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Glenn Weisfeld retires as Editor

By Bill Charlesworth

Glenn Weisfeld, Editor of the *Human Ethology Bulletin* since 1991, has retired. Long live Glenn! Since the beginning of human ethology in the 1960's at least two forces have held it together as an organization--the biennial ISHE conferences and the *Bulletin*. The key to the latter is its editor who has the unspoken task of holding the thread of human ethology tightly, month after month, issue after issue. Conferences come and go, trends change, but the *Bulletin* has to remain fast--in policy and quality. It does, and with Glenn it did.

Today, we can say the *Bulletin* has not only held fast but it has flourished--it is informative, interesting, and helpful. And it has grown in size. In short, it has been a great success. For this the Society is very indebted to Glenn...as well as to his predecessors who managed the *Bulletin* over earlier years--Don Omark and Murray Edelman, Cheryl Travis, Joan Lockhart, Bob Adams, and, just before Glenn, Frans Plooij.

Here is Glenn in an interview conducted in February, 1999.

BC: Glenn, what were your goals when you took over the editorship?

GW: I thought the *Bulletin* should be open to all ideas and viewpoints that were in any way related to ethology.

BC: No question this goal has been reached in a big way. All one has to do is attend ISHE conferences and read the *Bulletin* to see how diversifed and rich in content and methods human ethology is these days.

GW: I also wanted to keep costs down and, in this respect, I think we did pretty well. But more importantly, I wanted to keep ISHE in contact with other professional societies and organizations. This can be done in may ways--holding joint meetings for example, inviting speakers from other disciplines, ensuring our literature review was as broad as possible, and so on. I think we have pretty much succeeded in this as well. We have established solid lines with the European Sociobiological Society and with the Across-Species Comparison and Psychiatry Society, for example.

BC: Glenn, you've been around human ethology for some time now. What has happened to the field over the years?

GW: Plenty. When I attended my first meeting of ISHE back in 1974 in Champaign Urbana Illinois there were very few of us (about two dozen or so). At that time we had been holding our meetings with the Animal Behavior Society. Back then human ethology had a tough time getting accepted by academics. Many of them had the feeling that anyone studying human behavior from a biological (evolutionary) perspective was guilty of a whole number of

unacceptable things --ethologists were reactionary, racist, sexist, fascist. These labels were even thrown at some of us at meetings. It was a kind of McCarthyism. Also, getting our research into mainstream journals was often very difficult if not impossible. Actually, if one did a good observation study of children's behavior, it may have gotten published, but only if no mention was made of evolution and biology. Also, teaching about ethology in courses was more controversial then.

BC: I know very well what you are referring to.

GW: Then the tide began changing. For many reasons I can't go into here, human ethology gradually became much more acceptable. Today, ethology, Darwin, evolution, the whole bag are now very popular and even evoke some envy because of their appeal. The ironic thing is that, while academics and researchers rejected ethology, educated laypersons, journalists, and popular writers did not. They were intrigued by the things ethologists had to say. Also, students would ask questions that clearly begged for better answers than those offered by environmentalists or traditional theories. Students wanted to hear more about the nature part of the nature/nurture controversy. Many faculty had to start reading more ethology or call us up on the phone to help with their answers to the students. Also, various departments (psychiatry, education, medicine) would invite faculty who knew anything about ethology to speak to them. Today, our work has broken into most mainstream journals even if it is often still misconstrued.

Today I think human ethologists should feel proud of their discipline. Many of the major theories in psychology, developmental psychology, psychiatry and anthropology, for example, have either vanished or been greatly diminished or discredited by new findings. Many of the holes they have left are now being filled up by evolutionary hypotheses and explanations. More and more textbooks include ethological ideas and research, and some texts are explicitly evolutionary in their approach.

BC: But has all this been smooth sailing?

GW: No. At the same time, that the field was expanding and getting recognition, factionalism began developing. Maybe this is to be expected. When a field becomes too big (like evolutionary biology today) it can easily break up into subareas. That has happened now with ethology. For example, the journal, *Ethology and Sociobiology*, no longer exists, having been replaced by *Evolution and Human Behavior*. Ethology, the oldest of behavioral evolution disciplines, is now broken up and represented by different subareas--evolutionary psychology, for example. Such schisms are clearly not necessary since no fundamental differences separate these current subareas. Ethology is defined (as it has always been defined) as the study of behavior from an evolutionary perspective. This means it is not limited to certain content such as fixed action patterns and releasers, or to field observational methods. It's a discipline that aims at answering Tinbergen's famous four questions. As we all know, answering such questions encompasses the efforts of a wide range of disciplines--those concentrating on development, brain mechanisms, hormones, behavior genetics, cross-cultural comparisons and so on.

I think that some evolutionary scholars are not aware of the venerable history of ethology and of the enduring value of its constructs. Although many textbooks claim Konrad Lorenz as the founder of ethology, the field actually began around the turn of the last century, with Oskar Heinroth playing a major role (see John Archer's Ethology and Human Development, 1992, Savage, MD: Barnes & Noble). Thus it did not begin as a reaction to American behaviorism, which it antedated. The term itself dates back to 1859 when it was employed by Geoffroy-St. Hilaire. Furthermore, the field was not confined to Germany. Important developments have occurred in The Netherlands, Japan, England, Canada, and elsewhere. ISHE now has members in over 35 countries. Naturally all of us tend to track most closely research in our own country, but human ethology as pursued in Europe and Canada has suffered some neglect by American evolutionary psychologists. Perhaps partly because of our notorious ignorance of history and our enthusiasm for novelty, some Americans have neglected human ethology

under the misconception that it is passé. To the contrary, the recent surge of the evolutionary perspective constitutes a general catching up with the principles developed by ethologists. For example, the notion of cognitive modules for specific human behaviors is a recasting of the notion of releasers and innate releasing mechanisms of classical ethology. And research on mother-offspring bonding, attachment, and the study of emotions has obvious roots in ethology. Basic emotional expressions in humans are themselves an example of fixed action patterns in our species. Inclusive fitness theory, developed by people who called themselves sociobiologists, constituted a major advance in thinking about behavior, but this notion was not incompatible with traditional ethology, which has incorporated it.

Another common misconception seems to be that ethology is averse to discovering the neural mechanisms of behavior. To the contrary, understanding proximate causation is one of the goals of ethology as elucidated by Tinbergen. Current ethological research on pheromones and sexual attraction, gonadal hormones and various cognitive aptitudes, the corpus striatum in obsessive-compulsive disorder, and brain serotonin in dominance behavior are examples of continuing interest in mechanisms underlying observable behavior. Naturally, if one does not keep abreast of current ethological research, one risks assuming that the field has not progressed for 50 years. Moreover, the methodology of human evolutionary research still features prominently methods originating with Darwin: naturalistic observation of humans and related species, studying newborns, cross-cultural comparison, and physiological analysis. Identification of the function of a given trait is still carried out by studying the phyletic distribution of the trait, and occasionally by experimental manipulation of a crucial condition.

BC: Are there any other factors that work against smooth sailing?

GW: Yes. We're an international organization that holds biennial meetings. We alternate these meetings between continents (so far North America and Europe). This means we meet on the same continent once every four years. Given the costs of travel, you can imagine what that does to attendance and continuity of intellectual contacts, especially for students who usually do not have institutional support. On the other hand, our conventions of 100 people or so allow an intimacy and informality that more crowded meetings lack.

Being an international society, however, is one of our great strengths. We have been instrumental in maintaining communication between evolutionists over the oceans. We have also been highly interdisciplinary, rather than identifying with only a single mainstream discipline. However, since we ceased meeting with the Animal Behavior Society and the primatology societies, we have reduced our direct contact with people studying animals. Most models of human behavior, as evolutionists well know, derive from comparisons with other species.

Another problem is that, as a relatively new discipline, human ethology (like other new disciplines) has had a tough time breaking into established programs at most universities and colleges. Setting up a new discipline, even within a department (not just within a college) is not easy. One needs trained faculty, a curriculum that includes ethology, job prospects for students who major in it, et cetera. One also needs appropriate textbooks. The field is still pretty young for these things to develop quickly. Also, different countries vary considerably in how much they are going to support academic research in new disciplines. In some countries, universities have been become very profit-oriented. Research grants are still hard to get for people working in a field that some still feel is politically objectionable.

BC: Glenn, although there are many things I would like to ask, I have to end this interview. Any final comments?

GW: Yes. I would like to emphasize that I found the job as editor very gratifying for many reasons. One of the major reasons is how cooperative everyone has been in helping me get the *Bulletin* out. I especially owe a great tribute to the *Bulletin's* Editorial Staff.

During my tenure, this staff has included the Chief Book Review Editors, Linda Mealey and Peter LaFreniere, the Current Literature Editors, Bob Adams, and Johan van der Dennen, and our Treasurer, Barb Fuller, who systematized the membership list for me. To them and to you reviewers, other contributors, and readers, many, many thanks.

BC: And many, many thanks to you, Glenn!

COMMENTARY

Parallels Between Wolves and Early Hominids

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Schleidt's "Is Humaneness Canine?" [*Human Ethology Bulletin*, 13(4):1-4 (December 1998)] brings to mind Hall's and Stevenson's elaborations[1,2] upon Cachel's bold idea[3] opposing the 1975 near-consensus that robust australopithecines ate only plant matter. She proposed that gracile australopithecines and robusts were sympatric predators. Hall and Stevenson then called attention to parallels between these hominids and another set of predators, the three North American wolf species in the Upper Pleistocene (coyote, timber wolf, and dire wolf). Both Cachel and Hall argued that the robust's huge molars do not necessarily imply a strict vegetarian diet (for which its small front teeth were poorly adapted). The dire wolf had comparable molars, excellent instruments for processing meat and bone. (To do tasks for which the dire wolf's sharp front teeth were adapted, robusts made stone tools.[4,5]) In many features (especially of jaw, jaw muscles, and teeth), gracile coyote stands to dire wolf as gracile australopithecine to robust. Recent evidence[4-8] has confirmed that diets of graciles and robusts were similar, both eating significant quantities of meat, the robust form either preying upon or scavenging kills of African megafauna, while the gracile form chased down smaller game. Hall believed that, like the coyote, graciles hunted either alone or only a few together, while robusts operated in large packs. Both dire wolf and robust australopithecine became extinct along with megafauna and sabre-toothed cats on their respective continents.

Consider two facts about the robust australopithecine: (1) males were far larger (more "robust") than females[9,10]; (2) in the Rift Valley they occupied a highly fragmented habitat. When a female reached maturity, she felt no inclination to leave a well-watered home territory (supplying fish and both aquatic and land plant matter) for uncertainties of the relatively barren, dangerous outside. It is difficult to credit the usual assumption, australopithecine female exogamy.[11] Male exogamy is much more probable.[12] If this is so, bands of nonkin male outsiders may well have developed habits of cooperation in two vital endeavors: acquiring regular supplies of meat and, ultimately, defeating and dispersing a band of male insiders guarding a congregation of relatively sedentary females, thereby winning access thereto and control thereof.

Robust fossils far outnumber *Homo* fossils from long after the appearance of the first *Homo* species in the Rift Valley.[13] Yet a consensus is emerging that robusts and *Homo* share a common ancestor not yet found[14,15]; micropatterns of skull growth are similar in robusts and early *Homo* while different from the gracile pattern.[15] It is tempting to assume that our line came late to the Valley in large numbers, having arisen earlier, nearby. Perhaps we see a clue in *erectus*'s ability at nearly 1 million years ago to cross an 18-kilometer strait and occupy the Indonesian island Flores.[16] This is more likely evidence of stamina in swimming than skill in fashioning watercraft. Did *Homo* at first dwell by the Red Sea? Were early *Homo* males strong swimmers, hunting at sea in bands? Exploiting sea turtles and dugong, browsers on eelgrass (*Zostera marina*)? If so, our male ancestors, like orca (a species of exceptional altruism), also learned cooperation. In successful *Homo* lines, significant reduction in sexual dimorphism in size[9,10] surely reflects major

The deadline for abstract submissions and symposia proposals is March 15, 1999. The deadline for entering the New Investigator or Post-Doctoral Competitions is May 12, 1999.

********** Call for Papers **********

POPULATION AND ENVIRONMENT:
A JOURNAL OF INTERDISCIPLINARY STUDIES publishes papers on the linkages between demographic and environmental variables in historical, traditional, and contemporary cultures, including migration issues and issues related to population and socioeconomic development. The journal also provides a forum for discussion of public policy questions related to these issues. Papers developing evolutionary perspectives on the these issues are especially welcome. POPULATION AND ENVIRONMENT is a publication of Human Sciences Press, a division of Plenum Publishing Corp. MANUSCRIPTS should be submitted in triplicate, double-spaced throughout, with a 100-word abstract to Dr. Kevin B. MacDonald, Department of Psychology, California State University at Long Beach, Long Beach I California 90840-0901; telephone (562) 985-8183; fax (562) 985-8004; e-mail: kmacd@csulb.edu.

***** Calling All Human Ethologists! *****

Human ethology has been making recent inroads in the former Soviet Union, but not without stiff ideological opposition from social scientists. To overcome various misconceptions with psychologists and some cultural anthropologists regarding Human Ethology, we have organized a roundtable discussion on "Human Ethology and it's place in Behavioural Sciences" on March 26, 1999.

Sample questions for discussion are:
What is human ethology now?
Why do we need human ethology to understand human nature and culture?
What are the essential differences between ethological and psychological approaches and methods? Is cooperation between ethologist and psychologists possible ?
Teaching "Human ethology" courses for psychologists and cultural anthropologists.
What contribution can human ethology make to cross-cultural research?
How can cultural anthropologists and human ethologists overcome disciplinary boundaries and collaborate effectively?

Any ISHE members who are interested in presenting their views on these questions and other issues can do so via e-mail by contacting the organizer, Marina Butovskaya (marina@carabus.msk.su), via special e-mail address (butovs@rsuch.ru), or in person by attending the conference to be held in Moscow on March 26, 1999.

Bulletin Submissions and Duplication

All items of interest to ISHE members are welcome: Society Matters; articles; replies to articles; suggestions; announcements of meetings, journals or professional societies; etc. These sorts of submission should be sent to the editor. Book review inquiries should go to the book review editor. All submissions should be in English, and sent to the appropriate editor via e-mail, preferably as an attachment. If e-mail is impossible, hard copies will be accepted, as long as they are accompanied by the same text on diskette (preferably in Microsoft Word version 6.0 or earlier). Shorter reviews are desirable (less than 1000 words). **Please include complete references for all publications cited.** For book reviews, please include **publisher's mailing address and the price of hardback and paperback editions.**

Submissions are usually reviewed only by the editorial staff. However, some submissions are rejected. Political censorship is avoided, so as to foster free and creative exchange of ideas among scholars. The fact that material appears in the newsletter never implies the truth of those ideas, ISHE's endorsement of them, or support for any policy implications that might be inferred from them.

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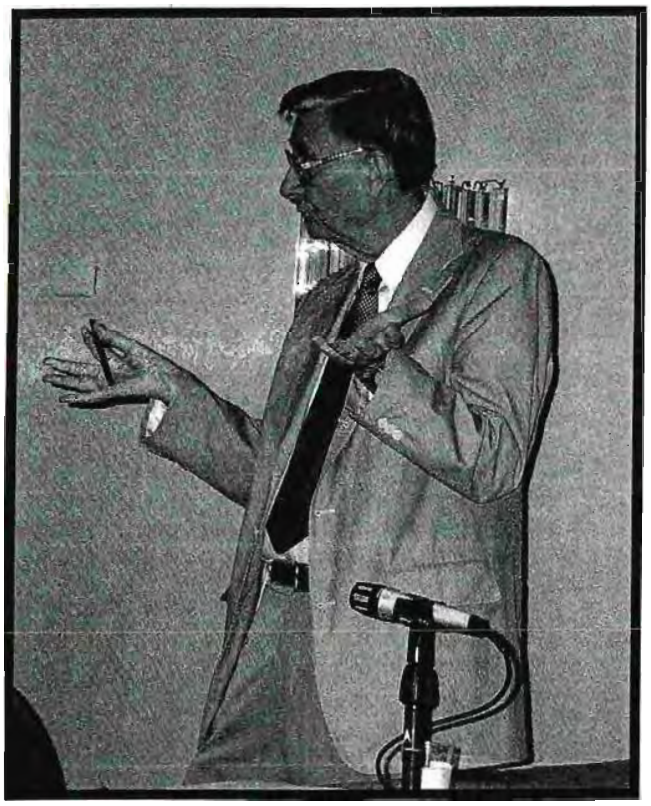
BOOK REVIEWS

Consilience:

The Unity of All Knowledge

By Edward O. Wilson. New York: Knopf, 1998) Hard cover, $26.00 pp. 322.

Reviewed by Frank Miele. Senior Editor, *Skeptic* Magazine, 620 Iris Avenue (#216), Sunnyvale, CA 94086 USA



In 1975 E.O. Wilson threw down the gauntlet to the prevailing paradigm in the social and behavioral sciences. *Sociobiology: The New Synthesis* (Wilson, 1975) laid out the evidence for the evolutionary and genetic basis of social behavior across the animal kingdom. Most controversial was his final chapter, "Man: From Sociobiology to Sociology," which challenged the 'standard' model that had dominated social science since the end of W.W.II. The standard model maintained, virtually as articles of faith implicitly accepted by all within the respectable academy in the U.S., that "the uniquely malleable human mind, together with the unique force of culture, has severed our behavior from its evolutionary roots; ... and [that] there is no inherent human nature driving events... our essential nature is to be driven" (summarized by Wright, 1994, p.5). Wilson's challenge was met and so the 'Sociobiology Wars' of the late 1970s were fought in academic journals, conferences, and campus demonstrations. (See Caplan [1978] for a collection of the most important articles on each side).

Looking back twenty years, the Sociobiology Wars ended in less than half the time needed to freeze out the Cold War and the a-biological standard model of the social sciences is now as scientifically defunct as the former Soviet Union. Even Stephen Jay Gould, one of the severest and most influential critics of sociobiology in the mind of the literate public in the U.S. has conceded that "some facts and theories are truly universal (and true) -- and no variety of cultural tradition can change that" (quoted by Ehrenreich and McIntosh, 1997). Today the greatest threat to human sociobiology, to Wilson's dismay now generally termed evolutionary psychology, comes not from its critics, but its friends and practitioners who have been eager to generate hypotheses which all too often prove incapable of empirical testing, and therefore scientific meaningless. (See Holcomb, 1996 for a philosophical critique).

In the intervening 20 years Wilson has been active in the environmental movement, which has produced some interesting political changes of opinion as regards his scholarship. While political conservatives were delighted with Wilson's arguments that there was a basic human nature that was relatively impervious to social, political, and economic conditions, they have been less than enthusiastic about his avid support for environmental conservation. Thus conservative talk show guru Rush Limbaugh felt moved to spend the better part of one 3-hour radio program denouncing Wilson as "just the kind of guy the Clinton administration is listening to and who is teaching our children" (Limbaugh, 1993, quoted in Miele, 1993) --

which certainly must have come as news to both Wilson and the Clinton administration!

I cite this swapping of political bedfellows not because it is an amusing curiosity. Rather it demonstrates at the visceral level Wilson's growing conviction that the known facts of evolutionary science require us to reconsider our entire consensus *Weltanschauung*, particularly as it applies to public policy and moral philosophy. Wilson believes both liberal and conservative political and moral philosophy are pre-evolutionary and hence long overdue for radical revision if not shelving. As he states in *Consilience* :

> Every college student should be able to answer the following question: What is the relation between science and the humanities, and how is it important for human welfare. Every public intellectual and political leader should be able to answer that question as well... Most of the issues that vex humanity daily – ethnic conflict, arms escalation, over-population, abortion, environment, endemic poverty... cannot be solved without integrating knowledge from the natural sciences with that of the social sciences and the humanities (p. 13)

> ...by exploring the biological roots of moral behavior, and explaining their material origins and biases, we should be able to fashion a wiser and more enduring ethical consensus.... Moral reasoning will either remain centered in idioms of theology and philosophy, where it is now, or it will shift toward a science-based material analysis. (p.240).

Consilience is nothing less than Wilson's attempt to draw the outlines for this new philosophy. In so doing, he is returning to the world view of the pre-Socratic Greek materialist philosophers and dislodging the cornerstones of what have been the great Western religions-- Judaism, Christianity, and Marxism, all of which view man as somehow special, separate from the rest of nature, exempt from many of its laws, but subject to unique, moral ones. And it is on these points that the Consilience Wars are now being waged in debates between Wilson and his critics such as those at the Smithsonian Institution and the 1998 meeting of the Association for Politics and the Life Sciences (see photos) and in journals such as this.

The most vociferous anti-Wilson opposition has come not from the populist religious pulpit, but from other members of the secular academy. Their counter-argument is best summarized by yet another of S. J. Gould's (1996) catchy neologisms, NOMA (Non-Overlapping Magisteria). Simply put, NOMAism contends that science is science, politics is politics, ethics is ethics, and never the twains should meet. Taken to its logical conclusion, NOMAism asks us to live split-brained lives and to accept that the difference between being outraged by incest and child molestation, indifferent to them, or approving of them, is on all fours with preferring vanilla, chocolate, or tutti-frutti ice cream.

Prominent NOMAns certainly don't act as if they really believe science and morality are separate as oil and water or that morality is merely a matter of habit or preference. In real life, NOMAns are anything but morally indifferent to child molestation, warfare, human sacrifice, or a host of other social and intellectual matters. Practical NOMAn behavior is, in fact, better than theoretical NOMAn belief. Indeed, the biggest moral taboo for NOMAns is trying to build a system in which morality and policy are based on evolution or genetics. To NOMAns, this would open the door to accepting a world best summarized two millennia ago by Thucydides' *Peloponessian Wars* in the dialogue on Melos in which "the strong do as they will, the weak suffer what they must." But if morality is merely preference or habit, how is that world really any worse than any other?

It is in their treatment of the genetic and evolutionary basis of human behavior that NOMAns, philosophically, give away the game. Here they are every bit as moralistic, and far more literate and prolific, than the

Bible Thumpers who for over a century have denounced Darwinism as the cause of war, sex, drugs, rock 'n roll, and everything else they don't like. NOMAns have written whole libraries of books and articles vehemently trashing various hereditarian and evolutionary theories as both morally wrong and factually incorrect. But if NOMAism is correct, what should these two have to do with each other? Following NOMAism, factual right can be proven empirically, moral right is just a matter of preference. Why all the righteous indignation?

The conflation of moral right and wrong with factual right and wrong as regards the bases of human behavior reveals not merely a glaring contradiction at the heart of NOMAism, but its essential religious, if non-theistic, nature. NOMAism is an anathema that can be conveniently invoked to prevent heretical minds from exploring the genetic and evolutionary basis of human behavior, especially moral behavior. After all, no matter how much one may deplore weapons of mass destruction or the prospect of nuclear war, no one disputes the scientific validity of $e=mc^2$. Rather, it is precisely because the equation is accepted as factually so true that some deem its application to war so immoral!

The non-theological alternative to Wilsonian Consilience, in which various fields of knowledge and action are informed by and draw upon each other, is then fragmentation. In computer science, fragmentation refers to the scattering of files (i.e., information) across non-contiguous areas (Magisteria) that degrades system performance, ultimately causing the entire system to crash. Having rejected divine revelation as a source of our morality, if we do not ground morality in evolution, what can we ground it in? If not grounded, what is morality other than personal preference or societal habit? NOMAism amounts to attempted cultural and intellectual fragging and is at the heart of today's "culture wars," "ethical crisis," and the "conflict between the humanities and science."

In a previous issue of this journal, Tom McBride (September, 1998) argued that however well-intended or well-reasoned, Wilson's appeal for humanists to embrace consilience will fall on deaf ears. Today's humanists and belle-lettrists are committed not only to the standard model of social science, but to literary determinism as well. The latter is the belief that rather than describing reality, however poorly, language instead determines reality.

Consilience provides it own answer to this challenge – Darwinian survival. Could any business, army, sports team, family, or even coffee klatch survive if it took linguistic determinism literally? Could an individual who did so survive anywhere outside a contemporary university or a mental institution? Consilience will eventually triumph over the objections McBride clinically describes simply because it works in the real world. Thorough-going linguistic determinists are no more going to eschew the latest therapies derived from the results of the Human Genome Project than Biblical Fundamentalists reject blood transfusions or satellite broadcasting – neither of which can be squared with a literal interpretation of scripture. The few who do will appear as curiosities. One must wonder if any linguistic determinists do not just "talk the talk," but really "walk the walk." I doubt it.

Perhaps the picture is not quite as bleak as McBride has painted it. A slow but steady movement toward bridging the paradigms has begun in such journals as *Politics and the Life Sciences*, and the *Journal of Social and Evolutionary Systems*. Most recently, the largest German university, the Ludwig-Maximilians-Universität in Munich, established the center for the human sciences, an institute aimed at integrating the humanities, social sciences, and the biological sciences. Founding members of the institute, most notably ethologist Irenäeus Eibl-Eibesfeldt, argue that the distinction between culture and biology has been over stated, that Homo sapiens has evolved to be a cultural species, and that both ethology and cultural studies can profit from cross-fertilization (not to mix metaphors too promiscuously). Books such as Joseph Carroll's *Evolution and Literary Theory*, Ellen Dissanayake's *Homo aestheticus: Where Are Comes From and Why*,

and Alondra Oubré's *Instinct and Revelation: Reflections on the Origins of the Numinous* have explored literature, art, and spirituality, respectively, from an evolutionary perspective that is illuminating and respectful, rather than dismissively debunking.

A stronger argument against Wilson's Consilient Approach is itself a pragmatic one. At this point, consilience cannot provide direct answers to vexing moral dilemmas such abortion, animal rights, immigration, eugenics, genetic engineering, ethnic conflict, or genocide. When pressed during my interview, Wilson would only goes so far as to state that incest should not be tolerated and that if "the facts about the risk of over-population and the accelerating destruction of the environment... were laid out before everyone, which we have not properly done... the world would most likely move to a pretty solid consensus" (Miele, 1998, p. 81).

This perceived weakness of the Consilient Approach, however, is also its strength. Consilience is best thought of as a progressive research program, as defined by philosopher of science Imre Lakatos*. Lakatos argued that it is relatively easy for any theory or viewpoint to deal with (that is, make its theories consistent with) anomalies. The critical question is whether it does so in a progressive or in a degenerating manner. A progressive research program not only deals with anomalies but also makes extra predictions, which can be tested and confirmed; a degenerating program does nothing more than accommodate anomalies in an ad hoc manner. (For an application of Lakatos' methodology to the not unrelated issue of the IQ debate, see Urbach, 1974a and 1974b). Since it is a progressive research program, rather than a series of articles of faith, the consilient approach can easily monitor, modify, reject, and so successively improve our ethical policies. Further by adopting this approach, the Consilient Approach necessarily links knowledge with action. NOMAism, on the other hand, is inherently degenerating in the Lakatos sense, in that by definition it has hermetically sealed itself against any possible refutation.

It is in this sense of a research program, a map for exploring the borderlands between disciplines in Wilson's words, that *Consilience* is truly revolutionary (or counter-revolutionary, depending upon one's point of view). Understanding the origins of human morality means trumping the claim of moralistic arguments to trump other forms of discourse, and thus cut off any further debate. Adopting Wilson's Consilient Approach means instead realizing that:

> it lies within the power as well as the duty of all of us to recognize not only the possibility that we might be wrong but the virtual certainty that on some occasions we are bound to be. The fact that this is so does not absolve us from the duty of having views and putting them forward. But it does make it incumbent upon us to recognize the element of doubt that still surrounds the correctness of these views. And if we do that, we will not be able to lose ourselves in transports of moral indignation against those who are of opposite opinion and follow a different line; we will put our views forward only with a prayer for forgiveness for the event that we prove to be mistaken. (Kennan, 1968).

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* I am indebted to Professor Richard Wiebe of Northeastern University for suggesting the application of the Lakatos approach to the Wilson's Consilience argument.

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How Brains Think: Evolving Intelligence, Then and Now

By William H. Calvin,. Basic Books, 10 East 53rd Street, New York, NY 10022-5299, USA, 1996, $20 (hdbk).

Reviewed by Douglas A. Kramer, Depts. of Psychiatry & Zoology, University of Wisconsin–Madison, 780 Regent St., Suite 300, Madison, WI 53715, USA.

William H. Calvin, cognitive neuroscientist, biologist of the mind, and self-described "theoretical neurophysiologist," a writer whose prolificacy is beginning to rival Stephen Jay Gould's, did something very interesting in writing this book. He wrote two versions, one intended for a general audience, *How Brains Think: Evolving Intelligence, Then and Now,* and one for a scientifically sophisticated audience, *The Cerebral Code: Thinking a Thought in the Mosaics of the Mind,* published in the same year (Calvin, 1996). The latter was reviewed in the *Human Ethology Bulletin* (Tennov, 1997). Both are reasonably priced.

An interesting service Calvin provides is a website for "supplements and corrections," including the full text of *How Brains Think,* as well as links to reviews, related articles, ordering information, and the text of his other books, all via the same web address: <http://weber.u.washington.edu/~wcalvin/bk8.html> I learned at the website, for instance, that the book is now available in Japanese, Polish, Chinese, Korean, and Hungarian, and is in preparation for seven additional languages.

In this book, the eight chapters are devoted to a single idea each. Chapters begin with interesting quotations from well-known behavioral or cognitive scientists, Sue Savage-Rumbaugh and Derek Bickerton for instance, or writers and philosophers including Lewis Carroll and John Stuart Mill. Many similar quotations are used to illustrate ideas within the text as well. Drawings are used liberally to illustrate anatomy, concepts, and the hypothesized thinking processes.

At the end of the text, an additional reading list is included, and as seems increasingly true for books at the interface of professional and nonprofessional reading, chapter notes appear which contain many of his most interesting points. *How Brains Think* is well indexed.

Chapter 1, "What to do next," is an introduction with beginning explanations of what intelligence might be, historical context, and an organizational plan of the book. Calvin begins the introduction with his idea that a cortical trial and error process is the basis of intelligence, what he will later call a "darwinian machine." However, he disappointed me as early as page 1 by describing it as "an aspect of our intelligence not seen in even the smartest ape." How does he know? And from whence does he think these "machines" evolved? Granted, we haven't "seen" it, perhaps because of a lack of sophistication of our measurements, but why re-establish this dichotomy? Perhaps he is saying that real intelligence requires consciousness, as implied on page 5, "on the milliseconds-to-minutes timescale of consciousness," or is he blurring the distinction between intelligence and consciousness? William James is given credit for the idea that mental processes might be modeled on a Darwinian template.

Chapter 2, "Evolving a good guess," is a more complete discussion of what intelligence is, in Calvin's view, including such attributes as the size of the response repertoire, the speed of learning, "creative cleverness," foresight, imagination, innovative behavior, play, and planning, especially "multistage planning." He continues to develop the idea of a dichotomy between humans and the great apes. He comments, "Compared to apes, we do a lot of that," referring to his conclusion that intelligence seems to involve the capacity to "make a detailed advance plan in response to a unique situation . . . imagining multiple scenarios." (p. 24) In a day-to-day environment largely created by the species in which these aspects of cognition are operating, this capacity is certainly adaptive; but is it intelligence, or is it consciousness?

Chapter 3 is devoted to an examination of consciousness, both to distinguish consciousness from intelligence and to suggest that "higher" intellectual processes may require it. The title of the chapter, "The janitor's dream," appears to be a comment on "the basement of chemistry or the subbasement of physics" versus the "penthouse" of the cognitive scientist (p. 36). True, the topic of "levels of organization" is essential to an understanding of complex processes, but Calvin seems to be unable to avoid the construction of these dichotomies. This only revives and prolongs the problem of mind-body dualism without resolving it, something which this field generally and Calvin in particular could easily do with the building blocks on hand in this book. Reference is made to Hofstadter in discussing the levels issue, the "traffic jam" metaphor (Hofstadter, 1985), but Gregory Bateson's name never appears in the book despite very similar ideas at least 20 years earlier (e.g., Bateson, 1978). The term "self- organization" is used many times without mention of Stuart Kauffman (Kauffman, 1993).

Chapter 4, "Evolving intelligent animals," discusses generalist/specialist issues in the context of selective forces during and between the various ice ages. Calvin theorizes that the latter, in combination with evolution of the capacity for accurate throwing during hunting, led to the size and cognitive abilities of the human brain. This brings in tool making and tool use, as well as Calvin's area of research interest, the visual cortex.

How Brains Think, a book full of interesting scientific anecdotes, historical notes, and philosophical quotations, finally gets to the issue in Chapter 5, "Syntax as a foundation of intelligence." Calvin begins the presentation by returning to the comparison with our nearest relatives: "There's no doubt that syntax is what human levels of intelligence are mostly about--that without syntax we would be little cleverer than chimpanzees." (pp. 63-64).

He doesn't say it directly, but I assume that the structural foundation of intelligence as he defines it, the minicolumns, the macrocolumns, the triangular arrays, the spatiotemporal firing patterns, etc., are similar in humans and apes. Thinking must be an emergent property thereof, made possible by whatever incremental neurological addition allowed syntax to structure protolanguage, and made knowable by consciousness. The candidates later nominated (Chapter 7) that underlie this step are "corticocortical precision" and the "neocortical Darwin Machine."

As Jared Diamond has argued, there are three chimpanzees extant today (Diamond, 1992). Most of what we think of as human language in modern societies, including syntax, emerges from culture. Primitive languages have primitive syntax. The difference worth knowing in terms of language capability is the one that differentiated the first upright hominid, before the accumulation of culture, from the common ancestor of the three chimpanzees (in Diamond's epistemology).

"Syntax is a treelike structuring of relative relationships in your mental model of things . . ."(p. 75). Presumably, the difference between humans and the other two chimpanzees lies in the internal architecture that allows this "structuring of relative relationships," and the culture accumulated thereafter. Calvin gives credit to William James for seeing that mental processes might operate in a "darwinian" manner as early as the 1870s. I was, in addition, reminded of Konrad Lorenz's description of "path habits," as he and others observed in water shrews, and his "perfection-reinforcing mechanism," an idea he adapted from Buhler's *Funktionslust*. Lorenz's model of learning and memory as they relate to motor behavior was accompanied by speculations about insight and will, in other words, about thinking (Lorenz, 1965).

Chapter 6, "Evolution on the fly," is a risky combination of standard evolutionary theory, memory theory, and neurology, interspersed with Calvin's hypotheses regarding the emergence of a new thought being an analogous process to the emergence of a new species. The words "may" and "might" are used so frequently that one stops noticing, and the frequent references to neurology and neuroanatomy leave the impression that there

is more here than a nice hypothesis. Much of the chapter parallels Freeman's work on chaotic systems, learning, and memory (Skarda, & Freeman, 1987; Freeman, 1991), but he receives credit only in one chapter note recommending further reading (Freeman, 1995).

The most important chapter, Chapter 7, one that strangely begins by asking, "Is this chapter really necessary?", is next. "Shaping up an intelligent act from humble origins" gives a good, and as far as I know accurate, description of the microarchitecture of the cerebral cortex in the context of its spatiotemporal levels of organization. It is easy to see Freeman's influence in this chapter also, but equally powerful is Calvin's knowledge of cortical microanatomy, particularly the visual cortex.

I will not rewrite Calvin's thesis in a review, but he includes in his organization the six layers of the cortex, the superficial pyramidal neurons, corticocortical connections, minicolumns, macrocolumns, "blobs," spatiotemporal sequences of neuronal firing, Hebbian cell assemblies, pattern copying or cloning (totally hypothetical), recurrent excitatory connections, "skip-spacing," triangular arrays, and NMDA channels. The differentiation between fact and hypothesis is clear in this chapter: "That's how it could happen–how I imagine . . ." (p. 138). Chapter 7 makes *How Brains Think* worth the purchase price. My worry is that many readers will never get to this clear and concise description of Calvin's idea. Chapter 8, the final chapter, is "Prospects for a superhuman intelligence" and is interesting analysis of philosophy, ecology, cultural evolution, and artificial intelligence.

In conclusion, I wish Lorenz's thoughts had warranted a footnote. I believe Freeman's ideas and research findings overlap Calvin's more than is indicated in the text.

And I am concerned about the lack of debt acknowledged by Calvin, and almost all of today's authors in the areas of cognition, mind, and consciousness, with one recent exception (Wilson, 1998), to Gregory Bateson (Bateson, 1972, 1979). A simple literature search for "mind" would find *Steps to an Ecology of Mind*, and *Mind and Nature: A Necessary Unity*. Even the dust jacket cover of *Mind and Nature* states, "Insofar as we are a mental process, to that same extent we must expect the natural world to show similar characteristics of mentality." Regarding selective processes including natural selection, Bateson stated (1979, p. 127), " . . . the sort of system I call *mind* is capable of purpose and choice by way of its self-corrective possibilities. . . It is influenced by 'maps,' never by territory. . . the system will learn and remember, it will build up negentropy, and it will do so by playing the stochastic games called *empiricism* or *trial and error.*"

And in terms of the idea that there is an analogy, or even an homology, between evolution and thought, he states (Bateson, 1979, p. 148), "In sum, I shall assume that evolutionary change and somatic change (including learning and thought) are fundamentally similar, that both are stochastic in nature . . ."

In our quest to understand evolution, we should be clear about the evolution of ideas.

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Human Evolution, Language and Mind: A Psychological and Archaeological Inquiry

By William Noble and Iain Davidson, Cambridge University Press, 1996, 272pp

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With "Human Evolution, Language and Mind", co-authors William Noble and Iain Davidson have integrated two distinct disciplines. Noble, whose training is in psychology, has research interests in the areas of hearing impairment and communication via visible signs. He cites Gibson's (1979) ecological theory of perception as the major influence on his work. Noble has also been influenced by Hewes (1979) who advanced the view that human language evolved from communication using gestures. In contrast, Davidson's training is as an archaeologist. His research background includes attempts at reconstructing how the earliest of signals could be recognised without the protocol of language. The commoninterest the authors share is in the emergence of symbol use.

Noble and Davidson open with the premise that mind is synonymouswith language in human life. They argue that human speech is different from other forms of communication in the animal kingdom, specifically in that other animals lack intentionality in their signalling. Noble and Davidson believe intentionality to be a defining feature of human language, and in this book they aim to identify behaviours in the archaeological record which may suggest that hominids were engaging in reflectiveness and planning. They criticise Burling's (1993) claim that "mindedness" developed as a precursor to language, arguing instead that the archaeological evidence is better interpreted in terms of mind evolving concurrently with language.

Language development however, requires morethan the ability to plan and be reflective. Linguistic communication, like other skilled activities that humans engage in, involves co-ordination of the central and peripheral nervous systems for the control of vocal and respiratory mechanisms. This level of language complexity is not thoroughly dealt with by the authors– although they do discuss the relationship between object manipulation and the potential for language in relation to primate brain function. [See Westergaard (1996), e.g., on the role of throwing and tool production as preconditions for language development. See also Tennov's review of Calvin (1996) in the September 1997 issue of *HEB.*]

Next, the authors deal with the emergence of symbolism- the ability to see that one thing can stand for another and the essence of any code. They are particularly concerned with the ability of shared symbols to refer to things not present (displacement). In this section they discuss the "linguistics" of vervet monkeys as reported by Cheney & Seyfarth (1990) and

explore the possibility that classical conditioning might be sufficient to explain symbolic representation. In the final analysis they reject the idea, concluding that the conditioned stimuli in the classical conditioning paradigm are not symbols.

In later chapters Noble and Davidson address gestures and emblems (using the terminology of Saussure 1983), tool use, and the value (and limits) of the archaeological record. They argue for the "social construct" approach to understanding mind, in preference to the "representational" approach. The ultimate conclusions they reach are not new, but are controversial.

In the course of making their argument, Noble and Davidson do not present new evidence or even a new interpretation of the archaeological evidence. Rather, they present a coherent linkage of previous accounts and interpretations. In this sense, it is essentially a large and complex "just-so-story". To the authors' credit, a balanced view is provided. They make no claim that theirs is the definitive story, but present a chain of reasoning which aims to not violate interpretations of either the archaeological record or current behavioural evidence. Furthermore, they present a range of alternative arguments for each point and then explain why they believe their viewpoint is correct. It is hard to find fault with such an approach.

The book is written as a scholarly text with the primary intended audience being the academic community. As an academic work, it is very detailed and cohesive. In terms of its applicability to general-interest readership, it is, at times, heavy going. This is a result of the fact that a large number of theories are presented, some which require significant background knowledge relating to language and mind. For the entire corpus of the book to be critically evaluated, an immensely broad knowledge base would be required. The complexity of argument and the detailed level of the discussion may lead general interest-readers to question whether the journey through the theory was worthwhile. On the other hand, the authors make good use of simple analogies for the purpose of clarification, and the text is filled with sentence-long similes which liken an aspect of theory to a more tangible aspect of life. Together these work to hold the attention of the general-interest reader. Further, Noble and Davidson do a lot of scene-setting in the early chapters, and the concluding chapters synthesise the material well.

Overall, Noble and Davidson's account of the evolution of language and mind is interesting and plausible given current psychological and archaeological evidence. As new information comes to hand, it is certain that revisions will be required. Nevertheless, this book represents a step forward in our understanding of the evolution of language and mind and will provide a stepping stone for future work.

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Darwinian Evolution

By Antony Flew from the *Social Policy and Social Theory Series*, David Marsland (Series Ed.), New Brunswick: Transaction Publishers, 1997, 149 pp., $19.95 soft cover.

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In this update of the original 1984 edition, the philosopher Antony Flew offers a compact, well-rendered view of the formation of Darwin's theory of natural selection and its continuing impact on Western thought. Although a slim volume of just four chapters, the book manages to cover a range of topics about how Darwinian theory was conceived and what it meant for other thinkers, especially in philosophy and the social sciences.

In the introduction, Flew sets the stage for his coverage of these topics by invoking recent disputes over evolutionary theory's implications for social theory. Taking the examples of Margaret Mead's erroneous account of Samoan sexuality and *The Bell Curve's* (Hernstein & Murray, 1994) handling of the determinants of intelligence, he contends that the muddles of political correctness can be dispelled by acknowledging that Darwinian theory countenances both a commonality of human nature and the existence of genetic differences within the species. The emphases of the book, as reflected in chapter titles, are:

(1) "From Darwin's *Origin* to Today's Synthetic Theory,"
(2) "The Philosophical Implications,"
(3) "Social Science, Evolutionary Biology and Sociobiology," and
(4) "Progress, Social Darwinism and an Evolutionary Perspective."

Flew opens with an engaging biographical account of Darwin. Included here is the role of Darwin's family in shaping the course of his intellectual life, the Beagle voyage, his reading of Malthus, his mysterious ailments, and his pushing the *Origin* into print under the impetus of A. R. Wallace's co-discovery of natural selection. Flew aptly stresses the synthetic achievement of Darwin's work in tying together the earlier theories of Erasmus Darwin, Lamarck, Lyell, and as his final insight, Malthus's theory of population. Following a guided tour of Darwin's arguments and the evidence presented in *The Origin of Species*, Flew reviews the problems it presented for the dominant creationist accounts of the time.

After arming the reader with a background in Darwin's life and his theory, Flew discerningly analyzes the logic of the theory, including the fundamental but elusive relations between reproduction, mutation, natural selection, limited resources, and adaptation. (Not even Julian Huxley got these relations quite right, as Flew shows). Although Flew's presentation is dense at times, it becomes clear that while Darwinian theory is logically conceived it is not simply an exercise in tautology, as Karl Popper once notoriously claimed. The falsifiability of Darwinian theory is framed by Flew as a response to the cladists at the Natural History Museumin London, who held that "the idea of evolution by natural selection is a matter of logic, not science" (p. 34). By acknowledging the misguided complaint of the cladists, Flew gives the reader the opportunity to view the paradoxes of a well-formulated theory, and solve them. Although logic is not pure science, the fact that a theory is logically construed does not detract from its scientific merit. Indeed, Darwin's conclusions were not mere tautologies since they were "far indeed from being obvious to able men already sufficiently familiar with [his] premises" (p. 38). Separating Popper's notion of falsifiability from his skeptical fallibilism (the notion that theories remain forever tentative and unprovable) allows Flew to offer a resounding second opinion to the cladists.

The theory of evolution by natural selection was anything but obvious to Darwin himself at the beginning of his career. After Darwin left medical school, his acceptance of creationism became most apparent. He studied theology with a literal belief in the writings in the Bible. Ironically, the orthodoxy of the Beagle's Captain FitzRoy may have acted as a

catalyst propelling Darwin away from religion. FitzRoy's staunch literalness, combined with Darwin's reading for the trip (Lyell's *Principles of Geology*) challenged his religious assumptions to their core. As Flew points out, the evidence subsequently assembled by Darwin is still not convincing to many.

Debates on the arguments from design have been active for quite some time. Hume, Paley, Descartes, Aquinas, and most recently Pope Pius XII all had outlooks that attempted to buttress their world-view. Creationists were arguing for teleology, and assumed that humans were ultimately adapted to their environment. Evolutionary theory, though, does not assume that there are end points that species evolve towards, or that species are ultimately adapted to their environment. A further problem for teleologists was the continuity Darwin saw between species, including humans. Descartes resolved the problems of a mechanistic world-view by proposing a sort of ghost in the machine, but the continuity between species gave humans a new challenge to the soul. The emergence in evolutionary history of the soul is certainly difficult to determine. New questions needed to be answered: at what point in our evolutionary past did animals become besouled, and can we trace the soul's origin through time?

This new world-order was presented to the social sciences with far-reaching results. Flew examines the connection between social science and evolutionary theory first with the impact of Malthus on Darwin. The less understood influence of the thinkers of the Edinburgh Enlightenment from the late 18th century is deftly linked to the theory of evolution by natural selection. From the older David Hume to the less well-known Adam Ferguson, the philosophies of these Scots are tied to later Darwinian theory. Just how direct these influences were remains uncertain. At the very least, though, Flew makes it clear that Darwinian theory was the result of an intellectual ecology, and these earlier social scientists contributed to the zeitgeist of evolutionary theory.

The impact of Darwin's original theory on the ensuing development of social and political systems, such as those of Marx, continues the connection between the biological and social sciences. Unfortunately, Flew writes as though on a personal crusade to discredit Marx and his putative reliance on Darwinian theory, instead of trying to set the record straight. Rather than giving concise and informative examples, Flew offers rambling and confusing ones. His treatment of Marx-an "unconscionably long" one, by his own admission-suffers from both an ad hominem flavor and the too-modest goal of debunking any effort "to put Marx forward as an equal of Darwin" (p. 113). Flew seeks this goal in part by clarifying the two commonly confused philosophies of race. In the sense of Marx, the racist is one "who wants to advantage or disadvantage individuals for no other or better reason than that they happen to be members of this racial group rather than that" (p. 94). The Darwinian "racist," on the other hand, believes that "there are or may be hereditarily determined average differences in potentialities or in temperaments as between some racial groups and others" (p. 94). The implication is that the latter relies on factual information whereas the former does not, though Flew fails to consider the possibility that scientific beliefs may house subtler ideological components.

Flew takes pains to convince the reader that Darwinian theory can have some devastating results when applied to social science. In the end, though, the new Darwinian synthesis propounded by E. O. Wilson and others does allow for a more accurate, and pleasing, combination of social and biological science. But this new understanding can quickly lead "from is to ought," and Flew warns the reader not to ignore the uniquely human aspect of choice. Malthus argued that choice was the one thing that kept the human species from becoming extinct, but these choice-like aspects of human life can be seen in the natural world as well. For humans, choice is manifest in increasing the quality and quantity of food crops or by restricting the number of children a member of a society can have. These act as solutions to environmental demands. Flew ignores the fact that future adaptations of any species can act in ways similar to what he calls choice, and these adaptations are clearly present in other animals. The trick that

natural selection plays on our understanding of the natural world is that it is often difficult, if not impossible, to predict the future direction of a species and the adaptations it will make in order to survive. In fact, species have been found to decrease their reproductive rate in response to food shortages or nonoptimal breeding grounds. In social animals, with their natural hierarchies, often only the high-ranking females mate (Goss-Custard & Sutherland, 1997). Do these animals have what Malthus called "moral restraint" or choice? Darwin argued that "there can be no artificial increase of food and no prudential restraint from marriage" in any species other than humans (p. 75), but in light of similar responses evidenced by animals, humans may be acting with similar natural rather than (supposedly transcendent) voluntary responses.

In the wake of the Darwinian deterministic world-view, Flew implies that our capacity for "higher" mental activities, reflected in a conscious mind, allows us superiority and freedom of choice. As Darwin realized, once natural selection has replaced special creation as the means of speciation, systems of biological classification can be viewed as arbitrary sets of rules used to aid in identifying one species from another. More profitable than searching for sharp distinctions between humans and other animals in regard to intelligence, language, consciousness, and a host of other "human" characteristics, would be to examine our evolutionary genealogy for their nebulous origins. The growing fields of primatology and animal cognition may make the distinction between human and animal mental capacities less clear than Flew, and probably others, would like.

In releasing this book in its second edition, Flew has chosen to leave the original text intact, updating the work only through the addition of a new introduction. This proves less than optimal. Aside from displaying needless redundancy with the main text, the introduction offers scant bibliographical guidance to important literature that has appeared since the 1984 edition. Thus, readers are directed to Desmond and Moore's fine 1991 biography of Darwin and to Dennett's *Darwin's Dangerous Idea* (1995), but will find no mention of equally relevant works by Gillian Beer, Robert J. Richards, or Elliott Sober.

In sum, Flew's book provides an even-handed and knowledgeable guide to Darwinian theory, its historical origins and philosophical standing, and its chief implications for social science. Its brevity recommends it for use as an ancillary reading in upper-level courses on any of these topics, although many instructors will want to tap other recent literature for more detailed, or more radical, analyses of the theory's thorny social and political implications. General readers, including the many social scientists whose work is touched by evolutionary theory, will likely want to do the same.

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It is time to renew your membership for 1999 if you have not already done so. Membership is by calendar year, so dues are to be paid by the first of the year. **If the date on your mailing label is earlier than the current year, it is time to renew your membership.** Please report any errors, change of address, etc. to the Treasurer. Current dues and directions for payment are given on the last page. Allow four weeks for recording changes.

The Lifespan Development of Individuals: Behavioral, Neurobiological, and Psychosocial Perspectives.

By David Magnusson (Ed.), Cambridge University Press, 1996. $44.95 (paper)

Reviewed by Marie J. Hayes, Dept of Psychology, University of Maine, Orono, ME 04469, USA

David Magnusson observes in the forward to this book that, "the developmental process depends on how the different operating factors, from the cellular level in the biological system to the specific elements of the culture, function throughout life." (p. XV). The promise - of unifying the varied domains of developmental inquiry from molecular to cultural -is achieved by the precise guidance of Professor Magnusson who has organized an exceptional collection of essays in which the contributors adhere to these theoretical goals.

The book is presented in six modules: Early Development; The Changing Brain; Cognition and Behavior; Biology and Socialization; Social Competence; and Aging. Each section contains a brief introduction, three papers from well-known contributors to the topic at hand and an authoritative commentary from scientists in each area. The latter is aimed at flushing out the similarities between the papers in light of the commentator's personal view and previous research. This tack of adding a single voice aimed at integration yields some very creative musings and, for the most part, aids directly in interpreting the individual paper contributions. The end result is an exquisite guided tour for understanding the relevance of each of the varied approaches to developmental processes.

To begin the book, the lifespan theme is expansively discussed by Patrick Bateson in "Design for a Life." He hypothesizes that "the individual is a juke box, capable of playing more tunes, but in the course of it's life, possibly playing only one set. The particular suite of adaptations that it does express is selected by the conditions in which it grows up." Bateson's view embraces both the Darwinian and epigenetic perspectives (which is reverberated uniformly by all of the contributors throughout the text) and sets the theoretical tone for what follows.

Part I : "Early Development" begins with an exciting chapter by Dennis O'Leary on the nature-nurture issue of cortical specification during development. Evidence for a pivotal role for thalamocortical (i.e. sensory) input on cortical architecture during development is proposed to be achieved through the processes of neuronal (cell) death and morphological change mediated through repetitive circuit stimulation. The role of genetic restriction in differentiation is, of course, not ruled out.

The next two papers in this section ("Genes and Environment" by J. C. Lochlin and O. Reynold's " Causes and Outcome of Perinatal Brain Injury) appear so different from each other and O'Leary's chapter that there is some risk of topical and theoretical discontinuity. Gilbert Gottlieb's commentary "A Systems View of Psychobiological Development" saves the day. He offers a candid discussion of the problem of different vantages of the developmental process. One solution is to address the philosophical underpinnings of scientific inquiry. He contrasts theoretical reductionism: "to explain the behavior of the whole organism by reference to its component parts.." (p. 80) with methodological reductionism: "description of the various hierarchically organized levels of analysis of the whole organism" and argues that the latter approach is "necessary ... to a developmental understanding of the individual." (p. 80). Gottlieb also reminds us of the importance of appreciating structure - function bidirectionality when interpreting our findings whatever the level of analysis. Following this didactic interlude he neatly reviews and comments on each of the papers with these theoretical issues in mind. The cohesiveness of the section is thus sustained.

My favorite chapters, of course, reflect my interests; nonetheless, I have been genuinely informed and impressed by each of the other modules as well. Part II "The Changing Brain" brings the level of analysis to a cellular level

in order to more closely examine specific modification of the developing brain. J. P. Changeaux presents a challenging chapter on genetic models of neurotransmitter regulation; R. G. M. Morris' paper, "Learning, Memory and Synaptic Plasticity" offers a provocative hypothesis of long-term potentiation as one mechanism of hippocampal synaptic plasticity in forming memories for successive scenes in our experience. Next, Dale Purves and colleagues construct an excellent discussion of the age-old question of the relationship between brain size and neural space and its functional (behavioral) consequences for the organism. In an ambitious essay, Purves et al. reviews the history of the debate in the 19th century and then examine specific phylogenetic examples of specialized behavior (e.g. echolocation in bats) and allocation of neural space (e.g. auditory processing areas in cerebral cortex; cortical barrels for somatosensory function in the rat). However, within members of a species, the correlation of size and function breaks down. The example of asymmetrical neural space allocation between two cerebral hemispheres in humans and relation to function is well known (left hemisphere: language, handedness). Using handedness, Purves argues that handedness (a neural bias) and hand size are poorly related in individuals, despite a nonsignificant tendency to correlate. The evidence Purves et al. present soundly refutes the physiognomic argument for brain size differences as an explanation for small differences between the sexes in human intelligence testing scores.

In Part III: "Cognition and Behavior," I especially enjoyed the chapter by Bellugi and colleagues on developmental differences in the acquisition of spatial and linguistic skills in brain-damaged children. She specifically contrasts cognitive abilities and compromise in Down's and William's syndromes in relation to correlated neuroimaging findings on the brain areas that are selectively impacted. The commentary by the Damasios on recent advances in methodology in cognitive neuroscience is a brief but helpful review with useful references for the uninitiated.

Part IV: "Biology and Socialization" is a very broad topic area that is tackled first by Cairns who takes a developmental psychobiologist's view of individual social development as influenced by complex, historical interchanges between species-dependent predispositions and the individual's unique experiences. Cairns reviews the theoretical contributions of Wilson, Schneirla and Kuo in this discussion, as well as convergent ideas from Sameroff, Bronfenbrenner and Magnusson in the human literature. This introductory chapter is followed by contributions by Robert Goy and Roger Gorski on the androgenization and feminization of the CNS during development and the known changes in behavior and brain structures that have been best elucidated by their respective laboratories.

Part V: "Social Competence" is led by a provocative, comprehensive chapter by Robert Hinde entitled "The Interpenetration of Biology and Culture." The socialization of children is framed in terms of both modern views about socialization and the transmission of culture from a biological view. Hinde discusses recent trends toward cross-cultural comparisons as often overreaching, especially when hastily made from nonrepresentative samples and unaddressed problems of construct validity. He cautions, from the Darwinian point of view, that cultural practices that are successful in one culture are not better or worse than practices in another. Further, cultural solutions are not transplantable and should not be viewed as simply another, or better, way of child rearing for example. These are serious and germain criticisms of the science and applicability of cross-cultural research and support the view of culture as selected by niche. Next, Jerome Kagan and Michael Rutter offer clear and readable reviews of their seminal contributions to developmental issues of temperament and psychopathology respectively. These chapters make excellent didactic introductions to this important body of work.

In Part VI: Aging, I particularly enjoyed Baltes and Graf's lead off chapter: "Psychological Aspects of Aging: Facts and Frontiers" which reviews lifespan developmental psychology theory: "The search for gains and losses in adaptive capacity

directions to reach different overwintering sites in Africa. Further proof that such knowledge is genetically programmed can be obtained by cross-rearing individuals from different populations. When this is done, the first-generation offspring will choose migration directions that are intermediate between those chosen by their parents.

Wehner's chapter sets the tone for the rest of the book in that intelligence is characterized less as an ability to synthesize information than as the collective functions of specialized parts of the brain. Although the parts of the brain dedicated to navigation were not identified in Wehner's paper, he did hypothesize that there are special-purpose subroutines that are hard-wired into the insect and avian nervous systems. He contends that there are various modules that interact in such a manner to produce "intelligent" behaviour. Taking the argument one step further, intelligence can be viewed as an emergent property resulting from the cooperative interactions among modules or subroutines.

Do the same principles apply to higher vertebrates such as primates? If I correctly interpret the reasoning presented in chapter 3, titled *The Modular Nature of Human Intelligence* , Leda Cosmides and John Tooby would say that the same principles do apply. To quote them directly: "...all normal human minds reliably develop a standard collection of reasoning and regulatory circuits that are functionally specialized and, frequently, are designed to operate within a particular domain (for example, sexual behaviour, food navigation). That is, they are often **domain-specific**." Superficially, their conclusions may seem obvious to anyone who has taken biology or psychology 101 where you were taught that different parts of the brain are devoted to different tasks such as vision, hearing, movement, and emotions. But explaining how all this order and specialization came about is another matter, and this is precisely what Cosmides and Tooby set out to do. They proceed by logically organizing what is known about the structure and operation of the brain into an evolutionary framework. By building their discussion around five basic principles that characterize cognitive processes, they conclude that the best way to understand human psychology is to view our behaviour as the end product of selective forces that impacted upon early humans. One consequence of these past selective forces is the creation of a brain that is highly modularized both in structure and function. In chapter 6, Steven Pinker takes a very similar approach as Cosmides and Tooby when he discusses the evolution of language.

Being an adaptationist at heart, I found reading Cosmides & Tooby's, and Pinker's chapters intuitively satisfying although at times tedious when they explained basic evolutionary theory (such sections, however, could be skipped by the reader). For me, the fireworks didn't begin until Terrence Deacon's chapter titled *Evolution and Intelligence: Beyond the Argument from Design.* (I must admit I had to reread chapter 5 several times because Deacon's ideas are revolutionary and not at all intuitive.)

Deacon is an evolutionist and would agree that the function of the brain is modularized, but he doesn't believe that every mental function or organization of the brain is genetically encoded; there simply isn't enough genetic material to even start to layout in detail the myriad of connections made by the billions of neurons in the brain. Deacon contends that most information used to wire the brain is, instead, produced during the early developmental stages of growth. He also proposes (Guald and Edelman) that how much different parts of the brain develop depends upon the internal selective forces created when the different parts of the body compete for resources and space. Along this line of reasoning, a whole section of his chapter is titled "Brains Adapt to Bodies." When he compares the human brain with those of other primates, he concludes that there is no evidence for new parts of new homeotic genes controlling development, despite an obvious difference in size. The dynamic of axonal competition for connections throughout a large brain should differ from the dynamic in a small brain. Could this difference lead to the dramatic improvement in cognitive capabilities in humans compared to other primates? After backing up his ideas with detailed descriptions of how visual neurons of

across the lifespan has been paralleled by the range and limits of plasticity of mind and behavior." (p. 432). They report that decline in cognitive ability with age is selective to some degree. For example, intellectual functioning (particularly information processing ability) irrefutably declines with age, but not subjective well-being. The authors present several creative approaches to studying psychological aging that are greatly needed in this area.

Morgan and Gordon's chapter, "Aging and Molecular Biology" makes accessible an introduction to molecular theories of aging, such as error catastrophe theory, cumulative damage theory, somatic mutation and gene derepression theories. In the commentary by Finch, the endocrine hypothesis of aging is well stocked with interesting facts about cross-species patterns of reproductive decline and sex differences in reproductive fitness and aging throughout the lifespan.. Hardy's chapter on Alzheimer's disease explains recent advances in genetic risk as well as the co-morbidity between this type of CNS decline and advancing age. This module is very enlightening for theorists of regressive processes in development.

This book has accomplished a serious mission in integrating such diverse topic areas. One of its strengths is the remarkable ensemble of scientists that have participated and, for the most part, given generously to the task of speaking broadly to their own and related research. If I can offer any criticism at all, it might be that linkages are better achieved in some modules than others. However, students of all disciplines that intersect with behavioral biology will be well served by use of this volume, as will scientists faced with the ever increasing challenge of our information age to be cognizant of related fields and interdisciplinary work.

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The Origin and Evolution of Intelligence

Edited by Arnold B. Scheibel and J. William Schopf. Jones & Bartlett, 40 TallPine Drive, Sudbury, MA US 01776, 1997, 169 pp.

Reviewed by Wm. James Davis, Ph.D., Editor, Interpretive Birding Bulletin, 136 Payne St., Indooroopilly, Old 4068, Australia

From its title alone you might expect this collection to be full of papers with graphs and figures showing trends in brain size, and explanations of how the size and organization of different parts of the brain are related to behavioral differences across species. You would be wrong on both accounts. The book comprises six chapters inspired by papers presented in 1995 at the Eighth Annual Symposium of the UCLA Center for the Study of the Origin and Evolution of Life. The papers in this this short volume provide an overview of conceptual advances in the field of neuroethology, with a focus on modularity of function.

The first chapter, by Rüdiger Wehner, discusses seemingly intelligent behaviour of two nonprimates in the context of demonstrating extraordinary navigational skills. Wehner's first example involves the ability of a desert ant, *Cataglyphis fortis,* to head directly back to its nest after criss-crossing the desert floor in search of food. By comparing the pattern of polarized skylight against a fixed internal representation, the ant is capable of calculating the direct path home. Wehner argues that evolution has built into the nervous system of many insects (specifically ants and close relatives the bees) specific geometrical knowledge relating to their external world. Moreover, this knowledge is constantly updated prior to each foraging excursion (hence, volatile memory capacity is also involved). In the second example, birds are also shown to possess an innate knowledge of geography which is used to navigate long distances during seasonal migration. Young European Warblers, *Sylvia atricapilla,* migrating to Africa for the first time, instinctively know what direction to fly and for how long. In fact, warblers living in different parts of Europe will choose different

three-eyed frogs are connected and how fetal brain tissue of pigs successfully connect when transplanted into rats, the plausibility of his proposals is inescapable.

The remaining two chapters by Robert Seyfarth and Dorothy Cheney (chapter 2) and Sue Savage-Rumbaugh (chapter 3) examine the possibility that non-human primates possess rudimentary language skills by studying how the animals themselves communicate with one another. Issues of grammar, syntax and semantics (do signs and sounds used represent objects or events) are raised in both chapters. Seyfarth and Cheney, studying the Verbet monkey, *Ceropithhecus aethiops*, are interested in revealing whether monkeys possess a **Theory of Mind** such that they can attribute beliefs, knowledge and emotion to other monkeys by watching what they do and how they do and how they signal one another. They conclude that: "Monkeys, and perhaps also apes, are skilled at monitoring each other's behaviour. There is little evidence, however, that they are equally adept at monitoring each other's states of mind."

Savage-Rumbaugh apparently would disagree with Seyfarth's and Cheney's conclusion. Based upon her work with chimpanzees and bonobos, Savage-Rumbaugh argues that our inability to detect a **Theory of Mind** or consciousness in non-human animals is due to the observer's failure to comprehend the animal's frame of reference from which communication attempts are based. When apes naturally learn to comprehend spoken English (at the level of a 3 year child), they are able to respond appropriately to complex questions particularly questions that require knowledge of what another ape knows and what it does not know. In short, the apes' responses strongly indicate that they do possess a **Theory of Mind**.

Although the papers in this volume were presented three years ago, they are still highly relevant when addressing the issue of how the organization of the brain influences its functionality. Defining the function of specific regions or modules of the vertebrate brain continues to be a major area of research. How interdependent are the different modules? Is it correct to assume that attributes such as self-awareness and consciousness depend upon the existence of a so called language or "grammar" modules? Or, are these higher order functions emergent properties that will naturally occur once the size and/or organization of a brain reaches a critical threshold? Definitive answers to such lofty questions are not provided in this volume, but the authors do provide plenty of quality data and ideas to think about.

The Evolution of Sibling Rivalry

By Douglas W. Mock and Geoffrey A Parker. (1997). Oxford University Press, Oxford, Great Clarendon Street, Oxford OX2 6DP.

Reviewed by Gerald Beroldi, Department of Psychology, California State University--Long Beach, LongBeach, CA 90840-0901, USA.

The Evolution of Sibling Rivalry holds surprisingly little appeal to those whose interest is primarily human sibling rivalry, since it focuses on birds, and its only chapter on mammals cites no primate or human literature. The authors begin with a review of basic concepts such as the difference between the profligate reproduction of*non-nursery* taxa (species that do not provide parental care) vs. the strategic over-reproduction of *nursery* taxa. Hypotheses for this are: *Resource-tracking*, a family size that, in a good year, all will survive. *Replacement offspring*, compensation for potential deaths. *Progeny choice*, parents can choose off-spring with the highest mate quality for preferential investment. *Offspring facilitation*, another sib to help other sib, this help frequently takes the form of being cannibalized. It is easy to see how this may occur due to the over-lapping nature of the above factors, a point that is elucidated in this work. Sibling rivalry is dichotomized into *resource-based* vs. *cannibalistic*. Mock and Parker skillfully discuss the interaction between parent-offspring conflict and sibling rivalry.

Next are three chapters on theory organized around the connected topics of genetic Hamiltonian selfishness, lethal and sublethal competition among siblings. Of particular interest were adaptations involved in begging, sibling rivalry in birds, and supply, demand, and defendability. The next five chapters dealt with parent-offspring conflict: Theory, models of resolution, begging as an honest signal, clutch size and sexual conflicts, and tests of parent-offspring competition vs. collaboration. The ideas developed are applied to chapters dealing with sibling rivalry in birds (again), mammals, ectothermic (cold blooded) vertebrates, invertebrates, and plants. The chapter onsibling rivalry in plants contained a section onplant-animal differences, and a brief primer on plant biology. The lone chapter on mammals explored the (not surprising) centrality of milk in sibling competition. The eight theoretical chapters had extensive mathematical expositional support and the others were likewise well supported. Each chapter is ended by a numberedlist of summary paragraphs.

The Evolution of Sibling Rivalry could act as a helpful antidote to human evolutionary scientists who focus on the cooperative aspects of sibling relations, driven as they are by close genetic relatedness and sequential stages of life history. Eating your sib as a way of increasing your direct fitness is not frequently explored in the human literature.

However, looking at the topic from a human evolutionary perspective may justify the cooperative orientation. (It also raises the question of relevance that non-human animal studies have for human behavior, especially non-mammalian ones). In the EEA, if the statistically average woman had her first child at age 18 and a life expectancy of 35 years then her oldest child would be 17 when she died. The statistically average husband probably died around the same time We can easily imagine that given these average reoccurring situations in the EEA that we developed strong and extensive psychological adaptations for sibling solicitude. We no doubt also have them for sibling rivalry and in historical and contemporary environments the environmental triggers for eliciting rivalry may result in more competition.

Sibling rivalry and relations have not received the attention they deserve in either the mainstream or evolutionary literature. This topic has scientific and social importance, especially given the frequency of reconstituted families with children who are half-sibs or genetically unrelated. Sibling relations may act as a model for peer relations and be the major source of non-shared, environmental influence on one's personality. Mock and Parker's work was not written for an audience whose primary interest is in humans, and should not be criticized for this. However, their goal for their book: "...to attract hungry and energetic postgraduate students to the topic of intra-family dynamics..." is a worthy one human evolutionary scientists can share.

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