Foreword from the Scientific Side

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The cleavage between naturalism and social constructivism in literary theory highlighted by the essays to follow extends to the foundation of knowledge itself. The essence of the matter, I believe, is as follows: Either the great branches of learning—natural sciences, social sciences, and humanities—can be connected by a web of verifiable causal explanation or they cannot. Either existence can be mapped as a continuum with the aid of science, as the naturalistic theorists suggest, or science is "only one way of knowing," as the constructivist theorists believe, with many other disjunct truths arising from cultural and personal happenstance.

The naturalistic theorists have at the very least clarified and framed the issue. If they are right and not only human nature but its outermost literary productions can be solidly connected to biological roots, it will be one of the great events of intellectual history. Science and the humanities united! The opposing opinion is equally interesting. If the naturalistic quest consistently fails to the extent that the constructivist default position earns general acceptance, that would be an even greater advance in intellectual history. Existence is not consilient! In this case, the constructivists guessed right, but the would-be unifiers will have forced the issue and provided the crucial evidence. There is only one way to settle the issue: Go there and find out; utilize Francis Bacon's dictum that truth comes more easily out of error than out of confusion.

Confusion is what we have now in the realm of literary criticism. The naturalistic ("Darwinian") literary critics have an unbeatable strategy to replace it. They do not see the division between the great branches of learning—the natural sciences on one side and humanities and humanistic social sciences on the other—as a fault line between two kinds of truth. They do not consider it a line at all but rather a broad expanse of mostly undiscovered phenomena awaiting cooperative exploration by scholars from both sides. This conception has the enormous advantage that it can be empirically proved to be either right or wrong or, at worst, unsolvable.

An analogy exists between the current contest of ideas and the history of geographic exploration. The first geographic explorers were Columbian: they searched for continents and archipelagoes. The second wave of explorers were
Magellanic; synthesizers by nature, they encompassed the whole. The third wave were cartographic: they pressed on into the details of coastlines and rivers, of cordilleras and inland tribes. The naturalistic literary theorists are would-be Columbians. Embattled, even scorned, by tenured constructivists, they have launched their frail caravels on an uncertain sea. Who will gamble against them? If there is any chance of success, who with any courage and ambition would not want to join them—or at least lend support?

Their ultimate key to success is the understanding of mind. Twenty-five centuries of philosophy have not succeeded in what Darwin once aptly termed the assault on the citadel. Indeed, much of the history of philosophy up to present day has consisted of failed models of the brain. Freud, Jung, and the psychoanalytic schools they inspired were naturalistic in approach. But they also failed. There was not enough neuroscience and evolutionary biology in their time to build sound models of the brain. The psychoanalytic theorists also sought independence from biology, causing them to go further astray (see Dylan Evans's "From Lacan to Darwin," this volume).

Nowadays neuroscientists, cognitive psychologists, and evolutionary biologists appear to have gained an entrée in the assault. Their painstaking, bottom-up approach—process by process, circuit by circuit—is at last disclosing the multiple workings of the brain. They seem likely to attain, perhaps within a decade or two, at least a rough answer to the question universally regarded as premier in the natural sciences: What is the mind?

As the properties of mind are clarified empirically, it will also be possible to define human nature with greater precision. That there is a human nature is no longer in doubt. Until recently great controversy raged over the question of whether the brain is wired to predispose certain patterns of learning and behavior, or the brain is a blank slate, free of all but the most elemental drivers and ready to be molded almost entirely by culture and personal history. The blank-slate model could be tested empirically. It lost. The evidence from the biological and behavioral sciences converged to establish that the brain is in fact intricately wired from birth. Human behavior is determined by neither genes nor culture but instead by a complex interaction of these two prescribing forces, with biology guiding and environment specifying.

In the light of modern biology, what is then human nature? It is not the genes, which prescribe human nature. Nor is it just the universal traits of culture, such as the creation myths, incest taboos, and rites of passage, possessed by all societies. Rather, it is the inherited regularities of sensory and mental development that animate and channel the acquisition of culture. The number of genes in the human genome, about thirty-six thousand, is too small to encode more than a minute fraction of the variants of human behavior. Obviously the spectacular efflorescence of cultures is based on learning. Yet for all its achievements, and for
all its prodigious variety, human behavior is severely constrained relative to the combined behavioral repertories of other animal species. At base we have remained true not only to our origins as primates but as savanna-dwelling African catarrhines. We possess no ability to see the ultraviolet light that guides butterflies, no electrical sense by which electric fish organize their lives, none of the echolocation by which bats and whales hunt and orient, and not a trace of the magnetic sense by which songbirds migrate at night. We are also microcosmic idiots, having almost lost the sense of smell so exquisitely refined in the vast majority of animals. Our cultures and values seem highly variable to us but in fact are very specialized and very epigaeic and diurnal mammalian. Here, for example, are several of the values that we could expect to characterize termite cultures if they had attained the intelligence threshold of civilization: loving dank darkness, photophobic, with a refined taste for lignin and cellulose and for music consisting of sophisticated pheromonal song, faithful to the taboo against reproduction by any caste but royalty, and devoted to the duty of consuming injured and dead nestmates. Civilized termites, I feel certain, would consider the very conception of human existence a nightmare.

The mind is a narrative machine, guided unconsciously by the epigenetic rules in creating scenarios and creating options. The narratives and artifacts that prove most innately satisfying spread and become culture. The societies with the most potent Darwinian innovations export them to other societies. In the process of gene-culture evolution, genes affect which scenarios and memes are created, and the cultures thereby generated affect which genes survive. The long-term interaction of genes and culture appear to form a cycle, or more precisely a forward traveling evolutionary spiral, of the following sequence:

*Genes prescribe epigenetic rules, which are the regularities of sensory perception and mental development that animate and channel the growth of culture.*

*Culture helps to determine which of the prescribing genes survive and multiply from one generation to the next.*

The brain develops its activity and thence mind and culture by epigenetic rules of thumb that channel learning. Incest is avoided, for example, by the Westermarck effect, an automatic inhibition that occurs between two people who live in domestic proximity during the first thirty months in the life of either one or both. That imprinting is the foundation of an important part of our moral code—and the production of literary themes. In another realm, that of aesthetics, the brain is activated most sharply by abstract patterns with about 20 percent redundancy, which perhaps not coincidentally is the amount put into much of abstract art. Also, as color vocabularies grow more complex across cultures, those with two terms usually designate black and white; those with three colors black, white, and red; green or yellow makes a fourth; next comes green plus yellow; and so forth.
Successful new genes or gene combinations alter the epigenetic rules of the populations.
The altered epigenetic rules change the direction and effectiveness of the channels of cultural acquisition.

Scientists and other scholars have begun to map a few of the connections between genes and culture. But the details of the coevolutionary spiral cannot be predicted from knowledge of the genes or even the circuitry of the brain alone. It can only be adduced by joining the relevant data of cognitive psychology, the social sciences, and the humanities with those of biology.

The time has come to bring science into closer contact with epistemology. Science is the organized, systematic enterprise that gathers knowledge about the world and condenses it into testable laws and principles. In addressing phenomena that range all the way from the origin of the universe to the workings of the brain, science is distinguished from pseudoscience by five qualities. The first is repeatability of the observation, preferably by different observers using different techniques. The second is economy: the accounts provided by the best of science are those that are simplest (and, usually, most aesthetically pleasing) and also yield the largest amount of testable information. The third diagnostic quality is mensuration: the best science comes from phenomena that can be measured repeatedly by generally employed scales and tested for likelihood by statistical inference. The fourth quality is heuristics: the best discoveries are those that raise new questions and stimulate further inquiry. The fifth diagnostic quality of true science is consilience: the explanations of different phenomena most likely to survive are those that can be connected and proceed consistent with one another.

Science is neither a philosophy nor an ideology. It is a way of exploring the tangible world that conferred understanding and power beyond the imaginings of prescientific people. Although born in Europe at a particular time, during the seventeenth century, modern science is not in any sense an idiosyncratic contrivance of Western civilization. The knowledge it generates is the most inclusive and transparent, as well as democratic, available to all of humanity. (Tibetan Buddhism and postmodern constructivism are also among the many ways of thinking available to all of humanity but have none of the diagnostic characteristics of science.)

Naturalism is a conviction, based upon the spectacular successes of science continuing to the present time, that scientific inquiry can be taken to any level of detail, including the productions of mind and culture. In accepting this world view myself, and as a biologist, I like to reflect on the parallel between the productions of organic evolution expressed in ecosystems and the productions of the brain expressed in cultures. Each species of the millions (when bacteria are included) that compose ecosystems, like each defining element of every culture, is worthy of a lifetime of study. Each has unique biological traits that can be understood in depth. Such is the level of competence of individualistic biology at the present time. But how species are assembled into ecosystems and how the
ecosystems sustain themselves as higher level entities are only partly understood. And so it is, a fortiori, with mind and culture.

The substance of the creative arts is of course the work itself. In creating literature, visual art, or music successful innovators have no need of theory. We may even hope that authors who generate literature of genuine originality, who use language to transmit images and feeling directly from one mind to the other with aesthetic and emotional power, will remain, as they have ever been, largely unencumbered by theory. To explain what they have accomplished, or have not accomplished, and why and, further, how literature evolves and, finally, the role it plays in culture—all that is the responsibility of the literary theorist. Those who take the naturalistic approach stand apart from science in important ways but have much to accomplish if they draw upon all it has to offer.