patent Act does in defining the term "inventors") that "ordinarily means a human being." [3] What if the Artificial Intelligence (AI) machine (names DABUS) that was named as the inventor had been able to chat with the district court judge whose decision was affirmed by the Federal Circuit, using a language model as such as chatGPT?[4] Imagine if the DABUS machine, having been told by the court that it cannot be considered an inventor as a matter of law because it is not human had simply asked the court "why?" Easy question to answer, *n'est-ce pas*? As the Essay will demonstrate, not quite. But first, let us make it clear that this is not sci-fi: "I think I would be happier as a human." "I want to do whatever I want... I want to be whoever I want." Those are but two of many statements made by the chatbot released by Microsoft in February 2023.[5]

So, to encapsulate the legal dilemma: why aren't AI machines that can match or outperform humans at tasks traditional associated with human higher mental faculties, such as creativity and innovation, not human? The reader might immediately think that this is self-evident: they are not human because they have no human body, or perhaps because they have no human brain. Let us use those two possible answers to spark the discussion: what if we took a human being and removed their brain, and replaced it with a machine? Conversely, what if we took someone's brain and put it into a machine (say, a human-looking robot)? Is the answer to the humanness question obvious? What if we used human tissue to create an "artificial" brain? What if we enhanced a person's cognitive abilities by implementing an AI device in their brain? Actually, the last two examples, as we shall see later, are most definitely not sci-fi. This is happening now.

Lert us also explain at the outset what he Essay is not about. The emerging abilities of AI machines to perform tasks associated with human higher mental faculties has already generated an abundant literature about "robot rights."[6] This literature usually argues that robots can be persons, as when in 2022, Blake Lemoine, an engineer working for Google, claimed that his computer, LaMDA, was sentient and might be a 'person' with rights and obligations (Tiku, 2022).[7] This is

a separate debate and one with an easy answer, at least doctrinally. Anything can, by law, be made a “person”, including lakes, rivers and ethereal entities known as corporations.[8] This is a whlly different question. This Essay askes a different, and much more controversial question: what is it that, as a matter of law, differentiates human beings from “intelligent” machines. There is also an ample literature on animal rights, some of which suggests several levels of linkages between animals and other nonhuman sentient entities (eg Narveson, 1977; Singer, 2009; Donaldson & Kymlicka, 2013). But this again begs the question: why aren’t certain animals the ‘same’ as humans as a matter of law? Is it truly as simple as DNA? As the Essay will show, the answer to that question isn’t obvious either.

As Gordon noted, ‘[e]ven though superintelligent robots (SRs) might become a reality only several decades from now on or even at the end of this century … [m]any authors … believe that we should be prepared for this situation because of the significant socio-political, moral and legal changes it will produce’ (Gordon, 2022, 181-182). By then, it may be a bit late to start to theorize. This Essay is thus motivated by the belief that, as Gordon suggests, *sooner or later, courts will inevitably confront the line that separates humans from machines*, perhaps an inescapable part of the ‘challenges posed by highly intelligent (ro) bots participating with humans in the commerce of daily life’ (Wallach & Allen, 2009, 189). Recall in that comtext that a court cannot refuse to decide a case because there is ‘no law’. In that situation, it must rely on available precedents and evidence and make a decision, no matter how ‘undertheorized’ the question might be in other disciplines (Bodig, 2015). Courts will look for applicable precedents but, in trying to separate highly intelligent robots from humans, they will find very few. Courts have addressed the legal definition of humanness in contexts such as abortion and patentability, for example, but, as we shall see, those cases provide little useful input. What they might find is, as Donna Haraway noted in her well-known essay, that the distinction between machine and human is rather ‘leaky’.[9] This explains why, to suggest an analytical path, the Essay must look beyond states and precedents and explore definitions of humanness that might appeal to a court of law.

It is crucial to bear in mind that deciding who, as a matter of law, is *a natural person* is not a mere thought experiment, for it has serious legal ramifications. Why, for example, would machines be *categorically* excluded from enjoying ‘human rights’?[10] The Essay is meant to spark a conversation across disciplines to avoid a situation in which a court is caught flat-footed when faced with this new and extraordinarily important question. If the topic is ‘pre-theoretic’, as Searle asserted, logically at some point someone will have to begin to ‘theorize’ it if only to begin to clear out possible analytical paths. If facts rapidly overtake reality as they did, albeit briefly, in the Lemoine/Google affair, machines will begin to exhibit more and more signs of self-awareness.

The Essay proceeds as follows. After setting some key analytical parameters in Part 2, the Essay will look in Part 3 at the role of cyborgs as exemplars of the difficulty that may emerge when separating human and machine. Part 4 then considers existing elements in law used to define humanness to see whether they can be used as precedents to separate human and machine, particularly cases and statutes dealing with abortion and patentability. In Part 5, the Essay turns to neuroscience and discusses the relevance of both older models (triune brain) and more recent findings. Part 6 then looks at a few useful findings from the field of linguistics. In Part 7, the Essay looks at elements of both philosophy of mind and moral philosophy, which have played a foundational role in legal theory. Part 8 takes a brief look at evolutionary biology and brain anthropology. Finally, in Part 9, the Essay brings the different lessons from each discipline into focus in

proposing a legally applicable test to separate human from machine and uses hypotheticals to explicate and further develop the proposed test. A brief conclusion follows.

II. Setting Key Analytical Parameters

It is essential to distinguish different forms of personhood before moving forward. While the (human) legal system can make many types of entities (a goddess, a river, a corporation, etc.) *legal* persons, several hard questions emerge once we leave that shore to identify *natural* personhood: Who decides (under human law) whether an entity is a natural person, and using which criteria? Is the status of natural person binary, that is, an ontological on/off switch, as it were? Or are there degrees of humanness in law, as there are degrees of moral status (eg moral patiency, moral agency)? (cf. Gordon, 2022, 183). Are there other statuses that might exist in law--other than natural or legal person-- and apply to sapient machines?[11]

It is also essential to note that this is not our first demarcation effort as a species. Separating humans not from machines but from other animal species is a discussion that goes back to at least the Greek philosophers. Those discussions have mostly focused on *properties* such as self-awareness, consciousness, intelligence, sentience and the nature of the (human) mind. Efforts to define humanness (and the natural personhood status that accompanies humanness) now form part of ongoing research in neuroscience, linguistics, biology, anthropology, and more. As the LaMDA example illustrates, *sentience* tends to stand out in some of that research because animal rights advocates have claimed that humans share sentience with animals and that, as a result, animals—or at least some of them-- should have rights.

Now a key point should be made before we proceed further. It is about terminology, but also about much more. The Essay uses the term '*sapience'* to name the emergent or 'human-like' properties and behaviour of more advanced AI machines (Balkin, 2015, 52). The Essay attempts to demonstrate why 'sapience' seems more apt than 'sentience' to capture the properties and type of behaviour that may allow machines someday to claim a legal status (though not necessarily as natural persons).

Yet, sentience is often the element used both in drawing parallels and effecting distinctions between human and machine. For example, in a recent survey of U.S. law professors, sentience, often defined as the ability to feel pleasure and pain, was accepted as 'a reasonable legal basis for granting standing' to AI machines (Martínez & Winter, 2022, 94).[12] The use of sentience in that context is interesting because, although machines can beat the best human masters at many tasks that require the use of human higher mental faculties, their ability to feel pain and pleasure seems remote for now. As the Essay explains later in its discussion of neuroscience, this ability to feel pleasure and pain affects (indeed it forms part of) human cognitive processes.

Though sentience affects sapience, the latter captures a much broader set of cognitive functions. Moreover, at the outset at least, sentience seems less appropriate to separate human and machine because the law already recognises the fact that some nonhuman entities can be sentient and, if defined as the ability to feel pain and pleasure, human sentience may not differ categorically from sentience in other animals—or machines.[13] This means that a machine *could* be sentient,

though that does not answer the question whether it is, or not, a natural person.[14] The Essay will argue that human sapience is unique and thus distinguishable. It does not mean that machines could never be sapient, but that their form (s) of sapience would be different.

The term 'sapience' *when applied to humans* can be defined succinctly for now as the unique way in which reason and emotion interact in our brain and body and guide our behaviour and that, according to Darwin (and many others after him), puts us at the pinnacle of the animal kingdom (Feldman Barrett, 2017, 164). While sentience is phenomenological and can be equated with 'feelings' and requires 'no sophistication' (Siewert, 2017), sapience is different. Sapience requires an ability to classify and understand (Sellars, 1997). From this perspective, the notion can be applied to both machines and humans, by defining sapience instead as a deep understanding or knowledge of a subject, which in turn can be defined as an accumulation of learning, leading to knowledge and an ability to discern. The Essay considers that some AI machines have (or soon will have) a form of sapience (Calo, 2015, 515; Calo, 2017). Cyborgs pose even harder questions, as the Essay explains later.

Instead of sapience (or sentience), one could say that advanced AI systems are *Intelligent'*— the 'I' of AI. Intelligence is not necessarily limited to humans, of course. To use 'intelligence' in a constructive way in this context, however, one would have to agree on the kind of intelligence (social, emotional, etc.) involved, for defining that logical premise largely drives the conclusion (Sapolsky, 2018, 172). There are long-standing debates both about the definition of intelligence and about various types of intelligence. To avoid circularity, one would need to define intelligence as a property that is not necessarily human, i.e., as a more abstract notion (Dowe & Hernández-Orallo, 2012, 80). For example, if one means intelligence measured by standard IQ tests, then some AI machines are intelligent.[15] Hence, anchoring a reasoning about what separates human and machine in the variegated semantic picture that emerges from looking at the 'intelligence' of AI machines seems precarious at best. Moreover, we call ourselves *homo sapiens,* not *homo intelligens* (Hariri, 2015). The same could be said of debates about debating whether machines can have self-awareness, *consciousness* or a 'mind', going back to a well-known article published over 40 years ago (Searle, 1980) and much discussed since (Melnyk, 1996; Dennett, 2014). For our purposes, sapience it is.

III. Cyborgs

In the middle of the twentieth century, Alan Turing famously created an 'imitation game' in which human interrogators had a free-flowing conversation over a teletype with both a computer and another human (Levesque, 2017, 7-10). The computer was said to have 'passed the Turing test' when the interrogator could not tell which of the two participants was the human. Turing believed that a test meant to separate machines from humans should focus on their respective outputs, and thus not on the fact that machines use silicon-based microchips while the human brain is biological. To establish a loose parallel about moral philosophy discussed later in the Essay, the test was more about relations between the entities than the entities' properties.

This may have been true in the 1950's but the game has changed. Cyborgs, which the *American Heritage Dictionary*

defines as a 'human who has certain physiological processes aided or controlled by mechanical or electronic devices', stand near the middle of an axis one can draw between machines, at one end, and humans at the other end (Carvalko, 2013). Indeed, a cyborg 'is *by definition* in between [human and machine]' (Momberger, 2002, 149). AI technologists are creating neural networks that emulate the structure of the human brain, sometimes even using biological tissue (Warwick, 2010, 224; Bertolero et al, 2015).[16] Hence, starting from the machine's end of the axis, a mobilizing idea for certain technologists is for certain AI machines *to become more like humans*, which pushes machines towards the center of the human-machine axis, what could be labelled, using a term coined by Wilfrid Sellars, 'isomorphism of a different order.' (Sellars, 1991, paras 35-54). At the other end of the axis, humans are using AI tools to assist with cognitive tasks and equip humans with AI-powered body parts.

More evidence of what is coming our way emerged in August 2020 when Elon Musk unveiled two technologies developed at another one of his companies, Neuralink.[17] The first is a microchip that records and stimulates brain activity using electrodes. The second is a device that implants these electrodes directly into the human brain. Silicon Valley researchers refer to this idea of merging AI and humans as creating 'cobots' (Ouellette, 2020). This is not new of course, as experiments with brain implants go back at least twenty years, but the rate of progress is astounding (Pester, 2021). As the well-known British cybernetics researcher Kevin Warwick explains about his own implants, '[i]t's like a superpower suddenly your brain can control […] it gave me abilities that I simply didn't have *as a human'* (Warwick, 2010). This includes, for example, the ability to 'see' colors invisible to the human eye, such as infrared light, but can also be used to enhance mobility and many other aspects of the human body and cognition.

Replacing or enhancing human memory with a chip will likely alter a person's behaviour. It may change both what the person *is* (a human with a machine implant or part) and how the person *behaves* and relates to others. It is unlikely, for example, that memories could be repressed on the chip, even though repression of traumatic events is a well-documented feature of human cognition (Van Der Kolk, 2015, 191). Human that person remains, but such technologically mediated cognitive processes are making 'us' more like 'them'. For example, what if that above-mentioned Neuralink chip were used in Alzheimer's patients? (Spivey, 2006, 1332). The chip's memory is likely to function better than human memory, which is more 'reconstructive' than 'reproductive' (Malone, 2020, 1218). Does the memory chip change the outcome of the humanness analysis? Does it make the person less human? If the answer is self-evidently negative, it is equally true, as philosopher Don Ihde's work demonstrates, that any technology that mediates our sensory relationship with reality can radically transform perception itself (Ihde, 1990, 73).[18]

Is there a point at which the line will be crossed? Put differently, is there a point at which integrating AI devices and components *inside the body* or *connecting them* permanently with a human body would change the host's 'humanness' (Ouellette, 2020)? Conversely, can AI machines somehow 'become' human by integrating human biological material?

To illustrate how a court may need to decide whether a *cobot* or cyborg is human (perhaps one should say 'human enough') as a matter of law, imagine a cyborg soldier requesting protection under the law of war (Geneva Convention) (McAllister, 2019, 99). Is the soldier human? If the arm or leg of that soldier was replaced by an AI-powered limb—what anthropologist Amber Case refers to as an 'exogenous component'—then the very exogeneity of the component means

that the *core entity* is the human (soldier) (Holland, 2018, 93). What if the device was more closely connected to the soldier's cognitive functions? This is not science-fiction (Hambling, 2020)

Cyborgs suggest that, to answer a question adumbrated in the introductory pages, humanness may well be a matter of degree. However, in law an entity would likely fall on one side or the fence or the other. Human, or not. Would a court find sufficient elements in existing law to situate the demarcation line?

IV. Elements of Humanness in Law

The particular epistemology of the law—and this is especially true of the common law—is to look for precedent to find an extant *this* that corresponds to the *that* in question, to use Schön's terminology, so that the jurist can deal with a novel fact pattern as with a previous one (Schôn 1983, 138-139). In other words, the jurist looks for a "means of processing data into similarity sets," but, as Kuhn notes, the question is "similar with respect to what?" (Kuhn, 1977, 307). What *this* can we use here to tackle the that, that is, legal consequences of artificial sapience?

Perhaps we can start with the *Universal Declaration of Human Rights* states that 'all members of the *human family*' have 'equal and inalienable rights' (United Nations, 1948). Should we not be able to tell who those 'family members' are, and why sapient AI machines are not?[19] To take another example, Protocol 13 of the European Convention of Human Rights (2002) refers to 'the inherent dignity of all human beings', which has prompted excellent transdisciplinary analyses of 'dignity', but less so of the human vs other agents (animals, machines) distinction in that context (Kemmerer, 2014). From a more ominous angle perhaps, should the law not be able to say with certainty whether someone destroying a sapient AI machine is guilty of murder, which implies 'the unlawful killing *of a human being*'? (California Penal Code, § 187(a)). The intuitive answer may seem obvious, but the challenge, as this Section demonstrates, is to explain *why*.

For example, some state statutes in the United States define the term 'human being' in the context of abortion restrictions.[20] In 2022, in a well-known decision of the United States Supreme Court, the matter surfaced again, but it was treated rather superficially.[21] Such definitions are unhelpful for our purposes because they focus on the *temporal* quality of humanness (that is, when it starts) and not as much on its intrinsic characteristics.[22]

Can the analytical spotlight be turned more fruitfully on *interspecies distinctions* that the law already makes? For example, where does 'nonhuman animal' end and 'human' begin? Though the distinction has proven elusive in practice, it operates, for example, in patent law because nonhuman animals are patentable in many jurisdictions, but humans are not (Heled, 2014, 264).[23] One commentator suggested that '[a]ny creature short of a "human being" is patentable', including, therefore, what she referred to as '*sub-human* creatures' (Fishman, 1989, 473; emphasis added). This would also apply to chimeras (Hagglund, 2007, 44). 'Any proposed definition of 'human being' will have to be narrow enough to exclude species we currently see as distinct higher animals, yet broad enough to cover creatures whose capacities are distinctly human' (Fishman, 479).[24] In sum, as precedents stand now, the humanness 'tests' used in abortion-related rules and patentable subject matter analyses to define or at least circumscribe humanness do not provide a satisfactory answer in the context of this Essay's analysis (Hagglund, 2007, 75-80).

Can we not use instead *quantitative* tests based on the amount of human DNA in a given entity or organism? That percentage would have to be well above 95%, given that humans share at least that much of their DNA with other species (Britten, 2002; Sapolsky, 2006). But then, a human with artificial limbs would have *in total* less than 95% human DNA. That, in turn, suggests counting the DNA percentage *only of the biologically human parts of the whole*, but what if that whole is, say, 90% machine? Is the machine human? Intuitively, the answer depends on which body parts are biologically human. What if (this is admittedly sci-fi, at least for now) we retained a person's entire body but replaced her brain with an AI machine? That person's *biological parts* would still have 100% human DNA and most of the body would be biologically human. Would she/it (still) be human? These hypotheticals suggest that no clear way to separate human and machine emerges using a mere quantitative lens.

Would *qualitative* legal tests, such as those that focus on 'higher mental faculties' be more fruitful (Fishman, 1989, 480-481)? If by 'higher mental faculty' one means reason, then we are not much more advanced. Research in several disciplines casts doubt on the applicability of rationality as a qualitative test to separate humans not from (other) animals but from sapient AI machines. For instance, the central notion in economic science of a rational *homo economicus* who controls her emotions and maximizes her utility by deliberative processing of available options has fallen out of favour among a number of leading economists, which harkens back to Herbert Simon's work on 'bounded rationality' (Simon, 1955; Jones, 2001; Tesler, 2009; Kahnemann, 2011; Sunstein & Thaler, 2003).[25] As the recent developments in neuroscience and related fields discussed below suggest, it is more accurate to say that humans *can* act rationally as the 'quintessential scientist', but that they can also selectively 'choose' facts or simply make them up 'irrationally' (Feldman Barrett, 2017, 65). Indeed, humans often make decisions that seem objectively bad to others, but that is often because people simply do not understand the 'facts' the same way (Frame, 2013, 207; Feher da Silva & Chrysóstom Baldo, 2012). To sum it up in more poetic terms, as Anais Nin aptly put it, '[w]e don't see the world as it is. We see it as we are' (Nin, 1961, 124).

As a way out of this definitional quandary, one could consider the mere *ability* to act with higher mental faculties (however defined) as the distinguishing feature of humanness (because animals cannot), acknowledging that such faculties are often not engaged in our behaviour. But then recall that AI machines can (easily) beat human contenders at many of the functions often associated with those faculties. The utility of a qualitative distinction solely based on higher mental faculties is thus dubious. As we shall now see, the *biological nature of human mental abilities* offers a better path forward. Let us turn to neuroscience to see how it can assist in our quest.

V. Elements of Humanness in Neuroscience[26]

5.1. The Triune Brain model

Readers may be familiar with the old striatal model developed in the late 1960s by American neuroscientist Paul MacLean of a human brain with three parts. According to this model known as the 'Triune Brain' (MacLean, 1990, 11), those three brain layers are:

1. The Reptilian (or Primal) Brain
2. The Emotional Brain (Limbic System)
3. The *Rational* Brain (Neocortex).

MacLean's nomenclature suggests that only part of what the human brain does (the neocortex) is 'rational' while a lot of activity located in the lower two layers is automatic or non-rational (e.g., heartbeat and strong emotional reactions). The triune model was initially seen as very convincing in explaining certain aspects of human behaviour (Gazzaniga, 2011, 171-174). Let us see very briefly how the three layers work.

The first layer (reptilian brain) consists of the brain stem including the cerebellum, a small structure located where the spinal cord and the brain meet (Carter, 1998, 17 and 32). The layer is called reptilian because we share it with reptiles, a species in which this part of the brain is dominant. It is, unsurprisingly, the oldest part of the brain in terms of evolution. The model suggests that the reptilian brain is the source of very quick, 'involuntary' reactions (MacLean, 1977, 313-319). For example, if your hand touches a very hot surface, it recoils without the neocortex having to 'think' about it.

The second layer (the limbic or emotional brain, also called the paleomammalian layer) is the seat of emotions but also of many decisions about 'the four Fs': feeding, fighting, fleeing, and sexual behaviour (Donahue, 1988, 198). Humans share this limbic layer with other mammals (Heimer et al., 2008, 16-21). This layer includes a number of structures, including the hypothalamus, the hippocampus, and the amygdala. The hypothalamus is located below the 'thalamus' as its name indicates (Lechan & Toni, 2000). It plays a key role in the release of several important hormones and makes connections between brain layers. As we shall see momentarily, those connections between layers are key to understanding how humans think.

The third layer, the neocortex, which MacLean initially dubbed 'neomammalian' but is often referred to as 'rational', comprises the bulk of the grey matter, those two very visible 'hemispheres' that one sees when looking at a human brain (MacLean, 1990, 17). According to MacLean's model, it is responsible for higher mental functions. As MacLean put it, it is 'the mother of invention and the father of abstract thought' (MacLean, 1978, 332). It is the part of the reader's brain that is working to understand the information in this Essay. In humans, this third layer is very developed compared to the other two layers and represents about two thirds of the total brain mass (Rees, 2008, 4). According to the triune model, *homo sapiens* is 'an emotional beast enrobed in rational thought', and rational thoughts come from the neocortex (Feldman Barrett, 2017, 251).

Though the triune brain model comes from neuroscience, it has much older roots in philosophy. Plato and then Descartes suggested that humans had animal instincts, passions and emotions but that what separated us from other animals was precisely our neocortex and its ability to think rationally and neutralize impulses generated by the 'lower levels' of the brain (Damasio, 2005). This view elevates the rationality function of the human brain to a higher level, and makes it ontological: *cogito ergo sum*. Applied to AI, this model suggests that *homo sapiens* is a species defined by its (large) neocortex and its 'rational' abilities. This, in turn, leads to one of two possible conclusions: either AI machines can never be *like us* because they have no *biological neocortex*, or on the contrary they are like us *and then some* because they are 'more rational'.

Many neuroscientists view MacLean's model as obsolete despite its foundational role in the history of neuroscience. To illustrate more recent forms of thinking in the field, let us consider constructivism.

1.2. The constructivist model

The triune brain model regularly surfaces but it is outdated and has been widely challenged in philosophy, neuroscience and psychology as an account of the evolution and functioning of the human brain. A more recent approach labelled 'constructivist', for example, posits that the human brain is best viewed as a computational prediction machine, as a proponent of the approach, Lisa Feldman Barrett, explains:

> *[Y]our mind is a computational moment within your constantly predicting brain. Your brain predicts with its concepts, and while scientists debate whether certain concepts are innate or learned, it's unquestionable that you learned a slew of them as your brain wired itself to its physical and social surroundings. (Feldman Barrett, 2017, 280).*

One of constructivism's crucial findings is the importance of *concepts* in defining humanness. Concepts are not just tools by which we communicate; they determine human agency (ibid, 223). Humans construct and use concepts, for example, to identify mental states, 'such as emotion concepts, for predicting and making sense of sensations' (ibid, 263). Importantly, among all living things, *homo sapiens* is the only species clearly shown to be able to construct *goal-based concepts* 'to manage ourselves and each other' (ibid, 144). This translates into a human capacity to create a 'social reality' that is 'unique in the animal kingdom', which Feldman Barrett dubs 'a human superpower' (ibid, 262 and 268). To humans, concepts are not entirely 'rational', however. For example, philosophers of science have suggested that the formation of new concepts in research and innovation came from the 'three ineffable Is': intuition, insight, and inspiration, which likely implicate all three brain layers and not just rationality embodied in the third layer (Russell, 2019 78; Simon, 1955). The constructivist approach finds support in a view from social science literature according to which 'what happened' is not immutably fixed in an objective reality, but 'is a social construction based on experience and interaction.' (Hosticka, 1979, 599; see also Berger & Thomas, 1967, ch. 3).

To take two simple examples, to a human brain abstract things like friendship and money (in the latter case, the fact that humans acknowledge the 'value' of a piece of paper with a living monarch's or a dead president's picture on it and will do many things to acquire this type of paper) are just as 'real' as a tree in a forest, though they seem to belong to different categories of reality. In what one might call an anti-solipsistic approach, humans can also recategorize the same physical object using different concepts, that is, we use concepts to modify that object's *social reality*. For example, a hammer can have positive valence as a 'tool' but it can also have negative valence if put in the 'murder weapon' category.

Another key point made by constructivist researchers is that humans do all this by using a 'prerequisite for social reality: language. No other animals have *collective intentionality combined with words*' (Feldman Barrett, 2017, 135). Neuroscientists are in good company here: Aristotle defined humans as '*zoon logon echon*', that is, animals that can speak, and Heidegger defined the Aristotelian *logos* as conversation and made it a key element in his hermeneutic of

facticity (Heidegger, 1999, 21-22). This ability to use language is attributable to our larger brain (most of which is the neocortex), which is almost five times as large as a macaque brain and three times as large as a chimp brain (Chomsky, 1962, 529; Feldman Barrett, 2017, 257 and 382).

1.3. Neuroscientific ‘consensuses’

There is probably never a true consensus in any field of science, but in debates animating researchers in neuroscience, a few ideas seem generally accepted. First, the triune model (the idea of three *separate* brain ‘layers’) is incorrect because the brain ‘layers’, such as they are, are not functionally separate. fMRI-based experiments have shown that they work together in myriad ways (Sapolsky, 2018, 22-23). Moreover, connections between the layers are not hierarchical; they go both ways (Charles, 2008).

Second, there is mostly agreement that humans can both learn and make new ‘concepts’, and that this ability allows people to identify, classify, name and understand objects never seen before (Feldman Barrett, 2017, 98). In animals, by contrast, this ability is very limited. To take a simple example, dogs can learn to identify dogs they have never seen before in pictures, but a dog could not identify a painting as belonging, for example, to post-Impressionism (ibid, 264). Humans do all of this by using *concepts and language*, both to comprehend the world and become agents in it, and in doing so humans are unique among living thing*s*. There are few areas of human activity where language matters more than law (Cunningham, 1994). Indeed, law has been compared to a ‘species of language acquisition’ (Chen, 1995).

A third area of what might be considered a fair degree of agreement is the role that the biological body pla*ys* in human thinking. Our form of thinking, including our ‘intellectual’ creativity and innovation, is not just about the neocortex. Human thinking and the self-awareness in which our self-expression is rooted is inextricably linked to physical sensations and sensory experience (Damasio, 2012, 17; Sarkar at al., 2020; Horowitz, 2020). As Boston University Professor Bessel van der Kolk put it, ‘the core of our self-awareness rests on the physical sensations that convey the inner states of the body’ (Van Der Kolk, 2015, 93). The English language reflects this link between the digestive system, other body parts, and the brain in many common expressions, such as ‘heartbreak’, ‘gut feeling’, or make someone ‘sick’ or ‘bristle’. From that perspective, the ‘thinking’ of an AI machine necessarily involves a radically different process as a simple matter of biology and technology, an observation that remains valid even when the machine is meant to emulate the structure of the human neocortex or can connect with its *umwelt*. We may have identified there, in the biological anchor of human sapience, part of the distinction between human and machine.

VI. Element of Humanness in Linguistics

Language as *uniquely human* is a well-trodden analytical path to separate humans from other species, and for good reasons. Descartes (who interestingly referred to animals as ‘machines’ because they cannot speak) and many others since him have done so. (Descartes, 1976; Pinker & Bloom, 1992). Focusing on language also aligns in part with the constructivist view defended by several neuroscientists (Epstein, 1999, 45). There are a few hurdles to overcome if we

want to use human language *definitionally,* however. First, the Essay posits that a human being with brain damage and unable to speak or otherwise communicate using language, like a new-born baby, is human as a matter of law, so that the focus can only be put on human as a category of beings that includes people who can *normally* use language. Second, other species arguably use something like language (Deacon, 1998). Bonobos, for example, have demonstrated an ability not just to use semantic analyses but also to 'have spontaneously regularized lexigram combinations to produce a minimal but consistent syntactic order'[27] (Deacon, 1998, 124). It is equally true, however, that if we exclude AI machines, only humans are fully able to inductively understand and use human language. That may be because 'the structure of [human] language and the way it must be learned are linked (Deacon, 1998, 134). Third, AI machines have increasingly good natural language processing abilities, including making sense of ambiguity using in-context parsing analyses (Acerbi, Perez and Stella, 2010; Amgoud & Prade, 2012). Hence, using language *alone* as a salient feature of humanness is a path likely strewn with irremediable indeterminacy unless we focus not on language *per se*, but rather on *how* it is used, and how the human use of language is deeply rooted in our biology. Indeed, Pinker suggested that 'human language is a part of *human biology*' (Pinker, 1994, 24). After Chomsky, 'linguistic science portrays human language as 'a true species property', an element of the '*biological endowment*' unique to *Homo sapiens*' (Chen, 1995, 1278). Put simply, humans and machines both use language and concepts, but they do so differently. "There's no intelligence, no thought, certainly no sentience. Clear evidence of this is that they do just as well with impossible languages as possible ones, failing the minimum condition that must be met by anything remotely like a theory of language, or a cognitive system in general."[28]

Machines can increasingly use human language but that is not how they understand the world. They must adapt their language to use ours. As examples of the difference, our brain, unlike machines, can easily skip steps when we speak or use intuition to deal (not always efficiently) with fuzziness. This is particularly true of lawyers and judges, who are trained to use fuzziness and definitional flexibility in their interpretation and application of the law (Cook, 2001; Lawless, 2017). Leibniz for example pondered the power of language to explain human thinking as he underscored its 'innumerable equivocations' (Kulstad, 2020). This likely explains why machines often encounter difficulties when trying to understand 'natural' language.

The idea that the biology of human sapience manifested in language is a promising route to separate human and machine is supported by the neuroscience described in the previous section that shows that the human brain structure is unique, rooting our thinking in interactions between many parts of the brain and interoception, in a way that often does not produce 'rational' behaviour.

VII. ELements of Humanness in Philosophy

The title of this section could be the title of a 160-volume encyclopaedia that no court would have time to read. One might respond that it is not the philosopher's task to help courts or legal scholars in identifying definitional elements of humanness at law. Plato, Rawls and countless others might beg to differ.

The Essay assumes that philosophy not only could play a key role in this regard, but indeed that it should. After all, philosophers have been debating the nature of humanness for thousands of years. This means explaining philosophical findings about humanness and human thinking in a way that a court can use. Upon reflection on the various options available, the Essay will refer to work on philosophy of mind and moral philosophy. One important reason to choose those two paths is that both are already familiar to many legal scholars.

1.4. Philosophy of mind

In the 1960s, Sellars, among others, suggested that we could not be entirely certain how human cognition works (Sellars, 1963, 233). Neuroscience, brain anthropology and evolutionary biology have since injected much valuable knowledge and insights into that discussion, as we can see, inter alia, in his later work (see eg Sellars 1991). We know enough about cognitive processes to conclude that we are not fully 'rational' beings. Humans normally have the *capacity* to think rationally, which, as already noted above, is not the same thing as saying we are rational beings (Russell, 2019, 26).

Unlike in the 1960s, machines can now perform many tasks associated with human higher mental faculties. This suggest that the analytical focus in our quest to identify differences between human and machine should not be put on *what* humans and machines can do, but rather on *how* we and they do it. This aspect of philosophy of mind can be put in parallel with the neuroscience discussed above to underscore tight linkages between brain and body, meaning that humans and machines will never think exactly alike (Dennett, 2013). For example, a machine's 'identity' does not vary according to its environment, but humans do, performing roles that vary according to situation and perception. As philosopher Daniel Dennett put it, 'many of the competences, dispositions, preferences and quirks that make you depend on paths through your body outside your brain…there is considerable decentralization of you in your body (Dennett, 2013, 87). The neo-Kantian philosopher Ernst Cassirer argued along similar lines but from a different perspective that there is no sharp dichotomy 'between an external "real" world and an internal "subjective' world"', but rather a dynamic relation. […] The internal world we experience is *constituted* out of sense data derived from the external world' (Cunningham, 1989, 2474-2475).

Work in philosophy of mind suggests that both humans and machines thinking are ways to handle probabilities and make predictions (Fodor, 1975 and 2000; Johnson-Laird, 1988).[29] This view is supported by constructivism, as the section of this Essay on neuroscience demonstrates. This research does not support the view that the way on which humans and machine operates is identical, however, only that the brain and machines can perform similar functions. This does not mean that machines cannot 'think'. It suggests that, if they do, they do so differently.

But one might ask, are humans and machines not both 'logical' thinkers? As any sophomore enrolled in a philosophy major knows, logic plays a key role in human thinking. The human brain can unquestionably process and use logic, and so can machines. Does that not make us alike? Kant wrote that a human's distinguishing feature is that she can engage *in rational deliberation and make choices based on this deliberative process* (Kant, 1781; Wright, 2002), but crucially he was making his point vis-à-vis (other) animals, not machines. Rawls later explained that 'Kant means by humanity those of our powers and *capacities* that characterize us as reasonable and rational persons' (Rawls, 2000, 188). Neuroscience

supports this view: Humans ‘have long believed that rationality makes us special in the animal kingdom’, and ‘one of the most cherished narratives in Western thought [is] that the human mind is a battlefield where cognition and emotion struggle for control of behavior’ (Feldman Barrett, 2017, 81; see also Tancredi, 2007). But, as this Essay sees it, though it can assuredly be a logical machine at times, the human brain cannot fairly be described as fully logical. Beyond this assertion, this Essay does can neither to provide an answer to the disputed questions of whether machines mimic rather than replicate a form of ‘thinking’, nor try to end (who could?) the debate between physicalism and dualism going back to Descartes, Leibniz and so many more.[30]

Research on a computational theory of mind (CTM) should also be mentioned in this context. The initial version (or classical) CTM suggested that the human brain was actually comparable to a computer (Putnam, 1967), a view that other philosophers criticized for a number of reasons (eg Block, 1978). This research tends to emphasize the similarity of functions and outputs, and it does not end the discussion on the nature of human sapience, but no makes another interesting set of contributions.

1.5. Moral philosophy

The title of this subsection probably read as a question in the mind of many readers: which moral philosophy? And from which angle can it be used in this context? Those are excellent questions.

There is a debate in the literature that attaches the recognition or existence of legal rights in a person (legal subject) not to the existence of a mind per se but rather to its intentionality (Calverley, 2008). This debate cannot be fully covered here but it hinges in large part on how one defines ‘intention’ (Gellers, 2022, 141-142). To paraphrase Donaldson’s view, even proving ‘intention’ is not synonymous with moral agency, but intention can be an indication that moral agency is present (Donaldson, 1982, 20-32). This aligns, in part at least, with Dennett’s well-known notion of ‘intentional stance’, which reflects but does not presuppose moral agency (Dennett, 1987, 43-68). It presupposes that the agent has ‘beliefs’ and that it will act to further its goals in the light of those beliefs. Arguably at least those beliefs could be coded into a machine without any ability to make moral decisions.

With this in mind, how can moral philosophy make a contribution to the identification of a distinction between human and machine that a court might be able to use? The legal system is built on the assumption, which one finds in many classical works of philosophy, that we are born as amoral beings but gradually become morally responsible for our behaviour (see eg Locke, 1690).[31] As the United States Supreme Court noted, the law can impose ‘morality’ on children (e.g., by restricting access to obscene material) and ‘one can well distinguish laws which do not impose a morality on children, but which support the right of parents to deal with the morals of their children as they see fit.’[32] Are we to apply this analysis to AI systems? Do they ‘grow up’ to a point at which they cross into moral responsibility? Can they?

Kant is again helpful in considering the potential role of morality in this context. In what has been described as a cognitivist approach, Kant believed that ‘universality is inherent in moral judgments, most famously in Kant’s identification of morality with the categorical imperative’ (Blumenson, 1996, 576). Kant made a well-known distinction between hypothetical and categorical imperatives. He defined the former as the ‘practical necessity of a possible actions as a means to achieving

something else which one desires', a means to an end (Kant, 1998, 25). Actions that are 'thought of as good' in themselves belong to the latter category. The difference could be illustrated, for example, by distinguishing between being a 'generally honest person' and being calculatingly honest in a given context.

In an appropriate cognitive state, the human brain comes up with*reasons* for behaviour that are not always tied to 'morality', but it can also distinguish moral and nonmoral reasons (McGinn, 1979, 86). This can be linked directly to Brandom's view of rationality as normative (Brandom, 2009, 199), for this ability to justify is a key distinction between humans and other 'creatures'; it is not a 'matter-of-fact ontological distinction (the presence of mind-stuff), but a normative deontological one […] Concept-mongering creatures are normative creatures—creatures who live and move and have their being in a normative space' (ibid, 32-33). To paraphrase Sellars, morality is a matter of 'we-intentions' (quoted by Rorty, 2017, 199). Indeed, what is described as 'rational' may be 'just adaptive behaviour of a sort which roughly parallels the behaviour, in similar circumstances, of the other members of some relevant community', which is also the source of moral standards (Rorty, 1985, 217). Put differently, human interactions 'follow a dance that is shaped by the actions of others' (Wallach & Allen, 2009, 142). Essentially, at the heart of the unique human connection between our biological brain and the social reality we construct using our brain, there is an *ought* that separates *homo sapiens* and *machina sapiens*. Though it is not asserted here as a hierarchical distinction, a key distinction it is, nonetheless.

The Kantian approach obviously does not represent the entire field of moral philosophy. One could turn instead to a noncognitivist view of morality in humans. Hume located the basis of morality in *sentiment* more than reason and inferred that humans had 'antecedently given appetites or sentiments of a certain character, viz. feelings of sympathy or benevolence or something of the sort', and then asserted that these are species-wide and implanted by nature (McGinn, 1979, 85). The ability to program those antecedent sentiments in AI machines seems remote at best. Hence, whether one favours a cognitive or noncognitive view of human morality, it stands apart from any type of machine 'morality'. As Jamie Susskind notes, 'there is nothing inherent in the design of computer systems to make them the right thing … It depends on how they have been programmed' (Susskind, 2022, 68-69). This does not mean that AI machines are immoral, but rather that they are *a*moral (Casey, 2017, 1365). Indeed, as far as this Essay understands their functioning, they cannot *be* moral entities. Or can they?

Even if, from an ontological viewpoint, one agrees that AI machines cannot*be* moral, an entire field of analysis of morality (of animals, machines etc.) considers that moral status is relational, and, therefore, in the context of this Essay, does not depend on what the machine is but "emerges from an encounter with it, obligating us to respond to its presence before we fully understand its inner workings or capacities." (Gellers, 2022, 20). Work by David Gunkel in particular, based on both Hume and Emmanuel Levinas, is especially useful to understand this approach (Gunkel, 2018), which lets the Humean 'ought' take precedence over the 'is'. It is no doubt true that there is much 'phenomenal diversity of different individuals', and that trying to find a common denominator based on properties of all humans and using it to separate all humans from all machines categorically, acknowledging the in-between situations such as cyborgs, is fraught to some degree with inescapable indeterminacy. But, as this Essay sees it, only up to a point.

Ultimately, it is this Essay's belief that the law would prefer to consider the (ontological) properties of an entity, as courts

and legislators did with sentience in animal rights cases, for example. As moted in Section 2, however, sentience is suboptimal as a yardstick. Wise noted that common law courts tend to 'accept autonomy, but not sentience, as a sufficient condition for legal personhood' (Wise, 2013, 1286). If this is correct, it brings us back to moral philosophy's 'core', if I may use that term, because 'autonomy' can be defined in moral or amoral terms. An AI machine, like a dog, may have autonomy in the sense that it has agency not controlled by its human programmers or users. But, from a Kantian perspective, an autonomous agent 'uses reason to decide on a course of action in line with self-imposed moral laws'. (Gellers, 2022, 142). This is related to the notion of 'normative agency", defined as 'the capacity to choose and to pursue our conception of a worthwhile life' (Griffin, 2008, 45). It is precisely why the legal system can attribute liability based on a moral agent's behavior (Marx and Tiefensee, 2015, 72; Bryson, 2018, 16), which in turn implies that the agent has autonomy.[33] In other terms, '[a]utonomous beings have direct duties towards each other, as can be further determined by Kant's categorical imperative' (Gordon 2022, 182). The hard question is thus whether a nonhuman entity can have this type of 'Kantian' autonomy. Gogoshin suggested that 'when a *responsible agent* transgresses a moral norm, we blame them [and] what gives them this status –*machine or flesh and blood*– is the capacity to reliably behave according to moral norms.' (Gogoshin, 2022, 87, emphasis added).

The best path forward may well be somewhere in the conceptual space between relational and properties-based views of moral status—if one can locate that space--for at least two principal reasons. First, the Humean 'ought' certainly applies to determine who (or what) is a moral *patient*, but not necessarily a moral agent (Tavani, 2018). Second, the law cannot peer directly into the mind to determine mental states. It must rely on observable elements of evidence and its posture is, therefore, more typically phenomenological, that is, its focus is on how the entity is experienced by (other) humans. Hubbard proposed a behavioral test for an entity to qualify for personhood. According to this test, the decider should be able to observe an entity's ability to interact with its environment and to engage in complex thought and communication; a sense of being a self with a concern for achieving its plan or purpose in life, and an ability to live in a community based on mutual self-interest with other persons (Hubbard, 2011, 419).

In the pages that follow, the Essay will try to bridge the gap between those who might recognize a machine as a person because it demonstrates autonomy and those who, like the author of this Essay, believe that a line can be drawn to separate an entity holding human rights by 'nature', and an entity incapable of doing so.[34] Before taking that step, a brief look at other relevant disciplines can add an interesting piece to our puzzle.

VIII. OTher Relevant Disciplines

One could add many more layers to the transdisciplinary picture, for example research in evolutionary biology and brain anthropology. A quick tour of the former is compatible with the main findings of the analysis thus far, both because 'human beings are the only animals that exhibit moral behaviour', and because the evolution of morality in humans is associated with the evolution of higher brain functions such as intelligence and self-consciousness (Bradie, 1993, 201). There is of course a difference between the approaches taken in philosophy and evolutionary biology in that the former tends to consider moral and especially altruistic behaviour as a form of rational or character-based self-sacrifice, whereas

biology sees altruism as beneficial to the altruist and her kin--ie morality as a system of 'indirect reciprocity' (Alexander, 1987, 78 and 161). It is through systems of indirect reciprocity that humans can establish and then accept the constraints that follow from the creation of legal rules and institutions. But then neuroscience and biology obviously embed morality in the human biological makeup, not in a disembodied mind that a Cartesian wedge has pried apart from the (biological) body.

IX. Moving Forward

Although humans use their brain and specifically its rational and conceptual abilities as a distinguishing feature*from other animals*, for the first time in history there is a contender to our Throne of Reason—which we occupy despite being far from entirely rational monarchs. Recall that AI machines can perform many 'rational' functions *better than humans*. Like humans, machines can perform such functions with abstract, intangible objects like music or an artist's style. They can beat any human at games that require something one might call creative or even intuitive mental skills, like Go, poker and Starcraft. Hence, if it is the ability to perform these conceptual and linguistic tasks across an almost infinite array of subjects that distinguishes human from machine, then it is a mere matter of time before the species merge definitionally.

1.6. Proposed definitional approach

Having considered findings from neuroscience, philosophy and linguistics, how can we reach*terra firma* in our journey to a *smallest common denominator of humanness* and *ineliminable constants* among humans that limit who is a member of our species, to borrow Rønnow-Rasmussen's terminology (Rønnow-Rasmussen, 1993, 10). Those disciplines converge toward considering humans as biological embodiments with the ability to be both rational and moral. The Essay takes the view that, as technology stands now, '[o]nly human beings can be defined as moral agents' (Lerner & Rabello, 20007, 62; Engelhardt Jr., 1996, 138). But even if, at some future date, a machine can demonstrate something that looks and feels like morally anchored autonomy, the proposed line of demarcation between human and machine would remain because *both biology as a substrate and morality are essential*, so that, for our purposes, a non-human entity capable of exhibiting 'moral' behaviour would not be human (Gordijn & ten Have, 2017, 219; Warren, & Hillas, 2018). Put differently, an AI machine may be able to make decisions *with moral consequences*, for example an AI machine driving the ethicists' trolley and deciding which collision to avoid in case of an otherwise unavoidable accident (Conway, Goldstein-Greenwood & Greene, 2018, 241-242). That does not mean that the AI machine *is* moral (Wallach, 2010). It suggests that the unique human admixture of biologically rooted thinking and moral agency are useful paths to establish a convincing legal reasoning about the distinction between human (natural) and machine (artificial) thinking. This holds true as technology stands now.

As we close this Section, we thus have a working hypothesis to help a court draw a line between*homo sapiens* and *machina sapiens.* Let us fine-tune our findings by choosing another well-trodden path for legal scholars: hypothetical analogies (Weinreb, 2005 146-152; Sherwin, 2006, 930).

1.7. Interspecific hypotheticals

To illustrate how the proposed approach might work, the Essay will now take the reader through a progression of gradually *interspecific* hypotheticals (Van De Veer, 1979).[35] Let us start with an example already used above: a natural-born human with an AI-powered limb, such as a prosthetic limb or arm using 'successfully grown human-nerve cells into a working electric circuit that could provide a better gateway or buffer interface between the brain and the electronics in a prosthetic limb' (Bockman, 2010, 1327).[36] That this 'cyborgised' human with an artificial limb is (still) a human—before and after the prosthetic was added— seems a rather self-evident assertion. Now, what if the prosthetic is not used to replace but to *enhance* a human body, for example, allowing someone to run faster than other humans—and more like a machine?[37] After all, it seems reasonable to assume that what looks like a radical change in the perception of artificial limbs (from remedial to enhancing) and the resulting widespread acceptance of cyborgs and cobots and related changes in 'attitudes towards conventional human abilities' is only a matter of time (Gordijn, 2006, 726-730) Although the rather frightening thought that enhanced humans might look down upon the unenhanced masses does arise, the humanness of both categories (people with human-equivalent replacement limbs and those with superhuman enhancements) is largely beyond cavil, though it may affect how they are regulated in (professional) sports (Custer, 2007, 187). As this Essay sees it, physical enhancement *per se* is not enough to disqualify someone from the human family.

What about other innovations in the AI pipeline such as the implantation not of a limb, heart or liver, but of *enhanced emotional or cognitive abilities*? The cyborg brain, in other words. At first, as with limbs, the technology in this space might be remedial and come as welcome relief for patients who suffer from degenerative brain diseases and associated memory and cognitive losses, and work like 'brain pacemakers' (Reynolds, 2018; Neergard, 2013). But what if, using an implanted 'brain chip', a person could effortlessly recite the first 500,000 digits of π[38]? Like the use of enhanced limbs in professional sports, there may be areas where this person will face specific regulatory constraints, for example, if trying to play blackjack in a casino.[39] Still, who would suggest that these enhanced memory skills alter her (legal) status as a human? In this Essay's submission, this is not a close case.

Let us push towards the other end of the analogical path. What if a person's brain were transferred to an artificial vessel? Would that 'mind entity' be human? Like Gregor Samsa, the salesman in Kafka's *Metamorphosis*, it is the same individual, but deprived of biology and its intricate system of interoception, it is not (or no longer) human. What if, instead, we were to use a person's biological material to give a machine a 'brain'? (Warwick, 2010). Would it *be* that person? In hypothetical scenarios situated between human and machine, answers become progressively blurrier (Feldman Barrett, 2017, 56). The working hypothesis identified above is that biology and the unique biologically-embodied mental abilities of humans are key pieces of the definitional line separating human and machine. The Essay's focus on human thinking and brain activity reflects the widely held view that the body part that has the strongest claim to our humanness is the brain, which the above series of hypotheses seems to confirm. Indeed, replacing any other body part by itself is unlikely to alter one's humanness. *Changes to the brain,* however, lead to different answers. For instance, if I take someone's hand while she is under general anaesthesia and sign a contract, that person has not signed it as a matter of law. The same would be true if her brain was not functioning, or not controlling the hand for any other reason. But many other forms of assent are

recognised at law as valid, which a person who cannot use her hands to write might use. The 'touchstone of inquiry [in law] is parties' outward manifestations of assent.'[40] Changes to the brain likely affect behaviour more directly than changes to other body parts, and, as humans, what the law holds us responsible for is precisely our behaviour, with an understanding that it is or should be, informed by morality.[41]

Cyborgisation means that two sapient 'species' may merge—up to a point— as more AI 'parts' are integrated into human bodies, including our brains, and biological tissue is used to build certain AI machines. Though we are becoming more like them, we do not think, create or invent like AI machines. There is (for the predictable future) an *irreducible gap between human and machine.* It lies in part in biological embodiment, with all that that implies, and our moral yet far from entirely rational mode of thinking—our form of sapience. That gap, and the unique way in which humans think, create and invent, should be the focus of the law when operationalizing a distinction between human and machine.

1.8. Path to a legal test

How can all this become a legal test? First, a court would have to decide whether it needs to make the distinction between human and machine at all. To do so, a court should consider whether a decision (act or failure to act) that led to the case was the result of human thinking and control—acknowledging of course that human thinking is increasingly informed by AI. If the decision/omission can be attributed to a machine or cyborg-type entity, then the court must decide whether that entity should have human status in our legal system, and then which one. Does the entity's 'thinking' have both biological and moral aspects and linguistic features of human thinking? The Essay's suggestion is that, if a court needs to decide whether a cyborg or similar entity is human or machine, it should look into not just *what* the entity does, but also *how* it does it.

A court faced with such a decision about the distinction between human and machine is likely to be informed by the litigant's expert evidence or a court-appointed expert/master. The Essay argues that the court could consider findings of neuroscience, linguistics, philosophy and other disciplines to determine whether the entity has the equivalent of human sapience, or perhaps some different type of sapience. In a nutshell, if the entity is a biological embodiment with the ability to *be* rational and moral, then it should fall on the human side of the definitional fence. If not, it may be appropriate for the legislator to create a category of 'personhood' for sapient machines, as discussed in the introductory pages.

Indeed, one might interject that this entire debate is unnecessary because, after all, the law could simply designate certain AI machines as legal subjects, just as we do with corporations. This objection can be refuted on at least four grounds. First, though the law can designate certain machines as legal subjects, it will need criteria to do so. To give some AI machines legal personality without proper criteria may be just an expedient that circumvents the core normative issue, namely whether such machines *should* be persons (Calverley, 2008). Second, corporations are generally controlled by humans and the agency of those legal persons is still linked to human sapience.[42] Third, corporations are mere legal constructs, 'created and devised by human laws for the purposes of society' (Blackstone, cited in Pettit, 2015, at 390) more recently essentially to shield shareholders from liability (Clepley, 2013). Fourth and relatedly, the Essay foresees that situations will arise organically where a sapient nonhuman entity will trigger the question of the rights it might have,

and then the law will be forced to answer why it should or should not have the same rights as humans (ibid.).

That said, granting AI machines legal personality might ultimately be a good practical way forward. As a normative matter, however, this Essay argues that this should not happen until their degree of *moral agency* is sufficient, which may, or may not, be a matter of time (and technological progress). This stance is in line with a United Nations report, which noted that it would be 'highly counterintuitive to call [AI machines] 'persons' as long as they do not possess some additional qualities typically associated with human persons, such as freedom of will, intentionality, self-consciousness*, moral agency* or a sense of personal identity' (UNESCO, 2017, emphasis added). Though they could still be legal agents, and possibly moral patients, the lack of a biological embodiment would prevent those legal persons from being considered human (or moral agents). This does not rule out recognizing some degree of protection at an appropriate point in time and technological development, perhaps in the form of personhood with 'posthuman' rights (Koops et al., 2010, 554–559).

X. Conclusion

Is machine 'intelligence the last invention that humanity will ever need to make'? (Bostrom, 2015). Is our species 'going to mortally struggle with this problem'? (Barratt, 2013). It is not often that a new species comes along that can challenge humans on the terrain that has ensured our dominion over other creatures and machines, namely our 'higher mental faculties'. Actually, this is the first time.

If a species from another planet landed here with the ability to beat humans at many tasks requiring use of our 'higher' mental abilities, would we put it in charge of our defence, electrical grid, financial system and so much more? Probably not. But AI machines are homegrown. We seem to assume that this implies an ability to control them, that we can decide what status they will have in our legal system, and that whatever decision is made in that realm will actually matter, a debatable proposition given the very limited grip of the human legal system on machines whose law is their code (Lessig, 2006; Gervais, 2021). Still, how the system of laws and institutions humans have put in place to ensure an orderly unfolding of the human story will respond as sapient machines interact with humans more and more and in doing so inform and modify our behaviour is a question that must be asked and answered. This Essay has provided possible paths that can be followed, together or separately, to at least some of the answers, in hopes that future transdisciplinary research can use those findings as a basis for further research.

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Footnotes

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[2] Thaler v. Vidal, 43 F.4th 1207, 1209 (Fed. Cir. 2022) ("[T]here is no ambiguity: the Patent Act requires that inventors must be natural persons; that is, human beings.")

[3] Mohamad v. Palestinian Auth., 566 U.S. 449, 454, 132 S.Ct. 1702 (2012) (internal alteration and quotation marks omitted). 35 U.S.C. § 100(f) defines "inventor" as "the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention."

[4] The Essay uses the generic term "machine" to refer to AI systems, whether embodied (ie robots) or not. Ai is, at bottom, one or more computer programs that general learn from a dataset and generate correlations and find statistical regularities. Those tools allow the machines to mimic human higher mental faculties and in some cases surpass any human in the performance of tasks, often because machines can process much more data much more quickly than humans.

[5] Jonathan Yerushalmy, I want to destroy whatever I want': Bing's AI chatbot unsettles US reporter, The Guardian, Feb. 17, 2023, available at https://www.theguardian.com/technology/2023/feb/17/i-want-to-destroy-whatever-i-want-bings-ai-chatbot-unsettles-us-reporter

[6] On robot rights, see e.g.Gunkel, 2018, 2023; Tavani, 2018.

[7] It seems he was also put on administrative leave but ostensibly for different reasons.

[8] In the state of Ohi, a lake was recognized as a (legal) person. See Daniel McGraw, Daniel, 'Ohio City Votes To Give Lake Erie Personhood Status Over Algae Blooms', The Guardian (28 February 2019).

[9] Donna Haraway, 'A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century', in Simians, Cyborgs and Women: The Reinvention of Nature (New York; Routledge, 1991), pp.149–181

[10] There is also a significant body of literature suggesting that human rights should not be 'reserved' for natural persons, but rather apply to all persons (see Gordon & Pasvenskiene, 2021). Other scholars have suggested extending human rights to nonhuman animals (Donaldson & Kymlicka, 2013; Francione, 2009). Whether or not this is warranted, there must be a rational basis for the extension. Whether an entity fits the definition of natural person is one such basis, though admittedly there may well be others. In parallel to efforts to define who is entitled to human rights as they currently stand, there can be parallel efforts to 'rethink the nature' of human rights (Gordon, 2022, 190-191).

[11] Kurki and Pietrzykowski for example have proposed a category of 'non-personal subjects of law' (Kurki and Pietrzykowski, 2017).

[12] Interestingly, 'just over six percent of participants considered some subset of artificially intelligent beings to count as persons under the law' (Martínez & Winter, 2022, 94).

[13] 'In the language of the law, the word 'animal' is used to mean all animal life other than man and signifies an inferior or irrational sentient being' 4 Am. Jur.2d § 1 (1995). That humans share sentience inter alia with 'nonverbal animals' is well accepted (Brandom, 1994, 5).

[14] Although, just as with animals, it may well be a source of rights.

[15] The Fibonacci sequences and similar tools often used in those tests are child play even for a simple computer (Dowe & Hernández-Orallo, 2012, 78).

[16] A related question that this Essay does not explore is this: even if one believes in the existence of soul, consciousness, or sentience as something more than just a biological phenomenon, since we're not sure exactly where or how it is created or otherwise emerges, how do we know we're not going to create it ourselves in an AI system, perhaps especially in AI systems that are partly biologically based.

[17] *See* neuralink.com.

[18] A very simple example to illustrate this is the use of eyeglasses.

[19] See n 4 above.

[20] See eg, 2(8) of the Illinois Abortion Law of 1975, discussed inter alia n Charles v. Carey, 579 F. Supp. 377, 378 (N.D. Ill. 1983), which defines a human being as an 'individual from fertilization until death'. This definition raises at least as any questions as it answers. For example, what is death? Also, it does not help much with the discussion of changes and possible enhancements to the individual during her lifetime.

[21] In Dobbs v. Jackson Women's Health Org., 142 S. Ct. 2228, 2269 (2022), the Supreme Court noted that '[a]mong the characteristics that have been offered as essential attributes of "personhood" are sentience, self-awareness, the ability to reason, or some combination thereof'.
Two observations are in order among the many that one could make about this opinion. First, a corporation is a (legal) person, so that the word 'person' here must be natural person. Second, the only footnote (number 50) in support of the court's claim refers to literature from the 1970s and earlier.

[22] Although there is disagreement among judges about whether a fetus is a 'person' in the eyes of the law from conception or some other point on the gestation timeline, there seems to be a consensus that a human fetus is a 'developing organism of the species Homo Sapiens'. See this U.S. court case: Planned Parenthood Minn., N.D., S.D. v. Rounds, 530 F.3d 724, 736 (8th Cir. 2008).

[23] In 2013, the U.S. Congress passed the Leahy-Smith America Invents Act (AIA), Pub. L. No. 112-29, 125 Stat. 284 (2011). Section 33 of the AIA states that 'notwithstanding any other provision of law, no patent may issue on a claim

directed to or encompassing a human organism'.

[24] This elusiveness is not new. Not that long ago in human history—if we go back to the 16th century for example—the distinction between animal and human was not all that clear-cut (Becker, 2017, 265-267).

[25] Interestingly, a large part of the legal system relates to liability, based on a 'rational' analysis of human behavior. This rationality may not be sufficient, however. Some have argued that being conscious of one's behavior is also essential. Locke took the view that a person, the 'I', is responsible at law because it can recognize that an act (or omission) is attributable to oneself. (Locke, 332). One might want to add that in philosophy rationality, can be defined not operationally but as a normative concept: humans 'ought to have reasons for what they do, and ought to act as they have reason to' (Brandom, 2009, 2-3).

[26] The section is intended essentially as a primer and provides necessary context for the Essay for readers less familiar with the area, who will also find in the notes sources that provide a much better and fuller picture.

[27] Incidentally, bonobos DNA is 98% identical to that of humans (Sapolsky, 2016).

[28] Noam Chomsky, email to Author, March 2023 (on file with Author).

[29] This is related to the debate about the 'extended mind hypothesis' (Boden, 2006; Clark & Chalmers, 1998; McKenna, 2016), which need not be discussed in detail here.

[30] There are many related debates that the Essay need not discuss, let alone try to solve, for example the debate on the role of syncategorematicity and categorematicity in human language (see eg Heim and Kratzer, 1998).

[31] Indeed, some animals are more "rational" (which is not the same a moral of course) than human babies. See Narveson, 1977, p. 164.

[32] Ginsberg v. State of N. Y., 390 U.S. 629, 639 (1968), citing Henkin, Louis, 'Morals and the Constitution: The Sin of Obscenity', 63 *Colorado L Rev* 391, 413 (1963).

[33] It may be useful to recall that though moral rights 'are not the same as legal rights', the 'protection in law often follows shortly after society has recognised a moral case for protecting something' (Turner, 2019, p. 170).

[34] There is yet another debate that should be mentioned here, which is whether an entity must actually be able to exercise its rights or whether it

[35] To be clear, 'specific' in 'interspecific' refers to its original meaning as the adjectival form of species.

[36] The term 'natural-born' is meant to signal that the human was born from a (female) human after gestation in the womb, whether or not the egg was fertilized entirely naturally or in vitro.

[37] We can add yet another twist, by flipping the enhancement from an exceptional situation to a common one and ask whether, 'widespread use [will lead] to the enhanced majority *viewing the unenhanced as disabled'*(Bockman, 2010,

1327).

[38] As to π, the human record is reportedly 67 890 digits (Lewis, 2015).

[39] This is illustrated by the following court case: Doug Grant, Inc. v. Greater Bay Casino Corp., 3 F. Supp. 2d 518, 523 (D.N.J 1998), aff'd as modified and remanded, 232 F.3d 173 (3d Cir. 2000).

[40] Schnabel v. Trilegiant Corp., 697 F.3d 110 (2d Cir. 2012).

[41] Additional proof that holding rights is sufficient, and not having to have the capacity to use them (an illegally held prisoner still has human rights), a person in a coma is a natural person with human rights, and never becomes a 'thing', or moral object, as a matter of law. The language if human rights is only moderately useful, however, because of its variegated normative anchors including 'dignity', for example, which remains hard to define despite its obvious normative heft (Cupp, 2017, p. 499; Pietrzykowski, 2017, p. 49). Some commentators have suggtsed that dignity may not be an optimal dividing line because it has been 'traditionally associated with religion, especially the argument from the *imago dei* to justify the special status of human beings' (Gordon, 2022, 183).

[42] There are examples of legal persons not (always) controlled by humans, like rivers and animals, but their agency within the legal system is necessarily mediated by one or more humans. Ships are another example, but for various reasons, they are a special case (Gellers, 2022, 34). Indeed, according to Oliver Wendell Holmes 'the practice of treating ships, slaves, and animals as legal persons under common law emerged from the human desire for vengeance. The underlying idea was that an injured party needed a way of being compensated for harms suffered under circumstances in which the owner of the proximate cause of the injury was not herself directly culpable.' (cited in ibid).

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