post-human. Advances in public health care and in medical technologies have certainly increased average human life spans considerably during the last few centuries (Wilmoth, 2000). These increases, however, have not been taken to mean that we are on the path to becoming post-humans. Thus, it seems that the increase needs to be more significant. Obviously, immortality would be a candidate. Indeed for some (Kass, 2001; Harris, 2004; Fukuyama, 2002) there is a scientific race to achieve human immortality. Such speculations include claims about whether immortality would produce boredom, how it would affect our, already depleted, economic and environmental resources, whether there will be a loss of personal identity, whether it would make people happier, and about the consequences of having parallel populations of mortals and immortals existing alongside one another (Kass, 2001; Harris, 2004, 2000; Fukuyama, 2002; Glannon, 2002). Yet it hardly seems necessary to say that no evidence whatsoever exists that manipulating human DNA can attain such a goal. Also, longer lives filled with the manifestations of old age would hardly be desirable. Thus, those desiring longer lives for humans also desire to slow the aging process. But, there is no empirical evidence to support the claim that aging in humans has been modified by any means, nor is there any evidence that it is possible to measure biological age (Hayflick, 2004; Turner, 2004; Olshansky et al., 2004; Miller, 2002). It appears then that discussions about changing human life spans and aging processes in ways significant enough to create post-humans are no more than wishful thinking (Turner, 2004, 19–21). Nothing in current biological knowledge suggests that genes alone are responsible for controlling these traits.

The misunderstandings about human biology are not limited only to the incorrect assumption that genes control most human traits and behaviors (or at least that they control those traits that we think represent the "essence" of humanity,) and that thus, other aspects of humans' biology, environmental factors, and social arrangements and institutions are irrelevant as causal contributors to such traits or behaviors. Proponents and opponents of genetic enhancement also err by presupposing that our social environment is immaterial as a causal contributor to the judgments about such traits. That is, these arguments commit the error of assuming that our biological traits and behaviors can be evaluated outside of the environmental, social, and political contexts in which such traits and behaviors are expressed. Genetic predispositions have to be expressed as phenotypic traits, i.e., observable physical or behavioral characteristics that result from the interplay of genes and environments, before we can evaluate whether these characteristics are good or bad things. And, many human phenotypic attributes diverge in value according to the social and environmental contexts in which they are expressed. For instance, homosexuality, assuming for the sake of this argument that this is a genetically determined trait, can be very problematic in societies that place great value on the connection between sexual acts and reproduction, but it would be unlikely to raise much concern in social environments where such a connection is irrelevant.

Let us go back to our interest in making "healthier" humans. As the recent debate on obesity indicates the concepts of "heath" and "disease" as applied to humans are far from uncontroversial (Kaplan, 2000, ch. 8; Mokdad et al., 2004; Flegal et al., 2005; Gard, 2005; Oliver, 2005). It is clear, however, that health and

disease cannot be assessed by simply looking at genes, not even at genes in the context of whole organisms. Consider, for example, the case of allergic reactions to a substance that is only present, and in great quantities, in highly industrialized societies. Even if such allergic reactions were mainly determined by having certain genetic material, we would be hard pressed to call this a disease or disorder, indeed, we would be hard pressed to be concerned with it at all were we living in a non-industrial society. Or, take the case of some Italian speakers who have neurological markers for dyslexia, but show no learning impairment, as compared with English-speaking dyslexics who have a much more difficult time learning to read because of the complexity of their language (Paulesu et al., 2001). It seems then, that to evaluate human diseases, disabilities, or disorders and their effects, one must take into account the ecological and social environment in which human beings grow and develop. Human biology is not independent of where we live and how we live. Most human traits and behaviors need to be evaluated in social contexts. Such social contexts are not fixed. They have changed over human history, and there seem to be no reasons to believe that we cannot change them again to pursue worthy moral goals such as, for example, equality or fairness. Judgments about the desirability of traits such as beauty, health, weight, strength, or life span depend on the environmental context in which they are expressed, which in the case of humans includes social and political contexts. If the value of these traits is not determined by the fact that they are genetic traits or behaviors, then to assume that these traits will be valued by future generations as we now value them presupposes that we must believe that the social and political context will not change. Nothing in human history warrants such a belief.

The failure to achieve a balance between a responsibility to contemplate theoretical possibilities that might result from genetic enhancement, and a responsibility to convey whether such theoretical possibilities would come to be, does not result only from the incorrect conception of the role of genes in the development of human traits. The emphasis on the post-human future betrays the belief, dominant in Western science and philosophy, that the world, and its components, are machines that work in ordered, predictable ways (Dupré, 2001). This belief has extended to include humans who are also modeled as machines with distinct subunits that can be studied and evaluated independently. Our latest concern has been the human genome and its manipulation.

However, much of this discussion on human genetic enhancement and the creation of the post-human neglects the fact that the increasing focus on genes as causes stems from our increasing ability to manipulate DNA in the lab and in some cases in the clinic in an attempt to achieve what are perceived to be desirable ends. Insofar as theory directs action, genetic problems call for genetic, technological, solutions (Gifford, 2002; Gannett, 1997). It is, nonetheless, one thing to say that, for almost any particular human trait, there is a range of genetic influences, as well as a range of environmental influences, which underlie it. It happens to be the case, and for a variety of reasons such as a mechanistic view of the world, research priorities, the presumed intractability of environmental and social factors that we are concentrating on, and in many cases finding, genetic influences. It is quite a different thing, however,