The creation of artificial intelligence will require a physical body.

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All of humanity's problems stem from man's inability to sit quietly in a room alone.
--Blaise Pascal

Traveler's in the further regions of experience.
--Clive Barker

This statement may be considered the core driver of all life: there exists a body that seeks the avoidance of pain. Secondary, but nearly identical as a drive, is that body's pursuit of pleasure. While many argue that all actions cannot be attributed to just these "drives," it is difficult to explain how any actual learning required for intelligence may have originated without them - and without the existence of an intelligence in the implied body - as a starting point. The classic "brain in a vat" makes no sense until that brain via a body (eyes, hands, ears, a brain with a memory for remembering, comparing, evaluating, and modeling) has "learned the world" via interactions, experience, and from the activity of themselves and others in the past.

In fact, albeit a bit cold-hearted, we could even conceive of all our human emotions as just genetic adaptations or "tricks" to induce joy from behaviors that are beneficial to the famous "selfish gene." Most of these emotions, for basically the same reason, just so happen to also be beneficial behaviors for the survival of the human tribe including empathy, altruism, love, even greed. Recent research has shown human babies to be born with innate or core emotions or beliefs including the ability to identify physical differences between other babies, a sense of compassion, and a sense of fairness or justice. All of these innate traits can be seen as helping to promote the aggregate success of the tribe and gene pool and thus, perhaps, is why it hurts, arguably for both parties, to be cruel, to kill, to steal, and to be alone.

Over time, as human babies observe and copy behaviors, those behaviors that are successful are then learned and remembered thus reinforcing these behaviors. In essences, if a behavior is successful, then add it to my "tool belt" (i.e. remember it) and increase its value metric or participate in learning to avoid pain and seek pleasure or wants.

In an effort to truly understand intelligence, human or otherwise, we need to be aware of the tools in the proverbial tool belt and the associated biases that come with them. It can also be seen that tools from ancient history may not be the best ones for the modern world. Strong muscles or physical endurance may not help in a world requiring brainpower and great memory although networking and personal appearance still have major value in a community of humans. At the same time, humans face the challenge of determining when to continue to cooperate with our ancestral instincts, versus when to innovate and depart from them. We can pivot away too fast, e.g. the cleanliness hypothesis, where lack of exposure to germs or allergens actually leads to an unprepared and over-active immune system producing children and adults with allergic reactions, asthma, and other immune system illnesses.

Regardless, in terms of understanding and ultimately hoping to create or replicate intelligence, while we might cynically consider all of our historical traits and behaviors as sort of inherent traps or biases, we can also consider them ultimately as tools to aid in the solving of the most fundamental of puzzles (for a being with a body) which again is the avoidance of pain and pursuit of pleasure if not rest. Thus, we can consider the body as the original primer or impetus or "bootstrap" that ignites the mechanisms of problem-solving and likely ultimately intelligence. Thus it is likely the easiest way, if not the only way, to create general artificial intelligence is via the use of a body that can experience pain from sensory input. In short, no body then no pain and if no pain then no problem or "puzzle to solve" and no impetus to solve any puzzle.

So, as the world has worked to create an artificial general intelligence, many have speculated, along the same lines, that a body is likely a prerequisite to building intelligence. I would argue that the prime reason for the need for a body is that this original pain and pleasure drive is the key motivation to get any intelligence (at any level) to do anything. So without a body, how can we actually expect to motivate a theoretical intelligence to do anything? Even the "love of learning" itself can be considered of obvious evolutionary advantage again developed out of tribal and genetic history.

Without the concept of a body, it becomes a very difficult challenge of how to create what we consider intelligence. Separate from discussions of the ability of an intelligence to recognize its own self, so much of how humans communicate and learn is based on copying and empathizing. Without any comparable sense of sensory input, it may simply be impossible to even communicate with an intelligence even if it did exist. But a body with, in essence something akin to a brain, would be needed to not only "experience" the physical world (ultimately to understand and take action on the physical world and to interact with humans) but also, as noted, to be able to store and retrieve information or experiences, to compare and evaluate new experiences versus past experiences, scenes, techniques, sequences, etc…, to find pattern-matches and to model and plan, and finally to execute actions in an effort to ultimately achieve goals that likely, again, originally will be to survive via the avoidance of pain and thus harm and the pursuit of goals that bring about pleasure or reward.

To create intelligence without this paradigm may be an incredibly difficult challenge that may not even be possible without likely a further understanding of the deeper nature of reality or concepts akin to the nature of mind, consciousness, space-time, and the origin of the Universe and life. Otherwise, if an artificial intelligence is created that is not modelled based on a body in a physical world or on "values" we are familiar with, akin to the respect for life, survival of a tribe, and co-existence in an ecosystem, we risk the potential for a being that could be entirely self-driven as it will have no concept or experience to compare against for any notion of empathy.

Human beings, that are born dependent on other humans to survive for so many years as children with parents and caregivers, are inherently biased toward certain concepts even that of a God. Arthur C. Clarke had famously pondered what it would be like to communicate with an ant-like intelligence to understand if they also worshipped an all-powerful deity having been born within a notably different framework than Earth-born mammals. Some have speculated that the creation of the concept of a supreme creator or God as analogous to that of a hyper-parent as human beings found themselves in crisis attempting to establish a logical meaning to why they suffer pain or die. While the concept of a religious God having influence on our planet now or at any time in the past may never be resolved, the concept of a God may never be lost as it may always remain synonymous with the answer to the original bootstrap problem of the creation of the Universe or the why of "something versus nothing." Perhaps, however, we are all still biased by our bodies into believing reality is a world of "something and nothing," akin to pain and pleasure where, in actuality, maybe the entire Universe is latent intelligence just in forms, scales, or time-frames we do not recognize. Or perhaps even consciousness is "nothing special" and just again an ancestral tool to assist with the survival of our gene pool and tribe. Perhaps we humans believe we are special since we exist with the duality of a mental world and a physical world, but perhaps the vast majority of intelligence exists entirely or with the majority of their entity in only a mental or Platonic world?

Returning to the efforts to create an artificial intelligence, we can again consider how without time or in computer parlance a "runtime," code is just code. But until that code is executed in a framework in time, we cannot claim to have a valid computer program. Thus, perhaps intelligence is latent in our Universe but without an intelligence having experienced at least a certain amount of time in a physical incarnation or body even with processing power of photonic speed computer processing, as suggested by Ray Kurzweil regarding The Singularity, it is still hard to imagine any code without a body able to become intelligent.