

Review

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"Nature vs. Nurture"
by Jsun Van Tatenhove, 2000

Ken Richardson, *The Origins Of Human Potential*, Routledge, 1998, and *The Making Of Intelligence*, Columbia UP, 2002

INTRODUCTION

Ken Richardson is a British researcher in human development and learning. He has written several books on the subject. These two were written in 1998 and 2002, respectively, to refute the ideas of sociobiology (SB) and evolutionary psychology (EP). SB and EP are the latest waves of the genes-determine-behavior school of science. Rather than answering the many fallacies point by point, Richardson offers an alternative global view that is completely incompatible with SB/EP. Among the many excellent refutations written in the last few decades (see, for example, Gould, Hubbard, Keller, Lewontin, Oyama, H. Rose, and S. Rose--references at the end), these two books of Richardson's, while not necessarily the most comprehensive, are two of the most penetrating antidotes I have read.

This review was written for those who want a better understanding of the most fundamental and coherent basis for rejecting these particular forms of pessimistic ideology. Even if it doesn't prompt one to read Richardson her/himself, I hope it will give a reasonable summary of his writings, as I understand them. The main reason it is critical to see through the pseudoscience that comprises SB and EP is that widespread acceptance of their ideas constitutes an obstacle to the replacement of capitalism with an egalitarian, working-class-run society. It is Richardson's greatest shortcoming that he doesn't draw

the conclusion himself that such a society is possible, let alone desirable. Nevertheless he provides a powerful basis for the reader to draw her/his own conclusions.

Pseudoscience has in common with science the offering of evidence from which logical inferences can be drawn, but differs from science in three main ways: 1) what is offered by its practitioners as evidence is often false, 2) pseudoscientists judiciously overlook evidence that implies different conclusions, and 3) they draw inferences for which the offered evidence, even when true, may be necessary but is not sufficient--in other words, alternative inferences would equally follow but are neither raised nor refuted.

THE CORE OF THE PSEUDOSCIENCE OF SB/EP HAS BEEN AROUND FOR MILLENNIA

Richardson points out the continuity between the modern genes-determine-behavior outlook of SB/EP and that of Plato, who, over 2000 years ago, set out to justify the hierarchical Greek world of inequality, in which the small number of rich persons exploited, enslaved, and murdered the great number of poor persons. Plato justified social inequality primarily through the *ranking* of human individuals and groups according to a variety of characteristics held to be *innate* and therefore unchangeable. That is, he postulated invidious distinctions according to claimed scales of value.

Today's Platonists, such as E. O. Wilson, S. Pinker, S. Dawkins, R. Plomin, J. Tooby, and L. Cosmides, may or may not be as aware as Plato seems to have been of their role in shoring up what is today a dying system, but shore it up they do. Their "science" is pure subjective rationalization, in which they are forced to ignore the major portion of scientific progress made in the last few decades in fields as disparate as evolutionary biology, genetics, psychology, paleontology, education, history, sociology, anthropology, and even mathematics. But even more important than the factual and theoretical issues they ignore is the perceptual framework from which they operate.

The modern Platonic search for the *ranking* of human individuals according to allegedly *innate* characteristics is a consequence of the competitive quest for profit. Ranking people with respect to any allegedly innate characteristic opens the door for ranking groups and individuals by ethnicity, gender, and geography. In other words, ranking opens the door for *racism*, *sexism*, and *nationalism*, even if the authors deny, as they sometimes do, that this is their intention and even if they explicitly oppose one or another of these genocidal concepts. In a different kind of world from today's, in a world in which all cooperate to achieve mutual ends and to satisfy mutual needs, the question of how to rank human individuals might not even arise, as it would be without a *raison d'être*.

RICHARDSON'S KEY POINTS

First I list for easy reference what I see as the key concepts that Richardson raises, though, taken one point at a time, he is not necessarily the first author to do so. Then I

follow this list with fuller discussion--discussion in which I give free rein to my own interpretation of these points, such that Richardson may or may not always agree with the end product. Since my goal is to discuss the ideas rather than to praise (or bury, certainly) Richardson, where his ideas end and my ideas begin may not always be clear. Nevertheless, unless I state otherwise, all the ideas expressed are ones I accept as true, in my present state of understanding. Richardson's key points, to my mind, are as follows:

- Each stage of *development* in the embryo/fetus and during life, is brand new, rather than being merely the unfolding of predetermined stages.
- There is a *hierarchy of levels* of human existence, from genetics to epigenetics to cognition to culture, and all these levels are involved in mutual, two-way interactions.
- The concept that people are the *passive* products of, and innocent bystanders in, a battle between nature and nurture (i.e., genes and environment) is demonstrably false.
- A person's *activity* helps to determine her/his development.
- Natural selection requires many generations to produce change in a species, while animals (including humans) have to respond to environmental changes that are so *rapid* (much shorter than a lifetime) that natural selection has no chance to operate.
- These rapid environmental changes are in part produced by the *activity* of the animals/humans.
- What natural selection and other evolutionary mechanisms *have* done for humans is to produce a plasticity and capability of responding to these rapid environmental changes that occurs on a level above that of the genes and biology.
- Any *innate* aspects of human abilities are *common to all* members of the species--except (the usual disclaimer) for that small number of people with defects that are either genetic or congenital or a result of injury or illness.
- The absence or mutation of a single allele (one of the forms of a gene) may be shown to produce a particular negative effect in the organism, but this does not mean that the presence of the allele causes the positive effect (i.e., while an allele may be a *necessary* factor, this does not make it a *sufficient* one).
- The primary difference between humans and all other animals--including our closest relatives, chimps and gorillas--is not that only humans learn during their lifetimes (because other animals do as well), not that only humans use or even make tools (because in primitive ways other animals do as well), not that only humans walk upright nor that humans speak (beginning to differentiate), but rather that only humans teach each other (e.g., adults teach youth).

- As a result, only humans, as a species, make and have a cumulative history of social stasis and change spanning thousands of generations.
- The invention of IQ was *intended* as an artificial way to rank humans in a class divided society (capitalism), and the various IQ tests were specifically *designed* to rank humans according to the prejudices of the test designers, both among individuals and among groups. When the test failed to rank people according to these prejudices it was modified over and over again until the results came out as desired.
- One of the desired features of IQ tests was that the distribution of results in the population follows a *bell curve* (also known as a normal or Gaussian curve), and only by judicious selection of hard and easy questions in designing the tests could that result be obtained. This counters the claim by Herrnstein and Murray (among others) that the bell curve reflects an underlying reality about humans rather than about the tests.
- Most measured traits in humans do not, in fact, follow a bell curve distribution in the population.
- All studies of prodigies (children with unusual talents) have shown that their abilities were far from innate, but rather that their development required tremendous amounts of *work* and *sacrifice* of other activities by both the children and their parents.
- Even skills like math are developed when they become necessary (even without direct teaching), one example being 10-year-old street traders in Brazil.
- Cognitive skills are not a property (much less an innate property) of individuals, but rather are a *shared* property of humans in society as a result of human *culture*, and culture develops over generations, with a changing and non-repeatable history.
- Science is an important example of these developing cultural features.
- The understanding by individuals of things that require human cooperation can only be obtained through actually engaging in such cooperation, i.e., an isolated human could not achieve such understanding.
- Cognitive skills can not be reduced to rules that a computer can follow but rather involve context and past experience, and often serendipity (sudden insight that favors the prepared mind). As an incidental point on which I do not enlarge in this review, this suggests that the search for artificial (computer) intelligence that completely mimics human intelligence is futile.
- Humans, and perhaps other animals, learn from infancy by being able to single out, from among the myriad changeable relationships among things, those relationships

that are relatively fixed. This is also described as the recognition of patterns imbedded in a profusion of otherwise chaotic features, or the discernment of signal within noise.

I'll expand on most of these points, but first, to restate what I believe to be the main point and that I mentioned above, these points add up to a certain conclusion that Richardson, for whatever reason, does not draw in either book: The only way that each individual will be able to develop her/his cognitive abilities, limited only by her/his time on earth, is in the context of a social order in which competition and its inevitable companion, ranking, are abolished. Only in such a social order will it be possible for the concept of innate inequalities among individuals and groups to vanish.

DEVELOPMENT VERSUS UNFOLDING

Judging from what is published, most researchers and professors in the field of psychology harbor and espouse the notion that human development represents simply the unfolding of predetermined stages. Richardson, on the other hand, correctly, I think, maintains that human development is a process of creation of new and novel characteristics--whether prenatally or during the lifetime of an individual, or indeed over the history of groups and societies. That is, development is truly an act of creation, of something that has not yet existed out of what already exists. Learning, for example, for an individual is the creation of new psychological states that are not predetermined, and therefore cannot have been preprogrammed anywhere in the body, much less in the genes.

This is no less true for many, if not most or even all, animals, particularly mammals. Karl Marx pointed out over a century ago that humans create our own history, and this history is not written out in some monk's heavy manuscript prior to the events of which it is comprised. The new is continually arising out of the old. It is truly new, even though it will always bear aspects of the old, as well as differences from the old. The latter was another aspect of Marx's observation, namely that humans cannot make that history outside the context of the state of affairs to which past history has already brought us.

Historical context may be seen as analogous to traffic laws. Such laws do not determine where we go, when we go, or what route we take, but they do limit the speed at which we follow whatever route we choose, when we choose it, and do help to keep us from colliding with other vehicles at and between intersections. So to follow predetermined traffic laws is not the same thing as following a predetermined route and timing, much less to a predetermined destination. The confounding of the former with the latter is analogous to one of the essential fallacies in SB and EP, though the theoreticians in those fields apply this confounding reasoning to genes and organisms rather than to traffic laws and trips through town.

NESTED HIERARCHY

Richardson makes full use of the concept of a hierarchy of levels of existence, from the individual human's biological makeup (including her/his genes) to the influence that

environment exerts on selecting which genes are expressed (called into use) and when, to cognition and learning by the individual, to the social and cultural context in which all humans learn. The active role of the individual, both alone and in cooperation with others, is not lost on Richardson. He shows how this activity operates back on the selection of which genes are expressed and even on the selection of genes for reproductive success, particularly through the changes in the environment brought about by that human activity.

Richardson takes the linguist, Noam Chomsky, to task for claiming that humans have predetermined grammatical structures built into our genes. Chomsky claims that only such genetic structures make it possible for a newborn infant to acquire language from listening to adults (and other children). But the point is that young children do not, in fact, acquire language merely by listening. Rather they acquire it both by listening and, primarily, by acting, and indeed through the teaching activity of adults and other children around them. It is through countless, repeated, painstaking, and often frustrating efforts at trial and error in social interaction with others that children learn to speak. These trials at trying to speak are either reinforced (usually when basically correct) or discouraged (usually when in error) by the response of the adults and/or other children, and over time this active trial and error constitutes the process of language acquisition. By omitting the active role of the child, Chomsky is driven to supply some other explanation, since he is correct that listening alone could not explain the child's ability to speak.

An important implication of the primacy of human activity, as opposed to passivity, is that we don't have to simply accept the current situation in our lives, in our local and national surroundings, or in the world. Our activity--particularly collective activity--can change all that. We are not limited by any (imaginary) innate human characteristics, as SB/EP, and indeed much of bourgeois social science, would have it.

HUMANS ARE NOT PASSIVE IN A MYTHOLOGICAL BATTLE BETWEEN NATURE AND NURTURE

The cliché, nature versus nurture, is a cute and concise way of saying that humans are mainly a product of their genes (nature) modulated by the effects of environment (nurture). Richardson points out that even those SBers and EPers who seem to give a balanced role to each of the two players, always end up sneaking in an unbalanced and predominant role for the genes. The most fundamental antidote to such thinking is to resupply the missing *activity* of the human as she/he develops throughout life, even leaving aside for the moment the social context in which each of us carries out this activity.

(As an aside, Oyama gives a much more complete treatment of the fallacies involved in the opposition of "nature versus nurture." One of her most revealing points is that causation is always multiple--i.e., no effect has only one cause--and that the particular cause among many that is said to be the "determining" cause depends entirely on the author's arbitrary, and often unwitting, choice of which of the contributing causes are taken for granted, or taken as given, with the remaining contributing cause then

artificially raised to the level of "determining cause." She further undermines the "nature/nurture" opposition by indicating that they are not the same type of entity: rather her conception is that "nature" represents the current state of being of the organism, a product of all its prior development, while "nurture" represents some of the contributing causes to that development. Her writings are not easy to read, at least for me, but I find the effort to be extremely rewarding.)

SPEED OF CHANGE IN DAILY LIFE IS TOO FAST FOR NATURAL SELECTION TO WORK

Richardson points out that while natural selection may explain a significant amount of human evolution, i.e., the history of the development of humans out of ancestral animals, as well as possible evolutionary changes within the human species, it can only be an explanation for changes that take place over thousands and thousands of generations, in other words over many hundreds of thousands, if not millions, of years. But how can that explain the rapid adaptability of individual humans to rapidly changing situations with which they are confronted every day? There must be a level above the genes on which some capability has arisen to enable that rapid adaptation.

I recall a discussion in class many years ago in which one student maintained that certain ethnic groups would have to go another century or so before catching up socially with whites, in partial answer to which I merely pointed out that it had taken him less than two decades to get where he was. I refrained from suggesting that that was none too far, or indeed from throwing something at him, and later treated myself to a beer for my equanimity.

During the course of a single day, we are all confronted with many familiar situations, and often with ones that are less familiar, or even completely unfamiliar. And certainly not a single situation reproduces exactly any of those we have already experienced in our past.

Again let's use traffic for illustration. Learning to drive a car is not learning ahead of time where and when to drive, at what speed, and where and when to turn, slow down, or stop, every day for the rest of our lives--or at least until our offspring take our cars from us, in fear that our worsening eyesight and reflexes will cause the death of either ourselves or of some innocent bystander. Instead, learning to drive amounts to giving us the capability to act safely and effectively in a huge variety of novel situations every day, ones for which our driving teacher won't be around to help us.

Every time we speak we make sentences that we have never before spoken in precisely that particular context. Moreover every time someone else speaks to us we are hearing a combination of words that we have never before heard precisely in that context. So learning to speak is not a prescription for what to say every day for the rest of our lives. Only a playwright expects that of her/his characters. Only an actress/actor learns lines that way--and even then the tendency to ad lib is sometimes overwhelming. But learning one's lines in a play is certainly not the same as learning to use a language in the

first place. Indeed, learning lines presupposes knowledge of at least one language already, even if not the language of the play.

Therefore humans must develop a capability to adapt minute by minute to novel situations, and this cannot possibly be in the genes, since the genes are only formed and selected after hundreds of thousands to millions of years of experience by members of the species. Besides most of these daily novel situations do not relate to our ability to reproduce, and therefore the capability of dealing with them is not even a candidate target for natural selection. Novel situations cannot change genes, yet they can change the responses of humans. Only if human cognitive abilities are on a level of organization different from the genetic level can they possibly equip us to respond to such rapidly changing circumstances.

It is that plasticity--in particular, capacity for developing the capability of rapid adaptation--with which natural selection and other evolutionary mechanisms have endowed us. The advocates of SB/EP often allow that humans have a certain flexibility, but unforced by any observation or experiment, they unnecessarily postulate that violations of our genetic programming are exceptions and reflect the evanescent success of our individual struggle to rise above our genetic constraints. When such exceptions remain unexplained by a theory and are merely relegated to the status of exceptions, the theory explains nothing. Indeed such a body of thinking is not even a candidate for a scientific theory, despite the number of votes it may receive.

This ability to adapt to circumstances that cannot be anticipated is not peculiar to our mental activity. The ability of our bones and immune systems to adapt to changing conditions is also part of our genetic make-up, but the particular adaptations cannot possibly be preprogrammed in our genes. For one thing, our bones can adapt to a wide variety of circumstances by shoring themselves up to resist repeated or continuous mechanical stresses, and our immune systems can manufacture antibodies to invading antigens that the body has never before seen, or indeed that no human body has ever before seen. After all, harmful micro-organisms are continually evolving, and new ones arise all the time, but our bodies are capable of producing antibodies that are specifically designed to attach to new invaders. Astronauts lose bone density rapidly in outer space under conditions of weightlessness. How could this have been preprogrammed when no human had ever been in sustained conditions of weightlessness before the 1950s? So if our bones and immune systems have the plasticity required to adapt to new situations, why should not our mental faculties as well? To postulate that we have preprogrammed mental states that were selected by nature hundreds of thousands, or millions, of years ago flies in the face of rationality. Among other mysteries it leaves unexplained the lack of change in such mental states ever since. Certainly such a concept did not itself arise in the savannah during the Pleistocene epoch.

CHANGING ENVIRONMENTS

Changes in our environments do not always happen without our participation. Indeed much of the changing environment of the entire earth, such as global warming,

destruction of the ozone layer, leveling of forests, and multiplication of pollutants in air and water, is a product of what humans do. So not only does our environment influence what we do, but we influence how our environment changes. The same is true on the level of the individual. For example, we make friends, we elicit responses from our fellow workers and relatives, and we raise our children to, among other things, take care of us in our old age--though when we build an egalitarian society based on human need and cooperation, rather than private profit, the entire collective society will take care of us in our old age, rather than placing the entire burden on our own children. Lewontin, among others, has made the even more profound point that what constitutes the environment of an organism (or of a molecule or a cell, etc.) is determined by the mutual interaction of the organism (molecule, cell) and its surroundings, such that the various creatures in one and the same meadow, say, may have very different environments--the grasshoppers one, the birds another, etc.

Clearly humans are not simply passive victims of the environment in a one-way relationship.

INNATENESS

The only thing that can be said to be innate in humans concerning cognitive abilities is the ability to learn throughout life. What we learn, when we learn it, the order in which we learn it, etc. are all aspects of development (not simply an unfolding) and as such are not predetermined. When we test, or observe, the intellectual accomplishments of a particular individual at any particular time of any particular day under any particular circumstances, all we are doing is taking a snapshot, and often through a distorting lens at that (see below about IQ tests). To attribute this to the individual as a fixed characteristic is patently absurd. It's like testing a third grader and concluding that she will never be able to learn calculus. The most that could possibly be learned from this is that she doesn't currently understand calculus. And even that conclusion may be false, since it is based on certain assumptions, for example that she was willing and able to do her best during the test. Many people may be having a bad day or may always find the testing context one in which their understanding cannot easily be expressed. After all, a test taker has to understand and trust the intentions of the tester, which is anything but a foregone conclusion.

Another assumption is that the test is really capable of differentiating between those who do and those who don't understand calculus, let alone differentiating between those who will some day be capable of coming to an understanding and those who won't, or that the test is capable of assessing the current depth of that understanding. Such assumptions are rarely if ever even questioned, let alone tested, by those who are otherwise such ardent test makers and test givers.

There is an entire science of methods to evaluate diagnostic tests and devices. This science deals with such properties of a test as its sensitivity and specificity, as well as the way these each change when the criterion for pass/fail is adjusted up or down. This science has grown up mainly since World War II, when there was a need to tell whether

radar was picking up enemy planes or just undergoing random fluctuations from birds, wind, equipment noise, etc. It has found a rapidly growing application to medical tests and devices in the last couple of decades, and it is similarly applicable to educational testing, though it is rarely if ever used by school systems. In the absence of such a scientific approach to educational testing, the tests remain in the middle ages along with alchemy and astrology, and lend themselves only to the ranking of individuals for the needs not of the individuals but of the present and future employers of the individuals.

Fundamentally the very concept of innateness of *anything* within the cognitive level fails to take account of the social interactions that determine a person's cognition. Things social cannot be preinstalled in the individual, since they are a joint property of the individual and the others around her/him, and individual relationships and social forms change over time.

THE EFFECT OF GENE DEFECTS CANNOT PROVE THAT GENES CAUSE THE AFFECTED TRAIT

There are occasional individuals with a missing or defective allele (one form of a particular gene) that is associated with some defect in her/his apparent cognitive achievement. However, contrary to common claims, this proves nothing about that gene's contribution to that achievement, much less to the capability of greater achievement in the future.

Possession of the common allele shared by the rest of the species (and we share the vast majority of our alleles with all humans, with only a small proportion varying throughout the population) cannot be said to determine a characteristic that is absent when the allele is absent. It would be like concluding, just because you can't drink water out of a badly broken glass, that an intact glass determines that water will always be in it to drink or that water is the only thing you can drink from it. A necessary condition (intactness) to drink water is not the same as a sufficient condition to drink water. Yet the confounding of necessary and sufficient is the logic applied by psychologists and others who draw these conclusions from genetic defects.

DIFFERENCES BETWEEN HUMANS AND OTHER ANIMALS

Richardson makes the interesting observation--and for the moment I'll take his word for it, not having read enough in this area myself--that no other primates (monkeys and apes--our closest relatives) have ever been observed teaching their young. The young may learn from watching and doing, but there is no deliberate teaching. Only humans, he says, teach each other. Other differences between humans and non-human primates are often matters of degree, though the degree may be minuscule or gigantic. There are chimps and gorillas who have been taught to use language with a degree of understanding, even though they have to use non-oral forms such as signing or selecting symbols shown to them. So speech is not a sharp qualitative dividing line. And other animals use and make rudimentary tools--e.g., chimps. And still other animals walk more or less upright on two legs--e.g., flamingos.

It is teaching and the subsequently developed ability to extend memory by recording on stone or other surfaces that allow human experience to accumulate on the societal level. Without such accumulation there would be no development of history. While certain kinds of changes over the short term in social organization have been observed by primatologists in non-human primates (apes and monkeys), and by other scientists in other animals, only humans develop a history of noticeable changes in social organization over thousands of years, and with technological advances that stand on the shoulders of past technologies.

IQ AND ITS PROPONENTS

While Richardson is far from the first to expose the fallacies of IQ, he adds some interesting points. He, and others, have explained that the tests designed to measure something called "IQ" were deliberately designed to produce the outcome that they do, namely the ranking of individuals according to their current and future success in school. First, he points out that no correlation whatsoever has been found between a person's performance on an IQ test and the quality of her/his performance in her/his chosen career.

Second, he points out that one of the desired outcomes of IQ testing was that the results distribute according to the bell curve. The bell curve is a common, though far from universal, distribution of many features in the universe across a population. For example, height of children in a classroom (who are therefore close in age) has an average with some shorter and some taller than that average, and with most being relatively close to the average, and many fewer being much taller or shorter.

All that was required in the design of the IQ test for the scores to follow a bell curve among children of the same age and same ethnic background, and therefore roughly the same general social treatment, is the increase in the number of questions of either low or high difficulty and the decrease in the number of questions of medium difficulty. (Richardson has this reversed, but whether he has it right or I do, his point is still correct that a judicious choice of questions determines the shape of the distribution of scores.)

The main point is that the test was deliberately pushed and pulled and fixed and adjusted, over many, many testing sessions, precisely in order to yield the predetermined result, namely a bell curve distribution of scores. Thereby it would feed the illusion, even perhaps in the minds of the test makers, that this must be measuring something natural and innate.

Authors such as Richard Herrnstein and Charles Murray, who wrote *The Bell Curve* in 1994, used that feature as their title and to argue for innate abilities, and indeed to argue that therefore white children were clearly innately superior to black children. One psychologist, to prove a point, constructed a test many years ago in which he picked and chose questions to produce the outcome that on average black children got higher scores than white children. His point was not to show that black children were superior to white, but rather to expose the fact that any outcome is a feature not of the children tested but of

the test itself, and therefore of the prejudices of the test makers. Nor can any such test be invented that measures some fixed feature of the test takers.

Partly in response to the suffragette movement, a similar set of adjustments was made in order to force the tests to yield similar results for boys and girls. This, too, was accomplished by trial-and-error removal and insertion of various questions about things that were more or less familiar to boys or to girls.

Richardson decries the fact that IQ tests have so much become a part of the armamentarium of psychologists and teachers over the better part of the last century that the vast majority of them fail to see that IQ tests embody a complete and total lie. More often than not, it is said that, while IQ tests have their weaknesses, they are the best instrument we have to evaluate people's cognitive abilities. The primary point that Richardson makes is that that characteristic of people for the evaluation of which IQ tests are instruments, is a mythical characteristic, and therefore any instrument for its evaluation is necessarily based on a falsehood. To purport to choose the "best" instrument to measure a non-existent characteristic is to engage in deception, of others and possibly self. But not content to stop at that, he shows precisely how the IQ test lies when it purports to evaluate the test takers rather than the test makers.

Another interesting, but incidental, point made by Richardson is that most features of humans do not, in fact, follow a bell curve distribution. Changes in populations over time play a large role in just how these distributions may look--for features such as height, weight, age, number of teeth, etc. The example given above of height of age-matched children in a classroom may follow a bell curve, but for the population as a whole, of all ages, it does not. Rather, in the case of height, the distribution is skewed to one side, and to a degree determined by the age distribution in the population, i.e., how many people there are of each age, which is in turn determined, for example, by the life expectancy and the birth rate. However, even for age-matched children or adults, not all characteristics to which a number can be assigned follow a bell curve. There are potentially an infinite number of differently shaped distributions, each of which must be determined empirically by observation or experiment.

DOES THE EXISTENCE OF CHILD PRODIGIES PROVE THE EXISTENCE OF INNATE TALENTS?

Richardson says that all studies of prodigies, whether it be musical, or mathematical, or poetic, or athletic, have failed to show innateness of these talents. Of course, finding innateness may be difficult, since it is a rule-out diagnosis, which is to say that one can only conclude, and tentatively at that, that something is innate if you cannot find, at least for the time being, an alternative explanation for it. But these studies *have* found the alternative explanation, according to Richardson. They have shown that the prodigious talents of these children are always the result of hard work, by both the child and her/his teacher(s)--who are often the child's parent(s).

A couple of examples serve to illustrate the point. Mozart's father was a composer, who taught his son how to play several instruments and how to compose music when he was barely old enough to communicate. His father traveled around Europe showing off his son for his own aggrandizement--a common enough phenomenon in this day and age in the U.S. The apocryphal story is told that when a man came to the young adult Mozart asking if he would teach him how to write a symphony, Mozart responded that he would be better advised to start with something simple, such as a string quartet. When the man protested that Mozart was writing symphonies at age 4, Mozart responded, "Yes, but nobody had to teach me how." If the story is true, he had apparently been taken in by the innate prodigy myth, and presumably, as with his toilet training, he had been too young to remember his father's earliest musical lessons.

As other, more modern examples, the Williams sisters, Venus and Serena, were taught to play tennis by their father practically before they could eat with a spoon, and they've been practicing it for many more years than most people their age. Similarly Tiger Woods's father taught him to play golf at a very early age.

Nothing here is meant to take away from the literally extraordinary skills of these persons. On the contrary, to imagine that these skills are innate is to take away from the credit that is due them, since if such outstanding skill is innate, then what credit do they deserve for possessing it? We praise them for what they have done, not for what they were given, though in capitalist society, the opposite is usually the case. The myth is enshrined and promulgated in the very terminology of the "gifted" child. The rich, who have inherited their wealth, are given great adulation by the media and cultural outlets, as though they deserve praise for what they were given, rather than for what they had earned through hard work. Since they run the society in their own interest, they see to it that others are praised along similar lines--for what they were given--thereby perpetuating illusions.

The most harmful result of these illusions, a point that Richardson stresses, is that everyone who is not a prodigy is taught to believe that she/he lacks the ability, or rather the ability to acquire the ability, for such achievements. Indeed we are taught that not only we ourselves, but virtually all those around us, lack the ability to acquire such ability. This is highly destructive to billions of individual children and adults, but, and this is a point that Richardson fails to make, such destructiveness is in the interests, indeed is critical for maintenance of the class position, of those who run the society and who need to forestall a challenge for that control.

EVEN MATH ABILITY IS NOT INNATE

Richardson points out that 10-year-old street traders in Brazil, who are children living in poverty and scraping on the streets to survive, learn to manipulate the mathematics they need in their trading, despite the fact that they do not have the advantage, such as it is, of formal schooling in advanced placement classes. Necessity is the mother of invention, to coin a phrase--yet another reminder that invention is the source of this kind of ability and not innateness.

Mark Twain couldn't have put it better when he said that the only years his education was ever interrupted were the years he was in school. Richardson discusses the destructiveness of the schools, and even places the blame on capitalism, but in arguing that this must change, he fails to conclude that the only way it can change is that the power holders must be removed and replaced by a class with different interests--a class who need to value all members of the human species and who do not need instruments designed to rank people, and thereby divide them, so that they are ripe for conquest and exploitation.

CULTURE IS THE MAIN MISSING INGREDIENT

Richardson discusses the various levels of human organization, from genes to organs to the entire organism to social organization of multiple organisms, i.e., society. Lev Vygotsky, a Soviet psychologist of the early part of the twentieth century, is given credit by Richardson for the further development of the Marxist concept that humans are raised in a social context, without which we would not really be human. Indeed, says Vygotsky, we would have no language, and without language we would be incapable of forming concepts (Vygotsky).

Our common abilities to speak and form concepts derive from our interrelationships, our *active* interrelationships, with hundreds and thousands of people around us. This includes everyone from our parents and siblings to our teachers and fellow students to our friends and neighbors and coworkers, as well as to others with whom we are connected only through books, movies, etc. Numerous studies of feral children (wild children growing up outside the context of society, either with animals or locked up and isolated in cellars) have shown just how inhuman and animal-like such children can be.

This review doesn't begin to do these books justice, but should give enough of a flavor to encourage everyone to read them. In conclusion, in a world based on cooperation for the common goal of satisfying everyone's needs, ranking, by any criterion, would not arise, as it would be completely irrelevant. For example, if a number of persons hold a firemen's net to catch someone jumping out of a burning building, the only thing that matters is that each of them contributes to the saving of the jumper's life. It would be meaningless to ask which person had contributed the most, so the question would not arise.

While one can always imagine competition for the position of greatest contributor to such things as industrial production, such competition should be discouraged, and there will be no material basis for its continuation. It may take several generations for us to completely unlearn the social habits born of centuries of class society, though it may occur much faster than that--it will be, after all, a matter of development, the creation of newness, so it is difficult to predict with any degree of certainty. But with the material basis for competition gone, the learning, or unlearning, will be enabled to proceed

without hindrance. And then the ruling-class concept of individual intelligence will vanish from the earth.

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