How Steven Pinker's Mind Works

Steven Pinker, *How the Mind Works.*
New York: W.W. Norton & Co., 1977.

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Every so often, a book addressed to scholars and general readers alike attempts to reveal the workings of the human mind in a manner both broadly integrative in scope and abundantly rich in detail. In the mid-1960s, for example, Arthur Koestler's *The Act of Creation*, sought to explain in terms of a single powerful mental mechanism ("bisociation," the unlikely mental conjoining of two previously unassociated contexts of knowledge or experience) the widely disparate processes of humor, artistic creation, and scientific discovery. Another such book, the subject of this review, is *How the Mind Works*, authored by the head of M.I.T.'s Center for Cognitive Neuroscience, Steven Pinker, who presents "a bird's eye view of the mind and how it enters into human affairs."

Following Tooby and Cosmides of the Center for Evolutionary Psychology, Pinker skillfully synthesizes (another Koestlerian "bisociation"!) computational theory from cognitive psychology and natural selection from evolutionary biology. On this framework of "evolutionary psychology," he weaves together a vast array of ideas into a "big picture" about the complex structure of the human mind. Pinker's basic thesis is that "a psychology of many computational faculties engineered by natural selection is our best hope for a grasp on how the mind works that does justice to its complexity." (p. 58) He argues well for this view in the three opening chapters, and the weight of evidence in the five chapters of applications that follow make the conclusion seem inescapable. Such a wealth of interesting and valuable material is included in Pinker's hefty tome that this review will of necessity be but a selective

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glance of the "bird's eye" at some of its most salient virtues and flaws–beginning, appropriately, with Pinker's *definition* of "mind."

The human mind, Pinker says, is "a system of organs of computation, designed by natural selection to solve the kinds of problems our ancestors faced in their foraging way of life, in particular, understanding and outmaneuvering objects, animals, plants, and other people." (p. 21) This definition underlies a wide-ranging discussion noteworthy for clarity, precision, liveliness, and wit. Yet, its inconsistency with other things Pinker says leaves his stand on the mind-body relation shrouded in ambiguity. He says that the mind "is not the brain, but...a special thing the brain does, which makes us see, think, feel, choose, and act, [namely,] information processing, or computation." (p. 24), and that "the overwhelming evidence [shows] that the mind is the activity of the brain" (p. 64). By his own words, the organ involved in all these mental processes appears to be not the mind, but the *brain*, which has "a breathtaking complexity of physical structure fully commensurate with the richness of the mind." (p. 64)

Thus, although Pinker's definition refers to the mind and its component "mental modules" as a system of organs of computation that solve problems, it is *really* referring to the brain--and, more specifically, to regions of the brain "that are interconnected by fibers that make the regions *act as a unit*" (p. 30, emphasis added). Pinker construes mental modules or mental organs as being any interconnected group of brain parts or brain regions *insofar as they carry out (or able to carry out) a mental process.* "[M]ental modules are not likely to be visible to the naked eye as circumscribed territories on the surface of the brain [but instead] sprawling messily over the bulges and crevasses of the brain [or] broken into regions that are interconnected by fibers that make the regions act as a unit...distributed across the brain in a spatially haphazard manner" (p. 30-1) To refer to such brain regions and the functions they carry out as "the mind" or "mental modules" or "mental organs" seems altogether reasonable and accurate, and gives Pinker every bit of the semantic leeway he needs.

However, this would require Pinker to modify his stance that the mind is not the brain, but (some of) what the brain does – and instead to acknowledge that the mind *is* the brain insofar as it is doing *some* of what it does, i.e., *insofar as it carries out (or able to carry out) mental processes.* Or, in more Pinkerian terms: "the mind is a system of brain structures that function as organs of computation." This proposed modification would thus simply ratify and formalize his insight about mental organs or modules being specialized brain structures – and firmly place Pinker's work in the

best tradition of non-spiritualist, non-reductionist theories of mind, as exemplified by the "mentalist monism" of neuroscientist Roger Sperry (*Science and Moral Priority, Merging Mind, Brain, and Human Values*, Columbia University Press, 1983).

Pinker carefully distinguishes between mind in the sense of *intelligence* and mind in the sense of *consciousness*. Problems about the nature and origin of the former, he says, have been solved by cognitive science, intelligence being "the ability to attain goals in the face of obstacles by means of decisions based on rational (truth-obeying) rules." The source of intelligence is not "a special kind of spirit or matter or energy but...information," (p. 65) carried by some piece of matter that "stands for" the state of affairs that the information is about. This is the basis of the computational theory of mind, the idea that intelligence is computation, "the processing of symbols: arrangements of matter that have both *representational* and *causal* properties, that is, that simultaneously carry information about something and take part in a chain of physical events." (p. 76) Even if some special form of matter, spirit, or energy were someday revealed to underlie consciousness, what makes a system intelligent is not any of these, but what the symbols the system uses stand for and how its internal dynamic patterns "are designed to mirror truth-preserving relationships." (p. 77)

As for mind qua consciousness, Pinker slashes through the tangle of meanings that has grown up around the term. Sometimes "consciousness" is taken to mean access to information (as against information out of reach in the subconscious). The most interesting feature Pinker attributes to access-consciousness is "an executive, the 'I', [which] appears to make choices and pull the levers of behavior." (p. 139) This would seem to point to a naturalistic explanation for our experience of a self or will.

Unfortunately, Pinker's discussion of *freedom* of the will hits a fundamental snag. In saying that "the science game treats people as material objects, and its rules are the physical processes that cause behavior through natural selection and neurophysiology," he spotlights the Humean "event analysis, cause-effect" paradigm that has ruled modern science almost since its inception. On this model, there really *is* no room for a view of people as sentient, rational, free-willed agents -- and no answer to Pinker's question: "How can my actions be a choice for which I am responsible, if they are completely caused by my genes, my upbringing and my brain state?" (p. 558)

On the Humean model, it is all too true that "the scientific mode of explanation cannot accommodate the mysterious notion of uncaused causation that underlies the will...[A] random event does not fit the concept of free will any more than a lawful one does, and could not serve as the long-sought locus of moral responsibility...Either we dispense with all morality as unscientific superstition, or we find a way to reconcile causation...with responsibility and free will." (pp. 54-5) The latter is precisely what has to be done, along the lines of the Aristotelian, agent-cause model of causality elaborated in the writings of Roger Sperry and Edward Pols.

Rather than exploring an alternative to the metaphysical and methodological dogmas at the foundations of modern science, however, Pinker accepts them as given. Instead, he resorts to the tattered Kantian dodge of segregating science from morality, as if freedom and dignity were no real part of "what makes us tick and how we fit into the physical universe" – and "cloistering scientific and moral reasoning in separate areas" an adequate reconciliation of science and morality and safeguard against dehumanizing people or deontologizing science. (p. 56)

Finally, "consciousness" is sometimes taken as referring to "*sentience*, subjective experience, phenomenal awareness, raw feels, first-person present tense, 'what it is like to be or do something'..." (p. 135) Pinker admits that sentience and access may be inseparable, dual aspects of consciousness, despite their being at least conceptually distinguishable. He has no way, however, to answer claims that *qualia* (sentient experiences) are either cognitive illusions or inconsequential to our understanding of how the mind works. Pinker ultimately affects a "perhaps we weren't meant to know" stance that seems to amount to another Kantian cop-out on the research and rethinking that needs to be done. In contrast, this reviewer has noted elsewhere ("Review of Fred Dretske's *Naturalizing the Mind*," *Journal of Consciousness Studies*, Vol. 4, No. 3, 1997) that the background proprioceptive awareness of bodily states and processes is emerging as a likely candidate for the "what-is-it-like" quality accompanying conscious awareness. Qualia will yield their mysteries to the inexorable progress of cognitive science – much to the chagrin of the "Mysterians," to be sure.

Pinker also seems overly perplexed by thought experiments involving "zombies" and at one point says: "I can imagine a creature whose layer 4 [of the cortex] is active but who does not have the sensation of red or the sensation of anything; no law of biology rules the creature out." (p. 561) True, but imagination is no substitute for empirical research! If indeed there *are* creatures who have "access without sentience" – e.g., those

suffering from blindsight syndrome – isn't the needed line of research obvious? Following Pinker's own approach regarding intelligence (p. 65), find out *how* the system provides access without sentience – i.e., what parts of the brain are *not* working, or working differently from people with sentience *and* access.

On the evolution side of his synthesis, Pinker explores how the mind–and, more broadly, living organisms–could have evolved. He voices his agreement with Richard Dawkins that "a straightforward consequence of the argument for the theory of natural selection [is that] life, anywhere it is found in the universe, will be a product of natural selection," and he reviews the various alternative ideas that have been advanced and later shown to be "impotent to explain the signature of life, complex design." (p. 158) Quoting complexity theorist Stuart Kauffman's remark that evolution may be "a marriage of selection and self-organization," Pinker wisely acknowledges that complexity theory–the idea that mathematic principles of order underlie many complex systems and that "feats like self-organization, order, stability, and coherence may be innate properties of some complex systems"–may help explain how organisms and major organ systems came into being in the first place, and that "if there are abstract principles that govern...web[s] of interacting parts..., natural selection would have to work with those principles." (p. 161)

Even if complexity theory did explain the constraints within which adaptation works, however, Pinker argues that this would not render natural selection obsolete. The complexity involved is, after all, "*functional, adaptive design*: complexity in the service of accomplishing some interesting outcome...Natural selection remains the only theory that explains how *adaptive* complexity, not just any old complexity, can arise, because it is the only nonmiraculous, forward-direction theory in which *how well something works* plays a causal role in *how it came to be.* (p. 162) Furthermore, the evidence that life evolved by natural selection is overwhelming. Not only is natural selection readily observable in the wild, and in parallel in the numerous forms of artificial selection humans have practiced for thousands of years, but also mathematical proofs from population genetics and computer simulations from the relatively new field of Artificial Life have shown that natural selection can work.

Considering the obvious selection advantage of having an accurate sense of the real objects in the world, it is therefore no surprise that the study of psychology of perception has been in the forefront of evolutionary psychology's programme to "reverse-engineer" the mind, which Pinker discusses in his chapter on the psychology of perception ("The Mind's

Eye"). In contrast to skeptical philosophers who try to argue against "our ability to know *anything* by rubbing our faces in illusions," perception scientists "marvel that it works at all." The accuracy of our brains in analyzing the swirling patterns of energy that strike our sensory receptors and discerning objects and motion "is impressive because the problem the brain is solving is literally unsolvable; [deducing] an object's shape and substance from its projection is an 'ill-posed'problem...which has no unique solution." Through evolution, however, vision has made these problems solvable "by adding.... assumptions about how the world we evolved in is, on average, put together...When the current world resembles the average ancestral environment, we see the world as it is." (pp. 212-3) When these assumptions (some of which are discussed on pp. 234 and 247-9) are violated, illusion can result. The scientific value of the study of illusion is thus its revelation of "the assumption that natural selection installed to allow us to solve unsolvable problems and know, much of the time, what is out there." (pp. 213)

Of particular note are Pinker's discussions of the illusions by which stereoscopes trick us into seeing flat pictures as three-dimensional, the various "tricks" ("mental-rotation," "multiple-view," and "geon") our minds use to recognize shapes, the recently gathered evidence that mental images for both perception and imagination are indeed "pictures in the head," and the existence of a critical period in infancy for the development of binocular vision, "as opposed to rigid hard-wiring or life-long openness to experience" (p. 240), the latter being but one of many examples Pinker offers in his book against the oversimplified alternative of innate ideas vs. tabula rasa, favoring a view of learning not as the "indispensable shaper of amorphous brain tissue [but instead] an innate adaptation to the project-scheduling demands of a self-assembling animal." (p. 241)

Because of the limitations of images (see pp. 294-296), human beings also evolved the ability to think in terms of ideas, which is the subject of the next chapter ("Good Ideas"). In contrast to Darwin, who thought that his evolutionary theory would put psychology on a new foundation, scientists such as his contemporary and rival, Alfred Russel Wallace, and modern-day astronomer Paul Davies could see no good evolutionary reason for human intelligence to exist, turning instead for an explanation to the superior guiding intelligence postulated by creationism or some form of self-organizing process eventually explainable by complexity theory. Pinker follows Stephen Jay Gould in pointing out what Wallace, Davies, and others overlook: that the brain has made use of "exaptations: adaptive structures that are 'fortuitously suited to other roles

if elaborated' (such as jaw bones becoming middle-ear bones) and 'features that arise without functions...but remain available for later co-optation' (such as the panda's thumb, which is really a jury-rigged wristbone)." (p. 301) The human mind really *isn't* "adapted to think about arbitrary abstract entities...We have inherited a pad of forms that capture the key features of encounters among objects and forces, and the features of other consequential themes of the human condition such as fighting, food, and health. By erasing the contents and filling in the blanks with new symbols, we can adapt our inherited forms to more abstruse domains...We pry our faculties loose from the domains they were designed to work in, and use their machinery to make sense of new domains that abstractly resemble the old ones." (pp. 358-9)

Pinker explains at length "why the original structures were suited to being exapted" (p. 301), in the process also showing why the intuitive scientific and mathematical thinking that people do virtually from birth onward (contra William James' "bloomin', buzzin' confusion" model of infant awareness) is not always reliable for problems outside the demands of the natural environment. Faulty inference is to the conceptual level what illusion is to the perceptual; a close study of each kind of glitch reveals the original optimal conditions for the corresponding form of awareness--and how the formal sciences, mathematics, logic, etc. were developed at least partly to compensate for less optimal circumstances.

Among the intuitive theories presumed to comprise the mind's natural repertoire for making sense of the world are modules for objects and forces, inanimate beings, artifacts, minds, and natural kinds such as animals, plants, and minerals--as well as "modes of thought and feeling for danger, contamination, status, dominance, fairness, love, friendship, sexuality, children, relatives, and the self." (p. 315) Pinker stresses the point that what is innate is not knowledge itself, but *ways of knowing*. While exploring how these modules operate as babies learn about objects and motion and how to distinguish inanimate objects from living beings, he dwells on the very important issue of essentialism (are there natural kinds in the world?) and the equally important question of whether there really are objects in the world. Pinker defends essentialism against both the extreme essentialists such as Mortimer Adler who argue that human beings could not have evolved, and the modern anti-essentialists who use "essentialist" as a term of abuse against those who try to genuinely explain human thought and behavior (rather than merely redescribing it along ideological lines).

But do natural kinds exist? And why do we use concepts anyway? What is their biological utility? What in nature dictates that they are a necessity to our survival–if they are? The standard arguments given in psychology texts–memory overload and mental chaos–do not make sense, Pinker says, because we have more than adequate storage space for our experiential data (and we often remember both categories *and* their members), and "organization for its own sake is useless," if not downright counterproductive. (p. 307) Instead, he argues, the survival value of concepts and categories, the reason they evolved into being, is their *predictive* power. One kind of categories uses "stereotypes, fuzzy boundaries, and family-like resemblances" and is more useful for simply "recording the clusters in reality," for "examining objects and uninsightfully recording the correlations among their features," their predictive power coming from *similarity*. Categories of the other type are well-defined, having "definitions, in-or-out boundaries, and common threads running through the members," and they "work by ferreting out the laws that put the clusters there," their predictive power coming from *deduction*. (p. 309-10)

Sometimes the former–registering similarities–is the best we can do; but when we are able to use the latter, with definitions and lawful connections, we are not just fantasizing, Pinker says. At heart, Pinker is a realist – both in regard to the nature and existence of the external world and our knowledge of it, and in regard to the nature of our cognitive faculties. The world really is "sculpted and sorted by laws that science and mathematics aim to discover," and "our theories, both folk and scientific, can idealize away from the messiness of the world and lay bare its underlying causal forces." The systems of rules incorporated in "lawful" categories "are *idealizations* that abstract away from complicating aspects of reality, but are no less real for all that." (pp. 308, 312) Similarly for concrete shapes, motions, and objects themselves. As against people like Buckminster Fuller or Arthur Koestler who claim that modern science has "dematerialized matter" and that solidity is an illusion, Pinker avers that "the world *does* have surfaces and chairs and rabbits and minds. They are knots and patterns and vortices of matter and energy that obey their own laws and ripple though the sector of space-time in which we spend our days." (p. 333)

Such a ringing endorsement of common-sense realism – the view that the contents of our perceptual and conceptual awareness are real effects of real causes – is reassuring and welcome, indeed. What is truly remarkable is that the same author also acknowledges in no uncertain terms that the

forms of that awareness are the real effects of real causes, as well. Neither minds, nor living organisms, nor physical objects consist of a single, homogenous kind of stuff that somehow miraculously gives them their powers to do things. Pinker rightly consigns arguments postulating "mental spam" or "connectoplasm" and other formless, nearly-magical entities to the theoretical dustbin along with "protoplasm" and the ancient tetrad of "earth, air, fire, and water." Instead, mind like the rest of nature, is hierarchically organized and has a "heterogeneous structure of many specialized parts." (p. 31)

From a humanistic standpoint, the chapters on emotionality and sociality ("Hotheads" and "Family Values") are arguably the most important sections of Pinker's book. They should be required reading for all college majors in anthropology, sociology, and psychology–and for all parents. In the first of these, one of the shorter chapters of his book, Pinker manages to explode the reason-emotion dichotomy and to enlarge and enhance our concept of a universal human nature–an amazing accomplishment. To this, he adds some other very worthwhile material, including discussions of the biology of the positive and negative emotions, happiness, romantic love, and "altruism." A highlight of the chapter is the set of extremely valuable insights, supported by copious citations of contemporary research, that the human emotions are universal, that (in Darwin's words) "the same state of mind is expressed throughout the world with remarkable uniformity," and that the mistaken belief that emotions differ cross-culturally comes mainly from language vocabulary differences and opinions either naively or deliberately at variance with actual behavior."

Just as valuable is the revelation that the emotions are not nonadaptive baggage stowed in the basal ganglia and limbic system (MacLean's Reptilian Brain and Primitive Mammalian Brain) but instead, as Pinker shows, "are adaptations, well-engineered software modules that work in harmony with the intellect and are indispensable to the functioning of the human mind." (p. 370) The topmost goals of human beings, in relation to which subgoals, subsubgoals, etc. are the means, have been wired in through natural selection and, Pinker suggests, include not just the "Four Fs" ("feeding, fighting, fleeing, and sexual behavior") but also, more broadly, "understanding the environment and securing the cooperation of others," each emotion serving to mobilize "the mind and body to meet one of the challenges of living and reproducing in the cognitive niche," both those posed by physical things and those posed by people. (pp. 373, 374) The reason we need emotions to do this, he says, is

that we cannot pursue all our goals at once, but instead must selectively commit ourselves "to one goal at a time, and the goals have to be matched with the best moments for achieving them." (p. 373) Pinker thus sees the mechanism that sets the brain's highest-level goals at any given moment as being not, as some might expect, the will, but instead the emotions:

> Once triggered by a propitious moment, an emotion triggers the cascade ofsubgoals and sub-subgoals that we call thinking and acting. Because the goals and means are woven into a multiply nested control structure of subgoals within subgoals with subgoals, no sharp line divides thinking from feeling, nor does thinking inevitably precede feeling or vice versa (notwithstanding the century of debate within psychology over which comes first). (p. 373-4)

The emotions certainly are *motivating*, and it is difficult at times to analytically separate them from the thoughts that generate them. But motivation must be distinguished from *self-regulation*, which is the essence of the will. As Pinker explains later, the alleged reason-emotion dichotomy often refers to the fact that people sometimes are tempted to sacrifice long-term interests for short-term gratification. This problem of self-control or "weakness of the will" is actually rooted, Pinker says, in the "modularity of the mind": "When the spirit is willing but the flesh is weak, such as in pondering a diet-busting dessert, we can feel two very different kinds of motives fighting with us, one responding to sights and smells, the other to doctor's advice." (p. 396)

As Pinker explains it, "self-control is unmistakably a tactical battle between parts of the mind." We have many goals (e.g., food, sex, safety), which "requires a division of labor among mental agents with different priorities and kinds of expertise." These agents are all committed to the interests of the whole person over a lifetime, but in order to balance the person's needs and goals those agents also have to "outwit one another with devious tactics." Thus we are able to "defeat our self-defeating behavior," as Pinker puts it (p. 396), by acting through those mental agents "with the longest view of the future...to voluntarily sacrifice freedom of choice for the body at other times....The self that wants a trim body outwits the self that wants dessert by throwing out the brownies at the opportune moment when it is in control." (pp. 419-20) But how does this module or agent with the longest view *get* control if its motivating desires are *weaker* than those of the brownie-seeking module? More "devious tactics" such as giving one's

brownie-seeking self "permission" to eat the brownie, along with "permission" *not* to? Or instead perhaps the psychic equivalent of arm-wrestling with one's brownie-seeking self?

This is one of the weaker parts of Pinker's discussion, for it fails to provide for a master module for the "we," the "whole person" whose interests the lesser modules have been genetically engineered to look out for in a dynamically balanced way, the "whole person" who acts voluntarily, through one mental module or another, to deny pleasure to the body in preference to future well-being, or vice versa. Instead of a master self-regulator, the self/will, we seem to be left with a Dennett-esque congeries of clashing, warring self-regulators, reduced to using coercion and deceit over one another. The closest Pinker comes anywhere in the book to providing an explanation for even our *experience* of a self or will is his notion of an "executive process" or "set of master decision rules" comprising "a computational demon or agent or good-kind-of-homunculus, sitting at the top of the chain of command" and "charged with giving the reins or the floor to one of the agents at a time . . . another set of if-then rules or a neural network that shunts control to the loudest, fastest, or strongest agent one level down. (pp. 143-4) Unfortunately, he seems to prefer the model of the "society of the mind" in explaining the emotions.

Perhaps, as Pinker says in the next chapter is the case for society, some amount of this conflict will always be present in the "society of the mind," but that doesn't make it morally right and it doesn't mean we should try to reduce it. But how? Pinker does not pursue this, but his analogy between mind and society, expressed in the section "Society of Feelings," suggests that we should find ways for our long-term and short-term modules to *cooperate* with and *be generous* to one another in achieving what each other is after: e.g., delicious, low-fat brownie recipes, along with some combination of suspending or relaxing one's diet during holidays (retreat), not beating up on oneself for eating too much (conciliation), and accepting the fact that some weight gain is an inevitable part of the aging process (live and let live). But how is this cooperation to be implemented: anarchistically, by free-floating negotiation between competing modules— or governed from above by a mediating master module (the self/will)? As noted, Pinker does not address this point, nor do his other discussions of the free will issue help much.

Pinker sees the psychology of social relations as being largely about inborn motives that put us into conflict with one another. Contrary to several decades of conventional wisdom and romantic wishful thinking, epitomized by Margaret Mead's "spectacularly wrong" portrayal of Samoa

as a paradise of idyllic social relationships, conflicts over power, wealth, and sex are traits universal to all human cultures. Yet, as Pinker points out, this does not make exploitation and violence morally correct, nor does it mean that the existing level of them is necessary or the best we can hope for. "People in all societies not only perpetrate violence but deplore it. And people everywhere take steps to reduce violent conflict, such as sanctions, redress, censure, mediation, ostracism, and law." (pp. 428-9)

Cooperation and generosity, which also exist in all human cultures, do not "come free with living in groups" but instead, like stereoscopic vision, are "difficult engineering problems," which human beings solved through natural selection, because "even in the harshest competition, an intelligent organism must be a strategist, assessing whether its goals might best be served by retreat, conciliation, or living and letting live." (p. 428) The bulk of this chapter is devoted to a detailed exploration of "the distinct kinds of thoughts and feelings [people should have] about kin and non-kin, and about parents, children, siblings, dates, spouses, acquaintances, friends, rivals, allies, and enemies." (p. 429) Especially helpful are Pinker's asides about feminist theory, in which he explains how evolutionary psychology challenges not the feminist goals of ending sexual discrimination and exploitation, but those feminist arguments that rest on faulty biological, psychological, and ethical premises.

As a part-time aesthetician and music theorist, this reviewer would be remiss not to comment on Pinker's discussion of art in the final chapter. The arts seem trivial, futile, biologically frivolous, Pinker says; yet we often experience them as among the most noble, exalted, rewarding things our minds do. What computational, evolutionary function, if any, do they serve? The visual arts, he says, are sensory "cheesecake...exquisite confection[s] crafted to tickle the sensitive spots of...our mental faculties." (p. 534). Pleasure-giving "patterns of sounds, sights, smells, tastes, and feels" given off by fitness-promoting environments are purified and concentrated so that the brain can stimulate itself with "intense artificial doses of the sights and sounds and smells that ordinarily are given off by healthful environments." (pp. 524-5)

As a 25-year veteran parent and consumer of the Montessori method of education, however, this reviewer thinks it is clear that visual art as *not* just sensory cheesecake, but instead also a means for sensory *conditioning* or *training*, as the artist shares her view of, for instance, "Here's how to see (or think of) apples." The very "purifying" and "concentrating" of patterns Pinker cites has a consciousness-molding function–much as Montessori's didactic materials help children form

sharper mental images and categories than they otherwise would from unguided everyday experience.

Pinker also discusses the basic design features of music and claims that it functions as "auditory cheesecake." Music cannot convey a plot, Pinker says, and "communicates nothing but formless emotion." (pp. 528-9) This is supposed to decisively differentiate music – even dramatic music – from literature, which "not only delights but instructs" and is thus presumably not merely a technology, but an evolved adaptation (p. 541) Pinker describes fiction's function thusly: "the author places a fictitious character in a hypothetical situation in an otherwise real world where ordinary facts and laws hold, and allows the reader to explore the consequences... The protagonist is given a goal and we watch as he or she pursues it in the face of obstacles... Characters in a fictitious world do exactly what our intelligence allows us to do in the real world. We watch what happens to them and mentally take notes on the outcomes of the strategies and tactics they use in pursuing their goals..." The cognitive, biologically adaptive role of fiction, then, is to "supply us with a mental catalogue of the fatal conundrums we might face some day and the outcomes of strategies we could deploy in them." (p. 543)

As this reviewer has argued elsewhere ("Thoughts on Musical Characterization and Plot: the Symbolic and Emotional Power of Dramatic Music," *Art Ideas*, 5/1, 1998, pp. 7-9), much the same reasoning and facts apply to the case of musical plot and musical motion itself. The key to understanding a fundamental similarity between dramatic music and literature is unearthed by Pinker's account of a film made by social psychologists Heider and Simmel. The plot of their movie consists of striving by a protagonist to achieve a goal, interference by an antagonist, and final success by the protagonist with a helper's aid. The "stars" of this movie are three dots (!), which Pinker says it is impossible *not* to see as "*trying* to get up [a] hill...*hindering* [the first dot]...and *helping* it reach its goal." (p. 322) Even toddlers "interpret certain motions...as animate agents [which] propel themselves, usually in service of a goal." (p. 322)

The behavior of musical tones in dramatic music is completely analogous to that of these dots and, this reviewer submits, is naturally, unavoidably experienced in the same way. Like the three dots, musical tones are much more concrete and specific in their "strategies and tactics" than are (most) literary characters, but the kaleidoscopic variety of melodic and motivic development in Western music offers a vast catalogue of opportunities to perceptually experience goal-seeking. Surely this is adaptive. Surely it is a clear indication that music's alleged "purely

emotive" nature and its status as "the language of the emotions" is overblown hyperbole, soon to be replaced by the acknowledgement that it is merely "a" language of the emotions, operating by the same general kinds of imagery and syntax as literature and the theater.

Finally, it is rather surprising to hear a psychologist say that religion and philosophy are "biologically functionless activities." Isn't it obvious that we *need* religion and/or philosophy? Even if the answers they provide are *wrong*, we need *some* kind of plausible answers to the "holistic," orientational questions about life. *That* is an unavoidable consequence of the fact that humans require not just perception but concepts for successful living. Because we see beyond the here and now, we need guidelines, a mental framework, a model to steer us – for better or worse – through our day to day decisions and actions. People without such a view of the world are bewildered, disoriented – in a very important way, *maladapted.* Philosophy is not a luxury, but a necessity – even in the form of its protean ancestor, religion. Philosophy is a quintessentially human adaptation – not for solving specific life problems, but for solving the "holistic" problem of determining what kind of life to live.

Yet, presumably since certain fundamental problems have resisted solution for 2500 years, Pinker suspects that philosophy and religion are at least partly "the application of mental tools to problems they were not designed to solve" (p. 525) Perhaps so, but why couldn't they be "exapted" to solving those problems anyway? Pinker suggests that philosophical problems like the nature of subjective experience, self, free will, meaning, knowledge, and morality are not "sufficiently similar to the mundane survival challenges of our ancestors" (p. 525), and that is why people have pondered them for millennia "but have made no progress in solving them." Our minds are well suited to perceiving objects and motion and to discovering causal laws in *parts* of the universe, but their very excellence at meeting those challenges may compromise them for dealing with "peculiarly holistic" kinds of problems like the nature of sentience and will.

If our consciousness were inherently limited in this way, Pinker would be right: we should rejoice at all that our minds make possible and let go of perennial, insoluble conundrums. But surrender is not warranted. First of all, there *has* been progress. The vast increase in research into brain function and conscious processes in the past few decades has led to numerous discoveries and insights. Researchers and philosophers such as Roger Sperry, Edward Pols, Antonio Damasio, Jerome Kagan, Fred Dretske, Henry B. Veatch, and Panayot Butchvarov increasingly point the way to a non-dualistic, non-reductionist, naturalistic understanding of the

self and the will. Pinker's own impressive work is a prime exhibit in support of this more optimistic scenario.

Secondly, consider how long and how severely religion's supernaturalist premises and theocratic controls over society have impeded scientific discovery. Two and a half millennia is not nearly as long a time as it may seem. (What could we measure it against, anyway?) It may just be that the problems of self and will require a lot more hard work, and that science and philosophy must continue to pool their efforts in order to solve them. Such cooperation has gotten us a long way already, and there is no good reason not to keep traveling confidently down that road.

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