A Field Theory of Human Intelligence

1. Introduction

The brain-centric depiction of human intelligence is so widely accepted it has become in essence the primary, and usually unstated, assumption backing nearly all intelligence research. In the standard model of intelligence, the human brain is described as producing intelligence behavior, and the brain is typically portrayed as hosting intelligence within the material confines of its assorted lobes (Barbey, 2018; Colom et al., 2010). That is to say, the human brain and its mechanisms embody the *substance* of human intelligence. This deep adherence to a brain-specific model of human intelligence is evidenced these days at the very frontiers of intelligence research, where there are now many ardent attempts being made to record intelligence in action, through a broad assortment of increasingly sophisticated neuroimaging techniques (deBettencourt et al., 2023; Kristanto et al., 2023; Zacharopoulos et al., 2023). For nearly every intelligence researcher practicing his or her craft today, there is no questioning that the human brain forms the locus of human intelligence.

Nonetheless, despite this nearly universal acceptance of a brain-centric depiction of human intelligence, the standard model does face some serious challenges. In particular, there are two major challenges, that if left unresolved, could be seen as casting significant doubt on the validity of any brain-specific model of human intelligence. The first major challenge is the lack of specificity. Although it is widely presumed that somewhere within the cerebral mesh of neurons, synapses and biochemical activity there must exist a describable set of structures and dynamics that correspond and link directly to actual intelligence behavior, to date essentially no element of this set of structures and dynamics has been detailed in any degree (Goriounova & Mansvelder, 2019). The current situation regarding specificity for brain intelligence mechanics can be likened to that of someone having inventoried the many parts composing a clock or watch, but then being unable to say anything definitive about how those parts actually come together to represent time.

The second major challenge to a brain-centric depiction of human intelligence is the Flynn effect. The Flynn effect is the phenomenon first observed in the twentieth century—and observed nearly universally—that each generation has been scoring significantly better than previous generations on intelligence exams (Pietschnig & Voracek, 2015; Trahan et al., 2014). In other words, measurable human intelligence, as represented by the raw scores on intelligence tests, has been steadily increasing over time. This persistent and sizable increase has been so puzzling and so unexpected that many intelligence researchers have taken to insisting that the Flynn effect must be little more than a twentieth-century aberration, a temporary circumstance soon to disappear or even reverse (Dutton et al., 2016). But in fact, it can be easily demonstrated that an increase in measurable intelligence has likely been with humanity for a very long time, ever since the species' turn towards behavioral modernity, and in consequence, there is no reason to expect that the Flynn effect will end anytime soon (Griswold, 2023b). And if this is indeed the case, it poses a deep challenge to any brain-specific model of human intelligence. For if the human brain is to be described as physically producing and hosting intelligence, and if the level of that intelligence has been consistently and significantly increasing over time, what biological agency could account for such rapid and population-wide improvement? Taken at its face value, the Flynn effect would appear to defy almost every known biological and evolutionary principle.

Given the existence of these major challenges, it is not unreasonable to consider alternative models of human intelligence. In particular, any model that could provide greater specificity regarding the material structure of human intelligence, and could untangle the enigma of the

Flynn effect, would be a model worth some serious consideration. One pointer to outlining such an alternative model can be found in the above statement regarding the brain and its mechanisms embodying the *substance* of human intelligence. By example and by analogy from the domain of physics, it can be noted there was a period of time, following the publication of Newton's *Principia*, when mechanistic, substance-based models of natural phenomena were the standard approach—indeed, the only approach—to explaining observed events of the physical world. Heat, for instance, was generally conceived of as a caloric substance, materially transferable from body to body. Magnetism and electricity too were similarly hypothesized as consisting of different kinds of fluid, fluid tangibly housed within the entities producing and experiencing the corresponding effect. Eventually, however, these substance-based models began running up against a series of disquieting challenges, with scientists ultimately unable to describe in detail how the proposed fluids and substances could account for observed outcomes in a broad range of experimental trials (Einstein & Infeld, 1938).

This impasse was resolved beginning in the nineteenth century, first through the work of Michael Faraday and James Maxwell, who proposed that phenomena such as magnetism and electricity could be better described not as fluids or substances, but instead as dynamic properties of the contextual environment, as dynamic properties of a spatial-temporal field (Forbes & Mahon, 2014). This alternative approach to describing physical phenomena became known as *field theory*, and it broke the logjam that was holding up a deeper understanding of the material world. Among the many milestones that field theory has produced are Maxwell's differential equations detailing the characteristics and propagation of electromagnetic waves (Maxwell, 1865) and Einstein's gravity-solving formulas underlying general relativity (Einstein, 1916). Indeed, field theory has proven to be so effective within the domain of physics, that today almost no physical phenomena are studied as substance or material, but instead are studied almost entirely as characteristics of a corresponding field (Wit & Smith, 1986).

Human intelligence too can be modeled as a field. In a field theory of human intelligence, intelligence is identified with the structural properties of the human spatial-temporal environment, and in particular, with the structural properties of the *artificial aspects* of that environment. The symmetry, pattern, repetition, logic, form and so on that undergirds buildings, roadways, books, tools, etc., all this can be seen as constituting the properties of a surrounding intelligence field. The human neural system, including the brain, now released from any presumed need to produce and to host intelligence, can be restored to its customary biological role of being a stimulus/response system, responsive in this case to the stimulus of a surrounding artificial environment, to the stimulus of a surrounding intelligence field. Furthermore, this field is dynamic, it has undergone, and continues to undergo, an intensification. Several hundred thousand years ago, humans lived in an entirely natural setting, free of all artificial influence, which could be described as the equivalent of living in a zero-strength intelligence field. But today, as can be experienced at the heart of any modern city, humans find themselves literally surrounded by an ocean of artificiality, with the structural aspects of that artificial environment forming an extremely strong—and ever strengthening—intelligence field.

A field theory of human intelligence clearly runs counter to the standard brain-centric model, but a field theory of human intelligence does have some distinct advantages. For one, field theory provides a specified description of the material structure of human intelligence. Since intelligence is now being identified directly with the structural aspects of the surrounding artificial environment, describing those structural aspects is no more difficult than detailing the characteristics of the constructed world, characteristics that are entirely open to observation and readily enumerated. This is in sharp contrast to brain intelligence mechanics, which to date remain almost entirely unobserved and unspecified. Also, a field theory of human intelligence untangles the enigma of the Flynn effect. Because intelligence is now being identified directly with the structural aspects of the surrounding artificial environment, and because throughout human history—ever since the turn towards behavioral modernity—the amount, type and complexity of these structural aspects has been continuously increasing with time, this ongoing intensification of the surrounding intelligence field provides for an extremely straightforward and observable explanation of the Flynn effect.

2. Challenges to a Brain-Centric Depiction of Human Intelligence

Lack of Specificity

Picture if you will a modern computer on a table in the office of a Chief Financial Officer (CFO). On a daily basis, this computer performs the following set of tasks: it reads documents from the company's network containing recent billings, receipts, payroll, investment income, etc., then it updates the company's ledger with this new information, and finally it prints out a summary of current assets, liabilities, revenue, costs and profit. The CFO recognizes that this computer is displaying a type of accounting intelligence, an intelligence that the CFO could also display if needed. The CFO is curious about how this machine works, and one day asks a specialist from the technology department to explain the computer's underlying operations. "It seems like magic to me," the CFO says.

"Oh, it's not magic at all," the specialist replies. "There are very specific technologies underlying each step of the process. Here, let me demonstrate." The specialist then brings in some extremely sophisticated imaging equipment and arranges it around the computer. Then as the computer performs its daily set of tasks, the imaging equipment makes recordings of all the activity it can detect. Finally, the specialist provides an explanation of the computer's operations with the help of the pictures the imaging equipment has produced: "You see here, when the computer is performing payroll, this area gets much brighter, over near the fan, and there are some streaks of red color by the hard drive. Those are the operations of the payroll module. Now here, in contrast, when the computer is summarizing liabilities, the pattern of activity changes: it's darker near the fan but much brighter over there by the network card, and those red streaks of color have turned blue. That's the liabilities circuit running under the guidance of the balance sheet module."

The CFO looks quizzically at the specialist. "I appreciate what you've done, but that's not exactly what I meant. I still don't know how the computer works."

The specialist grins back at the CFO. "I know. I was just pulling your leg."

In way of apology for the joke, the specialist then goes on to explain and to demonstrate, in great detail, the actual operations of the computer. It is not an easy or a quick task. To give a thorough explanation of how a modern computer performs something like an accounting task requires a multi-leveled and painstakingly intricate description of many particulars: NAND gates, system-level caches, encodings, machine language, voltage sources—to name just a few of the technologies involved. Nonetheless, despite all this hierarchical complexity, the task of explication can still be sufficiently performed. There is not a single element of a computer's operation or architecture that cannot be outlined and explained in adequate detail (Hennessy & Patterson, 2012).

Now recall what was said of the CFO, that the CFO could also display accounting intelligence if needed. Here too, one could inquire about the CFO's underlying operations, how is it that the CFO can turn receipts and investment statements into an organized and meaningful financial summary? Where does this intelligence come from? If you ask intelligence researchers to explain how the CFO manages to perform these activities, here is what they would do. They would bring in some extremely sophisticated neuroimaging equipment and arrange it around the CFO. Then as the CFO performs accounting tasks, the neuroimaging equipment would make recordings of the CFO's cerebral activity. And finally, the intelligence researchers would explain the CFO's accounting intelligence with the help of the pictures and data the neuroimaging equipment has produced, including descriptions full of references to brain modules and neural pathways. But this time, unlike with the joke played by the technology specialist, everyone will be satisfied and impressed (Haier, 2021).

It might be argued that this comparison is not quite fair, that intelligence researchers do not have the luxury of tearing down a human brain and examining its parts and connections while searching for the intelligence inside—especially while the brain is in operation. But in fact we do already know a great deal about how the human neural system works, knowledge that comes both from post-mortem analyses and from experiments conducted on a wide range of other animal species. And what we do know is this: in general, the human neural system, just as is the case with the neural systems of other animal species, is primarily a stimulus/response mechanism (Simmons & Young, 2010). Certain aspects of the neural system are associated with receiving environmental stimulus, such as those nerve pathways connected to the eyes. Other aspects are associated with giving response, such as those nerve pathways that provoke muscle movement. And some aspects of the neural system connect and coordinate stimulus and response, allowing the organism to act productively as a biologically cohesive whole. It is true that we do not yet know in complete and perfect detail every component of this stimulus/response mechanism, but as an evolutionary artifact that is shared in common across nearly the entire animal kingdom, neural systems, including brains, are not magical or mysterious. They are, by and large, stimulus/response mechanisms that have been finely tuned to support survival and procreative demands.

Intelligence, however, seems to be something quite different, an augmentation beyond just stimulus and response. Indeed, if we are talking about language production, arithmetic problem solving, logical reasoning, etc.—abilities that can be assessed via an intelligence exam—then we are no longer talking about a system shared across the entire animal kingdom. Even among hominins, measurable intelligence is an activity—historically and evolutionarily speaking—that is really quite new (Klein, 2002). So the question is, exactly what could it be inside the human brain, an organ originally and biologically designed to be part of a stimulus/response mechanism, that would allow it to assume this supplemental role of producing and hosting intelligence? The standard model of intelligence assumes that these supplemental operations must exist. But without tangible evidence and without specificity, how is it that we can be so sure? No matter how convinced intelligence researchers have become that somewhere inside the human brain—and somewhere inside those neuroimaging pictures—there is to be found the material source of human intelligence, could it not be just as likely that the opposite is true, that these brain-based, neuroimaging-driven assumptions are just the latest form of an old practice, are just the twenty-first century version of phrenology (Uttal, 2001)?

There is a further problem for the standard model. Recall the comparison to a modern computer, for which every aspect of its operations can be described and explained in adequate detail. That comparison also suggests that even if we were to understand every intelligence operation within the human brain, that knowledge alone would not be enough for explaining intelligence. As any computer scientist could tell you, understanding every component and every procedure of a modern computer is not by itself sufficient to explain fully the computer's overall behavior. *On its own*, a modern computer will not display intelligence at all—be it accounting intelligence or otherwise. To perform tasks that can be seen as the equivalent of intelligence tasks, a computer must be primed with additional structure, additional structure that comes not from the machine itself but instead comes from the outside. This additional structure might be in the form of a program uploaded into the computer's memory, or nowadays, this additional structure might come in the form of machine learning, in which the computer is trained to perform various tasks via the influence of large amounts of ambient data (Mohan et al., 2021). But either way, in order for a computer to display something that could be likened to intelligence, it must first be organized into a structural system, a structural system that is not derived from the machine itself but is instead derived from the external environment. This raises the question of whether a computer's intelligence should be attributed to the machine or instead to the machine's contextual surroundings. And if this question is pertinent for a modern computer, why would it not be pertinent for a human brain?

The Flynn Effect

The first iterations of the modern IQ exam began to appear early in the twentieth century, and as that century progressed a curious artifact began to emerge from the growing collection of IQ exam results: the average raw scores on these exams were getting consistently and significantly better over time. Several researchers had made note of this phenomenon, but it was James Flynn in the 1980s who demonstrated convincingly, with large amounts of data, that the phenomenon was essentially universal, and shortly thereafter it would be dubbed the Flynn effect (Flynn, 1984, 1987). The Flynn effect remains surprising and perplexing to this day.

Because raw IQ scores have been increasing since they first began to be measured, the question arises as to whether this increase would have been apparent during earlier times, had IQ exams been available prior to the twentieth century. In other words, for humans, when did this increase in measurable intelligence begin? Oddly, it seems the general consensus from the intelligence research community is that the Flynn effect began sometime near the start of the twentieth century, the coincidental timing with the invention of IQ exams apparently notwithstanding. A few researchers, including James Flynn, have suggested that the Flynn effect could trace its origin back to somewhat earlier, to around the time of the Industrial and Scientific Revolutions (Flynn, 2007; van der Linden & Borsboom, 2019). But no researcher it seems is willing to entertain the possibility that the Flynn effect has been operative for a much longer period of time. And coupled with these suggestions of a recent start for the Flynn effect are further suggestions that the Flynn effect soon must end—if indeed it has not ended already. One of the latest trends in intelligence research has been the diligent hunt for evidence that the Flynn effect has plateaued or even reversed (Dworak et al., 2023).

What is driving this insistence that the Flynn effect must have a recent origin and an imminent demise is the standard model of intelligence. In order for the standard model to continue to make biological sense, the Flynn effect must be temporary. If the Flynn effect were not temporary, if it were instead to be seen as operative over an extremely long period of time, then any brain-based depiction of human intelligence could be seen as violating biological and evolutionary principles and boundaries. For instance, the type of raw intelligence gains that were apparent throughout the twentieth century, when extrapolated over a much longer period of time, would be akin to the average human body doubling in weight every century or two, a biological and evolutionary implausibility. If the human brain is to be depicted as producing and hosting intelligence, then in some sense intelligence must be biological and organic, and thus must also adhere to biological and evolutionary principles. This means that, according to the standard model, intelligence cannot grow indefinitely, and population wide, by leaps and bounds.

The need for the Flynn effect to be temporary is evident also in the many hypotheses that have been offered in way of explanation for the phenomenon. Better education, better nutrition, increased exposure to video games and puzzles, increased exposure to science, etc.—all these suggestions, explicitly or implicitly, are intended as recent and short-term boosts to brain productivity, boosts that ultimately have a limited shelf life. Nutrition and education cannot be improved forever, exposure to video games and science eventually becomes routine, and thus intelligence inevitably returns to something more steady. The apotheosis of these attempts to explain the Flynn effect as a fleeting phenomenon on top of a long-term trend towards intelligence stability can be seen in both the Dickens-Flynn model (Dickens & Flynn, 2001) and in Woodley's theory of fast and slow life (Woodley, 2012). These are parametrically complex models that attempt to reconcile a broad assortment of environmental influences—such as education, family size, nutrition, pathogen stress, social motivators, etc., influences that purportedly can account for short-term surges and pullbacks in measurable intelligence—reconcile these to genetic and physical factors, factors critical for determining the biological basis of intelligence and for ensuring the long-term stability demanded by the standard model. Thus, the labyrinthine complexities of the Dickens-Flynn model and the Woodley theory are motivated ultimately by the presumptive need for the Flynn effect to be temporary.

But in fact, there is no conclusive evidence and no compelling reason to assume that the Flynn effect is temporary. IQ scores prior to the twentieth century do not exist, so we cannot know for certain what the characteristics of measurable intelligence were before that time, and as for recent studies suggesting that the Flynn effect is ending, the data remains preliminary and is contradicted by continuing gains in various countries (Colom et al., 2023; Liu & Lynn, 2013; Nijenhuis et al., 2012). Perhaps more importantly, a straightforward analysis of human history indicates the opposite of what researchers apparently expect, indicates that far from being temporary, the Flynn effect has actually been operative within the human population for quite some time, ever since the turn towards behavioral modernity (Griswold, 2017, 2023a). The easiest way to see this is to consider what the species would have been like at the moment of that turn, somewhere around a few hundred thousand years ago. Humans were still in the state of being pure animals, focused solely on survival and procreation, and were not in possession of a single characteristic that could be measured by a modern IQ exam: no language, no arithmetic, no abstract reasoning, no construction (Klein, 2009). Administering an IQ exam to a human of that time would have been no more successful than administering an IQ exam to a wild animal today, and this means that measurable intelligence for humans a few hundred thousand years ago would have been quantifiable as absolute zero, the same as measurable intelligence for wild animals today. And since measurable intelligence has clearly progressed for humans to something more substantive right now, that overall increase, *by definition*, is a Flynn effect. It is in fact a *massive* Flynn effect, one that has been operative over an extremely long period of time.

What is also notable about this analysis of human history is that it points to an alternative source of human intelligence, one that is consistent with a growth in intelligence over the course of that history. A few hundred thousand years ago there was no artificial construction in the human environment, humans lived in an entirely natural setting. But as humans advanced towards behavioral modernity, the amount, type and complexity of the artificial construction contained within the human environment continued to accumulate over time. From simple tools, animal skin clothing and makeshift shelters to highways, electricity and towering skyscrapers, humans have found themselves increasingly surrounded by the ubiquitous influence of artificial construction. And this artificial construction must have something to do with human intelligence, because the *content* of an IQ exam is composed itself entirely out of artificial construction—words, numbers, puzzles, matrices, etc. (Wechsler, 1997). When one takes an IQ exam, one is in essence demonstrating one's dexterity with artificial construction.

Thus, if intelligence could be associated to the characteristics of the artificial construction contained within the human environment—instead of to the biological characteristics of the human brain—then explaining the Flynn effect would be no more difficult than explaining the historical increase in artificial construction. But the reason no one considers associating human intelligence to the human environment is that the standard model of intelligence insists otherwise, insists that human intelligence is to be associated directly and solely to the human brain (Jung & Haier, 2007). But is this insistence justified, does the standard model actually capture the true nature of human intelligence? Is there a reasonable and effective alternative available, a means to model human intelligence that associates intelligence not to the human brain, but instead to the structural impact of the artificial aspects of the human environment?

3. Field Theory

It is important to begin by noting that a field theory of human intelligence is not the same thing as other field theories that have been proposed in the domains of psychology and sociology (for example, those of Lewin and Bourdieu), theories that appear to have closer relationships to Gestalt philosophies and socio-political doctrines (Fernández & Puente, 2009; Lewin, 1951). Instead, a field theory of human intelligence is more akin to its physical science counterparts, such as those describing the phenomena of electricity and magnetism. Of the different ways to characterize this type of field theory, perhaps the most straightforward is to focus upon the reactions of responsive objects to the presence of a relevant field. For example, different kinds of metallic shavings are moved and aligned by the presence of a magnetic field, with some types of metals more responsive to that field than others. Nonetheless, the dynamic properties of magnetism are not determined by the characteristics of the metals themselves, which remain essentially constant over time, but are instead determined by the dynamic properties of the surrounding magnetic field. In a weak magnetic field, every metal will display proportionally less reactivity, and in a strong magnetic field, every metal will display proportionally more reactivity, even though the metals themselves remain unchanged. Thus, the overall intensity of the magnetic effect is determined by the strength of the magnetic field (Black & Davis, 1913).

In a field theory of human intelligence, the strength of the intelligence field is determined by the amount, type and complexity of artificial construction contained within the human environment. In other words, the more artificial construction there is, the greater the intensity of the intelligence field and the greater the amount of intelligence that can be measured (for instance, via an IQ exam). The responsive object in this scenario is the human neural system—or more particularly, the human brain—and just as some metals are more responsive to a magnetic field than are others, some human brains are more responsive to an intelligence field than are others. But the dynamic properties of human intelligence are not determined by the characteristics of these brains—characteristics that remain essentially stable over time. Instead, the dynamic properties of human intelligence are determined by the changing strength of the surrounding intelligence field, by the changing amount, type and complexity of artificial construction contained within the human environment.

A few hundred thousand years ago, when humans were still pure animals and there was no artificial construction to be found in the human environment, the strength of the intelligence field would have been essentially zero. Human brains of that time, despite being as capable of responding to an intelligence field as are the human brains of today, would have found no artificial stimulus with which to engage, meaning there would have been no corresponding response and thus no measurable intelligence. By around twenty-five thousand years ago, instances of artificial construction had begun to make frequent appearance within the human surroundings—structured tools, ornamental jewelry, cave paintings, abstract sounds, etc.—and the human brains of that era, responding to the stimulus of this newfound artificial construction, would have thereby been capable of displaying intelligence behavior (Christian, 2018). Administering an IQ exam to that population would have been conceivable, even though the exam would have needed to be crude and simple by modern standards, because of limited vocabulary, primitive numeracy, etc. Indeed, a corollary of field theory for human intelligence is that an IQ exam, in order to be an effective and accurate measure of the intelligence of a given population, would need to reflect and to serve as a proxy for the amount, type and complexity of artificial construction to be found in that population's particular environment. A modern IQ exam such as Stanford-Binet or Wechsler would overwhelm an ancient population, but an appropriately simpler exam would be able to assess that population's intelligence characteristics.

By the later era of the Mesopotamian, Egyptian and Greco-Roman empires, the artificial construction in the human environment had swelled to an even greater magnitude—permanent abodes, irrigation techniques, written words, advanced numeracy, etc.—and the human brains of that era, still biologically the same as human brains of previous eras, would have been responding to this increased stimulus of artificial construction by displaying still greater degrees of measurable intelligence. And today, in the twenty-first century, in a world now thoroughly suffused with buildings, roadways, computers, streams of structured data, etc., human brains find themselves responding ever more continuously to a growing and fast-paced array of artificially constructed stimulus, so much so that today's human brain—still biologically the same as previous human brains—can now easily handle the increased and increasing complexities of modern IQ exams.

Because the intelligence field is an observable and structured feature of the human environment, this field is in theory quantifiable. Unfortunately, there are some practical difficulties to actually making such a quantification. For one, the quantification process would be self-referencing, since quantification and measurement are themselves instances of artificial construction. Perhaps even more challenging is the fact that in the modern era, the depth, breadth and hierarchy of artificial construction contained within the human environment has reached such expansive proportions as to make the quantification task nearly overwhelming—on an order perhaps of cataloging and numbering all the organic and inorganic molecules contained within the oceans. Nonetheless, despite these practical difficulties, it is still possible to make accurate and meaningful statements about the dynamic properties of the human intelligence field. For instance, it should be clear from human history that the strength of the intelligence field has been continuously and significantly increasing over time, ever since the human turn towards behavioral modernity. The number and type of constructed artifacts contained within the human environment, as well as their underlying complexity, has been continuously on the rise, something that was quite observable across the course of the twentieth century, with the advent of airplanes, automobiles, electronic communication, computers, and the like, a torrent of additional environmental construction coming at the same time evidence was first appearing that measurable intelligence was significantly increasing within the population.

The simplest assumption that can be made regarding the dynamic properties of the human intelligence field would be to say that growth in artificial construction is proportional to the amount of artificial construction existing at any given time. This assumption is captured in the differential equation $\mathbf{di/dt=ki}$, where $\mathbf{i}$ is the intensity of the intelligence field, $\mathbf{t}$ is time, and $\mathbf{k}$ is a positive constant of proportionality. This differential equation has a solution, $\mathbf{i=e^{kt}}$, indicating that the intelligence field strengthens exponentially (Trench, 2013). This assumption is perhaps not unreasonable in the modern era, when the deep interconnectedness of the entire human environment allows for innovation and new construction to spread rapidly and uniformly around the globe. Nonetheless, a longer look over the course of human history indicates that growth in the human intelligence field has generally been less regular, with localized surges and intermittent plateaus. And given that there are biological aspects to human intelligence, it cannot be expected that its underlying formulas will display the same mathematical exactitude as do physical phenomena—the true differential equations describing the human intelligence field will likely be somewhat messy. This does not, however, invalidate the overall message of the theory, namely that the dynamic properties of human intelligence can be derived from the artificial aspects of the human environment.

While a field theory of human intelligence clearly runs counter to the standard brain-centric model, field theory does have several advantages that speak in its favor:

1. *A field theory of human intelligence does not require extraordinary biological and evolutionary assumptions regarding the functionality of the human brain.* In a field theory of human intelligence, the human neural system retains its traditional biological role of being a stimulus/response mechanism, and what changes is not the brain itself, but instead the environmental stimulus to which the brain responds. This means that the brain does not need to take on the supplemental and biologically extraordinary role of producing and hosting intelligence, and this further implies that the human neural system has not needed to transform biologically in any significant way since the beginning of the human behavioral transformation, an implication more consistent with the principles of evolution. Also, since what changes is the environmental stimulus, and not the brain itself, there is no biological restriction on the rate of intelligence gain, no organic hindrance to having intelligence grow indefinitely, and population wide, by leaps and bounds.
2. *A field theory of human intelligence provides a specified and observable description of the material structure of human intelligence.* Because intelligence is now being identified with the structural aspects of the human artificial environment—and not with the neurons in the human brain—the material structure of intelligence is entirely open to observation. The symmetry, pattern, repetition, form and so on that underlies most types of intelligence behavior—language, arithmetic, problem solving, and the like—these characteristics exist right before our very eyes, there in the human environment. Indeed, most of these characteristics have already been cataloged and explained, using the tools of mathematics, logic and science. Precise descriptions of the structure of the artificial aspects of the material world are in essence the same thing as precise descriptions of the material structure of human intelligence. This means that any attempt to uncover a *neuronal* structure for human intelligence would be to engage in nothing but a redundancy, an attempt to find something that we have already perceived. In a field theory of human intelligence, the locus of intelligence is not to be searched for inside the human skull; instead, the locus of intelligence can be found within the expanding artificial structure of the human environment.
3. *A field theory of human intelligence offers a straightforward and elegant explanation of the Flynn effect.* Measurable human intelligence, represented by the raw scores on intelligence exams, is the result of the orthogonal combination of two different factors. One of these factors is general intelligence ability, the strength of an individual's intelligence scores across an assortment of correlated intelligence tasks (Spearman, 1904). Effectively, an individual's general intelligence ability is a measure of that individual's general responsiveness to the presence of an intelligence field, an ability that differs from person to person, the difference being driven mostly by genetic factors (Gottfredson, 1998). General intelligence ability is the biological component of intelligence, and as such, it can be assumed that the average general intelligence ability within the human species has remained nearly constant over time, as would be expected for a biological trait. But the same cannot be said of the second factor contributing to measurable intelligence. The second factor is the total amount, type and complexity of artificial construction contained within the human environment, the target towards which general intelligence ability is applied. The amount, type and complexity of artificial construction has been significantly and

consistently increasing ever since the beginning of the human turn. And because measurable intelligence is the result of the orthogonal combination of both general intelligence ability (stable over time) and the amount, type and complexity of artificial construction (increasing over time), measurable intelligence also increases over time. This is a precise description of the Flynn effect, and it marks the increasing amount of artificial construction contained within the human environment—that is to say, the growing strength of the intelligence field—as the sole driver and the sole explanation of the Flynn effect.

In addition, a field theory of human intelligence gives rise to certain predictions about the future course of human intelligence:

1. *Field theory indicates that there is no reason to expect that the Flynn effect is ending or reversing.* Since field theory suggests that the Flynn effect has been operative within the human species for many millennia—ever since the turn towards behavioral modernity—it would be too much of a coincidence to have the phenomenon come to a screeching halt right at the very moment of its discovery. More importantly, barring a human catastrophe (such as civilization collapse), it can be expected that the amount, type and complexity of artificial construction will continue to accumulate within the human environment, and future generations, responding to this increased level of artificial construction, will thereby go on to demonstrate greater levels of intelligence performance on future intelligence exams. Therefore, it can be predicted that the average level of measurable intelligence at the end of the twenty-first century will exceed by a significant amount the average level of measurable intelligence from the beginning of the twenty-first century.
2. *Field theory indicates that the content of intelligence exams will need to undergo significant alteration as time goes by.* The content of an IQ exam is a proxy for the artificial construction contained within the human environment. The structure underlying questions regarding vocabulary, arithmetic, puzzles, matrices, etc., this structure mirrors the artificial structure that humans navigate and master in their everyday lives. Thus, an individual's performance on an IQ exam is an indirect measure of that individual's ability to navigate and to master ambient artificial construction, and since the amount, type and complexity of that ambient artificial construction continues to increase over time, the content of IQ exams must be similarly altered in order to remain effective. In general, future questions must take on greater variety and greater complexity, because if IQ exams were not altered in this fashion, they would gradually begin to fail in their purpose, becoming less able over time to detect individual intelligence differences and to predict accurately the life circumstances impacted by intelligence ability. Therefore, it can be predicted that the content of IQ exams at the end of the twenty-first century will differ significantly from the content of IQ exams at the beginning of the twenty-first century, mostly through the incorporation of greater variety and greater complexity, in an attempt to mirror and to proxy the increasing amount, type and complexity of artificial construction to be found within the human environment.

It is perhaps not out of place to mention that both of these predictions could have been made at the beginning of the twentieth century, and would have been verified by the end of the twentieth century. And unless one is convinced that the Flynn effect must be temporary, there is no reason to expect that the current century, or future centuries, will turn out to be any different.

4. Conclusion

The standard model of human intelligence is a brain-centric depiction of intelligence, and it enjoys nearly universal acceptance within the intelligence research community. Nonetheless, the standard model does have some serious shortcomings, including a lack of specificity and an inability to account for the Flynn effect, other than to assume that the Flynn effect must be a temporary aberration.

What has been presented here is an alternative model for human intelligence, one that identifies intelligence with the growing artificial structure contained within the human environment. Although this field theory approach to human intelligence runs counter to the widely accepted standard model, field theory does offer some advantages, including an eschewal of any extraordinary biological or evolutionary assumptions regarding the functioning of the human brain, a specific and observable description of the material structure of human intelligence, and a straightforward and elegant explanation of the Flynn effect. For these reasons, a field theory of human intelligence merits serious consideration.

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