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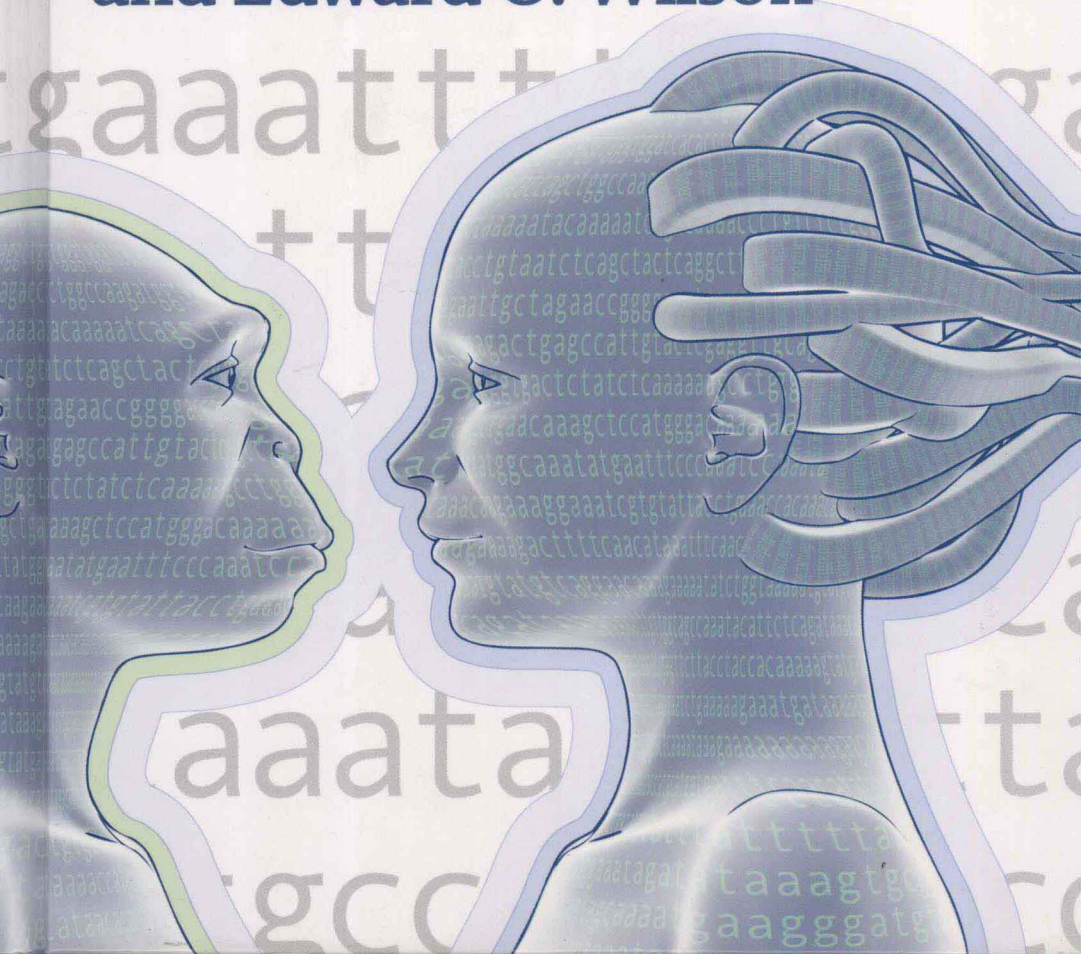
the coevolutionary process

25th anniversary edition

Charles J. Lumsden and Edward O. Wilson



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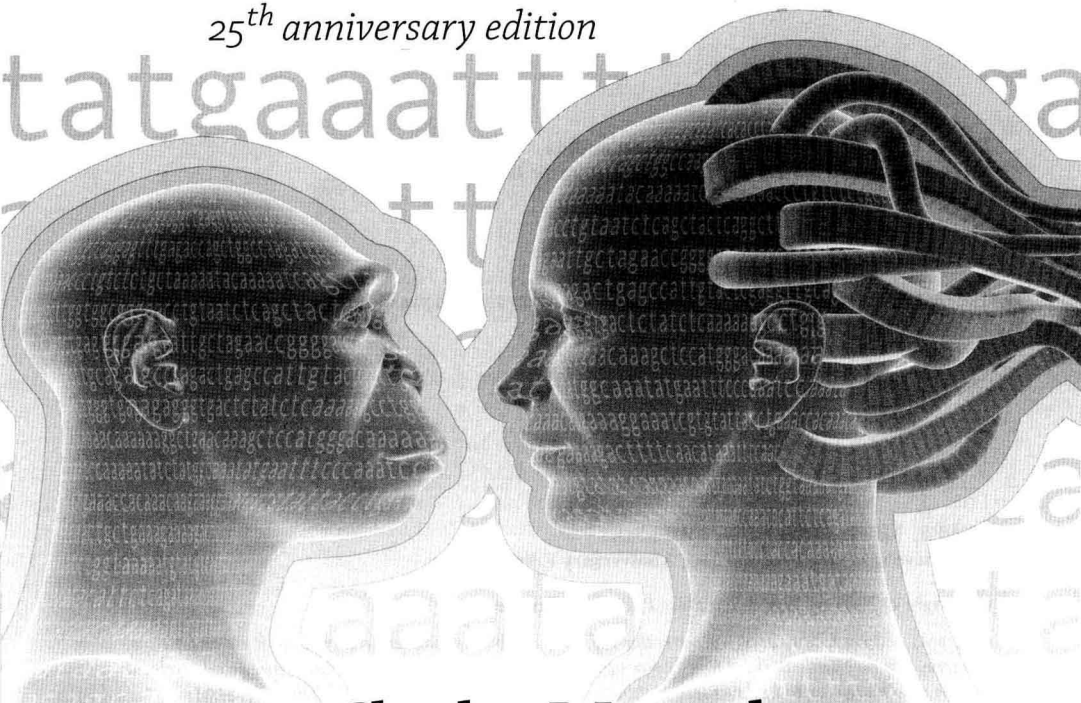

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Genes, Mind, and Culture

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25th anniversary edition

For Wei-yee Lumsden and Irene Wilson

Preface to the New Edition of Genes, Mind, and Culture

Adventures on the frontier of science are blessed when supported by the generosity and enthusiasm of friends. To this end our explorations of human sociobiology have been abundantly blessed over the years. We were delighted when Stanley Liu, then Acquisitions Editor at World Scientific USA, suggested the time had come for *Genes, Mind, and Culture* to be available to a new generation of students and scholars in the human sciences, in a form that would both respect the integrity of our original edition and survey the remarkable advances now reshaping the understanding of human nature in all its exuberant diversity. Our thanks go as well to Harvard University Press for supporting this effort with its permission to present our book intact in its 1981 published form. In particular, Claudia Buckholts of the Subsidiary Rights section at the Harvard University Press was outstandingly courteous, prompt, and effective in making the arrangements.

As usual, the entire production staff at World Scientific has been deft and efficient throughout the project. The enthusiasm of Stanley Liu and of Joy Quek, our Production Editor in Singapore, has made possible this release of *Genes, Mind, and Culture* in time for the book's twenty-fifth anniversary in 2006. We have also been assisted in this by the prompt action of the many scholars who, after almost a quarter century, once again supplied their kind permission to show diagrams and illustrations from their published work. These individuals are acknowledged by name in the relevant Figure captions and text passages, and as needed in the new Acknowledgements section elsewhere in the text.

Nicholas Woolridge, artist and scholar, colleague and friend, somehow found time amid the crush of teaching and research at the University of Toronto's Division of Biomedical Communications, and created the wonderful

new cover design for this edition of our book. Our warm appreciation goes as well to Amanda Ashford, who with boundless good humor managed the details of permission renewals and juggled its weekly flood of paperwork.

The passage of the years has stilled voices we miss, including some of our book's supporters and some of its harshest critics. Iron sharpens iron, says Proverbs 27:17. Science at its frontiers is not an ebb of saccharine consensus. It is the crackle of argument and debate as discoveries and explanations are assayed and refined. The merits of the program laid out in *Genes, Mind, and Culture* still speak, in this regard, largely for themselves. We will be more than content if this new century finds herein some small part of the energy needed to grasp humanity's future and, with wisdom and humility, bring it about.

Charles J. Lumsden

Edward O. Wilson

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Genes, Mind, and Culture is in part a synthetic work that highlights the discoveries of scholars in many disciplines. For their courtesy and assistance in permitting us to use illustrations from their published work, we would like to thank the following:

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FRONT ESSAY

The Next Synthesis: 25 Years of Genes, Mind, and Culture

by Charles Lumsden

In 1975 the publication of a book by one of us (EOW) provoked an outburst of controversy. Entitled *Sociobiology: The New Synthesis*, the book surveyed the knowledge about social behavior in all forms of animal life, including human beings (Wilson, 1975). It proposed that this diverse knowledge could be rendered coherent in a simple way: by applying to it the ideas of Charles Darwin. Darwin's gift to the modern world was a fundamental truth about the source of form and action in living beings; as the generations flicker by, he saw, variation in form and behavior passes from parents to their offspring and allows some lines of descent to flourish more than others, so changing the plant and animal populations in our planet's ecosystems.

Simple idea, profound implications. By the end of the 1960s, the power of Darwin's insight for behaviors directly beneficial to the individual had become clear. Still puzzling, however, was the prevalence across the animal world of behaviors and forms of group living — from the bustle of the honey bee hive to the relaxed pace of a Southern barbecue — in which living beings gather cooperatively, with common goals, rather than conflicting head to head for scarce resources. Could Darwin have gone astray with his assertion that heritable differences passed from individual to individual across generations are the wellsprings of evolution?

No, *Sociobiology* was to argue, Darwin was correct: biological descent with modification is the key. However, the paths of heritable influence are, for social behaviors, more complex and subtle than could be envisaged in Darwin's time. To master them one must understand the mechanics of how differences are passed from generation to generation through genetic inheritance. That came later, starting at the dawn of the twentieth century and accelerating into the

1960s with new insights into cooperative social action. The origin of altruism is the effects an animal's actions have on its kin (with which it shares a certain portion of genetic material by way of common ancestors) and on other members of its species who can remember, and take into account, its past record of helping or harming them. *Sociobiology* was the first systematic attempt to take these new ideas — invented by pioneer evolutionists such as William Hamilton, Robert Trivers, and John Maynard Smith — and apply them to the full sweep of social living from tropical sea corals to the gorilla troops of the African rain forests. An exhilarating unity began to emerge from the variety of animal sociality. Just a few elegant ideas about biological evolution set out through a new science — sociobiology — placed the known forms of social behavior in a comparative scientific framework, and brought order to the diversity.

Sociobiology, however, took a further step. It extended the comparative frame to include human beings. We were not to be a species apart; rather, all of human thought, feeling, and behavior in all their manifestations belonged together in one Darwinian science of human nature, which would be part of a larger evolutionary science embracing all forms of social life. It stated, flatly, that the human sciences, and by implication beyond them the humanities, the liberal arts, and perhaps even the arts themselves, are not free-floating realms. They are joined unbreakably to the hard sciences, to sociobiology especially, because we humans are evolved organic beings subject to the same processes of genetic variation and natural selection that created mind and sociality in all other organisms on our planet. Individual and species uniqueness — what it means to be human — would have to accommodate our biological heritage as well as our social history.

Thus began the sociobiology wars. Although just a small part of *Sociobiology*'s overall treatment of social evolution (29 pages of the book's 697), the final chapter on humankind evoked strong dissent. Humans are *human* came the response from critics in the humanities and social sciences, so by their consciousness and free will are subject to culture, not to the (supposed) restrictions of their biology. To hypothesize a role for genetic inheritance was nonsensical, so the claim went, and to propose a scientific search for the gene's actions in human mind and society was scientifically irresponsible, perhaps downright dangerous. (The tract by anthropologist Marshall Sahlins (1976) and the essays gathered in the volume edited by Arthur Caplan (1978) sample the rhetoric triggered by *Sociobiology*.) Now, I am not an historian of science, just an offspring of the sociobiology wars. I am happy to leave the thick description of that boisterous period to those qualified to do so (Segerstråle, 2000; the second chapter of Lumsden and Wilson, 1983, and the sixth chapter of Pinker, 2002 are also useful). However, in preparing this twenty-fifth anniversary edition of

Genes, Mind and Culture for the press (*GMC* hereafter), I cannot resist a few personal reflections on those turbulent years. Indeed, the appearance of *GMC* renewed and intensified many of the key debates brought on by *Sociobiology* and by *On Human Nature* (Wilson, 1978), the book in which one of us (EOW) answered the initial controversy with an extended reflection on human sociobiology and its meaning for humanity. I invite you, then, to step into an imaginary time machine and for a moment voyage back some thirty years to the university campuses and research laboratories of North America in the 1970s.

Past

From humanity's vantage point here at the dawn of the twenty-first century science, fresh from the first mapping of the human genome and steeped in brain scans that illuminate human mental activities ranging from speech perception to moral judgment, the mid-1970s seem a different age. With the advent of sociobiology, the evolutionary sciences were starting to place all forms of social behavior on a common ground. The behavioral sciences, centered today on the mystery of the human mind, were in the midst of a great thaw. For almost half a century, from about 1920 to 1970, the reigning paradigm in psychology had been behaviorism, the view that mental events, being invisible to the naked eye, were not observable and so "unscientific." Scientific psychology could be concerned only with *behavior*, which could be seen, and with how it responded to events in the environment. Genes, the quantum particles of Darwinian evolution might, according to this view, provide the animal's brain with a generalized capacity for learning, for responding to rewards and punishments from the environment. The genes were otherwise of no importance in understanding how minds worked and how they came to resemble or differ from one another.

Across much of the behavioral sciences of the 1970s, study of the mind was out of favor and genes (and evolution) largely ignored. From this scientific dead end (simply put: where to behaviors *come from*?) psychology, beginning slowly in the early 1950s edged past behaviorism and into the cognitive science revolution of the late 1970s and the 1980s (mind matters, not just behavior, and may operate like a computer program; you can't see the software inside your computer, but it makes a difference). By the mid-1970s psychology and the other behavioral sciences had begun their transition from icy exclusion of the mind over to a more consilient paradigm seeking to join brain biology, mentation, and behavior in one new discipline: cognitive neuroscience, the Ur-psychology of today. At the time of *Sociobiology* this sea change was barely in flood, and little had washed up on the quickly expanding shores of

evolutionary science. Many behavioral scientists were therefore ill-prepared to make sense of the idea that genes could shape the mind, acting with the environment to establish key regularities in social behaviors within and between species. The situation was especially acute for psychologists (the vast majority in North America at the time) working outside the largely European discipline of *ethology*, the science which studies animal behavior in realistic, natural settings from an evolutionary perspective (rather than animal behavior in artificial laboratory settings — the rat in a maze paradigm — from the perspective of behaviorism).

The behavioral sciences and sociobiology did converge, however, at a crucial notion: that of *learning*, the ability of animals to modify their behavior systematically in light of experience. *On Human Nature* (*OHN* hereafter) scrutinized the psychology of learning and explained how Darwinian evolution acting on genes could in turn mold an organism's proclivities for learning. Generalized capacities for learning would be important, *OHN* suggested, but there was a crucial modifier. Genetic evolution could steer the learning process toward certain ends by modifying the brain's learning circuits. This would exert a shaping force on individual behaviors and, ultimately, on the societal patterns rising from them. The conception was the *learning rule*, a statistical regularity of brain development shaped by the genes that made certain behaviors more likely to be acquired than others. Surveying human cultures, the author of *OHN* (EOW) was impressed by the concision with which complex human behaviors ranging from family systems to religious practice could thereby be connected to sociobiology, and thus to Darwinian principles.

The response to *OHN* was, if anything, more strident than had been the reception of *Sociobiology*'s final chapter on humankind. In part, the sparks emanated from the tectonic energy of previously disparate sciences in collision for the first time. Where *Sociobiology* had taken a few tentative steps toward human psychology and social science, *OHN* argued straight out for the non-independence of all the human arts and sciences, with Darwinian evolution as the common bond. Why the friction? Territorial primates for certain, career academics enjoy their specialist turf and rarely appreciate outsiders. But this was an especially sensitive period for American *belle lettres*. War riven by the bloody combat in Viet Nam, North American campuses were scraped raw by pro- and anti-war debates that polarized citizens within and between generations. Inside its homeland borders, American society still reverberated from the civil rights and counterculture movements that caught fire in the 1960s as John Fitzgerald Kennedy, his brother Robert, and Martin Luther King Jr. fell to assassins' bullets and a steady stream of dead and wounded trickled home from the battlegrounds of Southeast Asia. The toppling of the Berlin Wall and the collapse

of the post-Stalinist regime straddling northern Asia lay years in the future. In 1974, the year preceding the appearance of *Sociobiology*, the Doomsday Clock of the U.S.-based *Bulletin of Atomic Scientists* (www.thebulletin.org), the world's best known barometer of nuclear warfare tensions and threats to global security, crept forward to nine minutes to midnight, the hour of world-wide thermonuclear apocalypse. (In 2002 the Clock was advanced to midnight minus seven minutes; as of this writing another advance is widely anticipated as international tensions mount.)

In this charged atmosphere some scholars and intellectuals saw *Sociobiology* and *OHN* as a threat to human freedom and dignity. How could humans be free to create a good and just future if tied to the dispositions of their genes? Genes were inert chemicals. That would mean humans are chemically programmed robots or genetic zombies without claim to morals or liberty. Not possible.

The answer to this mistaken conception about gene action, about which the two of us have written many times starting with *GMC*, is the idea of empowerment. The activity of genes during human brain and mind development is more accurately understood as a process that empowers individual learning and action, that is, it enables a selective, self-organizing assessment and choice of individual behavior (including learning behavior) toward self-selected ends. The genetic activity sets up a directed pattern of learning and development in each person's mind, ultimately sustaining the emergence of individual consciousness with its capacity for moral reflection, critical self-scrutiny, and choice. So we and, increasingly, others have argued over the past decades (Lumsden and Wilson, 1983; Findlay and Lumsden, 1988; Wilson, 1998, 2002; Greene, 2003; Lumsden, 2004b, 2005). But at the time, the generalized learning capacity implied by behaviorism seemed, to many, a more secure defence against a supposed tyranny of the genes than did the learning rules mapped out by *OHN*. It was not. Equipped only with a generalized learning capacity, humans would be "free" to be shaped and molded at whim by their cultures to arbitrary ends — a tyrant's dream.

Another set of objections to *OHN*'s consilient program did, however, hit home, and helped set us on our future course. Despite its recognition of learning and genetically shaped learning rules, *OHN* still gave short shrift to the human mind; the focus in *OHN*'s treatment of our species remained on external behavior, and so increasingly out of step with the now revolutionary changes happening in the cognitive neurosciences. Equally important, although *OHN* drew a bead on social behavior the mother lode of the humanities — culture, that skein of media, symbols, and information in which the mind swims from birth to death — was not clearly in sight.

At that time one of us (CJL) was completing doctoral work at the University of Toronto's McLennan Physical Laboratories, in the early theoretical physics of complex systems — systems in the form of vast weaving patterns of interaction among simple parts. Then as now these were considered prime models of how the nerve cell networks of the brain might work and how the skeins of symbols and communication within culture might operate. I say early, as against current, because that research scene seems as quaint today as does psychology's last fling with hard core behaviorism. In the mid-1970s the mathematical tools of complexity — fractals, for instance, and dynamical chaos — were brand new to scientists. A generation of somewhat puzzled physicists and biologists was just coming to grips with them (for a solid text see Peitgen *et al.*, 1992). The nonlinear science gold rush of the 1980s and 1990s (surveyed in Cohen and Stewart, 1994; Solé and Goodwin, 2000) was still several years in the future. The computers used for scientific calculations still took up entire rooms. The internet was a just few years old. There was no World Wide Web. Databases defining whole genomes or nervous systems were tomorrow's dreams. The academic disciplines thought open to mathematical treatment using ideas from physics lay right about physical science itself: chemistry, and most parts of engineering maybe. Applications further afield were prone to raise, with a shudder, pejorative epithets like "social physics" and "physics envy," as if like oil and water the human sciences and the humanities could never mix with mathematics and its sciences. Polite ways of saying this used abstractions like the "incommensurable" nature of the various sciences and humanities, the absence of "covering laws" in one or another, and so on (the essays edited by Fiske and Schweder, 1986, provide a scholarly cross-section of the era's polarities on these issues). This was the period in which North American arts and letters felt the embalming grip of the so-called "poststructuralist" tradition in culture studies. Popularized on European campuses, especially in France, the manifestos of textual "deconstruction" pioneered by Jacques Derrida were particularly in vogue (Derrida, 1986, a work of singular wit and imagination, makes the Sirens' call sweetly audible even to the scientific ear).

The effect of poststructuralism on the humanities and human sciences was, at the time we began work, almost as inhibitory as that of behaviorism on the psychological sciences, and for similar reasons. A narrow, extravagantly triumphalist agenda organized around the ideas of a few scholars displaced, for a surprisingly long period, an atmosphere in which diverse approaches and ideas were vigorously pursued. In short: "Keep out." Within poststructuralism (as earlier in behaviorism) mind and human nature again started to disappear, this time into a fog of self-reference rather than into a schedule of rewards and punishments. Language directed at the world gave way to language as a