7

SEX AND SCIENCE: A CONCLUSION

> The biological argument is different. . . . With it the alleged authority of "science" is placed squarely behind the notion that it is not just politically questionable but practically futile to propose collective social action to eliminate . . . major inequalities that divide us.
>
> —PHILIP GREEN
> *The Pursuit of Inequality*, 1981

CONSIDER the average female. A composite drawing derived from the research findings presented in this book would describe an odd, sometimes incredible creature. She is a skilled housewife; but should she enter the work force, she will remain at the bottom or intermediate levels of the business, government, or professional hierarchy. As a result she will be poor, failing to earn a status worthy of cash rewards because she is not good at math; she may talk too much and too superficially; she is a potential victim; and she is unaggressive except when caught in the throes of some hormonal imbalance which may then turn her to irrational emotional outbursts and even, in extreme cases, to violence. Furthermore, what creative potential she has left over from child rearing peaks relatively early in her life cycle—at about fifty years of age—and thereafter she slowly slides downhill physically, emotionally, and intellectually.

Although the companion portrait of the average male is not entirely complimentary, it is in large part positive and in any case carries with it financial compensation. In general, men have evolved to become "controlled, cunning, cooperative, attractive to the ladies,

good with the children, relaxed, tough, eloquent, skillful, knowledgeable and proficient in self-defense and hunting."[1] They are likely to become successful businessmen, politicians, or scholars because of their controlled, unemotional aggressiveness and excellence at mathematics. Still, not all men luck out: a chance throw of the genetic dice causes some to fail in the competition for political power, social dominance, money, and mates. One sorry legacy of this biological fact is that while all men are potential rapists, some carry out that potential.

In this picture society emerges as fair and just. There is no significant wage or job discrimination. Ability determines income distribution; poverty results from individual incompetence. Nor is there anything wrong with the way our educational system works. If women do poorly at math it is because their brains work differently. Under the influence of "raging hormones" women and men, it seems, may both act irrationally—women killing their men friends and beating their children, men raping strangers and beating their wives. The courts are asked to treat these antisocial behaviors as biologically caused illnesses rather than as criminal activities. In interpersonal relationships men who fail to care for their families and women who flirt and play hard-to-get are simply responding to their genetic "deep structure." There is, in short, a lot at stake in using or objecting to the use of biological explanations of human behavior. The fundamental issue is social change—do we need it and is it possible?

I have obviously stated the most extreme composite cases. Yet it is not I who have formulated these ideas. I (along with others)[2] have simply underlined their presence in the scientific literature. With the possible exception of Stephen Goldberg,[3] probably none of the other scientists whose work I have criticized consciously believe that political, social, and financial male dominance is biologically inevitable. Perhaps, then, the metaphor of a composite drawing is itself inaccurate; maybe we should instead envision these scientists as having created a montage while blindfolded, unable to see or acknowledge the overall construction to which they contributed, a sort of scientific pin the tail on the donkey.

But it isn't really. Because in this case the donkey is a human female and the artistic composition and its implications far from random. Further, the implications are highly politicized, at the levels of both interpersonal and societal politics. One cannot help but be astonished at the apparently unself-conscious Everyman's

fantasy reflected in sociobiological descriptions of men as cunning, charming, legitimately trying to mate with as many women as possible while becoming powerful businessmen and scholars. I, for one, find the lack of introspection displayed by these (possibly) self-portraits quite astounding. While it is annoying to encounter individuals attempting to live out the fantasy, it is not at the interpersonal level of the "battle between the sexes" that the most widespread damage is done. Society incurs the greatest costs from social policy based on biological views about the origins of political equality, poverty, and equal opportunity and the (im)possibility of social change.

One version of the American feminist vision[s] foresees a world of total equality. Parents would share equally in child care while mates—both hetero- and homosexual—would live in relationships of mutual respect, openness, fidelity, and honesty. In this world of the future men and women would fully share political and financial power; no one would be unable—in the midst of great wealth—to feed and clothe their children adequately. Men and women would be represented equally, according to their equal abilities, in all walks of life.

The composite biological picture considered in this book, however, permits no such world. Women are naturally better mothers, while men are genetically predisposed to be "aggressive, hasty, fickle and indiscriminating."[4] If need be they will rape to pass on their genes, and the extreme measures society would have to take to change these circumstances would in themselves be so repressive as to be unacceptable. Furthermore, women's lack of aggressive drive and native ability ensures that they will always learn less; laws guaranteeing equal pay, ironically, would discriminate against the hardworking, hard-driving, and efficient men in the work force. So too would affirmative action programs, which would simply legislate the hiring of less qualified women. In sum, the biological program for society holds that unless one uses extreme measures of social coercion, more women will stay home while men will predominate in business and government. The increasing slide of women into poverty may not be preventable. This, I need hardly point out, is a very clear social vision, one at political odds with the feminist view of the future.

One central contention of this book is that there is no such thing as apolitical science. Science is a human activity inseparable from the societal atmosphere of its time and place. Scientists,

therefore, are influenced—consciously or unconsciously—by the political needs and urgencies of their society. Such needs can be recognized in the use to which the scientific discovery is ultimately put (as with the development of the atomic bomb). In our culture scientific research embodies inequality in the process of scientific production, a system in which there are scientists who get the honors and rewards and assistants who do the work. The most commonplace influence our society exerts on scientific activity is the direct political authority by which Congress can determine what kinds of research and how much of it will be supported.

Good Science, Bad Science, Feminist Science

Throughout this book I have taken a dual tack. I have asked of each claim about women and biology a very conventional scientific question: "What is the evidence?" At the same time I have scrutinized the data with an unconventional, feminist eye. While attempting to discredit the old ways of thinking I have tried to speak for newer, more complicated and at the same time more accurate and interesting ways of thinking about the issues at hand. Put another way, I have framed the issue as poorly done science, while at the same time undertaking to look beyond the existence of good science to something called feminist science. I have thus attempted to transform the conventional opposition of good versus bad science, in which only objective, universally agreed upon facts prevail, into a more complicated analysis of the scientific process.

Stephen Jay Gould writes in a review of Dr. Ruth Bleier's *Science and Gender* that he is:

> . . . not convinced that many methodological improvements now slowly making their way within science are, as Dr. Bleier argues, especially feminist ways of thinking—the rejection of dualism, the focus on interaction rather than dominance, the abandonment of reductionism for a holistic vision [are only] . . . the taxonomic way of thought that naturalists—most of them men—have been urging against reductionist biology for centuries.[5]

Gould, I think, is only partly correct. If the positive focus of a new

way of looking at biology is on complexity, holism, and interaction, then certainly more than one current of thought flows in those directions. That this is true has been brought home to me most clearly by finding, within all of the fields I have criticized, working scientists (often lesser known) who write insightful, often devastating accounts of the research in their fields. On occasion, as with Gould himself, those critics are men.* But often, especially in psychological and hormone biology research, they are women and, not accidentally, feminist scientists who have waged intense battles for the opportunity to do scientific work in the first place.[6] Their very status as outsiders—women and feminists in a masculine scientific world—has lent them a vision which quite appropriately claims the label of feminist. The fact that (as Gould points out) overlapping insights into biology have been achieved by others who traveled to a similar endpoint along alternate roads does not invalidate the feminist label. It merely confirms that more than one road can lead to the same destination.

It may be useful at this point to return to the work of Dr. Randi Koeske, and in particular to her theoretical analysis of menopause research.[7] Reading her work while reflecting on the question of feminist versus good science is a little like staring at one of those prints by Escher which have within them, in dark and light, a series of birds and fish. At first one sees the birds, but after staring a while the birds seem to swoop out of sight and rows of fish swim into view. Both sets of animals actually form part of a united pattern, but at some moments the birds stand out while at others the fish enter one's consciousness. Such is the relationship between good science and feminist science.

Koeske offers us her general views about science, followed by a categorization and critique of previous research on menopause, and finally a preview of the menopause research of the future. She finds unsatisfactory both the two current biomedical and the two current behavioral models. The first biomedical model suggests that all of the "symptoms" of menopause—both psychological and physical—result directly from estrogen withdrawal. In the second biomedical model the psychological aspects of the "change of life" lie at the bottom of a cascade that starts with hot flashes, which in turn cause loss of sleep, followed by depression and inertia. Koeske designates

* Similarly, as exemplified by the work of Dr. Katharina Dalton, not all female scientists do feminist science. The category of feminist and masculinist are ideological, not biological.

the two behavioral frameworks as the *premorbid personality* model and the *coincidental stress* approach. While both biomedical models suggest that menopausal symptoms are nigh unto inevitable, the premorbid model suggests that the presence or absence of psychological symptoms depends upon how well-adjusted and stable a woman is *before* menopause. On the other hand, as its label suggests, the coincidental stress model looks especially at all the other things going on in a woman's life during the period when she experiences menopause. Thus career changes, children leaving home, growing evidence of aging, changes in marital patterns, and the death of one's age peers all become focused or symbolized by the event of menopause; the biological changes involved do not in themselves *cause* all of the physical and psychological changes undergone during that period of one's life cycle.

Both the biomedical and the behavioral approaches ignore key aspects of women's existence and, more important perhaps, fail to appreciate the interaction between psychological and physiological states. The medical world, for example, views women as either normal or abnormal and assumes that their pathological reactions to menopause result directly or secondarily from declining estrogen levels. Such an analysis ignores the enormous individual variation in women's experience by categorizing personal descriptions of reality as "subjective" rather than scientific; it also turns a deaf ear to the ways in which women's social realities differ from those of men. On the other hand, most behavioral science models posit an oversimplified, one-to-one connection between social structure and individual experience. Put another way, the behavioral science models usually emphasize the "mind" side, while biomedical models play up the "body" side of the classical mind/body separation. This division of human reality has plagued the analysis of health and disease, both physical and psychological, ever since Descartes articulated his "clock model" of the human organism. (That is, the idea that, if it's broken, take out the faulty gear and put in a new one. This approach is taken by those who do heart, kidney, and liver transplants. The model fails to address the question of why the gear broke in the first place.)

Koeske does not provide a full-dress alternative to the biomedical and behavioral models. Instead she proposes a number of new areas and modes of investigation designed to switch us onto different sets of tracks. Her route, she hopes, will be more appreciative of the diversity of women's experiences, be they biological, psychological,

or social. To begin with she suggests developing some insight into the complex nature of body-behavior relationships. She emphasizes that

> . . . rather than a single one-to-one relationship existing between physiological processes and "symptom" reports . . . many such relationships exist. Variations may occur . . . in the number of different physiological processes . . . associated with the same "symptom," the openness of the underlying processes to environmental influence, the accessibility of the involved processes to conscious experience . . . [and the] incorporation of these processes into one or more system of explanation by different social groups.

Furthermore, we must simultaneously acknowledge the interaction between "pure" biological variation and cultural variation, the latter greatly influencing such things as "diet, exercise, obesity, sleep . . . parity, lactation, [and] . . . available medical care," all of which can and do affect the experience of menopause.[8]

In a move lifted straight from the (feminist) women's health movement, Koeske's first practical research suggestion is to take seriously women's own accounts of their experience. Noting that most chronicles of menopausal experience have been written by male doctors observing women who come to them for medical treatment, Koeske emphasizes the need to do more of the sort of widespread data collection done informally by the Boston Women's Health Collective (see chapter 4). Researchers must learn to use the "subjective" reports from women as valid data that provide legitimate insight into our understanding of the menopausal experience. In addition, researchers must learn to view the body and behavior as part of an interconnected system in which many different things happen at many different levels. To focus on only one such level inevitably distorts the picture. Koeske, therefore, urges the development of "studies that trace pathways toward experience up from the level of biochemistry and down from the level of culture or social context."[9] In addition, she urges researchers to figure out—as the work of Goodman et al. (discussed in Chapter 4) tries to do—just what features distinguish menopausal experience from other life experiences. Of course in order to carry out any of these tasks researchers must begin to include psychological and physiological variables in the same study.

Scientists, in Koeske's view, create models of reality into which they insert various things they can observe, directly or indirectly.

In working from such models researchers frame particular questions, decide what are and are not appropriate data, and decide which kinds of controls to use and how to analyze the information collected. Koeske's view of science is, in fact, the same as the one we have developed throughout this book. One implication of this "model of reality" viewpoint is that scientific research is not infinitely "objective." As Koeske writes, science is not "divorced from perspectives so that it becomes unequivocally possible to separate sets of data into the mutually exclusive categories of "error" and "truth." This process of validating truths is only possible . . . within the assumptions of a particular perspective."[10] Rejecting the idea that some methods, techniques, or approaches are inherently more "objective" or "real" than others, she argues instead that all methods have inherent areas of uncertainty; the usefulness of a particular research approach can be judged only in the light of the problem for which it is chosen.

Positively speaking, science, while not providing an absolute reality, can exclude areas of uncertainty by systematically investigating how well particular models of reality stand up under experimental test. Repeated observations, for example, of what happens when I take a book, hold it two feet above the floor, and then let it go, leave me quite certain that it will always fall down rather than float upward. Always, that is, as long as I do the experiment within the pull of the earth's gravity. In this context, gravity is a concept—not a tangible thing—which scientists have named to describe an aspect of our day-to-day experience, an aspect that is more consistent, less variable, and thus more predictable than *any* aspect of human behavior—especially any of the supposed male/female differences discussed in this book.

I began this detailed discussion of Koeske's work because I felt it illustrated the dilemma of trying to distinguish unequivocably between science well done and science that is feminist. At one level Koeske's analysis and suggestions for future work all merit the label of scientific advance. Now that she has shown the way, a better model can emerge. Good science in the long run prevails over bad. Although I do think Koeske's approach is solid science, clearly better and—if you will—more scientific than the work she criticizes, I nevertheless feel that an analysis of good science versus bad science does not accurately represent the complexities of scientific research.

To begin with, it is impossible to ignore the role of expressly

feminist insights concerning the subjective/objective separation, the validation of a woman's individual health experiences, the highlighting of the fear and dislike of women frequently found in the medical literature, and the complexity and social contexts of women's lives. Feminist scientists insist that these factors affect women's health and behavior (as well, I hasten to add, as vice versa). These ideas, although they may represent good science, arose in the context of a vast and multiply branched political-cultural movement, that of modern Western feminism. To hold out for a good versus bad science analysis is to ignore the important role feminism has played in *forcing* the re-evaluation of inadequate and often oppressive models of women's health and behavior.

It's not just that we feminists want credit and recognition for the impact we've had. We certainly do (naturally)! But if we don't recognize the approaches developed by scientists such as Koeske as one aspect of broad political change, then a real danger exists that "good science" will *not* prevail. In the past, legions of highly trained doctors and scientists have failed to see and criticize what is wrong with the biomedical and behavioral models of female behavior. Why? Because, I believe, they had no alternate framework within which to develop new sight. Feminism provided that new vision, allowing many scientists—even those who do not consider themselves political feminists—to move in a new direction. "Good science" in the absence of a political and cultural movement did not get very far. And even now, it is an uphill battle. The women and men attempting to redefine biosocial research have not gained the recognition, professional status, or funding which seems so easily to go to the more conventional researchers. Quality research alone is not enough. *Good science*—which in this historical moment incorporates many insights from feminism—can prevail only when the social and political atmosphere offers it space to grow and develop.

The Unbound Foot: Women and Athletics

Throughout this book I have looked at two somewhat different sorts of biological/sociological questions. The first, discussed in some detail earlier, involves aspects of physiology that are special

to women. These include menstruation and menopause. Although not discussed herein, physiological and psychological changes associated with childbirth—another uniquely female activity—also fall into this category. Accounts of uniquely female events, however, often intermingle with a second, different type of question, one that looks for and examines male/female differences. The question of male/female differences—just what they are and how great they might be—takes up space in many a cocktail party conversation as well as in many a scientific discussion. I have argued that little credible evidence exists to support the ideas that men and women have different mathematical and verbal abilities; I hold a similar viewpoint on the subject of sex-related differences in aggression. But how far would I take this lack of difference? Surely I must acknowledge that men and women are physically different. Where do I step over the line from denying difference to acknowledging it?

Let me begin with the obvious. Except for the incongruous cases of sexual development discussed in chapter 3, men and women have different reproductive systems and organs. They also have hormones that may differ in amount although not in kind. These differences may be small or large, depending on biological rhythms, life cycle rhythms, stress, and both lifelong and immediate individual experience. On average men are a bit taller and a bit stronger than women. Obviously a physiological, inherent, natural difference, you say? Here I begin to hedge my bets, a hedging that I can perhaps illustrate most usefully by examining male/female differences in athletic performance.

It is easy to forget that only in very recent times have girls been allowed, even as young children, to roam free and to train their bodies. Athenian women had permission neither to watch nor to participate in the original Olympic games; not until 1984 did females officially run in the Olympic marathon. One nineteenth-century American writer considered woman to be a true physical oddity: "The width of her pelvis and the consequent separation . . . of the heads of her thighbones *render even walking difficult*"[11] (emphasis added), while a well-known twentieth-century "sports philosopher" suggested that "one way of dealing with these disparities between the athletic promise and achievements of men and women is to view women as truncated males."[12] Only within the last decade have educators even considered the idea that boys and

girls should or could receive the same athletic training. The argument has always been that the biological differences between boys and girls and men and women prevent their competition on the athletic field. Yet one need only read the following poignant account of Chinese foot binding to remember that we still do not know how far a female athlete might have gone had she, from infancy, used her body as fully and as freely as do many little boys:

> They did not begin to bind my feet until I was seven because I loved so much to run and play. . . . [Then] they had to draw the bindings tighter than usual. My feet hurt so much that for two years I had to crawl on my hands and knees. Sometimes at night . . . I could not sleep. I stuck my feet under my mother and she lay on them so they hurt less . . . by the time I was eleven my feet did not hurt and by the time I was thirteen they were finished.[13]

The knowledge that women's feet have only recently been unbound, however, cannot hide the fact that grown men and women look different, that they are sexually dimorphic. Although humans are among the least dimorphic of primates, the fact that the average adult female weighs 10 percent less than the average male (among gorillas the average female weighs 50 percent less than the average male) remains obvious. So too do the variety of other physical characteristics, particularly adult muscle shape and size and the amount and distribution of body fat. Hormones most likely are an important factor in the development of height, muscle size, and fat distribution, although their specific mode of action is a matter of some dispute.[14]

During their early years, girls and boys are quite similar in height. By the early teens girls, who mature earlier but stop growing sooner, spurt ahead, but boys continue to grow for three to five years longer and thus on average reach a taller height. One college athletic recruiter commented that it is easier to recruit female athletes as first-year students because they are a known quantity, whereas the changes in height and strength for boys continue throughout the college years. The key hormone in this growth process is called, appropriately enough, *growth* hormone. The pituitary gland that produces it probably uses a somewhat different biological clock in males than in females, but even this is not certain. Some reports suggest that exercise can affect the short-term synthesis of growth hormone; thus the different activity levels of boys and girls could alter growth hormone metabolism.[15] There are

some suggestions that physical training in children leads to more vigorous growth.[16] Even today the amount of physical activity that boys and girls engage in varies greatly, although the differences must certainly be less than they were a hundred years ago. As social restrictions on little girls continue to fall by the wayside, it will be of interest to see whether one result is a decrease in the 10 percent height difference between men and women. My suspicion is that, given widespread changes leading to equal physical activity for boys and girls in an environment with adequate nutrition, the male/female height dimorphism will decrease by a few percentage points but will not disappear altogether.

About 25 percent of the body weight of nonathletic women is fat, in contrast to the 15 percent of the average untrained man's body weight.[17] [The fact that women usually have more of that fat in their breasts and legs is no secret.] This physical difference appears at puberty and, although poorly understood, is thought to result from the greater amount of estrogen active in the female. As anyone who has ever dieted knows, however, body fat is not constant. The amount present in the bodies of highly trained female long-distance runners approaches that of similarly trained men,[18] although what is there is still differently distributed. Some physicians think that the difference in fat content between average college-aged men and women is primarily due to differences in life-style.[19] This, too, only changing social customs will allow us to know for sure.

Height and shape differences are not absolute, but it may be that strength differences are. During development the cells that become muscle fuse with one another to form large fibers. The number of fibers in each individual becomes fixed during the first few years of life, and subsequent muscle growth consists only of increases in the length and width of such fibers. Much of the muscle size differences between males and females result from disparities in fiber growth rather than fiber number. Both hormones and physical activity play a role. Growth hormone differences may account for the fact that girls' muscles grow to their maximum size at an earlier age, while the combination of a more prolonged period of growth hormone synthesis in boys and increases in testosterone level may, together, account for the greater muscle bulk evident as young men mature.

The belief that testosterone builds muscle strength has contributed to a controversy in the sports world. Should athletes take

androgen-like drugs—paying the price in future health problems—in order to build up their bodies? Although these chemicals do promote weight gain and increased thigh circumference, controlled studies show no significant differences in strength between men who do and do not take these drugs. Ironically, the total amount of blood testosterone has been shown to decrease in men taking the externally supplied androgen, a change mediated by the lowered blood concentrations of a hormone-binding protein.[20] Despite such studies, belief in the effectiveness of androgenic drugs remains, continuing to provide serious difficulties for athletes, their physicians, and the organizers of athletic events.

Even for height, body shape, muscle fiber number, and physical differences in muscle shape, hormones alone tell only a partial story. This is made clear from an observation of Balinese men recorded by the anthropologist Margaret Mead.

> The arms of the men are almost as free of heavy muscle as those of the women, yet the potentiality for the development of heavy muscle is there; when Balinese work as dock-coolies . . . their muscles develop and harden. But in their own villages they prefer to carry rather than lift, and to summon many hands to every task. . . . *If we knew no other people than the Balinese we would never guess that men were so made that they could develop heavy muscles.*[21] [Emphasis added]

The question of muscle strength seems to be somewhat separate from that of shape. Some estimates suggest that even highly trained athletes use only 20 percent of their muscle potential, and changes in strength may well involve not only increases in muscle bulk but, perhaps as important, changes in the use of muscle that is already present. Strength is the ability of an individual to exert force against some external resistance, and different parts of the body have different strengths. The average strength differences between men and women result at least in part from men's larger size. The upper body strength of the average female (that is, strength derived from arms and shoulders) is about half that of the average male although, when matched for size, a woman has 80 percent of a man's upper body strength. The lower body strength of the average woman reaches 70 percent of the average man's, and when the comparison is made between individuals of the same weight a woman's lower body strength approaches 93 percent of a man's. Leg strength measured relative to lean body weight (leaving out the fat differences) actually shows women's legs to be 5.8 percent stronger than men's.[22]

One implication of these data is that sports emphasizing upper body strength will probably always offer males an advantage—as long as they are played in a culture such as ours, rather than in a place like Bali. Advantages accruing to men in other sports such as running, however, may be due only to differences in leg length, rather than strength.

In this discussion of differences between untrained men and women, the relative influences of height, fat content, strength of hormones, and environment cannot be easily untangled. At the moment it appears that differences in the timing of growth hormone synthesis during childhood and adolescence may account for male/female height differences and may also be a component of differences in muscle development. On the other hand, it remains possible (and only time will tell) that at least some of the height and strength dimorphism between males and females would diminish in a culture in which girls from infancy on engaged in the same amount and kind of physical activity as boys. It is my own guess, though, that even then small average differences would remain. Finally, it behooves us to remember that the amount of variation among men and among women is greater than that between the sexes. Thus no two differently sexed individuals can be assumed, sight unseen, to have different heights, shapes, or strengths.

Looking at highly trained athletes offers another view of physical differences between men and women. Although one assumes that both groups will compare more closely because they have had a greater chance through training to develop their potential, few female athletes begin to train as early or have the same opportunities and training as do male athletes. One sport in which differences in body composition redound to women's advantage is marathon swimming, women's greater body fat providing increased buoyancy and protection against the cold. Here women hold the world record, a title that came easily once it became acceptable for females to try the feat. The first woman ever to swim the English Channel (Gertrude Ederle in 1926) not only astounded the world by succeeding at all, but she broke the men's record by two hours! In fact she so took the public by surprise that a London newspaper did not have time to withdraw an editorial claiming that her failure (expected when the paper went to press) demonstrated that women were physically inferior to men and their entry into competitive athletics a hopeless enterprise.[23]

Between 1964 and 1984 women marathon runners have knocked

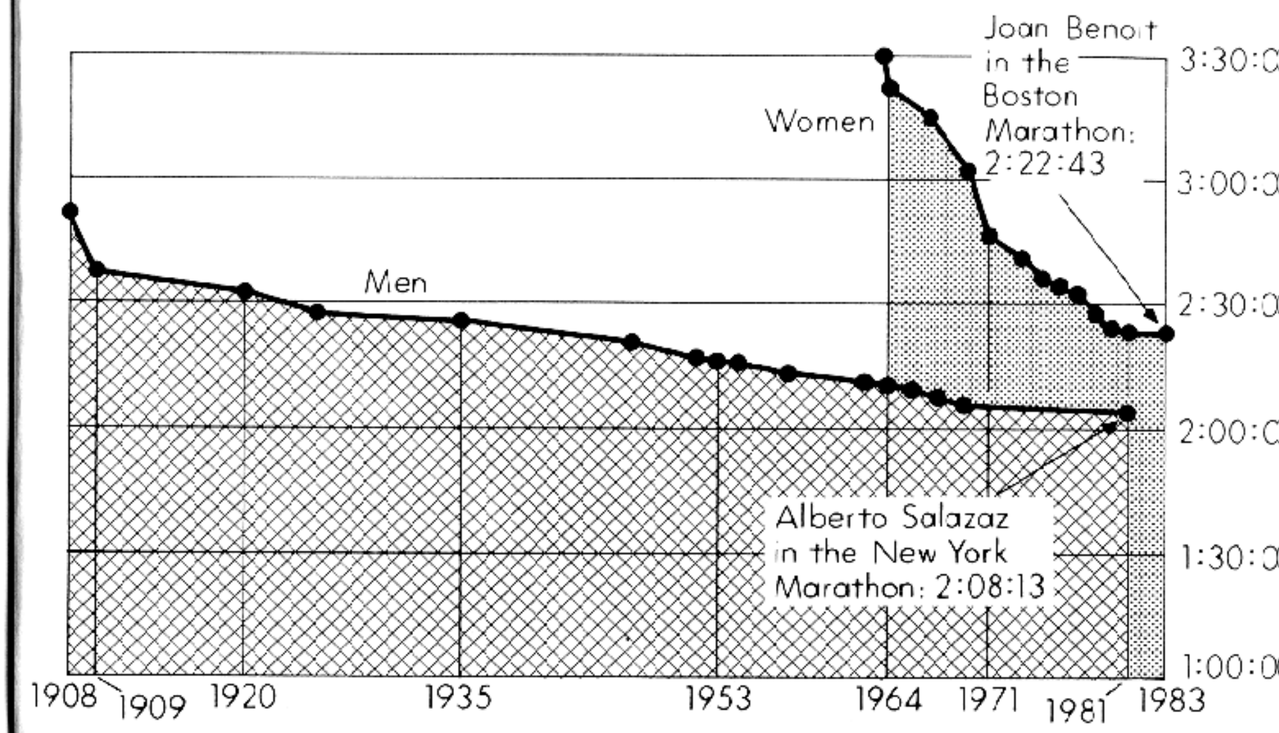

FIGURE 7.1

History of the World Record in the Marathon

NOTE: Jane Gross, "Women Athletes Topple Sports Myths," *New York Times*, 12 Aug. 1984, p. 22E. Reprinted by permission of the Amateur Athletic Union of USA. The marathon is 26 miles, 385 yards long. Finishing times are given in hours, minutes, and seconds.

more than an hour-and-a-half off their running times, while men's times during that same period have decreased by only a few minutes (see figure 7.1). The relative differences between men's and women's times in shorter running events have also fallen considerably since the 1930s. In 1934, for example, the women's time for the 100-meter run was 13.5 percent lower than the men's, but by 1974 the difference had decreased to 9.1 percent. There are similar trends in swimming (with the possible exception of the 100-meter event). In all swimming and track events in the 1976 Olympics, females were 89 to 93 percent as fast as men—that is, females were 10 percent slower.[24] If the gap between highly trained male and female athletes were to continue to close at the current rate, in thirty to forty years men and women would compete in these sports on an equal basis.[25] It is, of course, also possible that the rate of female improvement will level off. In that case we will have a better idea of just how different the physical capacities of the male and female body are. One way to guess about the outcome is to look at male and female differences in a country where training and coaching methods seem

comparable for both sexes. East German female swimmers, for example, swim a mere 3 percent more slowly than the men (for the 100- and 400-meter freestyle). The difference is there, but it isn't much!

In some sports, for example tennis, where the essential overhand serve relies heavily on upper body strength, and basketball, where upper body strength and absolute height are vital, men and women will probably always perform differently. Others, such as gymnastics, may well turn out to favor women. Whatever the outcome, however, it has become clear that girls and women can be excellent athletes, and it has become increasingly acceptable for the average girl to learn to enjoy using her body in physical activity. There are hormonal bases for some of the physical differences between adult men and women. Yet even these interact with culture and socialization to produce the final product. No matter how our ideas about male and female physique evolve in the coming years, one thing remains certain: our cultural conceptions will change the way our bodies grow, and how our bodies grow will change the way our culture views them.

A Program for the Future

This book is incomplete. I have chosen not to address myself to some aspects of allegedly gender-specific human behavior for which scientists have offered a biological explanation. The areas left unexplored include writings about women and depression, mothering (but not fathering) instincts, and theories about biological "causes" of homosexuality and transsexuality. That I have omitted these areas may violate some sense of completeness. In fact each could be subjected to the same sort of analysis used for the topics I have dealt with. But because I fully believe that the same combination of inadequate research and inappropriate model building would turn up (as a number of shorter analyses of these subjects have shown),[26] the general lesson emerges clearly without having to dwell on every available example. Any biological theory about human behavior that ignores the complex of forces affecting behavior as well as the profound two-way interactions between mind and body

is scientifically hopeless. Yet the continued appearance of such ideas in both the scientific and popular literature attests to their tenacity. Their often unself-conscious coupling with (usually retrogressive) social programs helps to explain their continued presence and to underline the political nature of their formulation.

As should be clear by now, I do not argue for a program of behavioral research that ignores biology. Instead I put forth a plea to release biology from its sacrosanct status as First Cause and give it a more appropriate place in the network of disciplines that constitute the proper study of humankind. The challenge—and a hard one it is—is to develop a new model. To do so we will have to commit ourselves to figuring out *how* to do contextual research. We will also have to develop new analytical frameworks, at first taking the sorts of tentative steps indicated by Randi Koeske and others and with time, thought, and more research, allowing our immature models to grow into adult ones. For scientists trained in an ideology of control this is a hard task. To begin with we will have to give up on the idea that the goal of behavioral research is to control behavior, accepting instead the fact that we will never reliably be able to predict human behavior. Instead of striving to be mechanists in biological clothing, we biological scientists must accept the idea that our enterprise is a rather different one, not *softer* than physics but a great deal more difficult. We can take pride in that difficulty and complexity rather than trying to simplify to the point of meaninglessness the phenomena we study.

I do *not*, however, believe that *all* of the research areas covered in this book warrant further investment of time, money, and talent. We need to learn more about menstruation and menopause, especially about those cases for which health problems really do arise. On the other hand, further research into sex differences in cognition or brain laterality seems to me uncalled for. If there are any differences at all, they are so small that intrasexual variation swamps them. The real issues in cognition center upon how one learns (both in and out of the classroom). As Dr. Sheila Tobias has recently stated the problem:

> The issues . . . have less to do with excellence than with resource allocation; less to do with education than with our nation's skewed investment in weapons science; less to do with assessing and punishing teachers than with re-establishing substantial support of math-science teaching . . . and less, much less, to do with re-establishing putative genetic inferiority of women and minorities than with establishing equal, really equal opportunity for young people to learn science.[27]

Similarly, it is not worthwhile to continue to do research on animal aggression in highly artificial settings. The trend toward understanding community and context in animal behavior research, on the other hand, is encouraging. Still, as exemplified by the work on rape, to take even very extensive animal research, define it according to uniquely human behaviors, and then to use it to analyze human behavior is both logically flawed and politically dangerous. The challenge to the scientific community, then, is to clean up its act and to undertake a new program of research which emphasizes complexity, mind-body interactions, and human flexibility.

That challenge, of course, cannot be met in the absence of a broader social program. Only in a society fully committed to educational equity can we develop research programs that focus on the learning and teaching process rather than on the possibility of inherent racial or sexual deficiencies. Only in a culture fully committed to economic and social equality can we have research programs that examine behavior in the context of present and future possibility rather than permanent limitation. And only in a culture that genuinely respects and values members of both sexes will respectful and healthful analyses of both female and male medical problems emerge, analyses that recognize reproductive differences as normal and that can make well-informed distinctions between healthy physiological activities and disabling states of disease. The two challenges—scientific and social—are profoundly interconnected. Neither the challenge to scientists to construct a more scientific and—yes—a more feminist research program, nor the challenge to all of us as world citizens to build a society that respects and recognizes difference while understanding and emphasizing human similarities, can be met separately.