Question the Big Picture and Expand the Horizon

Abstract - In order to objectively approach intentions and other aspects of mental functioning - certainly to the point of contemplating equations - it would be good to follow Sean Carroll's suggestion in *The Big Picture* that good science "needs to be completely open to the actual operation of the world". Such openness readily confronts phenomena that seriously challenge the scientific or materialist vision of the mind, and as such the basis for an essay contest like this one. This article considers some unusual but accepted behavioral conundrums as well as the unfolding "missing heritability" problem.

In contradiction to a number of superficial accounts, the past few years have seen a number of sober articles by insiders describing the actual state of neuroscience. On the one hand one can read in Sean Carroll's *The Big Picture* about "the tremendous strides in understanding" made by modern neuroscience into how our brains work, and on the other hand one read an informed review article like that found in the March 2014 issue of *Scientific American* by Rafael Yuste and George M. Church. After a splashy title - "The New Century of the Brain: Big science lights the way to an understanding of how the world's most complex machine gives rise to our thoughts and emotions", the Yuste and Church's article was a very sober one. The first paragraph read:

> Despite a century of sustained research, brain scientists remain ignorant of the workings of the three-pound organ that is the seat of all conscious activity. Many have tried to attack this problem by examining the nervous systems of simpler organisms. In fact, almost 30 years have passed since investigators mapped the connections among each of the 302 nerve cells in the round worm Caenorhabditis elegans. Yet the worm-wiring diagram did not yield an understanding of how these connections give rise to even rudimentary behaviors such as feeding and sex. What was missing were data relating the activity of neurons to specific behaviors.

After detailing some of the obstacles ahead the authors closed with a plea-ful conclusion:

> We need collaboration among academic disciplines. Building instruments to image voltage in millions of neurons simultaneously throughout entire [human] brain regions may be achieved only by a sustained effort of a large interdisciplinary team of researchers. The technology could then be made available at a large-scale, observatory-like facility shared by the neuroscience community. We are passionate

> about retaining a focus on new technology to record, control and decode the patterns of electrical spikes that are the language of the brain. We believe that without these new tools, neuroscience will remain bottlenecked and fail to detect the brain's emergent properties that underlie a virtually infinite range of behaviors. Enhancing the ability to understand and use the language of spikes and neurons is the most productive way to derive a grand theory of how nature's most complex machine functions.

Nonetheless, one might argue that this assessment is still missing the subtler challenges associated with matching the obtained images with the limited communications by subjects with regards to their coincident subjective experiences.

But also missing in such assessments are gross challenges to their brain-only based logic. For some time now it has been apparent that some individuals can function very well despite having very little brain tissue. As a result of the condition hydrocephalus, some people have had their brain's cerebrospinal fluid reservoirs (or ventricles) enlarge and thus displace and destroy other brain tissues. In a 1980 *Science* article, "Is Your Brain Really Necessary?", some significant findings on this condition by British neurologist John Lorber were discussed [Lewin]. In breaking down over 600 scans of patients with spina bifida - most of whom also had hydrocephalus - into categories based on the fraction of the cranium (or braincase) occupied by cerebrospinal fluid, of note were the scans in which in order to hold the increased fluid levels, "ventricle expansion fill[ed] 95 percent of the cranium". This category included "less than 10 percent" of the 600-plus patients. Within this category it was noted that "many" of these affected individuals were:

> severely disabled, but half of them have IQ's greater than 100. This group provide[d] some of the most dramatic examples of apparent normal function against all odds.

Lorber described one particularly dramatic example:

> [t]here is a young student at [Sheffield University] who has an IQ of 126, has gained a first-class honors degree in mathematics, and is socially completely normal. And yet the boy has virtually no brain.

What do neuroscientists think they would find at some future "observatory-like facility" when examining an individual like this? Additionally, it would seem that if Lorber observed that a significant fraction of the very small-brained people had obtained normal-like mental functioning, then shouldn't an appreciable fraction of the rest of us function at extraordinary levels?

Additional observations by Lorber pertained to a subgroup of patients for whom their ventricle expansion had been limited to one side of the brain. Lorber pointed out that:

> I've now seen more than 50 cases of [such] asymmetrical hydrocephalus and the interesting thing is that only a minority of these individuals show the expected and long-cherished neurological finding of paralysis with spasticity on the opposite side of the body.

Lorber then went on to point out that one of these patients displayed spastic paralysis on the *same* side as their "enormously enlarged ventricles". Why haven't such findings found their way into the popular neuroscience coverage?

More neuro-challenging observations can be found with studies of human memory performance, like that provided in a February 2014 *Scientific American* article. That James McGaugh and Aurora LePort article, "Remembrance of All Things Past", opened with an excerpt from an e-mail that the author McGaugh had received from a woman named Jill Price:

> As I sit here trying to figure out where to begin explaining why I am writing you ... I just hope somehow you can help me. I am 34 years old, and since I was 11 I have had this unbelievable ability to recall my past ... I can take a date, between 1974 and today, and tell you what day it falls on, what I was doing that day, and if anything of great importance ... occurred on that day I can describe that to you as well. I do not look at calendars beforehand, and I do not read 24 years of my journals either.

The authors then followed up by extensively testing Price's recall of events. Her memory was eventually proved faulty in only one case - the day of the week of one of the previous 23 Easters (and Price is Jewish). Along the way she "corrected the book of milestones for the date of the start of the Iran hostage crisis at the U.S. embassy in 1979". During tests of less significant dates Price:

> correctly recalled that Bing Crosby died at a golf course in Spain on October 14, 1977. When asked how she knew, she replied that when she was 11 years old, she heard the announcement of Crosby's death over the car radio when her mother was driving her to a soccer game [note an apparent typo in the article since Price couldn't have been 11 years old in both 1974 and 1977].

Jill Price demonstrated an "immediate recall of the day of the week for any date in her life after she was about 11 years old". Yet she "has trouble remembering which of her keys go into which lock" and "does not excel in memorizing facts by rote". The remainder article chronicled

their subsequent confirmation of similar extraordinary memories in about 50 people. Such memories were found to be "highly organized in that they are associated with a particular day and date" and that it occurred "naturally and without exertion". The authors did not find evidence that the phenomena tended to have a family history and thus some implied support for a genetic explanation. In any case, such phenomenal memories offer a significant challenge to neuroscience's neuron-based models of memory (as well our everyday experiences). How could these individuals perform such extraordinary feats without any apparent intention or effort?

Another area where the science's model of mental functioning is challenged is that of exceptional intellectual skills. The following is a description of a musical prodigy found in Darold A. Treffert's *Islands of Genius*:

> By age five Jay had composed five symphonies. His fifth symphony, which was 190 pages and 1328 bars in length, was professionally recorded by the London Symphony Orchestra for Sony Records. On a *60 Minutes* program in 2006 Jay's parents stated that Jay spontaneously began to draw little cellos on paper at age two. Neither parent was particularly musically inclined, and there were never any musical instruments, including a cello, in the home. At age three Jay asked if he could have a cello of his own. The parents took him to a music store and to their astonishment Jay picked up a miniature cello and began to play it. He had never seen a real cello before that day. After that he began to draw miniature cellos and placed them on music lines. That was the beginning of his composing.
>
> Jay says that the music just streams into his head at lightning speed, sometimes several symphonies running simultaneously. "My unconscious directs my conscious mind at a mile a minute," he told the correspondent [Treffert, pp.55-56].

Treffert's book contains a number of other examples supporting his conclusion that prodigal (including prodigious savant) behavior typically involves "know[ing] things [that were] never learned". Interested readers can look up accounts of the historical figure and musical savant Blind Tom. Such behaviors provide clear challenges to the current vision with regards to the origins of these abilities and intentions. Treffert also considered the phenomenon of acquired savant syndrome in which savant behaviors appear in the wake of central nervous system setbacks. Needless to say, it is unlikely that three pound neural organs would acquire skills as a result of physical damage.

More potential difficulties for the materialist perspective appears to be found with the transgender phenomenon. In the last few years media coverage seems to have opened to the fact that

some individuals strongly identify as the opposite gender. Readers can find a number of articles in which this unexpected and challenging situation is discussed, for example the *New York Time Magazine*'s "What's So Bad About a Boy Who Wants to Wear a Dress?" [Padawer]. Additionally, one study noted that amongst the subset that have undergone sex-change efforts (or transitioned) many "knew they had been born into the wrong gender from childhood" [Landau]? Such an explanation would seem to require some kind of mutation in the DNA which resulted in an individual whose brain then felt committed to identifying with the opposite gender and an associated agenda. It is worth recalling that it is believed that behind the scenes here, of course, are merely programmed molecular interactions where the perceived subjective entities including self and free will are simply illusions. This is not easy to envision.

From the above cited *New York Times Magazine* here are a few excerpts. It was said of one child at 3 years of age:

> he insisted on wearing gowns even after preschool dress-up time ended. He pretended to have long hair and drew pictures of girls with elaborate gowns and flowing tresses. By age 4, he sometimes sobbed when he saw himself in the mirror wearing pants, saying he felt ugly.

Such behaviors can pose challenges for transgender individuals as well as their parents, as one father put it, "I didn't know how to be the father of a girl inside a boy's body".

One self-assessment by an eight year old in Andrew Solomon's *Far From the Tree* contained:

> I'm a girl and I have a penis. They thought I was a boy until I was six. I dressed like a girl. I said, 'I'm a girl.' They didn't understand for the longest time [Solomon, p.604].

And then looking ahead (after commenting on possible solutions to their penis challenge):

> [w]hen I'm a mommy I'll adopt my babies, but I'll have boobies to feed them and I'll wear a bra, dresses, skirts, and high-heeled shoes [pp.605-606].

How can such intentions arise?

I move on here to the general scientific explanation for our particular behaviors and indirectly for intentions (as well as a possible basis for some of the unusual behaviors just considered). This explanation involves a combination of nature (DNA) and nurture (environment). Many investigations (from "several countries, and over four decades" [Pinker, p.372]) into that dynamic

have involved the study of monozygotic twins, fraternal twins, and also adoptees. These have suggested that about half of the specifics of a person's complex behavioral traits (i.e., "whether they are smarter or duller, nicer or nastier, bolder or shyer [, etc.]") comes from their DNA. It was also reported that very little of those traits was acquired via home environment which is most apparent through the limited impact of adoptions. The mysterious final contribution is supposed to come from an individual's unique experiences and this most tangibly provides an explanation for the differences found between monozygotic twins. As an example of the surprising extent of these differences, the concurrence on male exclusive homosexuality between monozygotic twins is only about 20-30% [Collins, pp. 204-205]. In any case the Nature plus Nurture model has always been loose and in this regard Steven Pinker acknowledged that "something is happening here but we don't know what it is" [Pinker, p.380].

There are, of course, some environmental contributions to our behaviors and thus also potentially related to our intentions. The environment does provide generic items like language, trauma-based fears, and apparently shows some influence towards family-based allegiances like political party affiliation - probably also involving fear. In a succinct statement of the findings of behavioral genetics Steven Pinker wrote:

> a simple way of remembering [the three laws of behavioral genetics] is this: identical twins are 50 percent similar whether they grow up together or apart. Keep this in mind and watch what happens to your favorite ideas about the effects of upbringing in childhood [Pinker, p.381].

That roughly sums up the inherent mystery of behavioral genetics.

The critical question here, though, is - can science identify the DNA basis for at least half-ish of who we are in a relative behavioral sense (and in parallel can personal genomics explain our innate relative health tendencies)? If so then that would provide a basis for a crude material-based description of our behaviors (and possibly offer insights into the origins of our long term intentions). With such a basis, science might then gain some understanding into the particular brain functioning behind some behavioral tendencies. And such insights could then perhaps lead to some foundations for contemplating possible physics-math descriptions of these biological processes. For a simple example one might imagine that some DNA particulars have been tied to being very smart, and also some others tied to being very introverted (versus extroverted). Together these DNA could then not only provide input into shaping some relevant neural circuitry, but might contribute towards shaping an individual's life goals and trajectory (in this case perhaps towards a heavy dose of education and a lighter dose of socializing). Continuing, one might

then be able to imagine a physics-math start for describing how said individual is steered towards goals.

That vision of DNA's contribution was covered in the 2016 book *The Gene* by Siddhartha Mukherjee [Mukherjee]. That book offered a verbose account of the history of genetics and, more significantly, an update on its current state and trajectory. The basic message of *The Gene* was nicely captured within an (also lengthy) customer review at Amazon. In the "most helpful" review it was suggested out that, "[w]e used to think that our future was in the stars. Now we know it's in our genes." That same review also pointed out that "[g]enetics is humanity and life writ large". Mukherjee claims that "[b]y the end of this decade, permutations and combinations of genetic variants will be used to predict variations in human phenotype, illness, and destiny." Consistent with this, the geneticist Craig Venter in his 2014 book, *Life at the Speed of Light: From the Double Helix to the Dawn of Life* [Venter, p.6], posited his answer to the basic question, "What is life?", with the expression, "DNA-driven biological machines".

Contributing to that genetic optimism is the under-appreciated fact that the variable portion of our DNA is merely a small subset of the complete DNA code. In a crude sense then you might argue that we are all identical twins. But not quite of course, as the DNA codes of any two individuals differ by about 3 million letters out of 3 billion genomic letters (or about 0.1%) [Schafer; Green; Kingsley]. That small subset should then for the most part contain the origins of our innate differences and thus provide the foundations for behavioral genetics and personal genomics (and as such crudely sketch out the who-we-are and what-happens-to-us territories). In another crude sense the ongoing DNA search efforts associated with those fields are simply trying to identify some additional Y chromosomes; that is DNA variations which can result in changes in the associated individuals (even they aren't visible in a mirror).

The problem facing genetics - and the content missing in Mukherjee's book - though, is that they have been looking for the expected connections for about a decade now and they have found almost nothing. In a 2011 assessment of the personal genomics situation, Jonathan Latham and Allison Wilson of the *Bioscience Resource Project* pointed out that with few exceptions (including previously identified genes for cystic fibrosis, sickle cell anemia, Huntington's disease; and also some genetic contributions to instances of Alzheimer's and breast cancer):

> according to the best available data, genetic predispositions (i.e. causes) have a negligible role in heart disease, cancer, stroke, autoimmune diseases, obesity, autism, Parkinson's disease, depression, schizophrenia and many other common mental and physical illnesses that are the major killers in Western countries [Latham and Wilson].

They went on to ask "*[h]ow likely is it that a quantity of genetic variation that could only be called enormous (i.e. more than 90-95% of that for 80 human diseases) is all hiding in what until now [circa 2010] had been considered genetically unlikely places?"* Latham and Wilson also pointed out that "[b]y all rights then, reports of the GWA [genome wide assessments] results should have filled the front pages of every world newspaper for a week". And yet, nothing like that has happened.

That 2011 rare contrarian take on genetics was preceded by an initial acknowledgement in 2008 by geneticist David Goldstein that:

> [a]fter doing comprehensive studies for common diseases, we can explain only a few percent of the genetic component of most of these traits. For schizophrenia and bipolar disorder, we get almost nothing; for Type 2 diabetes, 20 variants, but they explain only 2 to 3 percent of familial clustering, and so on [Wade].

Goldstein had then added:

> It's an astounding thing that we have cracked open the human genome and can look at the entire complement of common genetic variants, and what do we find? Almost nothing. That is absolutely beyond belief.

The substantial indirect hint of this unfolding failure (sometimes termed the "missing heritability problem") has been the absence of DNA-breakthrough headlines. Rather, in a more subtle fashion this failure has been chronicled on the science-side with an ongoing fountain of speculation about the surprising complexity of presumed DNA dynamics.

One big 2014 study appeared to breakthrough, though, and find some DNA-footing for differences in intelligence quotient (IQ). In the *Proceedings of the National Academy of Sciences* study, "Common genetic variants associated with cognitive performance identified using proxy-phenotype method", it claimed to demonstrate a "proxy-phenotype approach to discovering common genetic variants that is likely to be useful for many phenotypes [or outcomes] of interest to social science (such as personality traits)." The 59 authors' "substantive contribution", though, in actuality appeared to account for only about 1% of the innate variation in intelligence. Neurogeneticist Kevin Mitchell commented that "[w]ith effects this small, the chances that they represent false positives are vastly increased" [Horgan, Callaway]. This situation serves as a succinct introduction to the actual state of behavioral genetics.

For those willing to question the big picture of science, you can find a number of reasons to withhold confidence in the scientific vision of life, and in particular the material-only assumptions about consciousness. One can of course look at sincere, albeit taboo, books, like Elizabeth L. Mayer's *Extraordinary Knowing*, and thus contemplate extraordinary mental phenomena (and their possible physical implications). Likewise, it is not hard to question the work of contemporary skeptics. On the other hand, as introduced here, one can simply look at some of the uncommon behavioral phenomena described in accepted literature, and head off in a similar direction. Such investigations could at a minimum give pause to those trying to pursue more detailed understandings of consciousness based on materialist assumptions.

But I would warn against heavy investment in any of these approaches. Simply marching along with the presumptions of science strongly biases against contrary evidence. Yet going the other route of focusing on taboo phenomena tends to miss the larger questions. Perhaps there are some supernatural phenomena (i.e. exceeding current scientific plausibility), but if these are very rare and of little net import how significant would they be (other than to academics and a few affected individuals)? One obvious exception here, though, would come from extrapolating positive near death experiences in which a very positive afterlife is at least likely, if not a given.

The real issues here I think are the big picture problems unfolding in the fields of behavioral genetics and personal genomics (and thus a "debate is raging in human genetics" [Mitchell]). If the expectations of these fields continue to fall short then that would constitute a huge life mystery. It is noteworthy that this seems to be conceptually consistent with the intuition offered by the physicist Eugene Wigner with regards to a possible impasse at the intersection of the "laws of heredity and of physics" [Wigner]. I suspect that that will be the case and have written a book introducing some of the relevant problems facing science as well as some possible explanations available from the premodern transcendental understanding [Christopher]. In any case, I suggest people start questioning outside the materialist box as there are reasons to think that that box is insufficient. This could open a big door to further inquiry and physics contemplation.

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