Steven Pinker and Rebecca Goldstein

"There's a sea change, felt throughout the culture. There's a return to substantive questions, and there are artists fascinated with the thinkers pursuing substantive questions, the romance of knowledge. What we are seeing now also is more tolerance for being mystified, for recognizing that we sometimes stand, scientists too, in the presence of questions that are too big for us. We're allowing ourselves to be stunned by immensity and by our own cognitive incapacities."

Photography by Henry Leutwyler

*Rebecca Goldstein (opposite) has a PhD in philosophy from Princeton, and has taught at Barnard, Rutgers, and Columbia. Currently she is Professor of Philosophy at Trinity College. She is the author of five novels (*The Mind-Body Problem, The Late-Summer Passion of a Woman of Mind, The Dark Sister, Mazel, *and* Properties of Light*) and a collection of stories (*Strange Attractors*). Among her honors are two Whiting Foundation Awards (one in philosophy, one in writing), two National Jewish Book Awards, the Edward Lewis Wallant Award, and the Prairie Schooner Best Short Story Award. In 1996 she was named a MacArthur Foundation Fellow. Steven Pinker (previous page) has a PhD in experimental psychology from Harvard, and has taught at Stanford, MIT, and Harvard, where he is currently the Johnstone Professor of Psychology. Pinker's research on language and cognition has won prizes from the National Academy of Sciences, the Royal Institution of Great Britain, and the American Psychological Association. His books, including* The Language Instinct, How the Mind Works, Words and Rules, *and* The Blank Slate, *have earned the William James Book Prize (three times), the Los Angeles Times Science Book Prize, and two shortlistings for the Pulitzer Prize.*

May 19, 2004

Rebecca Goldstein: It's nice that we now have this chance to talk. I've been a longtime fan of yours. I was blown away by *How the Mind Works*. So many cognitive faculties explained, and such a satisfying strategy for explanation: combining the computational theory of mind with evolutionary psychology. It's an elegant and powerful theory.

Steven Pinker: Thank you. I'm happy to return the compliment. Your first novel, *The Mind-Body Problem*, is a classic among people in my field, and I've enjoyed all your novels since. They've taught me a lot of philosophy and physics, and they're tremendously enjoyable as literary fiction.

It seems to me that you were ahead of your time in bringing themes from science into fiction. We're certainly seeing more of that now: Authors are incorporating ideas from science into their fiction—together with analytical philosophy, which I consider continuous with science. And scientists are seeking insight from literature and other cultural mediums.

Perhaps it's because many of the ideas that scientists and philosophers worry about are the same ideas that thoughtful people worry about. How can we know the truth? What is the relation between mind and body? What does it mean to do right or wrong? Is morality a product of our minds and tastes? Or does it somehow exist outside of us?

RG: These are questions you can hardly avoid if you're at all given to self-reflection, though the culture did try to avoid them for quite a few decades. Scientists were apt to call these big questions meaningless, and philosophers were even more likely to do the same.

SP: One question that seems to worry both of us regards realism—the idea that things really exist out there, and are not just social constructions or figments of our imagination. Your characters are obsessed with realism. In *Properties of Light*, the embittered physicist hates the standard interpretation of quantum mechanics in which particles don't really have physical properties until they are observed. And in *The Mind-Body Problem*, the mathematician Noam Himmel staunchly believed he was discovering aspects of reality.

RG: Yes. Noam's form of mathematical realism can strike laypeople as eccentric, but I was really just echoing the ideas of famous mathematicians, particularly G.H. Hardy's in *A Mathematician's Apology*. Say you ask a mathematician, "What do you think you're doing when you do mathematics? Is it like chess, where you make up some rules and see what you can or can't do with them? Is math just a bunch of empty tautologies? Or are mathematicians just discovering the implications of certain features of thinking, so that you're really in the business of psychology? Or are you mathematicians more like physicists, discovering the facts—not of the spatiotemporal world but of necessary truths about objective mathematical structures?" Most mathematicians would probably choose an option like the last.

SP: Cognitive scientists care about this question because they wonder whether math is just the exercise of certain faculties of an evolved mind—the number sense, spatial cognition, estimation. Of course this may not be incompatible with mathematical realism. Given a creature who, for good evolutionary reasons, has a mind that can grasp concepts like two, three, and addition, the nature of mathematical reality gives it no choice but to conclude that two plus three equals five.

But why would a novelist care so much about realism?

RG: The search for objective knowledge strikes me as a form of heroism. It can be deeply marked by egotism, of course, and great thinkers certainly aren't necessarily saints. Still, to subjugate yourself to the objective truth is a humbling experience. And the life of the mind is filled with passion, so it's a fit subject for art, as more novelists and playwrights and moviemakers are finding. Dramatizing the passion of knowledge-seeking is a good corrective for post-modern cynicism.

heroism

SP: One of your characters, Raizel Kaidish, was passionate about the idea that morality has an objective reality. Many people who believe in the reality of rocks and even numbers have particular trouble swallowing moral realism.

RG: They do and they don't. People are often committed to moral realism without realizing it. My students often argue for moral relativism on the grounds that anything else is intolerant of other points of view. They're not willing to regard tolerance relativistically. Tolerance is a moral value on the basis of which they inconsistently argue that there are no moral values.

SP: People are always realists when it comes to their own convictions.

RG: One of the arguments for realism—and I'm thinking here of an argument that I think you make about our realism in regard to the external world of three-dimensional objects—is to show that these beliefs are structural features of our thinking and we can't get along without them. When we deny them, we end up contradicting ourselves, and the impossibility of consistent doubt provides some evidence for their truth. These deep instincts for realism—whether for physical objects or moral values—may have evolved because these actually are realities, so it's useful to believe that they are.

SP: The biological argument against cultural relativism is that it is not just a set of social conventions that vary from culture to culture, like driving on the left or right, but has roots in human

nature. But many people are just as nervous about *this* possibility, because they fear that it leaves morality as nothing more than a figment of the wiring of our brain, and still ultimately a sham.

But Raizel made me think that there really is a sense in which morality has a logic that exists outside of us, and that our moral sense may have evolved to grasp this moral reality in the same way that our faculty of depth perception evolved to deal with a world that really is three-dimensional.

RG: There is something in grasping another person in the full complexity of their own personhood that entails another domain of facts, facts about rights and obligations. There are ways that you can and can't morally treat a subject of experience, especially if that subject is a person. So if we're realists about other persons, perhaps we're forced to be moral realists. That's basically the Kantian argument.

SP: As long as your welfare depends on the actions of another person—as long as you're not a galactic overlord—you can't insist that they adhere to a code of behavior that you're not willing to adhere to yourself. Logically, you can't make the argument that you have privileged interests that other people lack—that there's something uniquely special about you in the universe.

RG: In the story you refer to, it's Raizel's mother, a Holocaust survivor, who makes an argument like the one you're making—that the immoralist is committing a sort of logical error in refusing to universalize the mattering he confers on his own person to other persons. Sometimes the mistake resides—as in the Holocaust—in not acknowledging the personhood of certain groups of people.

SP: Morality, at heart, is the idea that one's own perspective is not privileged—that the only coherent code of behavior takes a disinterested perspective that applies equally to oneself and to others.

RG: One of the many things I've learned from your work is that this kind of argument has its basis in our intuitive psychology. Part of the innate structure of our mind is a belief that other people are people in just the way we are. We need this belief to make sense of other people's actions and relate those actions to desires, beliefs, hopes, fears, the whole structure of the inner life. But there's a moral element in our acknowledging that other people have all the aspects of subjecthood that we do.

SP: The ability to take someone else's perspective may tie into the moral sense and the forces that led it to evolve—namely, the logic of reciprocity. If we live in a world in which each of us, in the fullness of time, will be in a position to do the other a favor—or at least refrain from hurting each other—and if we both end up better off if we help each other than if we hurt each other, then certain moral emotions are expected to evolve. For instance, sympathy, where we extend help to someone who we feel needs it, or gratitude, where we feel warm towards someone who extends help to us, or righteous anger, when we want to punish someone who withholds help or causes harm. So an aspect of reality—the inherent benefits of interchanging perspectives—may have shaped an aspect of the mind, namely the moral sense.

RG: I'm sympathetic to this account of moral reasoning, up to a point. But I don't feel that it provides the whole story of what it is to think morally, or the complete answer to why we all more or less naturally think morally, so that even the moral relativists in my classroom can't help slipping into moral realism. There's something very immediate, though also very complicated, in imagining yourself into another person that we don't get to by way of game-theoretic calculations. I think the rest of the moral story is tied up with a different kind of thinking—narrative thinking.

SP: And that brings us back to fiction. One problem for anyone like me who believes in a fixed human nature, including a fixed moral sense, is to explain how human behavior could have changed so radically over a few centuries or millennia. Much of the world has seen an end to slavery, to genocide for convenience, to torture as a routine form of criminal punishment, to capital punishment for property crimes, to human sacrifice, to rape as the spoils of war, to the ownership of women. We seem to be turning into a nicer species.

RG: There certainly are places on the globe right now where we're regressing dreadfully....

SP: But taking a millennium by millennium view, the twentieth century may....

RG: Seem like a bloodletting of horrible proportions, when in fact, statistically....

SP: We have a much lower rate of death in warfare than pre-state, hunter-gatherer societies.

RG: So we're getting less cruel.

SP: We are getting less cruel, and the question is how. The philosopher Peter Singer offers a clue when he notes that there really does seem to be a universal capacity for empathy, but that by default people apply it only within the narrow circle of the family or village or clan. Over the millennia, the moral circle has expanded to encompass other clans, other tribes, and other races. The question is, why did it happen? What stretched our innate capacity for empathy? And one answer is mediums that force us to take other people's perspectives, such as journalism, history, and realistic fiction.

RG: Storytelling does it.

SP: By allowing you to project yourself into the lives of people of different times and places and races, in a way that wouldn't spontaneously occur to you, fiction can force you into the perspective of a person unlike yourself, who might otherwise seem subhuman.

RG: There's a fundamental role that storytelling is always playing in the moral life. To try to see somebody on their own terms, which is part of what it is to be moral, is to try to make sense of their world, to try to tell the story of their life as they would tell it. So in our real life, just in making sense of people's actions and in seeing them in the moral light, we're involved in storytelling.

SP: So you agree that fiction can expand a person's moral circle?

RG: I think storytelling, in general, has a moral use. To be in the throes of a story, to have one's emotions provoked by another's story, is not quite ethics, but it's kind of the shadowlife of ethics. We train children by telling them stories. We try to get them to feel their way into other lives, and that itself is something. If we had no capacity for that there would be no hope. It would just be all rules that you would follow for fear of being punished if you didn't. And that doesn't amount to becoming a moral agent. But then storytelling can also correct that second sort of moral mistake, the one of not recognizing the essential personhood of certain groups outside your chosen sphere. And that's

morality

really the point you're addressing in speaking about the expansion of a person's moral circle and the role that fiction can play.

SP: One famous example, I guess, is *Uncle Tom's Cabin*.

RG: Lincoln, when he met Harriet Beecher Stowe, said, "So you're the little woman who wrote the book that made this great war!" He meant that she, as a novelist, got people to see the enslaved as people. And once you do see that, certain kinds of behavior become impossible.

I have a personal story about this. My sister was teaching English at an all-girl high school that was rather racist. So she brought in a short story, and she had the girls read it aloud. It was about a black man, and because the girls were so insensitive to this issue, they didn't get the clues about the identity of the protagonist until very late in the story, after they were hooked. She said it was like watching a moral awakening. They had been weeping over this man's story, inhabiting the point of view of someone who in real life would have been entirely opaque to them. And now that they had inhabited this point of view, would they ever feel the same again?

SP: That's a wonderful example of an answer to the question, "How can a part of the mind that was there all along—the capacity for empathy, in this case—suddenly be extended to a new target, which may not be evolutionarily natural?" Fiction can be a kind of moral technology.

RG: Storytelling is something that can awaken attentiveness, engagement, and empathy to a life that isn't one's own. And to be attentive, engaged, empathetic: that is moral.

SP: Of course, we don't only listen to stories to expand our moral sense. A puzzle that I wonder about is why our species takes so much pleasure in fictional narratives in general. Storytelling is universal; it's done in all cultures. And it emerges early in our lives, as we see from the delight that children take in stories. But why do people devote so much brain power to creating and appreciating tales of things that aren't true? Literature is a pack of lies. There never was a Hamlet. Eliza Doolittle never existed. But still, we can't get enough of it. And we also have the sense that storytelling is inherently worthy. It's not a waste of time to appreciate good fiction.

RG: So I'm going to ask the sort of question I learned to ask from studying you: How could all this storytelling have adaptive value? What good does it do the species to sit around enchanting itself with make-believe? And it really is a kind of enchantment. A writer feels it very much, because the enchantment of writing is of even greater intensity than being an enchanted reader. Plato said it was a kind of madness, which is why he didn't think very much of the literary writers. He exiled them from his utopia.

SP: You have delusions.

RG: You're spellbound. You hear voices. You're inhabiting another world. It's so thick, it's so deep, it's so profound, that it can seem like a half step away from madness. Except one is in control, and when the book is finished, the voices go away, which is always reassuring.

There's also the fact that when you are in that thick enchantment, so far away from reality, you're so much smarter, and that seems mystifying to me. Think of what Shakespeare knew about human nature, things you scientists can explain only years and years later. And the great writers still know more about human nature than you scientists do. There's something about this state of fictive enchantment that puts the enchanted writer in the way of very large truths, and that's an aspect that's very mysterious to me. And I'd like you to explain it.

SP: *[Laughs]* I don't know if I can do that, but I certainly have worried about the puzzle too. Why is fiction so compelling? Part of the answer might be that it is a way in which we press our own pleasure buttons. There are good adaptive reasons for people to enjoy gossip, namely that it provides compromising information about other people, which allows us to do the equivalent of insider trading. In a sense, fiction is simulated gossip. You're a witness to the secret foibles of other people. They just happen not to exist.

RG: And it's true that the great themes of gossip—sex and violence—are the great themes of fiction.

SP: I've argued that the pleasure-button theory helps explain many art forms, like painting and music. They would be evolutionary by-products, not adaptations. But when it comes to fictional narratives, I suspect there is an adaptive benefit as well. One problem we all face is how to act in a world that presents a vast combinatorial space of possibilities, especially when it comes to other people. I can do any of ten things, and you can do any of ten things in response to each of those ten things, and I can do ten things in response to your response, and so on. There is an explosion of possibilities that no mortal mind can deduce in advance. What fiction might do is allow people to play out, in their minds' eyes, hypothetical courses of action in hypothetical circumstances, which would then allow them to anticipate what would happen if they ever faced those situations in reality.

gossip

RG: If I'm a bored young wife, living with a provincial doctor, what will happen if I have a series of affairs with men above my social station and get into a great deal of debt that I can't tell my husband about? Flaubert figures out the consequences for us, so we don't have to go and actually live through Emma Bovary's bad decisions.

SP: Exactly. He answers the question, What's the worst that could happen?

For an adaptive hypothesis to be taken seriously, there should be some independent reason to believe that the trait really is a good engineering solution to the problem. We don't want to just invent any old story for why some part of the mind is useful, just because we know that the mind has that part. In this case, I think there is an independent rationale. It comes from the approach to artificial intelligence called case-based reasoning, in which the best way to solve a problem is to analogize it to some similar problem encountered in the past, rather than cranking out a set of deductions using logical rules. So the system keeps a library of cases in memory and refers back to them when solving a similar problem.

Perhaps fiction is a kind of case-based reasoning. It multiplies the number of scenarios that you have tucked away in your mind and that you can call on as a guide for a future action. Of course, for that to work, there have to be constraints in the fictional worlds. It can't be true that anything can happen, or else what plays out in a fictional plot would have no lessons for real life. And this gets us back to your observation that novelists feel they're at their most intelligent when they're creating fiction. I think the reason is that you have to have, in your own mind, a model of all of reality, so that *Continued on page 97*

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you can place your fictitious character in a plausible world. You can afford to be much stupider in real life. When we live our lives, we can let reality determine what happens. We don't have to remember that if you go upstairs you are no longer downstairs, or that when people get angry their face tends to show it. If you forget, the world will remind you. But a novelist has to keep that entire world in her head.

RG: There's this tremendous amount to hold in mind that the reader isn't aware of it. It's like the kinesthetic sense. You know where your body is; you don't have to look where your legs are right now. Well, a reader wanders through this reality, knowing without having to consciously think of all the things that have to be there. But if the writer violates this sense, if there's an inconsistency at all, the reader will immediately spot it.

SP: It breaks the spell.

RG: So there's a lot to carry in your mind when you're a writer. But what's so strange to me is that I've discovered things that I hadn't known and that I don't think I ever could have discovered except by being half out of my mind in fictive enchantment. Like the mattering map.

SP: Which is?

RG: Well, it's this idea that one of my fictional characters, Renee Feuer, in *The Mind-Body Problem*, came up with. One of the ways that you can understand a person is to understand what truly matters to them, what zone they occupy in the mattering map.

SP: So, in the mattering map of a typical academic, clothes count for nothing. Intelligence is the only thing that matters.

RG: If somebody tells me, "Nobody's worn that since 1983," what do I care? That's not my zone of the mattering map. Renee Feuer came up with an elaborate theory of mattering maps, and I've learned that this idea is now used in certain branches of psychology. I would say that I was the one who first formulated it, only that feels slightly dishonest. My character formulated it, or I did when I was trying to think like her, or when I was her. This state of fictive enchantment can put you in a strange relationship with your own identity, kind of hovering outside of it. That happens when you're deeply reading too, of course, but even more so when you're writing. And that weird hovering puts you in the way of big truths. That's my impressionistic, nonscientific explanation for why writers are smarter when they're writing fiction than when they're not.

SP: What about science fiction, or fantasy, or magical realism?

RG: There are still a hell of a lot of facts to keep straight—

SP: Yes, and I guess it's only a few circumscribed aspects of reality that are explicitly contradicted. The rest of reality, the reader assumes, works the way it has always worked. Otherwise, anything could happen, and I suspect people would get no pleasure out of fiction.

RG: The imagination is a cognitive faculty that's greatly underrated. Imagination is extremely important in science, as well. One of my favorite quotes from Einstein was something like, "When I look at myself, and my own methods of thinking, I have to draw the conclusion that my gift for fantasy has meant more to me than my talent for absorbing positive knowledge." So Einstein was a fantasist, too. Special relativity arose out of his famous thought experiment of trying to imagine himself riding a light beam. That rigorous theory originated in an act of imaginative fancy.

SP: My former colleague Roger Shepard has argued that every major finding in the history of science was first discovered through imagination, or at least could have been. Galileo could have discovered that objects fall at the same rate regardless of what they weigh by imagining two one-pound weights falling side by side, and then imagining a drop of glue joining them into a single two-pound object. Of course, that drop of glue couldn't have sped up the fall! And Roger showed that many great scientists were like Einstein. For example, Maxwell, of equation fame, began by visualizing electromagnetic fields as if they were elaborate sheets and fluids.

RG: Analytic philosophers are always making up stories, too.

SP and **RG:** *The Thought Experiment*.

RG: Sometimes the stories are very elaborate. Can you blow up a fat guy who's blocking the exit to the cave, if 20 people are inside about to die? Or if time travel is possible, can you go back in time and kill your great-grandmother before you were born?

SP: What would happen if a lightening bolt hit a swamp, and the droplets of goo just happened to coagulate into a molecule-by-molecule replica of myself?

RG: Lots of highly imaginative stories told. But they're not enchanting in the way that fiction is enchanting. These are stories constructed precisely to figure things out, and because of that you're never in danger of falling under a spell, stepping out of your identity. No matter how imaginative these thought-experiments are, you experience them as a form of argumentative reasoning. There's the pleasure of good thinking, at least when the thinking is good, but there's not the distinctive pleasure of fiction.

SP: In some cases, thought experiments have been incorporated directly into mediocre science fiction. *Back to the Future*, for example, was based on your thought experiment about time travel, and *The Matrix* was Descartes' evil demon brought to life. Many episodes of *The Twilight Zone* and *Star Trek* were philosophers' thought experiments staged for the camera.

So what is the extra ingredient that a good novelist supplies? Is it some combination of the two parts of fiction we discussed—the cognitive advantages of seeing how hypothetical scenarios play out, together with the emotional pleasures of empathizing with a character to whom good things happen?

RG: I think you're right, that you can't discount either factor—although I think it's more the pleasure of feeling a life that's not your own, not necessarily vicariously participating in good fortune. Tragic art provides some of the deepest aesthetic pleasure of all. Another factor that might contribute to the deep pleasure of storytelling is that it confers significance. Stories, unlike life, have a point. We'd like to think that our lives have a point, though we often suspect otherwise. But stories are shaped around points, even if the point of the story is the pointlessness of our lives.

SP: This may connect to our original question, namely, why are we only now seeing a convergence of science and culture? Perhaps it's because science and philosophy themselves have changed in the last 30 years. They are starting to address themselves far more to the themes that ordinary thoughtful people care about. As I recall, one of Renee Feuer's frustrations with her

career in philosophy was that philosophy had abandoned all interesting questions and instead was just trying to expose fallacies of reason that came from unclear language.

RG: Philosophy just got so modest. It's laudable to try to be clear and precise, but in philosophy you have to risk a little imprecision or you're going to end up saying nothing at all.

SP: We're seeing philosophers grappling more with the substantive problems of life, like the self, morality, consciousness, after having abandoned them as meaningless.

RG: Philosophy is subservient to the sciences. It's often trying to explain the philosophical implications of the sciences, to clarify, do clean-up work. I have this terrible image right now of the guys in the circus following after the elephants, cleaning up.

SP: *[Laughs]* While philosophy was dominated by logical positivism, psychology was dominated by behaviorism, which also denied that there was any meaning to concepts like emotions, images, morality, will, and consciousness. It's only recently that the science of mind has considered those to be respectable topics again. So perhaps it's natural that fiction, which has always dealt with those problems, should only now be getting inspiration from the sciences.

RG: I think that your field in particular, and specifically your work, has had such radical philosophical implications in terms of consciousness, the self, intelligence, the moral sense. People like you have helped force philosophers back into philosophy.

SP: Even cognitive science was, for many years, devoted only to the nerdiest parts of our minds, such as recognizing shapes and stringing words into grammatical sentences. One reason evolutionary psychology has became so popular is not that it invokes evolution but that it deals with the problems that laypeople consider central to their experience but that were long banned from the psychology curriculum. Love. Sex. Family. Status. Dominance. Motherhood. Gossip. Religion. Play. Food. Beauty. Jealousy. Disgust. One might think that these would be basic topics in any science of the human mind. But don't try to find them in the psychology textbooks. Evolutionary psychology is trying to win back a place for them.

RG: The theory of the mind that you've given us is making them amenable, at long last, to rigorous explanation. I think it's a very good sign for our culture that your books sell so well. This theory is not only intellectually exciting, in the way that good science is, but it globally changes the way to regard so many aspects of human life. It's deeply transformative.

SP: Which may be why you see evolutionary psychology and cognitive science appearing in the fiction of people like Ian MacEwan and David Lodge.

RG: There's a sea change, felt throughout the culture. There's a return to substantive questions, and there are artists fascinated with the thinkers pursuing substantive questions, the romance of knowledge. What we are seeing now also is more tolerance for being mystified, for recognizing that we sometimes stand, scientists too, in the presence of questions that are too big for us. We're allowing ourselves to be stunned by immensity and by our own cognitive incapacities.

SP: One of the ironies of treating the mind as a part of the natural world, as a product of evolution, is that one expects there should be problems that the mind is incapable of grasping, simply because of the way it's put together. You wouldn't expect a rat to learn a maze in which the food is placed in the prime-numbered arms—not because there's anything mystical about prime numbers, but because that's not the way a rat brain works. For the same reason, there may be limitations to the way the human brain works that make certain problems eternally paradoxical. One of the problems might be what philosophers call the "hard problem of consciousness."

RG: The "easy" problem of consciousness you guys solved. Or at least you know, basically, the sort of explanation to look for. Those are the problems you take on in *How The Mind Works*, subjecting them to the powerful explanatory machinery of the modular and computational theories of the mind and Darwinism.

SP: "Easy problem" is said with a smirk, because there's nothing scientifically easy about it. But at least they are tractable. These are questions like, "What's the difference between conscious and unconscious information processing, and where are they found in the brain? Why, in terms of engineering design, would a brain have evolved to segregate certain kinds of information and make them accessible to decision-making and verbal report, and to seal off other kinds in dedicated processors?" We don't have answers to these questions yet, but I think we will.

Whereas the hard problem—

RG: That's the traditional problem, the mind-body problem, that we haven't solved.

SP: Yes—why consciousness, in the sense of first-person subjective experience, should exist at all. Why it should feel like something to be a heap of firing neurons.

RG: There's something poignant and ironic about the situation that we're in.

LABORATORY
The Skies Over Birmingham

At dawn on May 13, residents of Birmingham, England, were serenaded by music from the heavens. Seven hot-air ballons, broadcasting soothing melodies, bathed the sleeping city in an aural tapestry orchestrated by sleep psychologists. The goal of this magnificent floating installation, organized by musicians Luke Jerram and Dan Jones, was simply to stimulate sweeter dreams.

We're inhabiting these minds, which in some sense we know very intimately. We're also learning ever more about our minds from scientific fields like yours, which explain how so much of intelligence, so many different cognitive capacities that we have, are computational. But then there's this extra fact about our minds: It feels like something to have them, to be undergoing these computational processes. And why that is still something we don't have a clue about. That's the question that isn't computational.

SP: Which, tragically, is the most indubitable thing we know. Namely, that we are conscious, as Descartes famously pointed out. So Descartes might have had the last laugh after all, even if he became something of a laughingstock among scientists, as we see in book titles such as *Descartes' Error* and *Goodbye Descartes*.

RG: He's the general-purpose whipping boy in philosophy and in science.

SP: Because of his dualism.

RG: He isolated the hard problem of consciousness, which was good, but then he went ahead and drew an ontological conclusion that attracts derision. Seeing the obstacles to explaining consciousness scientifically, he inferred that consciousness isn't located in the body. According to him, the subject of experience isn't identical with the body and there you get your good old "ghost in the machine," as the philosopher Gilbert Ryle facetiously dubbed it.

SP: Today we would say that consciousness is undeniably a manifestation of the physiology of neural tissue. You don't need extra ghostly stuff. But we can't really explain why it should feel like something to be that tissue, perhaps because our minds just don't work in a way that would allow us to understand the explanation. Perhaps an extraterrestrial with a brain that worked in a slightly different way could understand it.

RG: It's amazing that we've managed to get as much of a grasp of the world as we have.

SP: Given that the mind is a biological gadget.

RG: Given that the mind is a gadget that evolved in an environment where we were basically trying to solve problems of hunting and gathering, evading predators....

SP: Prospering in a social milieu.

RG: The fact that the mind evolved to deal with those concrete situations and it has applied its cognitive capacities to doing string theory and figuring out how the mind works is pretty amazing. So the thought that it can't grasp everything, particularly about itself, doesn't seem surprising, does it?

SP: In fact it would seem to be necessary, if we really are evolved creatures and not angels. Only angels could understand everything about everything.

RG: And we're no angels. *[Laughs]* Before we call it a day, I want to know what new book you're working on and how long we'll have to wait to get it.

SP: I just finished editing *Best American Science and Nature Writing 2004*, which will come out in September. In a couple of years I hope to complete *The Stuff of Thought: Language as a Window onto the Mind*, which is about the elementary ways of thinking and feeling from which our thoughts are composed, and how they reveal themselves in the structure of language. What is your next project?

RG: I'm taking a little respite from fiction. I've just finished a book on the mathematical logician Kurt Gödel, and his incompleteness theorems, for the Norton series "Great Discoveries." Half of the book explores the proof of the theorems and its implications, and half tries to penetrate this enigmatic man. He, too, was an ardent realist about mathematical truth.

SP: It's not just a game.

RG: Not for Gödel. His famous theorems were inspired by his mathematical realism. He's the kind of character I love to write about, passionate about ideas, misinterpreted. Only of course he's not one of my characters.

SP: He existed.

RG: But he's perfect anyway.

Criminal Science

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element of the "aggravating" factors needed to secure a capital conviction.

In 1985, DNA testing wasn't available to provide definitive answers about whose semen it was. Instead, the prosecution's case relied on the analysis and testimony of FBI forensic serologist Special Agent Paul Bigbee, who said the semen came from a "secretor" with type A blood and that House was a type A secretor.

Bigbee, a prosecution witness, was asked by General Phillips during House's original trial if Little Hube could have been the semen donor. Bigbee replied, "I was not able to determine his secretor status."

"OK. And he is definitely not a secretor?"

"I don't know whether he is or not. I could not determine that."

When testing for secretor status, scientists look for the "Lewis factor"—a blood antigen unique to a secretor. Two bodily fluids can be tested for the Lewis factor: blood and saliva. Blood is the less conclusive; saliva, however, always produces a definitive answer. Bigbee did test Little Hube's blood to ascertain his secretor status. And, exactly as he stated in his testimony, the results were inconclusive, and he was "unable to determine" Little Hube's secretor status. But Bigbee never tested a sample of Little Hube's saliva, a procedure guaranteeing a result. No saliva sample was sent by the prosecution, and Bigbee never requested one.

At trial, General Phillips quickly asked Bigbee,

"But you know that Mr. House definitely is a secretor?"

"Yes, sir."

It's hard to fathom why no saliva was tested, given the weight attached by the prosecution to the secretor evidence. What is apparent is that a line of investigation that may have provided exculpatory evidence for the defense was not pursued fully.

Another key piece of evidence wasn't aired: Before TBI Special Agent Scott sent Little Hube's blood for testing, Little Hube admitted he'd had sex with Carolyn on the day of her death. His statement was never seen by the defense.

Whatever obfuscation may have taken place during the original trial, new science has now proven whose semen was on Carolyn's clothes. An independent laboratory, California-based Forensic Analytical, performed DNA typing on House's blood and compared it to DNA extracted from the semen stains. The result was definitive: The DNA in the semen wasn't House's. A second round of tests by North Carolina molecular biology consultants LabCorp confirmed that DNA from the semen was a match with Little Hube—who proved to be a type A secretor.

THE BLOOD Carolyn's blood, smeared all over House's jeans, appears to be an insurmountable obstacle to claims of House's innocence. But it is possible this