Ian Hacking

Genetics, biosocial groups & the future of identity

'Biosocial' is a new word, but its pedigree, although brief, is the best. Paul Rabinow, *the* anthropologist of the genome industry, wrote about 'biosociality' in 1992.[1] He invented the word partly as a joke, to counter the sociobiology that had been fashionable for some time.

When he wrote, Rabinow was interested in groups and the criteria around which they form. Of course, human beings are biosocial beings: biological animals and social animals. But the fact that many *groups* of people can be loosely characterized in both biological and social ways, and that the 'bio' and the 'social' reinforce each other, prompted his term. This phenomenon is immediately evident: what are families or extended kinship structures if not biosocial groups? Currently, the genetic imperative – the drive to find biological, but above all genetic, underpinnings for all things human, in sickness or in health, in success or in strife – is fueling fascination with this concept.

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1 Paul Rabinow, "Artificiality and Enlightenment: From Sociobiology to Biosociality," in Jonathan Crary and Sanford Kwinter, eds., *Incorporations* (New York: Zone Books, 1992); reprinted in Paul Rabinow, *Essays on the Anthropology of Reason* (Princeton, N.J.: Princeton University Press, 1996), 91–111. Rabinow is an insider-outsider with whom many leading figures in the biotechnology field talk freely. They respect his wholly critical approach as good science in its own right, which means, in part, inquiry fueled by intense curiosity. This working relationship is truly uncommon in the burgeoning field of science studies. The respect is mutual. Rabinow has no doubt that geneticists are finding out how it is. Unlike most academics, he works well with the commercial, venture capital side of the industry, and is perhaps more comfortable there than in academic laboratories. See a series of his books from *Making PCR: A Story of Biotechnology* (Chicago: University of Chicago Press, 1996) to Paul Rabinow and Talia Dan-Cohen, *A Machine to Make a Future: Biotech Chronicles* (Princeton, N.J.: Princeton University Press, 2005). He does not restrict his work to the United States, for he is the most challenging informant about aspects of French biotechnology. Paul Rabinow, *French DNA: Trouble in Purgatory* (Chicago: University of Chicago Press, 1999).

He has also had another role, as America's first reliable facilitator (a handy enough term) for Michel Foucault, with whom there was the same mutual respect. Hubert Dreyfus and Paul

After an initial deterministic enthusiasm, almost everyone came to realize that everything is *not in our genes*, to cite the important polemic of Richard Lewontin, Steven Rose, and Leon Kamin.[2] One, there are not enough genes; second, it is the when and where and how of the expression of genes that counts; third, junk DNA and other primordial stuff are not as junky as they seemed; fourth, proteins are now where the action is; and so on. Nevertheless, the biological, and then the genetic, imperatives are facts of modern life. And far from increasing determinism and limiting opportunity, the life sciences are creating more choices. On the one hand, we have, in a sense, more biologies to choose from than we anticipated. On the other hand, new societies form along newly recognized (or, at any rate, newly asserted) biological or genetic lines, forging new alliances and loyalties. Forging new identities.

Some would say that Rabinow accepts too readily the self-image that life technologists would like to project. For example, when Lewontin was mounting his critical onslaught on the police's simplistic use of DNA fingerprinting, Rabinow published in 1992, the year he gave us 'biosociality,' a piece called "Galton's Regret: On Types and Individuals."[3] In it, he describes Francis Galton, the genius who, among many other accomplishments (including the invention of the silent whistle for police dogs), developed a system to identify criminals using their fingerprints. He adapted his system from the Indian Civil Service's, which was necessary because imperial administrators found it hard to recognize many of their subjects definitively. His regret was that, although a complete set of fingerprints does identify a person uniquely, it says absolutely nothing about that person's character.

In some ways, the work of Galton's rival, Alphonse Bertillon, who invented the French system of identification by ears, might well have proven more relevant for recognizing character traits. That, at any rate, was the speculation during the heyday of the criminal anthropology inspired by Cesare Lombroso. Anyone who has a green card conferring resident-alien status in the United States can check and see that the photo thereon conforms to Bertillon's demand that an ear always be shown.

But DNA fingerprinting – here perhaps I am carrying Rabinow's analysis a step too far – a method of identification intimately connecting you with a genetic profile, does indeed show a lot about who you are and who your ancestors

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Rabinow, *Michel Foucault: Beyond Structuralism and Hermeneutics*, 2nd ed. (Chicago: University of Chicago Press, 1983). I single out the second edition because the interview printed there is one of the most useful places to begin a philosophical discussion of Foucault's later ethical studies. Paul Rabinow, ed., *The Foucault Reader* (New York: Pantheon, 1984). He continues to explore some of Foucault's leads. Many of the essays in his *Anthropos Today: Reflections on Modern Equipment* (Princeton, N.J.: Princeton University Press, 2003) are at the intersection of Rabinow's abilities, on the one hand, to learn from Foucault and, on the other, to grasp what is happening in biotechnology. There is unlikely to be anyone else, at present, as agile with biotechnology and as adept in discussing biopower as Paul Rabinow.

2 Richard C. Lewontin, Steven Rose, and Leon Kamin, *Not in Our Genes: Biology, Ideology, and Human Nature* (New York: Pantheon, 1984). See also, for example, Richard C. Lewontin, *It Ain't Necessarily So: The Dream of the Human Genome and Other Illusions* (New York: New York Review of Books, 2000).

3 In Paul R. Billings, ed., *DNA on Trial: Genetic Identification and Criminal Justice* (Plainview, N.Y.: Cold Spring Harbor Laboratory Press, 1992); reprinted in Rabinow, *Anthropology of Reason*, 112 – 128.

were. Also where you come from, that is, the neighborhood in which you live. Galton would have loved it. But not only Galton: the entire European tradition of criminal anthropology has been brought back to life, although few dare to mention it because it is thought to be as disreputable as Galton's eugenics.[4]

Lewontin's critique was invaluable. There had been an all too glib enthusiasm for DNA identification following its initial successes in the United Kingdom. In addition to technical objections based on genetics or American jurisprudence, an elementary difficulty arose at once. There is the old adage that crimes against the person are most often committed by family members or neighbors. Family members share a lot of genetic traits, and neighbors live in neighborhoods – whose members tend to clump in historical and geographical, that is, ethnic, ways. Thus, the probability of finding a DNA match should not be the probability of finding such a sequence in the world's population, or even that of the northeastern United States. There the probability may be minute. Rather, the relevant figure is the probability of having such a match within a few blocks of the crime, where it will most likely be a lot larger. Let alone when the suspects form an extended family. So the chance of a false conviction based on the early DNA probability calculations was far greater than was at first supposed.

The criticisms made by Lewontin and others had impact, and in part thanks to changes that resulted, genetic fingerprinting is now considered remarkably reliable. One little-noticed effect was on the law-enforcement system. The FBI now has an enormous data bank containing DNA profiles of certain neighborhoods. If you come from a neighborhood where crime is common (in fact, as opposed to local folklore), the FBI knows an awful lot about your neighbors' genomes and, by statistical implication, perhaps your own. Hence, we can now assess DNA evidence with more relevant probabilities, or 'reference classes.'

The technique applies exactly as well in ethnically diverse neighborhoods that break into recognizable subgroups. For example, suppose DNA is left on the scene of a crime in a heterogeneous Los Angeles neighborhood, 40 percent of whose members are recent immigrants from the Republic of Armenia and 40 percent quite recent immigrants from Mexico. DNA evidence may indicate that the suspect is Armenian. Obviously, we do not then want to use the reference class of all inhabitants of the neighborhood to compute the probability of a random match between the evidence and our suspect. Instead, we want the reference class of Armenian immigrants, who may well be so genetically similar that reliable identification is very difficult. Especially if they all came from the same neighborhood in the old country.

DNA criminal identification needs innumerable cautions – some technical, some common sense. Lewontin rightly feared that poorly analyzed genetic evidence would make false convictions all too easy. At its worst, almost any member of an already targeted group could plausibly be made to fit the crime. However, in principle, if not always in prac-

4 For "A Bibliography for a Course of Criminal Anthropology, or Criminal Sociology, Circa 1893–4," see Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge University Press, 1990), 246–247. For parallels between that criminal anthropology and its 1990s facelift, see Ian Hacking, "Criminal Behavior, Degeneracy and Looping," in David T. Wasserman and R. T. Wachbroit, eds., *Genetics and Criminal Behavior* (Cambridge: Cambridge University Press, 2001), 141–167.

tice, the new local data banks make that far more difficult. And however much DNA has made securing convictions easier, genetic fingerprinting has also helped free a significant number of individuals previously convicted on inadequate evidence.

The House on 92nd Street, a wonderful movie made in 1944, provides a point of comparison between the new fingerprints and the old. Made with the full cooperation of the FBI (apparently *before* Hiroshima, although released only after), the movie shows how the FBI caught German spies stealing atomic secrets.[5] In it is a shot of a vast arena where young women searched the entire bank of fingerprints the FBI possessed in 1944 in order to identify the guilty parties. The filming took place on the real site, long since torn down. The room is auditorium-sized, but the procedure is automated, using Hollerith cards, derived in the first instance from the Jacquard cards for industrial weaving of long ago and the predecessors for the punch cards developed by IBM, which descends from Hollerith's original company.

One sees the force of the metaphor 'data bank.' It is not just a secure place to store masses of data; the endless stacks of cards are 'banks' in another sense of the word. For anyone who has trouble with gene sequencing and computers, this scene is a reliable metaphor for DNA-fingerprint searching today. The two chief differences: today's identifiers are genes, not the surfaces of fingers, and the sorting is electrical, not mechanical. And, of course, it takes place not in a room the size of a hockey rink but in a little gray box. Police services, in many parts of the world, are just as proud of their sorting devices today as the FBI evidently was of its in 1944. And rightly so, despite the occasional misjudgments that overreliance on black-boxed technology can produce.

Rabinow's more speculative remarks about biotechnology, as opposed to his anthropological, sociological, and historical descriptions of the scientific work, tend to be prophetic. Thus, although Lewontin was absolutely right to demand stiffer criteria for DNA identification, Rabinow was right to foresee, fifteen years ago, the increasing role of genetics in life and self-conceptions. I should at once emphasize that he was not primarily interested in the use of genetics for racial identification, the current bone of contention. No, he was looking further into the future when, for example, risk markers for disease and causes of death might prompt people to identify themselves as *that* sort, the ones at risk of having Alzheimer's, an autistic child, etc.

A neighborhood is a good introduction to the idea of already existing *de facto* biosocial identities. Many Armenians, for example, emigrated to a handful of locations in the United States for all the old-fashioned biosocial reasons: family ties, a network of employment opportunities, language, lifestyles. On a Sunday morning the parks of an L.A. suburb are full of Armenians, by no means all notably fit, playing soccer. Where there are serious Angeleno hills and canyons, groups of Armenians of all ages and both sexes are taking sociable walks, complete with sticks that appear to come from their former homes. This last observation by itself is enough, from a sociologist's point of view, to set them

5 *The House on 92nd Street*, directed by Henry Hathaway, released September 1945. All the FBI agents except Lloyd Nolan are played by FBI personnel – in many cases the actual personnel involved in the historical events.

apart from almost any other recent immigrant group. In small clumps on a hill they do look somewhat alike to the outsider. And, to put it bluntly, their Hispanic neighbors hate them. Romeo and Juliet had a simple life compared to the handsome son of the Mexican immigrant in love with the beautiful daughter of Armenians. Finally, there is the bonding narrative that burns in every soul, the Armenian massacre.

The ties that form this biosocial unit are certainly more social than biological. No one in the group needs to know what the FBI data bank holds for this neighborhood to identify with each other. They probably would not want to know, for with all the centuries of marauders, pillages, and rapes that run through the history of the Caucasus and nearby regions, one would find a far more distinct phenotype (what these particular Armenians look like) than genotype (which is not so different from that of nearby peoples in their former region). Nevertheless, in the new, quite compact neighborhood within the greater Los Angeles area, the FBI would have no difficulty (yet – just wait for Romeo and Juliet to do their thing) telling an Armenian DNA sample apart from a Hispanic one.

As is so often the case with living colloquial speech, the 'hood really denotes an important entity, which tends to be both social and genetic. To say that is to hold up the red flag for accusations of racism. Good. We need to get the race stuff out in the open quickly, or we may be overtaken by new versions of race science put to its most evil uses.

We must first erase one worthy item from the former dogma of liberal attitudes: that all race science is biased balderdash, in particular, that the genetic variation between two randomly chosen members of one racial group is just as great as that between two randomly chosen members of different races. This was commonly supported, in politically correct statements for general audiences, by saying that humans share 98 percent of their genome with pigs, or earthworms, or whatever species is obviously beneath us. So how could genes distinguish Armenians from Hispanics, if they can barely distinguish us from earthworms? We owe the scientific argument to Richard Lewontin, who put it in place over thirty years ago.[6] Editorials to this effect were still appearing in *Nature Genetics* and *Nature* as recently as 2001.[7]

Epidemiological practice has long ignored such agreeable cant, certainly since the early 1990s when racial registries for bone-marrow transplants were established.[8] Lewontin's doctrine was not as sound as it seemed. The trouble is that his theoretical argument assumed that characteristics associated with race, either stereotypically or physiologically, are statistically independent. They are not. As Hitler liked to point out, even though few whites have blue eyes and blonde hair, nearly every blue-eyed blonde has whitish skin. A. W. F. Edwards's 2003 theoretical refutation of Lewontin, attending to correlations among traits and genetic markers, is now widely judged to be correct.[9]

6 Richard Lewontin, "The Apportionment of Human Diversity," *Evolutionary Biology* 6 (1972): 381 – 398.

7 *Nature Genetics* 24 (2000): 97; *Nature Genetics* 29 (2001): 239; *Nature* 409 (2001): 812.

8 Ian Hacking, "Why Race Still Matters," *Dædalus* 134 (1) (Winter 2005): 102 – 116. I shall not repeat my four-page discussion of race-based medicine here, but it is taken for granted in what follows.

9 A. W. F. Edwards, "Human Genetic Diversity: Lewontin's Fallacy," *BioEssays* 25 (2003): 798 – 801. Edwards is a statistical geneticist at

Edwards's analysis is, for anyone with a modest statistical training, rather direct and 'self-evident,' and yet it had to wait thirty years before anyone thought the matter out in public. I suspect that, since Lewontin's conclusions were so 'obviously' correct, no one attended to the logic of his argument. I do not mean to imply that the issues are simple, only that what was so confidently asserted in *Nature Genetics* a few years ago is obsolete. The fall 2004 issue of the same journal was all about race and genetics. It sings to a tune altogether different from the harmonies of three years earlier.

The upshot is that stereotypical features of race are associated both with ancestral geographical origin and, to some extent, with genetic markers. On the one hand there was the experiment – I would categorize it both as acute and cute – in which samples of saliva were taken from people around the world, chosen on an essentially randomized protocol for geographical region. They were then run through fairly standard computer programs designed to sort groups of objects with lots of characteristics into small groups of distinct classes. These programs can take a midden containing pottery fragments with different designs, for example, and sort the shards into a few classes, which archaeologists conjecture come from distinct epochs. Such a program sorted DNA samples from around the world, unlabeled, into a small number of groups. It produced five groups of people, recognized as the five races of nineteenth-century science, plus one group that did not fit well with any preconceptions.[10] The experiment does not strictly prove anything, but it is a significant anecdote.

On the other hand, interbreeding among populations of different geographical origins has been common in many parts of the world for a very long time. In such regions, skin color and the rest furnish little indication of the proportion of one's inheritance that one owes to different geographical regions. This has been most decisively established for Brazil.[11] Genetic markers cannot distinguish between affluent urban white-skinned business people in São Paolo, who deem themselves descendants of the Portuguese, and rural dark-skinned peasants, who think their forebears came from Africa.

We have yet to have a good study of a real old-time melting pot like the Silk Road from China to the West. Those who are more impressed by looking than by analysis can make a guess of what to expect from the extraordinarily powerful paintings of nomads attributed to Muhammad of the Black Pen (Muhammad Siyah Qualam) in the thirteenth century, common era.[12]

At present, plenty of anecdotal evidence points to the same effect about Americans. It is symptomatic of the old race science that 'Caucasian' is still the

Cambridge University. For fear that his testimony be taken as *a priori* suspect, I should mention that perhaps the most vigorous lifelong proponent of the irrelevance of race for evaluating human beings is Luca Cavalli-Sforza. Edwards was for some years his collaborator and developed much of the statistical machinery on which his early population genetics depended.

10 Noah A. Rosenberg et al., "Genetic Structure of Human Populations," *Science* 298 (2002): 2981 – 2985.

11 Sérgio D. J. Pena et al., "Color and Genomic Ancestry in Brazilians," *Proceedings of the National Academy of Sciences* 100 (2003): 177 – 182.

12 See, for example, the catalog of the Royal Academy Exhibition, *Turks: A Journey of a Thousand Years 600 – 1600* (2005).

name used in the United States for white people, who not long ago thought a single drop of alien blood could 'pollute' them, when in fact people from the Caucasus are most likely a very mixed genetic bag, just as they are on the old Silk Road. Call that idiocy, or call that an inadvertent stroke of ironic prescience, as you please.

The partial alignment of genetic markers and stereotypical racial identification rightly leaves African Americans in a quandary. Although the fact is not much publicized, quite a lot of scientific work on race-based medicine is conducted under essentially Afro-American auspices. At a quite different level, for people whom slavery, exploitation, and contempt left without family history, DNA identification furnishes a probable but unreliable way of tracking their origins.[13] In these and other ways, some genetics is welcome. However, the fear that all this DNA stuff will be put to racist purposes, including high-tech criminal profiling, is justified. But there is no hiding. And it is quite possible that white liberals want to hide more than black Americans do.

There is a whole forest of practical needs for genetic identification. For example, if a person in another continent can show the existence of kin in North America, immigration there is facilitated and in some cases guaranteed. So a host of companies is offering genetic services.[14]

Most of the nineteenth-century Canadian treaties with Indians conferred rights to the Indians at the same time as they took their territory. In present law, descendants of treaty persons have, under various complex conditions, rights and privileges different from those of other citizens. Similar laws exist in the United States. Hence, companies determining the extent of a person's aboriginal ancestry also get a lot of business.

I am taking a rather benign view of the use of genetics to trace identities. I hope the dangers are evident. It will be tempting to turn optional sources of evidence into obligatory types of proof. Another reasonable fear is that a lust for technology, and an admiration for false precision, will make genetics override community, among not only technocrats but also people in general. For example, it might become easy to reject children who grow up in a community but for whatever reason are genetic outliers.[15]

13 "Blacks Pin Hope on DNA to Fill Slavery's Gap in Family Trees," *New York Times*, July 29, 2005, A1. You can get something about your ancestors quite cheaply. Since this is a highly competitive market, prices will keep on falling, and any costs I might write today will soon be out-of-date. For an idea, try Google: for example, *Family Tree DNA*, from Family Tree Genetics Ltd., located in Houston, Texas, displays what it asserts is a competitive chart of comparisons with two major rivals, Relative Genetics (U.S.) and the Oxford Ancestors (U.K.). "FTDNA lab's scientists are world-renowned geneticists and discoverers of original markers that have been included in other lab tests." It is difficult for a layperson to figure out exactly what any such organization is selling, or even who the world-renowned paid collaborators are. *Caveat emptor*, and consult a knowledgeable person before you spend a cent.

14 Thus, Genelex says it has facilities available in seventy-two countries from Argentina to Vietnam. Unlike the firm cited in the previous note, it does offer profiles of its management and consultants. It asserts, "Genelex tests are 100 times more discriminating than the industry standard. Typical positive test results exceed 99.99%." The longer you look at that assertion the more ways you can read it. Did I say *buyer beware?*

15 Jon Elster drew my attention to debate involving legislation under consideration in Vermont. Kimberly Tallbear, "DNA, Blood and Racializing the Tribe," *Wicazo SA Review* 18 (2003): 81–107.

If the genome begins to override culture, then all citizens must rise up and insist that social bonds are what make us people. But we must also understand that knowledge of genetic 'identities' will forge social ones, creating new communities of shared recognition based on partial science. That is not intrinsically bad, but it is still a phenomenon that can be grossly abused.

And whatever use individuals want to make of genealogy kits (yes, the commercial labs send you a 'kit' to collect some of your DNA for analysis), epidemiologists will relentlessly collect new data. Today, if you go to a National Health Service clinic in Great Britain, you will be asked to complete a questionnaire in which you state what you think are your ethnic and, above all, geographical roots (you can have as many as you want). Some well-educated liberal Brits I know mock these forms or oppose them. While their fear of the all-powerful nanny-state that knows too much about you is legitimate, they also ridicule these forms out of the uninformed belief that ethnic and geographical self-identification is, among other things, worthless. Not so: it is a useful, very cheap guide to aspects of your genome.

Yes, self-identification is imperfect information. But it is cheap. It is comparable to the BMI, the Body Mass Index, which the current obesity panic has made a household phrase. Adiposity, the ratio of body fat to body mass, is the important health indicator, but it is fairly expensive to measure by any current technique – and thus comparable to a personal DNA readout. But the BMI is very cheap: stand on a scale, stand under a device that measures height, press two buttons on a calculator (or use one of the innumerable online BMI calculators), and there you have your BMI. The BMI originated in epidemiology in the 1960s but was not so named until 1972.[16] One of its first classic uses was in a national Norwegian survey to detect seriously underweight people and note the correlation with tuberculosis.[17] A national study of adiposity would have been more informative and would have cost about a million times more. The U.K. National Health Service survey of ethnic self-identification is much the same: a large data set using cheap information rather than a minute data set using expensive information.

When it becomes clearer what one ought to be looking for in patient genetic data, and when obtaining that data becomes very cheap, epidemiologists will collect it. All British genes will go on file, unless a public outcry arises far greater than what has occurred so far. This is already being done piecemeal in quite a few parts of the world, including Quebec and the United Kingdom, but the most systematic and most publicized program is in Iceland, where a venture capital company, DeCode, and the Icelandic government have an agreement to match DNA, genealogies (which are more extensive in Iceland than anywhere else in the world), and health

16 Ancel Keys et al., "Indices of Relative Weight and Obesity," *Journal of Chronic Diseases* 25 (1972): 329 – 343. The *ratio*, namely metric weight over height squared, is much older. But it was used not for medicine but for anthropology (anthropometry), and in perhaps the first instance for studying the rate of growth in height and weight in children – a project that goes back to Buffon.

17 Erik Bielke, "Variation in Height and Weight in the Norwegian Population," *British Journal of Preventive Medicine* 25 (1971): 192 – 202. Much of the early BMI literature from international sources was published in British NHS-oriented medical journals. For the classic full study, see H. Th. Waaler, "Height, Weight and Mortality: The Norwegian Experience," *Acta Medica Scandinavica Supplement* 679 (1984).

records, both present and historical. The company then essentially leases the information to multinational pharmaceutical companies, who use it to prospect for links between genetic markers and disease.

Significant opposition to the Icelandic contract arose from a variety of civil liberty and 'green' spokespeople in Iceland. Some physicians objected: they were wary that their privileged access to patient information and control was being sold out from under their noses. International activists also protested. The Icelandic public, however, appeared relatively at peace with the deal. As always in such matters, local contingencies are often more effective in swaying public opinion than at first meets the eye. In this case, a large number of well-educated Icelanders reside in all parts of the industrial world. Many would like to go home if they could get a good job. Part of the deal with DeCode was that laboratory and computer work would be done in Iceland, thereby repatriating part of Iceland's greatest natural resource, her highly skilled citizens.

In prosperous parts of the world we already take for granted a great many specialized genetic searches. At the time of writing, New York State screens fetuses for forty-four different types of disease risk. It is often argued that full genetic screening is a public-health obligation, and sometimes that it is a right of the citizens covered by the system. We have not been clear about the resulting moral problems, though. Public discussions tend to emphasize how screening makes possible essential early medical services for newborns and infants. It plays down the extent to which screening prompts abortions. It is not only across-the-board opponents of abortion who worry when a test leads to killing the fetus. A vocal number of disability activists, who are in fact handicapped, also protest: "I would rather be me than unborn."

So we have plenty of things to worry about. I myself am more than perturbed about pharmaceutical companies marketing risk-oriented medications based on genetic treasure hunts. It is also troubling that preventive pharmacogenetics will be developed mostly for new drugs, whose patent writs will continue for a good time into the future. Preventive pharmacogenetics? I did not invent the noun. In the future, we will have the ability to screen patients for bad side effects of a drug, by picking out their genetic markers. Such 'tailoring,' as it tends to be called, will become standard for future drugs, but not for the large and useful pharmacopoeia of older medicines, many of which, like all potent chemicals, have awful unintended effects on some people.

In this section I have only been laboring the obvious: the intersection of medical, social, personal, and profit-making interests ensures that the avalanche of genetic information available about individuals and populations has only begun. We need informed debate from many points of view. Though we must also give blanket opposition its proper weight in the spectrum of dissent, it tends to stay of its nature long behind the cusp of what is actually and irreversibly happening.

The genetic imperative is the drive to find genetic markers in humans. It commands out of its own intrinsic strength, but it fits in neatly with our 'risk society.' Ulrich Beck was the first to use this term to describe the industrialized world.[18]

18 Ulrich Beck, *Risikogesellschaft: Auf dem Weg in eine andere Moderne* (Frankfurt: Surhkamp, 1986), translated as *Risk Society: Towards a New Modernity* (New York: Sage, 1992).

Beck was initially concerned with risks that we ourselves create by innovation, and its military and industrial applications, but the concept now applies also to risks that are not primarily of our own making, such as the risk of inherited disease or disability.

Disease genetics tends to track risks, not causes. There have certainly been unequivocal triumphs in discovering the latter, such as Jérôme Lejeune's 1959 identification of the association between an extra chromosome 21 and Down's syndrome.[19] Almost every fetus with an extra chromosome 21 will develop into a child with Down's syndrome, if it is allowed to live. This is so probable that it is unnatural to speak of risk here. The fetus is bound to develop in that way because of a programming malfunction – or so we imagine in our computer-driven era.

There we have a true success story of the genetic imperative in medicine. The genetic defect is now quite often identified with the syndrome, and this has been made part of French semantics, where the syndrome is usually just called *trisomie*. (This has turned out to be a less than exact label, for triplings of certain other chromosomes produce other birth defects or disabilities, so one must now say *trisomie vingt-et-un*.) There are other success stories, for which the teams that discovered them are justly honored. But the medical-research community is now fully convinced that most further correlations between genetic information and manifest illness or disability will be 'multifactorial.' Genetic markers will not be causes but *risk factors*.

Though 'risk' implies danger, and danger implies harm, not every genetic search is a search for harm. Some children may come from a gene pool that enables them to play the violin at age four and to compose symphonies at ten. We search for genetic markers of these exceptional desirable abilities as well. The possibility of genes that protect against diseases is also spurring genetic hunts. For example, Alzheimer's disease shows up rarely or not at all among certain American Indian communities. Something genetic may confer immunity to, or delay, the advance of senility. If so, finding this protection factor will be of great importance.

A certain ambivalence, or ambiguity, also surrounds the genetic imperative. Consider the well-publicized searches for a gay gene (typically in men) and an alcoholism gene. Those who hope for an alcoholism gene believe that the discovery will prove beyond all doubt that alcoholism is a disease or, at any rate, an innate disability. Those who hope for a gay gene believe that such a discovery will prove beyond all doubt that homosexuality is not a disease or disability. Such contradictory pairings remind us that we are still in the adolescent phase of thinking about biosociality.

19 Langdon Down contributed immensely by making the first identification of a separate developmental disability, which he called Mongolian idiocy. We blush now at the name, which was abandoned in 1960, but most of us have forgotten that his work was part of an explicitly racialist program to classify mental and physiological defects as throwbacks to other races. J. L. H. Down, "Observations on an Ethnic Classification of Idiots," *London Hospital Reports*, 1866; reprinted in *Journal of Mental Science* 13 (1867): 121–123. Mongolism became a standard diagnosis in the English-speaking world, thanks to W. W. Ireland, *On Idiocy and Imbecility* (London: Churchill, 1877), but was not picked up in continental Europe until the turn of the century. But the vigilant Cesare Lombroso included it in his atavistic anthropology as early as 1873, speaking of what awkwardly translates as "mongolian atavism of the cretinoid anomaly." C. Lombroso, "Sulla microcephalia e sul cretinismo," *Rivista Clinica di Bologna*, July 1873, fasc. 7.

After taking these ambiguities into account, though, we still cannot ignore this central phenomenon: *the genetic imperative finds its natural home in the risk society*. Even a relatively abstract search, the genome project, was funded because just identifying genes was going to help locate risk factors for disease or disability. The dream was eventually to eliminate the markers and thus remove that source of risk. But instead of genetic medicine we got risk factors. We shall undoubtedly continue to be bombarded with hype about discovering the Alzheimer's gene or the schizophrenia gene – with the implication that this 'gene' *causes* this disease or that disease – but we should expect mostly indicators of risk.

Though cases where genes can predict the occurrence of a disease with virtual certainty, like trisomy 21, are rare, the probabilities can nevertheless be great, as in the *early-onset* forms of diseases such as breast cancer, colonorectal cancer, or Alzheimer's. Indeed, early-onset forms seem to show most clearly a direct causal connection between genetic markers and the appearance of the disease at a definite stage in the body's aging process. This may give us real hope in the case of schizophrenia. One form of schizophrenia, first labeled dementia praecox, is triggered specifically by maturity, surfacing mostly in males around age seventeen or eighteen. Early-onset dementia, or so it was first described.

Scientists are devoting an immense amount of research to finding genetic antecedents of two other disorders: Alzheimer's disease and autism. Who knows how all these diseases are entangled? Alzheimer's is a type of dementia produced by aging; one kind of schizophrenia is early-onset dementia; and autism was first identified as a kind of infantile schizophrenia (the noun 'autism' was originally the name of a symptom of adult schizophrenics). Maybe those early guesses will have a genetic resurrection. Certainly autistic children and late-adolescent-onset schizophrenics are mostly male, suggesting a sex-linked locus for any genetic carrier.

Yet, in spite of all these tempting connections, what we should expect to see is not a gene *for* any of these disorders but many genes on numerous sites that increase the probability of the disorder appearing at some point. Some of these sites may contribute to several disorders, while each disorder may require in addition its own unique sites. Or maybe the genetic conjectures just will not pan out. In any case, we anticipate not determinism but risk factors, or worse, multifactorial risk. But for simplicity's sake, I'll refer to the gene or genes that heighten one's chances of getting a particular disorder – whether single or multiple – as a 'risk factor.'

A set of people with a risk factor is a biological, not social, group. But people at risk for the same disease will clump together for mutual support, joint advocacy, and, in many cases, activism. The emergence of these advocacy groups will be one of the most important topics for any history of medicine in late twentieth-century America.

Most advocacy groups in existence today are for people who are afflicted with a disease or disability, or have family members or friends who suffer from it. These groups often have names like 'Friends of Schizophrenia.' They are, of course, biosocial, that is, societies formed around a biological condition. And many are effective. Today, autism is on the front burner thanks to the intense advocacy of groups going back to the 1960s on behalf of children with developmental difficulties. Parents, understandably, make the fiercest activists,

but they were greatly aided by the fact that President Kennedy had a sister with special needs. We owe the ubiquity of special-needs services and programs in American schools to that concatenation of events. Until now, however, these groups have had little or no dealings with genetics, except to urge, and occasionally contribute financially to, the search for the genetic origins of their diseases. Now we step into the future. We will increasingly be able to identify families that are genetically at risk for various disorders. The advocacy groups will then consist not of those who are ill but of those who are at risk of becoming ill.

Such groups bring something rather new to the discussion of identity, a concept which Mediterranean, and then European, philosophers have debated for as long as they have waxed philosophical. Built into their conception of identity was the idea that one's essential features, not accidental characteristics, should constitute one's identity. Those words 'essential' and 'accidental' reek of high metaphysics. The metaphysics has gone underground, at least among English-language secular philosophers, ever since John Locke trashed essences over three centuries ago. Locke gave accounts of identity that are splendidly free of any waffle about essences. But those who wish to talk identities ignore the surreptitious idea of essence at their peril. And that is where genetic markers make a decisive difference.

Because no matter how much intellectuals, both humanists and scientists, may inveigh against it, people can hardly avoid thinking of their genetic inheritance as part of what constitutes them, as part of who they are, as their essence. But now comes a curious turn. We all carry an enormous mix of inheritance, and the greater the extent to which a person's recent forebears came from geographically disparate parts of the globe, the greater the possibilities for picking out and identifying with this or that distinct strand.

Up until now this has been possible only for those whose physiognomy is sufficiently ambiguous. Life experiences exploiting ambiguity have been turned into art by novelists, most recently by Philip Roth in *The Human Stain*. A boy in a black family, who had rather olive skin, chose to identify as Jewish, and thereby hangs the tale. That is a pregenetic tale – but it emphatically revolves around one recent fruit of biotechnology. Biotech and biopharm are going to be integral to many future novels that are true-to-life in the prosperous parts of the world. Some mentions will be so banal that no one will notice. In this case, the septuagenarian hero is disgraced when he falls in love with a woman in her thirties who works as a janitor. He chooses products from the biopharmaceutical industry to rejuvenate himself, to be a younger man than his undrugged body teaches. Pfizer's Viagra turns a once-essential property, the natural limitations of age, into what scholastic philosophers would have called an accident.

The novelist Philip Roth and the sociologist Erving Goffman share the idea of theater as a metaphor for chosen identities. Drama is more generous than society. Roth seems to imply at the end of the book that his protagonist can reject any of the identities he has chosen or that have been thrust upon him. He becomes truly free in a sense that the existentialists of half a century ago would have warmed to. I suspect Goffman, a child of that time, who knew Sartre's work quite well, would reply that you cannot exist without a roster of acted identities, or else you are taken for mad. And mad-

ness itself is not a role that can be played any old how. In every generation are quite firm rules about how you should behave when you are crazy.

Soon we shall have novels about people who send in their saliva to a gene-testing company and learn that their ancestry is more tinctured than they thought – or more pure than they feared. What will be the real-life effect on the self-consciousness of individuals, of how they think of themselves, of who they take themselves to be? In the near future it is as likely to be denial as anything else. The parable of Thomas Jefferson's daughter speaks for itself: only those who want to listen to their genes will do so.

Perhaps one of the first public demonstrations will be political. Imagine a very white-looking Brazilian capitalist turned politician. He wishes to declare himself a man of the people. He sends off his spit and back comes the desired answer: he is more African than Portuguese, with a convenient dollop of Amerindian thrown in. His party blazons these facts across the nation. The opposition repeats to no effect that this hardly distinguishes him from anyone else in Brazil, that he is nothing but a playboy from São Paulo whose grandparents were smart enough to become very rich.

We are experiencing and will continue to experience another feature of this phenomenon. A common objection to the most stringent kind of identity politics is that every human being has many 'identities.' Identity politics was particularly urged on minorities wishing to obtain their due and not only repudiate but also overcome past oppression. A friend of mine, dedicated to a number of struggles, furnishes a poignant example of being a multiple minority. Yes, she is black and a woman. More importantly, she is a Haitian, born and educated in Montreal. She was a minority even among Haitian Montréalais, for she had received an 'excellent' education at a bourgeois school and did not speak Creole at home. Then she was a francophone working in anglophone Toronto. Among Toronto Caribbeans, she had a hard time as a Haitian by a population that traces its roots mostly from Jamaica and Trinidad. Every single minority status demanded struggle, with allies on one front often not understanding her actions on another.

So much is a familiar story. It also happens that my friend was afflicted, at about age thirty, by a very nasty, little understood, and almost certainly inherited aging disorder, prevalent only among Haitians. It causes very rapid deterioration of the muscles, and not a great deal is known about it. And we are not likely to learn more about it for the simple reason that no one is willing to spend any money on a rare ailment that afflicts a small and mostly poor population. (That could change: New York, Paris, and Montreal have many well-to-do Haitian emigrés; Canada now has a Haitian-Canadian Governor-General.) Here we have a rather startling example of what may prove to be a new genetic identity, being at risk genetically for this disorder. My friend could decide that the pressing battle for her today is not the previous battles, for which she had many allies, but advocacy for those at risk for this disease.

My example may gain a specious plausibility from the fact that the disease appears to affect a subset of an already identifiable group, namely people of Haitian descent. But it is merely a dramatic way to illustrate the formation of new biosocial identities around risk factors, where those who have the fac-

tor are not markedly different in any other way. This is not an individual affair: those at risk often create organizations. And while their initial motivation might be advocacy or support, increasingly we shall have 'making up people' with a vengeance. That is, new kinds of people will come into being, people characterized by a certain risk factor, who band together to create a social group that evolves its own collective characteristics.

Thus far we have considered biology as given. It is not. By now we take for granted the biotechnology of organ transplants. The ways in which we come to regard our body parts as interchangeable is producing a curious reversal of much modern wisdom: body and mind are separating into their Cartesian habitats.[20] In the old days we used only to tattoo, pierce, and bind our body parts. These have been turned into new art forms, witness Orlan in Paris and the Australian performance artist Stelarc. They both use a lot of biotechnology, and their thoughts border on science. Sterlac, who favors extra ears, has lectured the surgeons at the Radcliffe Hospital in Oxford. The fate of people who want fewer appendages also seems grotesque. Yet real subcultures of individuals who are unhappy with their legs or other body parts exist.[21] There are more biosocial groups on earth, Horatio, than are dreamt of in your philosophy.

Sex is an aspect of biology about which there are various kinds of discontent. Likewise, gender. Transsexuals have completed or are undergoing sex-change chemistry and surgery; transgendered people adopt the lifestyle of the opposite sex without major use of chemicals or surgery. While stories of successful sex-change operations are well known, many misfortunes unfortunately go unpublicized. But these misfortunes are one of the reasons that transgendered people are becoming more common and transsexuals less prominent. There are many variations on these two themes, of which transhumanism is one of the more remarkable.

Last year, I agreed to give a talk for an adult-education series run by a good university department. Its main customers are alert retired people. The format was monthly discussions on the topic of 'the person.' My title was "People and Cyborgs." When I arrived, the organizers were astonished to see a far larger audience than usual. Many of the newcomers were not in their seventies but in their thirties – well-dressed, courteous, but, well, different. The man whose job was to keep the event running smoothly happened to be a gay friend. I thought he might know who the newcomers were. "No idea," he said quietly, "but perhaps they are from the liberal community."

No time for explanation. I began by quoting Francis Fukuyama. He was one of ten intellectuals whom *Foreign Policy*

20 Ian Hacking, "The Cartesian Vision Fulfilled: Analogue Bodies and Digital Minds," *Interdisciplinary Science Reviews* 30 (2005): 153–166; Ian Hacking, "Our Neo-Cartesian Bodies in Parts," *Critical Inquiry*, forthcoming.

21 Carl Elliott introduced amputism to the general reader in "Amputees by Choice," in *Better Than Well: American Medicine Meets the American Dream* (New York: Norton, 2003). For the in-house description of the need to be amputated, see Gregg M. Furth and Robert Smith, *Apotemnophilia: Information, Questions, Answers and Recommendations about Self-Demand Amputation* (New York: 1st Books, 2000). Furth is a New York Jungian analyst who does play therapy for terminally ill children. Smith is a Scottish surgeon who has done some self-demand amputations.

had asked which current idea would be most harmful to the world as we know it. He imaginatively answered, "Transhumanism."[22] He was referring to the idea that the human race should use all available technology to improve itself, an idea that has sparked a viable movement institutionalized in many organizations around the world. Fukuyama was his usual prescient self in picking something that few soothsayers would have noticed. Why is it so dangerous? Fukuyama answered in the truest, and best, conservative way. He gave Burkian reasons that one associates with von Hayek, Popper, or Oakeshot (or Fukuyama): don't make big changes; if you must change, change slowly and be sure you know what you are doing.

After quoting Fukuyama, I then asked the people in the room, "What do *you* think is the most dangerous idea around today?" I received the expected answers from people my age: genetically modified food and so forth. Then a young woman said very quietly, "The idea that we should not evolve." I would have said she was an impeccably groomed woman of about thirty, of Chinese ancestry, her accent standard Ontario well-educated. I ought to have been prepared, for I had given a more highbrow talk with a similar theme in Montreal a few weeks earlier. There, a young black man asked me very strong direct questions in standard educated French. I was later told he was an officer in the local transhumanist society.

As the discussion proceeded with various members of the audience, the penny dropped more slowly than it should have. Half the population in this audience already knew all about transhumanism. 'Cyborg' had been my unwitting bait. Moreover, a fair number of them had chosen their identities – in some cases, perhaps only for the day. I, the bland permissive liberal, became more and more uncomfortable. I realized how much I depend on knowing to whom I am speaking. I had no reason to think that the respondent was female, thirty, or Chinese. Yet, I wanted to know 'who' she was – and the same for a number of others.

But they were rejecting that question. Refusing to choose a society or a biology, they were denying in every gesture the very concept of a biosocial identity.

22 "Transhumanism," *Foreign Policy* 144 (September – October 2004): 42 – 43.

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