

Review of The Stuff of Thought by Steven Pinker (2008)

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ABSTRACT

I start with some famous comments by the philosopher (psychologist) Ludwig Wittgenstein because Pinker shares with most people (due to the default settings of our evolved innate psychology) certain prejudices about the functioning of the mind and because Wittgenstein offers unique and profound insights into the workings of language, thought and reality (which he viewed as more or less coextensive) not found anywhere else. The last quote is the only reference Pinker makes to Wittgenstein in this volume, which is most unfortunate considering that he was one of the most brilliant and original analysts of language.

In the last chapter, using the famous metaphor of Plato's cave, he beautifully summarizes the book with an overview of how the mind (language, thought, intentional psychology) –a product of blind selfishness, moderated only slightly by automated altruism for close relatives carrying copies of our genes--works automatically, but tries to end on an upbeat note by giving us hope that we can nevertheless employ its vast capabilities to cooperate and make the world a decent place to live.

Pinker is certainly aware of but says little about the fact that far more about our psychology is left out than included. Among windows into human nature that are left out or given minimal attention are math and geometry, music and sounds, images, events and causality, ontology (classes of things), dispositions (believing, thinking, judging, intending etc.) and the rest of intentional psychology of action, neurotransmitters and entheogens, spiritual states (e.g, satori and enlightenment, brain stimulation and recording, brain damage and behavioral deficits and disorders, games and sports, decision theory (incl. game theory and behavioral economics), animal behavior (very little language but a billion years of shared genetics). Many books have been written about each of these areas of intentional psychology. The data in this book are descriptions, not explanations that show why our brains do it this way or how it is done. How do we know to use the sentences in their various way (i.e., know all their meanings)? This is evolutionary psychology that operates at a more basic level –the level where Wittgenstein is most active. And there is scant attention to context.

Nevertheless this is a classic work and with these cautions is still well worth reading.

Those wishing a comprehensive up to date framework for human behavior from the modern two systems view may consult my article *The Logical Structure of Philosophy, Psychology, Mind and Language as Revealed in Wittgenstein and Searle* 59p(2016). For all my articles on Wittgenstein and Searle see my e-book *The Logical Structure of Philosophy, Psychology, Mind and Language in Wittgenstein and Searle* 367p (2016). Those interested in all my writings in their most recent versions may consult my e-book *Philosophy, Human Nature and the Collapse of Civilization - Articles and Reviews 2006-2016* 662p (2016).

"If God looked into our minds he would not be able to see there whom we were thinking of."

"Ought the word "infinite" to be avoided in mathematics? Yes: where it appears to confer a meaning upon the calculus; instead of getting one from it." RFM revised edition (1978) p141

"Time and again the attempt is made to use language to limit the world and set it in relief—but it can't be done. The self-evidence of the world expresses itself in the very fact that language can and only does refer to it. For since language only derives the way in which it means, its meaning, from the world, no language is conceivable that does not represent this world." Wittgenstein *Philosophical Remarks* S47

"The limits of my language mean the limits of my world" TLP

I start with these famous comments by the philosopher (psychologist) Ludwig Wittgenstein (W) because Pinker shares with most people (due to the default settings of our evolved innate psychology) certain prejudices about the functioning of the mind and because Wittgenstein offers unique and profound insights into the workings of language, thought and reality (which he viewed as more or less coextensive) not found anywhere else. The last quote is the only reference Pinker makes to Wittgenstein in this volume, which is most unfortunate considering that he was one of the most brilliant and original analysts of language.

Another famous Wittgensteinian dictum is “Nothing is Hidden.” If one dips into his work sufficiently, I think he makes it very clear what this means—that our psychology is in front of us all the time if we only open our eyes to see it and that no amount of scientific work is going to make it clearer (in fact it just gets more and more obscure). This is not antirational or antiscientific but it just states what he sees as the facts—a soccer game is out on the field—not in our head—and we understand perfectly well the motivations, anxieties, stresses and disappointments of the players and what effort is required to play and how the ball moves when kicked. Immense advances have been made in sports physiology, anatomy, bioenergetics, physics math and chemistry. Whole books full of equations have been written about how balls move thru the air and muscles apply force to move bones; about how muscle movements originate in part of the cortex, are mirrored in the brains of others; mountains of literature on motivation, personality, brain function and modeling. Has this given us any more insight into a soccer game or changed our experience of playing or watching?

Intentionality (rationality) has been evolved piecemeal from whatever tools (genes) animals had to work with and so is full of paradoxes and illusions. Just as we see mirages in the desert or read words into sentences that are not there, and see animated blobs on a screen “causing” others to move and “helping” or “hindering”, we look for thinking and believing in the head and confuse our innate psychological axioms with

empirical facts (e.g., regarding math and geometry as things we “discover” in the world, rather than invent).

In order for the concept and word “reality” to apply to the results we get from the use of differential equations, MRI scanners and particle colliders to a greater degree than or in place of apples, rocks and thunderstorms, it would be necessary for these recent discoveries to have had the same role in natural selection over hundreds of millions of years. It is only survival advantage over eons that selected the genes enabling our distant (invertebrate) ancestors to begin reacting in useful ways to the sights and sounds of the world and ever so slowly to produce brains that could form concepts (thoughts) that eventually were verbalized. Science and culture cannot replace or take preference over our ancient intentional psychology but merely slightly extends or supplements it. But when philosophizing (or doing linguistics!) we are easily misled as context is missing and our psychology automatically dissects every situation for the causes and the ultimate or lowest level of explanation and we substitute that for the gross higher levels because there is nothing in our language rules to prevent it. It comes ever so naturally to say we don’t think—our brain does and tables are not solid because physics tells us they are made of molecules. But W reminded us that our concepts of, and words for, thinking, believing and other dispositions are public actions, not processes in the brain, and in what sense are molecules solid? Hence, the quote above, which bears repeating, since I see it as one of the most fundamental ideas we have to get clear about before we can make any progress in the study of behavior.

“Time and again the attempt is made to use language to limit the world and set it in relief—but it can’t be done. The self-evidence of the world expresses itself in the very fact that language can and only does refer to it. For since language only derives the way in which it means, its meaning, from the world, no language is conceivable that does not represent this world.”

Much of W’s writing is examples of the common sense knowledge that is essential to the success of all animal behavior and by and large not only the behavioral science but even AI, which cannot succeed without it, has been unable to grasp and implement it. Even one of the fathers of AI, Marvin Minsky said (in a 2003 Boston Univ. speech) that “AI has been brain dead since the 70’s” and lacked common sense reasoning. But his recent book “The Emotion Machine” still shows no awareness of the work that W did 75 years ago, and this means no awareness of the contextual, intentional, point of view without which one cannot hope to grasp how the mind (language) works.

When talking about behavior (i.e., thought or language or action) it is a nearly universal mistake to regard the meaning of a word or sentence as attached to it, ignoring the infinite subtleties of context, and thus we go astray. Of course, we cannot include *everything* about context, as that would make discussion difficult, even impossible, but there is a vast difference between regarding meaning as something that can be fully given by a dictionary entry and meaning as shorthand for a family of complex *uses*. Even Klein’s classic book ‘Time in Language’ (not cited by Pinker) regards the ‘time’ as a family of

loosely connected uses, though of course he too has no awareness of W, Searle or intentionality.

The point of mentioning this is that Pinker shares the reductionistic biases of most modern scientists and that this colors his approach to behavior in ways that will not be obvious to most readers. As fascinating as his data are and as masterful as his writing is, it subtly leads us to what I think is a mistaken picture of our psychology—a view that is due to the innate biases of our evolved psychology and hence is a *universal* failing.

Pinker is the Richard Dawkins of psychology—one of the major popularizers of science in modern times. Possibly only the late and most unlamented (he was a self serving egomaniac who misled millions with his specious reasoning and blank slateism) Stephan Gould sold more volumes of pop sci. It was Pinker's masterful refutation of the universal delusion that human nature is culturally generated (one of Gould's many delusions) that made his previous book 'The Blank Slate' a classic and a top choice for most important books of the 21st century. Incidentally, there are many put-downs of Gould, including some by Pinker and Dawkins ("he has made tilting at windmills into his own personal art form" —as I recall it from a Dawkins review of a Gould tome from the Journal 'Evolution' a decade or so ago), but I think the best is that of Tooby and Cosmides in a letter to the NY Times (search their page or the Times). All of these works are intimately connected by the subject of animal behavior, evolutionary psychology, and of course 'The Stuff of Thought'.

Following convention, Pinker discusses Putnam's famous , but badly flawed, twin earth thought experiment (bizarre thought expts. in philosophy were essentially invented by Wittgenstein), which claims to show that meaning is not in the head, but it was W in the 30's—i.e., 40 years earlier-- who showed decisively that all the dispositions or inclinations (as he called them, though philosophers, lacking acquaintance with his work commonly call them by the incorrect name of propositional attitudes) including meaning, intending, thinking, believing, judging etc. function as descriptions of our actions and not as terms for mental phenomena. They cannot be in the head for the same reason a soccer game cannot be in the head. Later in life Putnam began to take Wittgenstein seriously and changed his tune accordingly.

He makes almost no reference to the large and fascinating literature on behavioral automatisms (i.e., most of our behavior!--see e.g., "Experiments With People' (2004) or Bargh's 'Social Psychology and the Unconscious' (2007) for the older work, and the now (2016) vast and rapidly expanding literature on implicit cognition), which shows that the more you look, the clearer it becomes that actions which we regard as results of our conscious choice are not. People shown pictures or reading stories of old people tend to walk out of the building slower than when give those of young people etc. etc. The well-known placebo effect is a variant where the info is consciously input—e.g., in a 2008 study eighty-five percent of volunteers who thought they were getting a \$2.50 sugar pill said they felt less pain after taking it, compared with a 61 percent control group. Such effects can be induced subliminally if the price info is input via images, text or sound. Presumably the same is true of most of our choices.

This brings us to one of my major gripes about this book—it's monomaniacal obsession with the "meaning" of words rather than their *use*-- a distinction made famous by W in his lectures and some 20 books beginning in the 1930's. Like W's insistence that we do not *explain* behavior (or the rest of nature) but only *describe* it, this may seem like a pointless quibble, but, as usual, I have found as I reflected on these matters over the years that W was right on the mark. He said that a formula which will work most of the time is that the meaning of a word (far better to say a sentence) is its use in language—and this means its *public* use in a specified context to communicate info from one person to another (and sometimes to another higher mammal—dogs share a major portion of our intentional psychology). I mention this partly because in a previous book Pinker accused W of denying that animals have consciousness (an extraordinary view that is actually defended by some) because he noted that a dog can't think "perhaps it will rain tomorrow", but W's point was the unexceptional one that there are many thoughts that we cannot have without language and that we have no test for interpreting a dog's behavior as showing that it expected something tomorrow. Even if it used an umbrella and invariably got it out of the closet the day before a rain, there is no way to connect this to it's mental state—same for a deaf mute who could not read or write or use sign language. This connects to his famous demonstrations of the impossibility of a private language and to the fact that dispositions are not in the head. W showed how the absence of any public test means that even the dog and the mute cannot *know* what they are thinking—nor can we, because disposition are public acts and the act is the criterion for what we thought—even for ourself. This is the point of the quote above—neither God nor neurophysiologists can see thoughts, beliefs, images, hopes in our brain because they these are terms for acts and neither the vague and fleeting epiphenomena we experience nor the correlates detectable by brain studies function in our life in the same way as do the contextual use of the sentences describing these acts. And, regarding animal consciousness, W noted that intentional psychology gets a foothold even in a fly—a point marvelously and increasingly supported by modern genetics which shows that many genes and processes fundamental to primate behavior got their start at least as early as nematodes (i.e., *C. elegans*) some billion years ago.

Intentional psychology or intentionality (very roughly our personality or rationality or higher order thought (HOT) is a very old philosophical concept that (unknown to most) was given its modern formulation by Wittgenstein, who, in the 20,000 pages of his *nachlass*, now mostly translated and published in some 20 books and several CDROM's, laid the foundations for the modern study of human behavior. Sadly, he was mostly a recluse who did not publish for the last 30 years of his life, never really finished writing anything of his later work and wrote his brilliant and highly original comments on behavior in a style variously termed epigrammatic, telegraphic, oracular, Socratic, obscure etc. and all published posthumously over a period of more than 50 years (the famous Philosophical Investigations (PI) in 1953 and the most recent-but not the last!—The Big Typescript in 2005) and thus, though he was recently voted one of the top 5 philosophers of all time, and Philosophical Investigations the most important philosophy book of the 20th century, he is ignored or misunderstood by nearly everyone. The feeling I often get is that our psychology is a coral reef with most people snorkeling on the surface admiring the bumps while Wittgenstein is 20 meters below probing the crevices with scuba gear and flashlight.

Wittgenstein's literary executors were stuffy academics and his books issued mostly from Blackwell with staid academic titles and no explanation whatsoever that they can be seen as a major foundation for the modern study of evolutionary psychology, personality, rationality, language, consciousness, politics, theology, literature, anthropology, sociology, law etc., –in fact everything that we say, think and do since, as he showed, it all depends on the innate axioms of our evolved psychology which we share to a large extent with dogs and to some extent even with flies and *C. elegans*. Had his works been presented with flashy covers by popular presses with titles like *How the Mind Works*, *The Language Instinct*, and *The Stuff of*

Thought, much of the intellectual landscape of the 20th century might have been different. As it is, though he is the major subject of at least 200 books and 10,000 papers and discussed in countless thousands more (including Pinker's *How the Mind Works*), based on the hundreds of articles and dozens of books I have read in the last few years, I would say there are less than a dozen people who really grasp the significance of his work, as I present it in this and my other reviews.

Those wishing a comprehensive up to date account of Wittgenstein, Searle and their analysis of behavior from the modern two systems view may consult my article *The Logical Structure of Philosophy, Psychology, Mind and Language as Revealed in Wittgenstein and Searle (2016)*.

One result of all this (what one philosopher has called “the collective amnesia regarding Wittgenstein”) is that students of language including Pinker take Grice's notions such as implicature (which seems just a fancy word for implication) and, more recently, relevance theory, as a framework for “the relation between words and meaning” (of course W would turn in his grave at this phrase since how can they be separable from their use if one follows his meaning is use formula?) but they seem to me feeble substitutes for intentionality as described by W and revised and enlarged by Searle and others. In any case, Grice is the normal soporific academic, Sperber (a leader in relevance theory) tolerable, Pinker engaging and often elegant and even poignant, Searle (see esp. ‘Rationality in Action’) is clear, rigorous, and quite original (though owing, I think, a very big debt to W) but too academic for the bestseller lists, while Wittgenstein, once you grasp that he is a natural master psychologist describing how the mind works, is very demanding, but brilliantly original and often breathtaking. Pinker writes masterful prose while Wittgenstein writes telegrams, though often moving and poetic ones and on a few occasions he wrote beautiful essays. Pinker can be mined for some gold, lots of iron and some dross while W is mostly gold, a little iron and hardly a speck of dross. Pinker is mostly summarizing the work of others (though in impeccable style) while W is so original and so bizarre he's way over most people's heads. I suggest reading Pinker, Searle and Wittgenstein alternately or simultaneously with a dash of Sperber, Grice and a few hundred others from time to time.

W said that the problem is not to find the answer, but to recognize that which is always before us as the answer. That is, our language is (by and large) our thought, which is about actual or potential events (including actions by agents such as barking, speaking and writing), and that meaning, contra Pinker and a cast of thousands, is use and nothing is hidden (i.e., language is (mostly) thought).

The ignorance in many quarters is so complete that even an otherwise marvelous recent 358 page book by Wiese on a topic virtually created by Wittgenstein (*Numbers*,

Language and the Human Mind—which I see is cited by Pinker) there is not a single reference to him!

W mostly emphasizes the different uses of the “same” words” (i.e., a splitter) who originally wanted to use the quote “I’ll teach you differences!” as the motto of his book *Philosophical Investigations*. That is, by describing the different uses of sentences (the language games), and by modifying the games in thought experiments, we remind ourselves of the different roles these games play in life and we see the limits of our psychology. But Pinker, again following the seductive defaults of our evolved modules and the egregious examples of thousands of others, is a lumpner who often blurs these differences. E.G., he speaks repeatedly of “reality” as though it was a single thing (rather than a whole family of uses). He also speaks of reality as something separate from our experience (i.e., the classic idealist/realist confusion). But what test is there for reality? He slips (as do we all) so easily into the reductionistic substitution of lower levels for higher ones so we are all inclined to dismiss the thinking that we can see (i.e., actions) for processes in the brain, which our language (thought) can not possibly be describing, as it evolved long before anyone had any idea of brain functions. If Pinker imagines that you are not really reading this page (e.g., your retina is being hit with photons bouncing off ink molecules etc.) then I respectfully suggest he needs to reflect further on the issue of language, thought and reality and I know of no better antidote to this toxic meme than immersion in Wittgenstein.

Reflecting on Wittgenstein brings to mind a comment attributed to Cambridge Philosophy professor C.D. Broad (who did not understand nor like him) which ran something like ‘Not offering the chair of philosophy to Wittgenstein would be like not offering the chair of physics to Einstein!’ I think of Wittgenstein as the Einstein of intuitive psychology. Though born ten years later, he was likewise hatching ideas about the nature of reality at nearly the same time and in the same part of the world and like Einstein nearly died in WW1. Now suppose Einstein was a suicidal homosexual recluse with a difficult personality who published only one early version of his ideas that were confused and often mistaken, but became world famous; completely changed his ideas but for the next 30 years published nothing more, and knowledge of his new work in mostly garbled form diffused slowly from occasional lectures and students notes; that he died in 1951 leaving behind over 20,000 pages of mostly handwritten scribblings in German, composed of sentences or short paragraphs with, often, no clear relationship to sentences before or after; that these were cut and pasted from other notebooks written years earlier with notes in the margins, underlinings and crossed out words so that many sentences have multiple variants; that his literary executives cut this indigestible mass into pieces, leaving out what they wished and struggling with the monstrous task of capturing the correct meaning of sentences which were conveying utterly novel views of how the universe works and that they then published this material with agonizing slowness (not finished after half a century) with prefaces that contained no real explanation of what it was about; that he became as much notorious as famous due to many statements that all previous physics was a mistake and even nonsense and that virtually nobody understood his work, in spite of hundreds of books and tens of thousands of papers discussing it; that many physicists knew only his early work in which

he had made a definitive summation of Newtonian physics stated in such extremely abstract and condensed form that it was impossible to decide what was being said; that he was then virtually forgotten and that most books and articles on the nature of the world and the diverse topics of modern physics had only passing and usually erroneous references to him and that many omitted him entirely; that to this day, half a century after his death, there were only a handful of people who really grasped the monumental consequences of what he had done. This, I claim, is precisely the situation with Wittgenstein.

It seems crushingly obvious that our evolved psychology has been selected to match the world to the maximal extent compatible with our genetic and energetic resources and that is ALL we can say about reality, and we ALL understand this (we LIVE it) but when we stop to think about it, the defaults of our universal psychology take over and we start to use the words (concepts) of “reality,” “aspects,” “time,” “space,” “possible,” etc. out of the intentional contexts in which they evolved. The following gem comes from biologists (I take it from Shettleworth’s superb but neglected book *Cognition, Evolution and Behavior*).

“The role of psychology then is to describe the innate features of the minds of different organisms which have evolved to match certain aspects of that physical external universe, and the way in which the physical universe interacts with the mind to produce the phenomenal world. “
O’Keefe and Nadel “The Hippocampus as a Cognitive Map”

Think of it this way—you can look up a word in the dictionary but you cannot look up a use there, unless there was a video which showed before and after the event and all relevant facts about it. The dictionary is like a morgue full of dead bodies. Here lies “rose” and here “run” and here “in” and here “is” and what is missing is life. Add a photo and it’s a little better: add a video and lots better: add a long 3D color hires video with sound and smell and its getting there.

Part of Wittgenstein’s description of our public psychology included many detailed examples of how the sensations and images in my mind don’t carry any epistemic weight even for me. How do I know I am eating an apple? My taste and vision might be wrong and how to decide? But if I talk about it or write it down and you say “that’s a tasty looking apple” etc. I have an objective test. Right and wrong get a foothold here.

W was going to use a quote from Goethe as the motto of PI --“In the beginning was the deed.” That is, evolutionarily it was perceptions and actions and then memories of them and then thoughts about them and then words voicing the thoughts. So, the event is the thing *Australopithecus* thought about and natural selection for being able to make acoustic blasts which substituted for them was strong enough to modify our vocal apparatus and suitable control circuitry at a fantastic pace, so by early Neanderthal time they were talking a blue streak and have not shut up mind or mouth for more than a few minutes since. W understood, as few have, the primacy of actions and the irrelevance of our thoughts, feelings etc. as the foundations of communication, which is why he is often

called a behaviorist (i.e., Dennett, Hofstadter, B.F. Skinner style denial of the reality of our mental life, mind, consciousness etc.) but this is patently absurd.

It reminds me of the famous description of Plato of the shadows on the cave wall vs turning around to see people actually using language—an analogy that I never thought of in regard to W and which I was stunned to see a few hours later in Pinker's last chapter. In any case if one considers carefully any case of language use we see that much of our intentional psychology is called into play.

One can see the ignorance of Wittgenstein in the articles in EEL2 (the Elsevier Encyclopedia of Language and Linguistics-2nd ed. (2005) 12,353p- yes that's 12 *thousand* pages in 14 vols and a mere \$6000) which is by far the biggest, and one hopes the most authoritative, reference in language studies. Curiously, Pinker does not have a single reference to it, but you can find it, along with nearly all of Pinker, Searle, Wittgenstein and thousands of others free on the net.

To get a grasp of the basic necessities for AI you might e.g., find it much more interesting to read W's RFM than Minsky's 'The Emotion Machine'. Pinker has referred to Brown's famous list of hundreds of universals of human behavior, but these are nearly all gross higher level behaviors such as the possession of religion, reciprocal altruisms etc. but it large omits hundreds of other universals which underlie these. Wittgenstein was the first, and in some cases perhaps the only one to date, to point out many of the more fundamental ones. However he did not tell you what he was doing and nobody else has either so you will have to puzzle it out for yourself. Most people read first (and often nothing else) his Philosophical Investigations but I prefer the more strictly mathematical examples in his Remarks on the Foundations of Mathematics. If you read with the understanding that he is describing the universal axioms of our evolutionary psychology which underlie all our reasoning then his work makes perfect sense and is breathtaking in its ingenuity.

Pinker illustrates how the mind works with the Barbecue Sauce example. There are of course a limitless number of others which illustrate our subjective probability (often called Bayesian reasoning—though he does not mention this). My favorites are Doomsday (see e.g., Bostrum's book or web page), Sleeping Beauty and Newcomb's problem. Unlike Barbecue, which has a clear solution, many others have (depending on your viewpoint) one, none or many. We may regard these as interesting, as they show gaps in or limits to our rationality (a major theme in Wittgenstein) or (what we have known at least since de Finetti's work in the 20's) that all probability is subjective, or like the famous liar paradox or Godel's theorems (see my review of Hofstadter's 'I am a Strange Loop), as trivial demonstrations of the limits of our primate mind, though Pinker does not expand on this issue nor give more than a few hints at the vast literature on decision theory, game theory, behavioral economics, Bayesianism etc.

EEL2 does have a passable short article on W which avoids making too many glaring errors, but it totally misses nearly everything of importance, which, if really understood, would make the article by far the longest one in the book. Nearly the whole thing is

wasted on the Tractatus, which everyone knows he totally rejected later and which is extremely confused and confusing as well. Hardly anything on his later philosophy and not a word about the two searchable CDROM's which are now the starting point for all W scholars (and anyone interested in human behavior) which are now becoming widely disseminate via the net. There is also nothing here nor in the articles about Chomsky, innate ideas, evolution of syntax, evolution of semantics, evolution of pragmatics (practically every one of his 20,000 pages has to do with novel ideas and examples on these two), schema theory etc., nor about how he anticipated Chomsky in studying "depth grammar", described the problem of underdetermination or combinatorial explosion nor a word about his discovery (repeatedly and in detail—e.g., RPP Vol. 2 p20) some 20 years before Wason of the reasons for "glitches" in "if p then q" types of constructions now analyzed by the Wason selection tests (one of the standard tools of EP research), nor about how his work can be seen as anticipating many ideas in evolutionary psychology, about his founding the modern study of intentionality, of dispositions as actions, of the epiphenomenality of our mental life and of the unity of language, math, geometry, music, art and games, nor even an explanation of what he meant by language games and grammar—two of his most frequently used terms. W made the change from trying to understand the mind as a logical, domain general structure to a psychological idiosyncratic domain specific one in the late 20's but Kahneman got the Nobel for it in 2002, for numerous reasons, not the least of which is that they did lab work and statistical analysis (though W was a superb experimentalist and quite good at math). Of course one cannot fault the EEL2 too much as it merely follows the similar omissions and lack of understanding throughout the behavioral sciences. And, I am not bringing this up in the way one might complain about the absence of info on ancient Chinese war rockets in a book on rocket engines, but because his work is still a virtually untapped mine of behavioral science diamonds, and, for my money, some of the most exhilarating and eye opening prose I have ever read. Nearly anything he has written could be used as a supplementary text or lab manual in any philosophy or psychology class and in much of law, mathematics, literature, behavioral economics, history, politics, anthropology, sociology and of course linguistics. Which brings us back to Pinker.

In the last chapter, using the famous metaphor of Plato's cave, he beautifully summarizes the book with an overview of how the mind (language, thought, intentional psychology) – a product of blind selfishness, moderated only slightly by automated altruism for close relatives carrying copies of our genes--works automatically, but tries to end on an upbeat note by giving us hope that we can nevertheless employ its vast capabilities to cooperate and make the world a decent place to live.

Pinker is certainly aware of but says little about the fact that far more about our psychology is left out than included. Among windows into human nature that are left out or given minimal attention are math and geometry, music and sounds, images, events and causality, ontology (classes of things), dispositions (believing, thinking, judging, intending etc.) and the rest of intentional psychology of action, neurotransmitters and entheogens, spiritual states (e.g., satori and enlightenment, brain stimulation and recording, brain damage and behavioral deficits and disorders, games and sports, decision

theory (including game theory and behavioral economics), animal behavior (very little language but a billion years of shared genetics). Many books have been written about each of these areas of intentional psychology. The data in this book are descriptions, not explanations that show why our brains do it this way or how it is done. How do we know to use the sentences in their various ways (i.e., know all their meanings)? This is evolutionary psychology that operates at a more basic level –the level where Wittgenstein is most active. And there is scant attention to context.

Among the countless books not referred to here are Guerino Mazzola's excellent tome investigating the similarity of math and music 'The Topos of Music', Shulgin's amazing work probing the mind with psychochemicals 'Phikal' and 'Tikal'. Many which try to represent mental functions with geometrical or mathematical means such as Rott 'Belief Revision' Gardenfors various books, and of course the massive efforts going in logic (e.g. the 20 or so Vol Handbook of Philosophical Logic) as well as many others edited or written by the amazing Dov Gabbay (e.g., 'Temporal Logic'). Re spatial language of the numerous volumes on the psychology, language or philosophy of space, the recent 'Handbook of Spatial Logic' (especially fun are Chap 11 on space-time and the last Chap. by Varzi) stands out. The point is that these logical, geometrical and mathematical works are extensions of our innate axiomatic psychology and so they show in their equations and graphics something about the 'shape' or 'form' or 'function' of our thoughts (modules, templates, inference engines) and so also the shape of those of animals and even perhaps of computers (though one has to think of what test would be relevant here!). And of course all the works of Wittgenstein, keeping mind that he is sometimes talking about the most basic prelinguistic or even pre-mammalian levels of thought and perception. Of course many books on AI, robot navigation and image processing are relevant as they must mimic our psychology. Face recognition is one of our most striking abilities (though even crustaceans can do it) and the best recent work I know is 'Handbook of Face Recognition'. Of the numerous books on space/time one can start with Klein's 'Language and Time' or McLure's 'The Philosophy of Time'. Smith's 'Language and Time', Hawley's 'How Things Persist' and Sider's 'Four- Dimensionalism', Ludlow's 'Semantics, Tense and Time', Dainton's 'Time and Space'.and 'Unity of Consciousness', Diek's 'The Ontology of Spacetime' and Sattig's 'The Language and Reality of Time". But as one would expect and as detailed by Rupert Read, the language games here are all tangled up and most the discussions of time are hopelessly incoherent.

And also a good but now dated book covering much of relevance with articles by Searle and others is Vanderveken's 'Logic, Thought and Action'.