

## Genetics and Morality

The Orthodox Forum  
Fourteenth conference  
March 17-18, 2002

Robert Pollack  
Professor of Biological sciences  
Director, Center for the Study of Science and Religion  
[Pollack@columbia.edu](mailto:Pollack@columbia.edu)

### I

I have been asked to address the question, "Are there morally objectionable behaviors which appear to be caused entirely by genetic factors without any meaningful volitional component?" The answer to this question is a simple "No."

What then is there left to say? To begin with, we can examine the question discover what is hidden beneath its apparently simple construction. Then we can look at the science.

What is a "morally objectionable behavior," if it is not also a free-will choice? If there were moral judgements attached to any act that took place without free-will and the volition to act on it, death itself would be a "morally objectionable behavior." We all agree that suicide is morally objectionable, but death comes to us all in the end "without any meaningful volitional component," as anyone who has stood by a loved one on the threshold of death must surely know. It is undoubtedly the case that our life expectancy is capped at around a century by germ-line "genetic factors" in service to the needs of the species; unless one wants to consider every death to be a "Morally objectionable behavior," we would be forced to say that there are no such behaviors which are completely determined by genetic factors.

And what exactly is intended here when we ask about the ramifications of "genetic factors"? The word Mendel himself used for genes was "factors," which conveyed the meaning of their particulate, unvarying nature. Mendelian inheritance is the inheritance of choices among the appearances -- or phenotypes -- of a population. So in a Mendelian sense, genetic factors are the genes themselves, stretches of DNA encoding a particular protein, plus adjacent stretches encoding switches that permit the protein to be made solely at the right time and in the right place in the developmental history of the organism. If this is what is meant by "genetic factors," then, as I have said, it is easy to show that the answer is No: genes construct us with brain and body capable of free will.

But today "factor" carries the notion of a partial contribution, whether genetic or not. Venality was a factor in the Enron collapse, and so was stupidity, and weak enforcement of the law. If we take this broader meaning of "factors," then the words "caused entirely by genetic factors" imply that other factors beyond what they encode, may also be provided to us by our genes. As we each begin as the construction of genes from sperm and egg, surely much about us thereafter is "caused entirely by genetic factors" if we allow that these factors include all those aspects of ourselves that begin with our genes. So by either definition of "factors," the answer remains No.

Put in other words, the question is whether a person who performs an act that is forbidden by halakha (a "morally objectionable behavior") can ever be taken as having a diminished capacity of free will and therefore not choosing at all. But this presumes too great a role for the human genome in determining behavior. Human genomes do in fact allow free will. There are about three billion letters in the human genome. But there about a million-fold more synaptic connections in a human brain at birth than there are letters in any human cell's canonical text. These synaptic connections - the basis of all mental activity later in life - cannot have all been specifically encoded by our genomes. At birth some are not functional, nor are many stable or specific; synaptic connections harden into circuits only later.

We are born with a tissue that becomes a mind through social interaction. Our DNA encodes, in other words, a Learning Machine. The Learning Machine is very complicated: it requires that most human genes be present in functional versions. Half or more of the genes in the genome are active in the nervous system, and for the most part only in the brain.

What these genes encode is the capacity of synaptic connections to be stabilized by use, through the activation and repression of genes in nerve cells. The Learning Machine starts up at birth at the latest, activated by initial input signals from the organs of perception. This is the mechanism by which the mind slowly emerges from the brain, through imitation of the minds of those people with whom the infant interacts. Experiences of the first two years, before language emerges, lay down much of the stable circuitry of the thinking brain.

But even after these formative years, the mature brain forever retains plasticity in its circuits, and it never loses the capacity to link past with present experience by familiarity of synaptic pattern. Synaptic connections are made and broken throughout life; these are experienced variously as sensation, perception, memory, repression and - for my argument's sake, most important - ongoing teaching and learning.

The learning machine requires adequate social interaction from birth on; absent that, sociopathic disasters ensue. Many of these will be "morally objectionable behaviors." Racism, for example, is one of these disasters.<sup>1</sup> Whomever is cast as the Other by adults when they interact with their children, will become the Other to those children. When racism is learned in this way, it is a biological event, in that the synaptic wiring of associations in the brain of the child will have mimicked those in the brain of the adult. This form of inheritance is not through DNA, but it can be as stable, and as long-lasting, as genetic inheritance. But we must be clear: it is social, not genetic. That is why there is no contradiction between thinking of race as a social construct – the product of racism – and thinking about it in the language of inheritance.

A crucial further implication of the incompleteness of genetic specificity in determining our individual behavior, is that genetic information may not be used as an excuse for setting aside religious values. The search for a causative rather than correlative link between versions of genes and propensities for various behaviors, even if it bore fruit, would not remove the obligation to work with every person regardless of their genetic gifts, because the moral context that gives meaning to science through medicine requires the attention of both science and medicine to a person in all his or her complexity and variability.

Perhaps the best way to see this is to understand that although in social terms people tend to aggregate into groups of majority and minority populations — often separated by religion — by the data of our genomes, we are all members of genetic minorities that range in size for the millions of a founder population, to the dozens of an immediate family, to the irreducible minority of one which is at the heart and soul of medicine. It would do us well to acknowledge that nothing in the legacy of human DNA blocks the choice to value the differences among us above the resemblance any of us might have to our idea of an ideal person.

## II

From the Jewish perspective, in particular, genes cannot propel us toward religious pursuits and experiences. Consider the following quote from the Rambam, "Mishneh Torah," Hilchot Talmud Torah, Chapter 3:

"Three crowns were conferred upon Israel: the crown of Torah, the crown of priesthood, and the crown of royalty.

Aharon merited the crown of priesthood, as [Numbers] states: "And it will be an eternal covenant of priesthood for him and his descendants after him."

David merited the crown of royalty, as [Psalms] states: "His seed will continue forever, and his throne be as the sun before Me."

The crown of Torah is set aside, waiting, and ready for each Jew, as [implied by Deuteronomy]: "The Torah which Moses commanded us is the inheritance of the congregation of Jacob." Whoever desires may come and take it.'

Rambam then goes on to make the point in his own special way. He says that when hiring a teacher of Torah for yourself or your child, you should give a learned *mamzer* precedence over an ignorant man, even if that ignorant man happens to be the *Kohen Gadol* himself.

Rambam is pushing a point, to make a critical differentiation. By distinguishing the availability of the "inheritance" of Torah, from the father-to-son inheritance of priestly obligations and privileges, and from the royal prerogative to pass a Jewish Kingdom to one's child, he is telling us that no aspect of Jewish life available to him was biologically inherited. The inherited priesthood needed a context of Temple sacrifice, and the Davidic reign needed a Jewish nation. At his time, all that Jews had left was Torah.

With this as background, let's look again at what we may yet inherit in a different way: "The crown of Torah is set aside, waiting, and ready for each Jew ... ." Take these characteristics of the Crown of Torah one at a time.

It is "set aside." In the dichotomy of *kodesh ve-hol*, the study of Torah is intrinsically *kodesh*. The crown of understanding cannot be taken, any more than it can be inherited. It can only be given, as a reward for study, for understanding, and for the enactment of what it teaches.

It is "waiting." The understanding of Torah does not require that one be born into the right family, or into the right moment. Rather, any moment is as good as any other to begin studying, and any Jew is as authentic as any other, in terms of the right and the obligation to begin studying.

It is "ready for each Jew." The depth of understanding of Torah necessary for the gaining of the Crown cannot be the same for each Jew. Instead, for each one of us, it is the saturation of our individual capacity to learn, rather than our particular level of innate, inherited capacity, that yields one of us the Crown, and another not. No wonder we say in the *shema*, "*ve-shinantam le-vanekha*" - "teach them thoroughly to your children ..." We have no other choice; we have not genetic, inherited shortcut for our children.

In summary, Rambam is not only saying that the Crown of Torah is not inherited, but that also, no aspect of one's wish to receive the Crown of Torah can be inherited either. Both are wholly a matter of choice and the will to follow Torah at each generation, neither is at all a matter of biological inheritance.

Moreover, there is no fourth crown to mention at all. There is no crown of sensitivity, no crown of spirituality, no crown of religiosity. Now step back and ask what this has to do with our sense of ourselves as Jews. Whatever "*pintele yid*." Whatever special Jewish soul we may wish to think we have, I think Rambam is saying that it must finally be what we were taught and what we learned, not what came to us through our ancestors' DNA, that makes us Jews. So, while Ruth might have inherited a genetic propensity toward loyalty from her Moabite ancestors, I rather doubt that we should draw upon that genetic legacy when trying to understand her behavior with Naomi or Boaz. Rather, Ruth teaches us that even the Davidic line -- with all it implies for our future -- emerges by teachable and learnable action, not through DNA.

DNA is a chemical of great informational density, a text of great importance. But any person's genome - his or her complement of two copies of each of about 60,000 genes, one copy of each from each parent - is no more the complete statement of that person's life and character, than a canonical text is the complete statement of a living religion. Everything interesting in both cases is the product of interpretation and interaction. Appearances begin with the information encoded in DNA, but anyone who knows one identical twin also knows that person to be unique, despite the presence of another person with the same canonical text in each cell.

Genetic differences among us are nevertheless great enough to account for some -- but not all! - of the differences between one person and another. From any one person to another, unrelated person, the differences in base-pair sequence - letters in the text - for the coding region of any gene studied come to between one in a thousand and one in a hundred. Imagine a canonical text with that many variations from copy to copy. There would be no chance of any version possibly being the "real" one. There can be no biological data in support of the notion of oneself as the member of a genetically identical group.

All that makes our genomes human - and all that makes us human in a biological sense - is that these six billion different genomes, and only they, are all capable of coming together with each other through sperm and egg to make another generation of people. So the biology is clear: there is no chance of some human genomes being Jewish and others not; the biology of us makes us truly all equal.

No rational explanation of what it is to be Jewish, then, can possibly begin with the claim that one set of these exceedingly large number of genetic variants is Jewish, and another not. Better, the history of our species tells us that we are all the descendants of Africans. The evidence for this comes from many quarters, but in our terms the DNA evidence is most interesting: because Africa is the home of us all, people who are the descendants of the original people - Africans - have the greatest genetic diversity of all human subpopulations.

The rest of us are, in a sense, tribal offshoots, each carrying away only a fraction of the genetic richness of our species, which still remains where it began, in Africa. The irony of universal African patrimony only makes the insult of American Racism more stupid, but not less dangerous, than any other dehumanization.

### III

By each of us exerting our free will to decide whether it is wise for us to know more or to know less about our own DNA at any given moment, the scientific data of DNA-based medicine may be returned to a proper medical context. In light of the DNA evidence we already have, this means stretching the definition of normal variation to include the greatest possible diversity of inherited appearances and behaviors. Our obligation here is as clear in its own way, as the countervailing trend is in current medical science.

The straightforward agenda of scientists and the short-term acquiescence of physicians fifty years ago lead to the creation of the National Institutes of Health, each Institute named for a disease of the middle-aged white men in Congress who gave out Federal money in those days and still do today. These Institutes have provided the country and the world with much knowledge of great value, both medical and monetary. But with the creation of cheap, easy scans for mutations in genes like BRCA1 -- the first human gene to be associated with an inherited propensity to develop ovarian and BREast CAncer (hence its name) -- knowledge contributed by NIH-supported science has begun to change medicine in ways that deny the meaning medicine provides to science.

In "The Missing Moment," I drew the following quote from my mentor and teacher, James D. Watson, discoverer of the structure of DNA and founding Director of the Human Genome Project. Writing in the Annual Report of his Laboratory, he had said:

"If we could use genetic analysis to help work out the biochemical pathways underlying memory and clear thinking, for example, we might be able to find pharmaceutical compounds to improve these most needed human attributes. Thus, those who want to protect the mentally ill or the slow learner may not get what they strive for if they portray them exclusively as victims of their environment. We might like to think otherwise, but only by reducing the differences in human beings will we ever have a society in which we can effectively view all individuals as truly equal."

I admire Jim Watson for his unmatched taste in picking the right question to ask of nature as much today as I did when I first met him in the late 1960s, but I know that here he was deeply wrong. We know from a century and a half of research in ecology and evolution that as a species our future lies not in minimizing our differences, but in cherishing them.

Finally, a further remark on the matter of DNA and the objectives of modern medicine. We have the choice to stop short of cooperating in the stigmatization of members of our own community by a false hope that DNA will relieve us of the difficulties that our gift of genetic diversity presents to us. In civil law, a claim of diminished capacity does not rest on any knowledge of the genetic makeup of a person, nor should it here. If I had been asked not about the reality of free will in the light of genetic science, but about the utility of genetic science in ameliorating a halakhic response to non-halakhic behaviors, what I would then say is that I would hope that halakhic responses to non-halakhic behaviors would always be as generous and gentle as possible, and that my hope was free of all scientific content.

In his essay "Catharsis," Rabbi Joseph Soloveitchik describes this paradox in a way familiar to secular scholars of the absurd: the essential element of heroism in Jewish terms is retreat. The paradigm of the hero who retreats is the patriarch Jacob, who wrestles an angel to the ground and then, instead of consummating his victory, lets him go. From such a withholding of final victory Jacob's descendants -- the Jews of today -- draw their continued existence:

"The Torah wants man, who is bold and adventurous in his quest for opportunities, to act heroically, and at the final moment, when it appears to him that victory is within reach, to stop short, turn around, and retreat. At the most exalted moment of triumph and fulfillment man must forego the ecstasy of victory and take defeat at his own hands. ... By freeing the defeated enemy Jacob defeated himself. He withdrew from a position he had won through courage and fortitude. He engaged in the movement of recoil."

To a person guided by Torah as the revelation of an unknowable but caring God, successful medical intervention need not confer any moral grandeur, nor need medical failure imply moral decay. The use of DNA analysis to provide a prognosis of certainty that another person will suffer the ultimate loss of free will that is a mortal illness - without also providing the means to ameliorate this certainty - is a form of medicine so unwittingly cruel as to be its own worst enemy. From this Jewish tradition, medicine can perhaps learn to recoil at the moment of victory, to pull back from the opportunity to take on the inappropriate role of judge of another person's fate.

It will be difficult to change the habits of the day, because for anyone -- Jewish or not -- who doubts there is an unknowable deity concerned for the moral content of their individual actions, medicine does have a way of filling the gap, sapping a patient's freedom to choose how to live his or her life. The enormous capacity of science to create tools for the manipulation of the natural world has helped confer moral authority on medicine by default. The lesson to be drawn from the Jewish tradition is that doctors and scientists have a moral obligation not to fill this gap with their own certainty, if for no other reason than to avoid acting as if they had somehow lost their own God-given free will in turn.

How might this single lesson from Judaism play out in more general, operational terms in today's medicine? In the most general terms, it would redefine medical practice in the following ways. The profession -- from basic researcher to primary-care physician -- would accept the full autonomy of the

patient at all times; the profession would see this autonomy of the patient as a critical aspect of the patient's identity as a unique and complete human being regardless of physical or mental condition; and these obligations would not be less compelling in the last moments before a patient's inevitable death. As my friend Ed Reichman reminds me to say, this might not bring secular medicine more close to the expectations of halakha, but it would make medical practice more humane.

For example, while criteria for screening for BRCA1 mutations are in flux, already we can see the outlines of a religiously-informed, sensitive policy, one informed by the experiences of the Ashkenazic community, but not limited to that community. Here, for instance, are the guidelines used by Dr. Freya Schnabel, a Columbia colleague whose practice includes many Ashkenazic families. First, the screen is not to be made available to everyone: in the general population the grounds for a BRCA1 test are either three cases of breast cancer in the family, two in women under sixty. In Ashkenazic families the criteria are slightly less restrictive, but still stringent: at least two cases of breast cancer, at least one in a woman younger than sixty.

Second — not a criterion but a boundary — prenatal screening for this adult-onset disease is not to be performed even in affected families. As there is no way to predict the age of onset nor whether the child will indeed develop a tumor at all, there are no grounds to put forward the choice of abortion, as there might be with inherited diseases that occur with complete certainty at birth or at a very early age.

The third, fourth and fifth criteria speak to the essential inseparability of mind and body and the central importance of psychosomatic and emotional events. Third, anyone entering the process of DNA diagnosis for BRCA1 status must first be counseled and a judgement made of their ability to understand and to accept either a positive or a negative result. Fourth, only people who are able to accept the lack of clarity of either result, and are willing to make decisions for themselves about the consequences nevertheless, should be assayed. And fifth, counseling, both psychological and genetic, should continue for at least as long after the result is in, as before the decision to be tested.

We may not all be members of high-risk families, but we are all at risk. It remains uncertain whether guidelines like these — which go far toward helping people to choose how to approach the future, while not unnecessarily shadowing anyone's free will with useless genomic determinism — will be applied widely, or whether genomic data stripped of any medical meaning will continue to be imposed on us all.

#### IV

##### My conclusions

All social constructs - good and bad - are expressions of our biological capacity to transmit brain states vertically by a second, non-DNA channel of teaching and learning. They are made possible by our genomes, but they do not depend on our genetic differences. This allows us to make the assumption - precious to us as Jews - that one's free will is undiminished when one chooses a forbidden act. Absent free will, there is nothing to forgive, nothing to teach, no chance for reinterpretation at a later date and, most important of all, no chance for *teshuvah* on the part of anyone.

We know as well from millennia of religious insight that there is no possible way to justify any ranking of one person over another on grounds of any aspect of their physical being. From those two insights we have the chance of working toward a properly informed medicine, capable of using any and all insights from science in a context derived from the insights of many religions, and thereby capable of reducing all data to one purpose: to help people in need, one person at a time.

---

<sup>i</sup> The Racist thinks of everyone in the Other category as if they were genetically identical clones: "all you people look alike to me." The irony of thinking of the Other this way is more perfect in the American case than any other. Here the Other is likely to be a descendant of Africans, who are today genetically the most genetically diverse of all people. It is a group of like-minded Racists who -- thinking alike despite all facts -- form a clone; not a genetic clone, but a social one.