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Issues and Questions

It's really incredible when you think about it. Here we are, well into the twenty-first century, and we are still fighting over the role of nature and nurture in human development. And it isn't even a new fight; it's not even a twentieth-century fight. It actually goes back to the nineteenth century and probably even before that. So why is it that we cannot get this question answered and move on to a new one? Is it because we haven't yet gotten the necessary data to make a conclusion one way or the other? Do we not yet have a powerful enough computer to sort everything out? Have we not identified the best method and statistics to collect and analysis the relevant data? One answer to these questions is, of course, "yes" to all these possibilities, but there is also another possibility. It may also be that we are having trouble coming up with the answer because we continue to ask the wrong questions.

The Nature–Nurture Debates: Bridging the Gap is an attempt to make sense out of the nature–nurture debate, to explain why this debate is still even a debate. I mean, after all, how many other topics in any of the sciences have been debated for more than 150 years without any resolution? Making sense out of the debate requires an examination of several issues and questions. For starters, what in fact are we talking about when we talk about nature and nurture? How is each measured, and how is its relative contribution assessed? What is the history of the debate? Have there been solutions that we now no longer accept? What were they? Why were they rejected? What has changed in our understanding of the course of human development? How has this change redefined the debate? What difference does it really make anyway how much nature and nurture influence our development? Is this essentially an academic debate that may never be answered to everyone's satisfaction, or are there important practical implications as well? What are the major theoretical positions in the debate? What does each have to offer? What claims does each make? What data does each provide?

Maybe a good place to start answering some of these questions is to agree on some terms. There is no common agreement on how to best describe those who see nature as having a disproportionate influence on development and those who see nurture as being more dominant. One set of terms that does have some historic precedence (Carmichael 1926) and is being used increasingly in the literature (Spelke 1998; Simpson et al. 2005; Spelke and Kinzler 2009) is that of nativists and empiricists. Carmichael (1926), in discussing the meaning of "empirical psychology," notes that the term empirical can be seen as referring to a perspective that sees development as an acquired process rather than an innate one and, as such, "the term is antithetical to nativism" (p. 522).

Having now agreed that we call those favoring nature nativists and those favoring nurture empiricists, the next issue is to get a better definition of what each is talking about, that is, about what in fact are nature and nurture. At first glance it seems that the nativists have an advantage because it might seem easier to define nature as genetics than nurture as environment. After all, aren't genes so specific and environments so vague? Well, yes and no. The genome mapping project has managed to unravel the DNA code, but the findings were somewhat surprising in at least one way. We do not appear to have enough genes to put us together if in fact genes put us together. The genome project identified about 25,000 distinct genes that seem to be involved in protein synthesis, the particular task genes actually have in our bodies. Even an ear of corn requires more genes in the formation of the proteins involved in its formation. To make matters worse, there is little, if any, evidence of a one-to-one correspondence between specific genes and specific outcomes at any biological or behavioral level. Rather, individual genes work in combination with other genes to produce proteins and the same genes, in combinations with other genes, produce different proteins. We even share many of the same genes found in other species. For example, we share approximately 98% of our genes with our closest primate evolutionary relatives and yet we are distinct from them in so many ways. Some researchers believe that the issue then is not what particular genes are present but how they function and how they are regulated. Kagan (2001), for example, notes that the same genes are involved in the formation of our brains as those of chimpanzees but that, in our case, these genes stay active longer in humans, allowing for the additional layers of cortex that apparently are reflected in our significant cognitive advantages. Then there is the matter of the fact that the majority of genes do not appear to code for anything. That is, the majority of our genes have been seen simply as "junk," a vestige of our evolutionary heritage and with no obvious role in our development. However, increasingly we are coming to appreciate (Keller 2010) that much of this junk is not junk at all but rather serves the purpose

of regulating the activity of structural genes. We examine the role of genes in more detail in later chapters, but for now, the answers to the question of what is a gene is are (a) it is a lot of different things, (b) we are not as sure as we once thought we were, and (c) we need to understand much more about how some genes go about regulating the activity of other genes, in particular, about what factors regulate these regulatory processes. All three appear to be true.

How then can we define environment? The first problem is the same as for defining genetics, that is, everything is environmental just as everything is genetic. If we define environment as context, then we quickly come to the realization that environment exists at a variety of levels because we can as easily talk of the context in which a protein functions as we can that of a 3-year old. In fact, because we can talk about an individual as existing at a variety of levels simultaneously, from the level of the gene to the level of the culture and beyond, then there are always many different environments impinging on the individual at any one time. To make matters worse yet, at least for humans, we can make a distinction between the actual environment and the perceived environment. You need to spend only a few minutes in a classroom to recognize that even though all the children are experiencing virtually the identical actual environment, the behavior of the teacher, the varied reactions by the children to the teacher's efforts tell us that their individual responses may not so much be to the teacher's behaviors as to their perception of the meaning of that behavior.

Even though we can talk about the environment as existing at a number of different levels across a number of different domains, the nurture side of the debate typically involves the interpersonal environment of interest to psychologists and others interested in the development of children and adults. In other words, the role of nurture in the debate is much more likely to involve some issue related to the family, the education of the child, or the peer group rather than the child's prenatal environment or the impact of pollutants in the air. In effect, one could argue that one reason the empiricists have lately found themselves somewhat on the defensive may be because they typically consider only a limited swath of the full range of the environment, that is, they may be engaging in the debate having tied one hand behind their backs (Shonkoff 2010).

The difficulty of defining both genetics and environment is clearly reflected in the form of the nature–nurture debate. It is much easier to control the behavior of the teacher than the children's perception of her efforts, even though those perceptions may be more developmentally significant. At best, we can only hypothesize about and test for some degree of correspondence

between the two. Similarly, if in the biological sense there can be no environmental effect without an organism to act on and if there can be no organism outside of its context, then nature and nurture would appear to be inseparable. But we have statistical procedures that are intended to do just that: partition genetic and environmental influences. How can we reconcile this seeming contradiction? Can it be reconciled?

Part of the problem in attempting to answer all these questions is that in reality, when we talk about the nature–nurture debate, we are not talking about one debate but rather about three debates. The first debate is the seemingly classic one: What are the relative and independent contributions of genetics and environment to an individual's development? This *classic debate* is a reductionist debate and reflects the theoretical view that complex phenomena can be reduced to individual antecedents and the influence of each antecedent can be assessed independently of all others. The second, or *new debate*, is taking place at a more holistic, systemic level. Here both sides seem to recognize that both nature and nurture are essential and ultimately inseparable, but there nevertheless remains in the new debate very much of a "chicken-and-egg" argument. There is some overlap in the participants of the classic and new debates, especially in terms of some of those who would describe themselves as evolutionary psychologists, but for the most part, the two debates are distinguishable by the level at which each is fought. Even though, for example, nativists and empiricists are on opposite sides in the classic debate, they often become strange bedfellows with respect to the new debate by both favoring a reductionist position in opposition to those favoring a more holistic systems perspective.

The third debate is actually a *proxy debate*. In this third case, the debate is simply a meeting place for arguments about even more basic issues, ones that define the very subject matter of human development. The three debates are not truly independent of each other, but it is worthwhile nonetheless to discuss the three separately because each sheds some light on why the debate (debates, actually) never seems to move off center, much less come to some resolution. It probably makes the most sense to start with the third debate because it raises the most basic questions about human development.

The Proxy Debate

Open up just about any introductory child development or life-span development text, and in the first chapter, in addition to the usual homage to Freud, Piaget, Erikson, Skinner, and the other grand theorists, will be a discussion about method and theory. The method discussion will talk about such things

as independent and dependent variables, the difference between correlational research strategies and controlled research strategies and about statistical analyses that allow you to measure the unique influence of each independent variable on the dependent variable. The theory section will most likely discuss whether development is best conceptualized as a continuous or discontinuous phenomenon, as showing individuals' status as relatively stable or changing compared with others over extended periods of time, the relative importance of structure and function in influencing behavior and behavior change, and the degree to which behavior primarily reflects preprogrammed or innate variables as opposed to environmental or epigenetic variables. The particular choice of words to describe each of these topics might differ, especially with respect to the "predefined" aspect of our development, but all these texts will have essentially the same discussion. And then the first chapter comes to an end, and, depending on whether the text is organized chronologically or topically, the next chapter concerns either prenatal development or perhaps biological development, and so on. Interestingly enough, the methodological and theoretical issues raised in the introductory chapters rarely, if ever, reappear in subsequent chapters. The reader is left with the impression that either these first chapter issues have in fact been resolved long ago or maybe they really are not that relevant to understanding the details of a particular developmental stage or domain.

The fact of the matter is that even though these methodological and theoretical issues might seem resolved to the reader of that introductory text, they are anything but, and more often than not it is through the nature–nurture debate that this proxy debate continues. Cronbach (1957) noted this rift many years ago when he talked of the distinction between what he referred to as "experimental psychology" and "correlational psychology." Whereas experimentalists are interested in only the variability that they are able to create through variations in experimental conditions, correlationalists are interested in examining the already present variabilities among individuals, groups, and species. Cronbach (1957) says that, for the experimentalist, individual differences are "an annoyance" because they reflect the "outer darkness known as error variance" (p. 674). But the correlational psychologist is "in love with those variables the experimenter left home to forget" (p. 674). For the correlational psychologist, the question of interest is how the already present characteristics of individuals determine their mode and degree of adaptation. And although we do not often see Cronbach's terms in use today, given the respective interests and typical methodologies of nativists and empiricists, we are still seeing the same two disciplines that he noted. Nativists, in the classic debate, are primarily interested in individual differences. They continue the

correlational tradition, although their methods are not necessarily restricted to correlational statistics. Empiricists, in the classic debate, are the experimentalists. They are interested in the identification and control of those variables that regulated development patterns and change.

McCall (1981) did not find things much improved 25 years later. He also noted a distinction between those developmentalists primarily interested in developmental functions common to all members of a species and those interested in the relative consistency of individual differences among members of the same species over time, a distinction he equates with empiricists and nativists, respectively. He saw this difference as reflecting the two realms of development and makes the point that continuing this gap hinders our full understanding of development. In particular, factors that may influence individual differences may have little influence on developmental functions and vice versa. For example, the variables that influence species-typical behaviors, such as walking or other large motor skills, may have little, if anything, to do with the factors that influence variability in onset or competence in walking or skipping or throwing. McCall notes that a focus solely on individual differences is like "studying the consistency of a few inches in the heights of giant sequoia trees from seedlings to maturity while ignoring the issue of how all the trees grow to over 300 feet" (1981, p. 3). He is not more sympathetic to empiricists:

> Lest the environmentalists feel smug, they are no better off. The environmental as well as the genetic factors necessary to produce fundamental characteristics in the species are available to almost everyone we study. As a result, the only way we can study the importance of certain major environmental factor for development is to take advantage of tragedies – children reared in closets, born blind and later given sight, or fed from birth through a fistula. (p. 4)

What Cronbach referred to as the two disciplines and McCall referred to as the two realms are no closer today; if anything, they are perhaps farther apart because of our presumed greater ability to study genetic and biological processes. The distinction is as evident in the distinction Simpson et al. (2005) make between nativists and empiricists:

> Nativists are inclined to see the mind as a product of a relatively large number of innately specified, relatively complex, domain-specific structures and processes. Their empiricist counterparts incline toward the view that much less of the content of the mind exists prior to worldly experience, and that the processes that operate upon this experience are of a much more domain-general nature. (p. 5)

In other words, nativists are more likely to see development as a continuous expression of some number of predefined capabilities, traits, or modules, each exerting its influence relatively independently of the others, whereas empiricists are much more likely to see development as an epigenetic, probabilistic process, one much more dependent on the vagaries of the lived experience. For nativists, the focus then becomes on understanding how these predefined variables cause differences between individuals and the degree to which these individual differences are stable over time. For empiricists, since little is seen as inherent, the focus is on an examination of the role external variables play in structuring the life course and the degree to which changes in these antecedents are predictive of changes in an individual's behavior. It is not that nativists deny any role for the environment or that empiricists deny any role for biological structure; rather it is that each see that other in, at best, a supporting role.

Said another way, the proxy debate is not restricted to arguing the relative merits of nature and nurture so much as it is a debate about the very foundation and maybe even soul of the discipline of human development. And it is a debate that goes deeper than issues of stability versus change. It is a debate that also argues the legitimacy of types of causes, the place of the concept of "purpose" in the study of human development, and even what the "original" causes of our development are.

Nativists tend to place most emphasis on what are seen as material causes and empiricists place that emphasis on efficient causes (Pepper 1961; Goldhaber 2000). Material causes are seen as components of the individual, such as the presumed modular structure of the brain or ones particular genotype. Efficient causes are seen as factors external to the individual; they are things that happen to the individual. Embedded within the classic debate at least is the fundamental belief that, although both efficient and material causes influence development, the two can be disentangled from each other and the relative influence of each determined independently of the influence of the other. Discovering such origins is seen as the fundamental purpose of science.

Even debates about the place of teleology in the study of development are reflected in the proxy debate. Teleology is the belief that ends are immanent in nature and that natural phenomena are determined not only by mechanical causes but an overall design as well (Anandalakshmy and Grinder 1970). Such notions are often reflected in evolutionary arguments about development that see the *purpose* of behavior to be increasing the chances that the organism will reproduce and therefore that the species will survive. Empiricists see little, if any, value in teleological arguments, placing them more in the realm of

philosophy and religion than in that of science. For empiricists, development is largely a reflection of the particulars of time and place.

The Classic Debate

The classic debate is between nativists and empiricists who look to the environment as the primary determinant of development. The point of the debate is the relative contributions of genetic and environmental influences on the course of human development. It is predicated on the shared (by both nativists and empiricists) fundamental belief that antecedents can be partitioned and the relative influence of each ascertained. This is where the agreement ends and the debate begins because each side favors a different set of antecedents, often examined with different methodologies, in one case measures looking for stability and in the other measures designed to look for change.

The nature side is represented by those who would describe themselves as *developmental behavior geneticists*. The nurture side, however, is a little tricky to define. There really isn't any particularly identifiable group so much as there are a large number of developmentalists examining the influence of any number of external antecedents on behavior. In fact, it is this lack of a definable environmental perspective, coupled with the significant advances in our understanding of genetic and biological processes over the last several decades, that has made it possible for the nature side to become increasingly visible and influential both within the discipline of human development and more broadly across the culture. Nativists take on the empiricists all the time, but the reverse is rare. More often than not, empiricists do not initiate the debate so much as they respond to nativists claims, as was the case when Jensen (1969) published his famous (or infamous, depending on your view) *Harvard Educational Review* article arguing that preschool test score gains in response to educational interventions were little more than a "hothouse" effect or when Scarr (1992), in her 1991 presidential address to the Society for Research in Child Development, made her argument for the "good enough parent." Both publications quickly brought forth rebuttals, but otherwise, empiricists do not seem to feel the need to challenge nativists in the same way that nativists challenge empiricists.

The particulars of the classic debate are discussed at length later in the book, but for now a sampling should make clear why this debate has gone on for so long and will continue to go on forever as it is presently constituted. The sampling concerns Scarr's reference to good enough parents and the response of one of her rebutters.

Scarr, speaking to a group whose members then and now are predominantly empiricist in orientation, made a striking behavioral genetic argument as to the relative influence of genes and environment on children's development. Simply put, according to Scarr, genotypes drive experience. Parental genes determine parental phenotype, child genes determine child phenotype, and the child's environment is "merely a reflection of the characteristics of both parent and child. Here differences among children's common home environments, *within the normal species range* [italics in original] have no effect on differences among children's outcomes" (1992, p. 9). And to support her argument, Scarr reported several kinship and adoptions studies that found much higher correlation coefficients among those more closely related (e.g., identical twins compared with fraternal twins) and, interestingly enough, between children and their biological mothers (even when separated at birth) than their adoptive mothers.

Scarr saw her strong genetic message as comforting to parents because she saw it as relieving parents of the burden of trying to be perfect. Now they just need to be "good enough" to keep their child's development within a typical, expected trajectory. And if they are good enough and if the child still goes off on an "undesirable trajectory," interventions are likely to have only limited and temporary effects.

Well, you can imagine the reaction from many in the audience on hearing that individuals make their own environments, based on their heritable characteristics. I do not know if Diana Baumrind was one of those actually in the audience that day, but the following year, she published (Baumrind 1993) a rebuttal to Scarr's address titled "The average expectable environment is not good enough: A response to Scarr." Her rebuttal took three forms. First, she questioned Scarr's conceptualization of a good enough environment, claiming that the concept was ill-defined and therefore of little scientific value. Second, she raised several methodological issues with the data Scarr reported, both in terms of how it was collected and the statistical procedures used in their analyses. Third, she reported a number of studies, her own work included, that she saw as clearly showing a significant parental influence on child outcome. In her words,

> There is a large and consensually validated body of evidence relating to children's prosocial competence to such parenting skills as persuasive communication, contingent reinforcement, and monitoring; and children's cognitive development to such parenting skills as scaffolding, academic engagement, and high-level distancing skills. All these parental practices manifest a high, not good enough, level of parental involvement and commitment. (pp. 1311–12)

The relative merits of Scarr's and Baumrind's positions aside, the one thing that is clear from this typical type of exchange between nativists and empiricists is the fact that they simply cannot agree on the terms of the argument beyond a commitment to reductionism. And if you cannot agree on the ground rules, then you simply cannot resolve the issue.

The New Debate

The new debate is between those who approach the study of development from an *evolutionary psychological perspective* and those who approach the study of development from a *developmental systems perspective.* It would be incorrect to equate one group with nativism and the other with empiricism as most in each camp recognize the synergistic interplay between nature and nurture.

Evolutionary psychology considers how our evolution as a species has come to influence our current behavior and development (Pinker 2002; Tooby et al. 2005; Geary 2006). We, as a distinct species, emerged approximately 100,000 years ago during the Pleistocene era. The characteristics that came to define us at that time reflected the cumulative consequences of adaptations to those conditions existing during the few millions years of hominid evolution. Evolutionary psychology argues that because we are, genetically at least, essentially the same as we were 100,000 years ago, the same genetic mechanisms that regulated our behavior and development then do so as well today. Needless to say, this is not a perspective that has gone unchallenged either in terms of the behavioral implications of such an argument as to the accuracy of the claims about our genetic similarity to our Pleistocene ancestors or in terms of arguments relating to the degree of flexibility of our genome (Ehrlich and Feldman 2003).

This evolutionary perspective has served also to reevaluate the concept and place of innateness in the developmental process. Have we, as a species, as a result of our evolutionary history, evolved certain specific structural domains or modules (Spelke and Kinzler 2009) that regulate our behavior to some measurable degree? Are these structures present at birth? How specific are they? How flexible are they? The renewed interest in the competencies of very young infants is in part a reflection of this interest in evolutionary psychology's arguments for a high degree of domain specificity present at birth.

Developmental system theory (Lewis 2000; Johnston and Edwards 2002; Gottlieb 2003; Lickliter 2009), on the other hand, argues that all developmental forms emerge out of the recursive bidirectional interactions of simpler components. The properties that emerge from these interactions are