



## Essay Review

Rebels, Deviants, and Individualists... Reactions to *Psychology: An Evolutionary Approach*. By Steven Gaulin & Donald McBurney, 2001, Upper Saddle River, NJ: Prentice Hall, 13 chapters, 402 pages.

by

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I met Gaulin and McBurney at the annual meeting of the Human Behavior and Evolution Society in June 2002. Gaulin mentioned a second edition of *Psychology: An Evolutionary Approach* (G&McB) and wanted my comments about the first one. Last July 4th I sent him a variation of what follows. Briefly, the book is finely done for what it does but, like a wax job on a car with no engine or fuel, it tells a story while hiding vital things about human origins and motivation. Accordingly, this essay, like the Holiday, is about how fast cars and organisms go and why. As Allport noted in 1955 (p. 82), we are all "rebels, deviants, and individualists" but those phenomena are far older than 1955 or even 1776.

### Two Explanations of Evolution and Human Nature

Pinker (2002) refers to "utopian" and "tragic" views of human nature, a model taken from Thomas Sowell (1987/2000), one that dichotomizes "unconstrained" and "constrained" visions of both societies and the individuals within them. In the former, human outcomes are cultivated by society and "reason." Envi-

ronments are the fertilizer, trellis, and sunlight: variation in the seeds that we supply is insignificant. In the latter model, individual interests and talents multiply or limit human and societal outcomes. Sowell places Rousseau, Locke, Marx, and Newton in the former camp; Edmund Burke, Thomas Hobbes, Thomas Malthus, Adam Smith, and Alexander Hamilton in the latter. Sowell's caricatures also fit the evolutionary tales that we get from psychologists and anthropologists versus the hints given to us by developmentalists and embryologists. The Greeks also used Sowell's models but called them "Apollonian" and "Dionysian": the biologists, Kim Sterelny and Paul Griffiths (1999) call them "externalism" and "internalism."

*Externalism:* The environment shaped us over generations, a Lockean story but one extended over millennia rather than decades and one effected through sex and death rather than through our mother's lectures. Adaptations are random, any form is possible, existing structures have limited influence on the structures that develop next, and adaptive changes are incredibly slow and incremental. Death is

the only thing sudden and stepped. G&McB accept the Bowlby EEA story, one that ignores our preferences for beaches and one that offers vague speculations about the origins of our sociality and intelligence. That is, we became clever in the ways that we did "just because" managing alliances had survival value. Furthermore, our genes are slower than our settings, even our cultural ones, and we are bound to be helpless and miserable. Externalism makes sense to minds that are inclined to be a little depressed... Darwin was only one of many in his time (Browne, 2002) and his temperamental descendants are still with us.

As Sterelny & Griffiths remind us, externalism is not the whole story.

*Internalism:* Behavior genetics and evo-devo give a second and third dimension to our history and moves us closer to genetics, biochemistry, and even physics. Even though internalism draws nourishment from the physical sciences, it leads us directly and easily to our cherished attributes that involve personal will and affirmation. These latter were favorite topics for Will James and remain so in psychology whose introductory students often care less about an abstract science and more about using psychology's mirror to manage their soul.

The difference between externalism and internalism is that of watching a movie versus having a role in one and making up our own lines. Our self-direction starts with *Hox*. *Hox* genes occur in mussels, octopi, worms, lobsters, toads, flies, snakes, mice, and feminists. The sequence of *labial*, *proboscipedia*, *deformed*, *Sex combs reduced*, *Antennapedia*, *Ultrabithorax*, *abdominal-A*, and *abdominal-B* occurs once in flies, perhaps three times in eels, and four times in mice and Gloria Steinem (Carroll et al., 2002). *Hox* activate in the same order that they exist on a chromosome, an order mirrored by the segments they orchestrate in a developing creature. And human *Hox* are close homologs of those carried by flies. *Hox* regulate our unfolding and the segments of our brainstem and body align with the thorax and abdo-

men of a fly (Raff, 1996; Gerhart & Kirschner, 1997; Carroll et al., 1991, Gould, 2002).

Thus, evo-devo's insights let us understand the identical genetic foundations that humans and birds share, foundations that sculpted functionally similar niches for us but one in trees, another on savannas, and still another along shorelines and in the sea. Our fundamental kinship is not only with chimps. Homology gains, convergence fades: the Aquatic Ape earns a club membership with Lucy.

Individual will is allowed, expected, and intrinsic to life. Communication, alliances and problem solving occur not only in hominids but also in bacteria (Bloom, 2000; ben-Jacob, 1998; Wright 2000). Mismatch is not an enduring misery wrought by technology but a powerful motivation as we design and use tools in order to impose our way, correct our mistakes, and build individually crafted nests of possessions and ideas. Incrementalism fades and possible evolutionary steps can become larger as we accumulate expansive assemblies of physical and behavioral variations that are revealed under conditions of extreme environmental stress and when we study the logarithmic increases in metazoan evolvability over time (Queitsch et al., 2002; Gerhart & Kirschner, 1997). Other creatures do with genes, muscle, cartilage, and bone what we do faster with steel, plastics, and electronics. A space station does for us what an underwater web does for a spider.

### **The Architectural Drawing for a 2nd Edition Evolutionary Credo**

The question of origins applies to our continued use of externalist and internalist models...after all, we have had these models and their adherents for a very long time. Do they represent homology (similarity through common ancestry as appears to be true for families of language) or convergence (similarity from common environments)? We might also be forgiven if we suspect not only adaptive and genetic foundations for them but trace those explanations back to statistical physics! (Ball, 1999, 2002).

First, Stuart Kauffman (1993, 1995) found that information networks replicate phenomena seen in math and in statistical physics. Living organizations show them as well. There are chaotic states and orderly ones and very narrow transitions, called phase boundaries, between them. For example, water is a phase boundary between ice and steam. Life tracks not only water but mimics its properties of consistency and variation. Not a lot evolves in ice, not a lot evolves in steam. Consistency in our structure across generations gives a basis on which natural selection can operate, variation between individuals and generations allows us both to track changes in our existing niches and to discover new ones. (Kauffman and Barkow, et al., 1992, have identical explanations but for different evolutionary phenomena: there is not enough time in the universe for random combination to arrange either our structure or our thought.)

We also have mental phase boundaries: boredom or helplessness steer us between too little and too much to do as we pick up or abandon tasks from moment to moment. We widen our phase transition with alliances, list making, and task prioritization. We narrow it with depression, impulsiveness, and isolation. We also manage it with tricks of gender (females are often more orderly and conservative than males and live longer; males tend to be explorers that die early but define new opportunities). Such is the statistical foundation not only for liquids, gasses, and magnetism, but also for genetic systems, neural networks, human organization, concept formation, and moral belief about good and evil (Sole & Goodwin, 2000; Brody, 1999, 2000, 2002). It also underlies Sowell's dichotomy.

Second, Lehn (2002) has a provocative article on supramolecular chemistry in a recent issue of *Science*. Big molecules organize themselves, demonstrate fitness phenomena, and develop receptors. Selection follows quickly thereafter.

Third, Albert-László Barabási's recent

book, *Linked: The New Science of Networks*, is an easy go and reveals a structure in emergent organizations whether those of cells, genes, neurons, or Internet pages. There is substantial transfer from fitness concepts in networks to those that we muddled in biology. Hierarchies are not simply an adaptation to prevent bloodshed but can be seen as a special case of networks that distribute resources. Network phenomena in our distant past were perhaps a more salient environment for us than the teeth and claws of our predators.

Fourth, David Rowe's *Limits of Family Influence* eases receptive audiences into the modern concepts of human behavior genetics. Sandra Scarr (1992), Thomas Bouchard (1990, 1996), Robert Plomin (1994, Plomin et al, 2000) and Judith Harris (1998), and David Cohen (1999) add girth to Rowe's muscle and bone. Monozygotic twins reared apart can be very similar but are, nonetheless, a conservative estimate of the extent to which each of us is channeled by the gametes of our parents and grandparents. Each of us singletons is a twin of our self. Only the truly stubborn will not be shaken by these ideas. (I am not the only one to believe that a gene keeps Kamin, Lewontin, and Rose from believing in genes. See Martin, et al., 1986.)

Finally, Laland & Brown's little guide (Laland & Brown, 2002) highlights the current mutations from Darwinism and neo-Darwinism. They discuss EP, human ethology, dual inheritance theory, and memetics in an orderly manner. And more important, Laland and his team elsewhere tell us that organisms make niches that become the foundation for further refinement of the organism (Laland et al., 1999; 2000). Our personal nest can be seen as an epigenetic gift, acquired and passed in a Lamarckian fashion (Turner, 2000), one likely magnified by the effects of imprinting (Little et al., 2003).

Thus, ideas about "emergence" and "self assembly" have moved closer to normal science that measures traits and refutes hypotheses. Se-

lection and self organization have penetrated physics, chemistry, emerged networks, receptors, and behavior genetics. Thus, rules that define organization came before genes and established boundaries for their operation (Thompson, 1917/1992; Sole & Goodwin, 2000; Kauffman, 1993, 1995; Brody, 2002). They also established requirements that genes must achieve if their vehicles are to find coherence. *It is now possible to sketch a suggestive ladder, one that describes similar functional relationships at widely different levels of observation.*

### **Making Tools**

Gerhart & Kirshner mention the bar-head goose that changed one proline to an alanine in its hemoglobin, increasing hemoglobin's affinity for oxygen but without changing its 3D structure (Gerhart & Kirshner, 1997). Bar-head geese can now fly over Everest. Ernst Mayr, for example, represents an externalist view: "No case is known to me in which a change in body chemistry initiated a new evolutionary trend. Invariably it was a change in habits or habitat that created a selection pressure in favor of chemical adjustments" (Mayr, 1964, p. 68). It is time for all of us to consider: Did Everest suddenly arise underneath a pond and force geese to fly high? And how many geese died over Mt. Everest before one made it over the top? Or did it happen that a hemoglobin-mutant gander explored higher altitudes, made it look easy and impressed a lot of ladies with his expanded territory?

Holding your core and developing new tools of a more varied nature is not new. It started at least 500 million years ago. Gerhart and Kirshner's impressive *Cell, Embryo, and Evolution* (1997) argues that metazoans not only evolved into smaller populations of more diverse forms, but apparently picked up *evolvability* as a characteristic of its own. G&K refer frequently to a highly conserved core assembly, perhaps spun from the first *Hox* assembly, one that appears to have been copied, *in toto*, four times or a doubling followed by another dou-

bling.

Because mollusks, flies, mice, and men have the same Hox foundations, it is less surprising that we and birds have exhibit striking similarities in communicating, flocking, and mating routines...remarkable since we have no recent common ancestors. As Wilson (2000) remarked, we have formed much of our understanding of aggregation, communication, territory and dominance, endocrine control of aggression and reproduction, mating, parental care, and even mixed species foraging from what birds do. Further, MacLean (1990) and his students found that lizards do pretty much the same things as we humans but talk about it less. For example, small children rear and yell at their mothers, wives and husbands rear and yell at each other. Rutting male lizards do the same thing. Likewise for hunting, territory, and about 25 or 30 other routines. We carried out of the EEA larger versions of the same bags that we carried into it.

### **Personal Will**

"Quite clearly it's crass to equate genetics with determinism and environmentalism with freedom. I think human freedom means something about the capacity of the human organism not to be pushed around or dominated by external circumstances. I would argue that evolution has given us our freedom. Freedom is the ability to stand up and transcend the limitations of the environment." Lindon Eaves (quoted in Wright, 1997, pp. 155-156).

"Externalism" and "internalism" label pervasive, complementary, but sometimes competing hypotheses. Sowell referred to constrained and unconstrained views of human nature, Pinker (2002) amplifies Sowell but endorses the labels of "utopian" and tragic." I find more optimism in the poorly named, constrained, internalist view of life and self. In externalism, I find repression and deception rather than utopia. After all, *Brave New World* was about environmental determination imposed by philosopher kings. (See Ridley, 2000.)

Popper (1992) advocated recognition of

the organism's role in making environments. Rose (sarcastically?) offered the term "Active Darwinism." Even if conceived in malice and destined for a short life, the phrase has merit since biologists have rediscovered the idea that environments are defined by organisms (Dawkins, 1982; Lewontin, 2000; Turner, 2000) and the mutual influence between setting and organism is perhaps best classified as a "construction" (Lewontin, 2000). Behavior geneticists have reached the identical conclusion (Bouchard et al., 1990). They distinguish between (1) shared environments that force our compliance and usually contribute about 2% to long term outcomes and (2) nonshared environment, the mass of unique experiences that each of us seeks and wears until we trade them for a shroud. Only in death do we become just like everyone else. (Yes, Virginia, the memes that matter most to each of us are a user-selected aspect of environment and have a genetic loading!)

Variation leads to the exploration of new niches. The receptor characteristics of our ancestors, mates, and predators shaped us once through long intervals of phylogeny as they led us to light, warmth, and running water. They eventually led our clinging to our mother's breast where we were calmed by her heartbeat, warmth, murmurs and milk. The taste of particular fats may have led us not only to hunt and fish but also to follow coastal highways of sand as we devoured the protein and oils of surf dwellers along ancient Mediterranean shores and the coasts of Asia Minor, Asia, and the Pacific rim (McKie, 2000; Culotta et al., 2001; Cavalli-Sforza, 2000). During all of our travels, receptors in various arrangements led our way from sea vents or still ponds to Interstate 95.

### **In Summary**

The Victorians took sea voyages but I travel in books and I found in them an island in biology where Dawkins and Maynard-Smith are whispered and W. D. Hamilton is not mentioned. The land is called evolutionary developmental biology, "evo-devo," and it's in a

southern hemisphere where not only seasons but explanations are reversed. Adaptation is internally driven, mutations make new environments possible for organisms, organisms manage environments, and physical settings as much as phenotypes experience the selective processes of retention, enlargement, and duplication.

We are not merely hammered by environment, we swing our own hammer. We metazoans not only became more adaptable with time, we became better at trying to adapt other things, including, sometimes, each other. Fitness, sexual selection, and personal will are a few of many concepts that take a new vitality in this expanded view, a gift from biochemistry and statistical physics, one that blames environments less and recognizes self determination more.

Ed Wilson traveled south when he mentioned that a capacity to modify the environment is the ultimate adaptation (Wilson, 2000, p. 159). G&McB and the rest of us could do with a trip and a tan. Nonetheless, I enjoy EP and respect the many within it who endured substantial risk to bring order and to build its fence. The people, however, within academia, are still engaged by reciprocity with the rest of social science: continuing relationships even between enemies nourish cooperation and agreement where there was none before. Like scholars in Darwin's time, we and our immediate neighbors all engage in negotiated compromises. We settle for steady, smaller rewards than a varying schedule of large gains in series with large punishments. Even I am no exception, I challenge academics but hide from the fundamentalist congregation a half block away. Again, Charles Darwin and his grandfather, Erasmus, were not exceptions but introduced their ideas first to the vulnerable but hid them from wives, patients, and clerics (King-Hele, 1999; Browne, 2002).

These modern negotiations, however, shaped the basic framework of EP to be isomorphic with that of Standard Social Science.

Time is different but environment is all. Standard EP resembles croquet on a lawn, an Eden of comradeship, statistics, and normal science: we arrange hoops, mallets, and balls on the inside where rules, explanations, and variation's grass are short. Personal Will, however, cavorts on the outside, where the weeds defiantly spring up near the forest. We sprout far more than we conform and we may yet find the shades of Erikson, Sullivan, Murray, and Goldstein in a developmentalist EP.

Many of us prefer (also an outcome of genes?) the surprises found in our brainstem and revealed by embryology and behavior genetics. G&McB is tunnel-visioned, night-blinded, fenced, and sometimes wrong in subtle ways that will eventually bore our best students, the ones who dream and scheme now as Bob Trivers once did. The ones who look for Eve, eagerly bite her apple, and sometimes promise "by the god Apollo" but cross their fingers and later toast Dionysus.

### A Story, a Quote, and a Thanks

1) I ate lunch in a mall. A small boy spun giddily between my table and that of his parents. He twirled himself headfirst into a chair at my table. He yowled and his father leapt up and scolded, "Bad chair, bad bad BAD chair!" The boy yowled some more and I rattled to dad: "You scolded the wrong chair." The externalist kid shut up as soon as dad yelled at the correct one.

2) "...evolution is best viewed as a history of organisms finding devious routes around constraints." (Lewontin, cited first in Maynard Smith et al., 1985, and again in Gerhart & Kirschner, 1997, p. 595). We remain wanderers, collectors, and builders but in not such a strange land as we put new information into old containers, belief systems that mirror what we see in genetics, information systems, and statistical physics. Our containers and their contents appear to reflect the statistical rules that govern us all. Allport in 1955 made the same distinction between externalist and internalist tradi-

tions but called them Lockean and Leibnitzian. His observations and argument are sound 50 years later just as they were millennia ago.

3) I bought Allport's *Becoming: Basic Considerations for a Psychology of Personality* in July 1960. It was on the required list for the Centennial Scholars Program at Denver University and it rests now in a stack to my left, on top of Jacob, Wilson, and Lewontin. I thank that Committee not only for their reading list but also for Russell Porter's "Charge to the Class of '64": "...to take the word of no man as final..." I forgot everything else in his speech. Indeed, I never learned it.

Steve and Don: Nice meeting both of you... thanks for this opportunity.

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### References

- Allport, G. (1955) *Becoming: Basic Considerations for a Psychology of Personality*. New Haven: Yale University Press.
- Ball, P. (1999) Transitions still to be made. *Nature*, 402, 73-76.
- Ball, P. (2002) The Physics of society. *Nature*, 415: 371.
- Barabasi, A-L (2002) *Linked: The New Science of Networks*. NY: Perseus.
- Bloom, H. (2000) *Global Brain: The Evolution of Mass Mind from the Big Bang to the 21st Century*. NY: Wiley.
- Brody, J. (1999) Paleopsychology and Complexity Theory: Mania, ADHD, ODD, Dysthymia and Hierarchic Regulation. Presentation at the Paul MacLean Festschrift, Boston, MA, 6/16 & 17, 1999.
- Brody, J. (2000) Life at the edge: Complicators and simplifiers in human transactions. Presentation at the Society for Across Species Comparisons and Psychopa-

- thology, Amherst, MA, June 16-17, 1999.
- Brody, J. (2002) From Physics and Evolutionary Neuroscience to Psychotherapy: Phase Transitions and Adaptations, Diagnosis and Treatment. In G. Cory & R. Gardner (Eds.) *The Evolutionary Neuroscience of Paul MacLean: Frontiers & Convergence*, Praeger-Greenwood, pp. 231-281.
- Browne, J. (2002) *Charles Darwin: The Power of Place*. NY: Knopf.
- Bouchard T., Lykken, D., McGue, M., Segal, N., & Tellegen, A. (1990) Sources of human psychological differences: The Minnesota study of twins reared apart. *Science*, 250: 223-228.
- Bouchard, T. J., Lykken, D., Tellegen, A., & McGue, M. (1996) Genes, Drives, Environment, and Experience. Chapter 1 in C.P. Benbow & D. Lubinski (Eds.) *Intellectual Talent: Psychometric and Social Issues*. Baltimore: Johns Hopkins Press, pp 5-43.
- Carroll, Sean, Grenier, J., & Weatherbee, S. (2001) *From DNA to Diversity: Molecular Genetics and the Evolution of Animal Design*. Malden, MA: Blackwell.
- Cavalli-Sforza, Luigi L. (2000) *Genes, Peoples, and Languages*. NY: North Point Press.
- Culotta, E., Sugden, A., & Hanson, B. (2001) Humans on the move: Introduction to human evolution: Migrations. *Science*, 291, 1721-1753)
- Dawkins, R. (1982) *The Extended Phenotype*. NY: Oxford.
- Eaves, L. (1987) Quoted in Wright, L. (1997) *Twins: And What They Tell Us about Who We Are*. NY: Wiley, p. 155-156.
- Gaulin, S. & McBurney, D. (2001) *Psychology: An Evolutionary Approach*. NY: Prentice Hall.
- Gerhart, John & Kirschner, Marc (1997) *Cells, Embryos, and Evolution*. Malden, MA: Blackwell.
- Gould, S. (2002) *The Structure of Evolutionary Theory*. Cambridge, MA: Harvard
- Belknap (especially chapter 10, "The integration of constraint and adaptation".
- Harris, J. (1998) *The Nurture Assumption: Why Children Turn Out the Way They Do*. NY: Free Press.
- ben-Jacob, E. (1998) Bacterial wisdom, Gödel's theorem and creative genomic webs. *Physica A*, 248, 57-76.
- Kauffman, S. (1993) *Origins of Order: Self-Organization and Selection in Evolution*. NY: Oxford.
- Kauffman, S. (1995) *At Home in the Universe: The Search for the Laws of Self Organization and Complexity*. NY: Oxford.
- King-Hele, Desmond (1999) *Erasmus Darwin: A Life of Unequaled Achievement*. London, UK: Giles de la Mare.
- Laland, K., & Brown, G. (2002) *Sense and Nonsense: Evolutionary Perspectives on Human Behavior*. NY: Oxford.
- Laland K., Odling-Smee F., & Feldman M. (1999) Evolutionary consequences of niche construction and their implications for ecology. *Proceedings of the National Academy of Sciences*. 96: 10242-10247
- Laland K.N., Odling-Smee F.J. & Feldman M.W. (2000) Niche construction, biological evolution and cultural change. *Behavioral and Brain Sciences* 23(1): 131-146
- Lehn, Jean Marie (2002) Toward self organization and complex matter. *Science*, 295, 2400-2407.
- Lewontin, R. (1998/2000) *Triple Helix: Gene, Organism, Environment*. Cambridge, MA, Harvard.
- Little, A. Penton-Voak, I, Burt, D., & Perrett, D. (2003) Investigating an imprinting-like phenomenon in humans: Partners and opposite-sex parents have similar hair and eye colour. *Evolution & Human Behavior*. 24: 43-52.
- MacLean, P. (1990) *The Triune Brain in Evolution: Role in Paleocerebral Functions*. NY: Plenum.
- Martin, N. G., Eaves, L. J., Heath, A. C., Jardine, R., Feingold, L.M., & Eysenck, H.J.

- (1986) Transmission of social attitudes. *Proceedings National Academy of Science*, 83: 4364-4368.
- Mayr, E. (1964) From molecules to organic diversity. *Federation Proceedings*. 23: 1231-1235. Reprinted in Ernst Mayr (1976) *Evolution & the Diversity of Life: Selected Essays*. Cambridge, MA: Harvard Belknap, pp 64-72.
- McKie, R. (2000) *Dawn of Man: The Story of Human Evolution* NY: Dorling Kindersley.
- Pinker, S. (2002) *The Blank Slate: The Modern Denial of Human Nature*. NY: Viking.
- Plomin, R. (1994) *Genetics and Experience: The Interplay between Nature and Nurture*. Thousand Oaks, CA: Sage.
- Plomin, R., DeFries J, McClearn G, & McGuffin, P. (2000) *Behavioral Genetics* (4th ed.) NY: Worth.
- Queitsch, C., Sangster, TA, & Lindquist, S. (2002) Hsp90 as a capacitor of phenotypic variation. *Nature*. 471, 618-624.
- Raff, Rudolf (1996) *The Shape of Life*. Chicago, IL: University of Chicago Press.
- Ridley, M. (2000) *Genome: The Autobiography of a Species in 23 Chapters*. NY: Harper Collins.
- Rowe D (1994) *The Limits of Family Influence: Genes, Experience, and Behavior*. NY: Guilford.
- Scarr, S. (1992) Developmental theories for the 1990s: Development and individual differences. *Child Development*. 63, 1-19.
- Sole, R., & Goodwin, B. (2000) *Signs of Life: How Complexity Pervades Biology*. NY: Basic.
- Sowell, T. (1987/2000) *A Conflict of Visions: Ideological Origins of Political Struggles*. NY: Basic Books.
- Sterelny, K., & Griffiths, P. (1999) *Sex and Death: An Introduction to the Philosophy of Biology*. Chicago: University of Chicago Press.
- Thompson, D'Arcy (1917/1997) *On Growth and Form*. NY: Cambridge.
- Turner, J. Scott (2000) *The Extended Organism: The Physiology of Animal-Built Structures*. Cambridge, MA: Harvard University Press.
- Wilson, E. O. (1975/2000) *Sociobiology: The New Synthesis*. Cambridge, MA: Belknap, Harvard University Press.
- Wright, R. (2000) *NonZero: The Logic of Human Destiny*. NY: Pantheon.