

# BRAIN SCIENCE PODCAST

*With Ginger Campbell, MD*

## Episode #6

Discussion of *The First Idea: How Symbols, Language, and Intelligence Evolved from Our Primate Ancestors to Modern Humans*, by Stanley Greenspan,

MD and Stuart Shanker, PhD

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## INTRODUCTION

This is the *Brain Science Podcast*, and I'm your host, Dr. Ginger Campbell. The *Brain Science Podcast* is the podcast for everyone who has a brain. In this podcast we explore how recent discoveries in neuroscience are unraveling the mysteries of how our brains make us who we are.

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This is the *Brain Science Podcast*, Episode 6. Today's episode is a discussion of the book by Dr. Stanley Greenspan, MD and Stuart Shanker, PhD, called [\*The First Idea: How Symbols, Language, and Intelligence Evolved from our Primate Ancestors to Modern Humans\*](#). Your first response to this title might be what does this have to do with brain science, so I want to take a minute to talk about how I choose topics for the *Brain Science Podcast*.

Since this is a one-woman show and I do all the preparation myself, in general the topics are a reflection of whatever I am reading; although I certainly pick my reading with a view to sharing it with you. I've been wanting to talk about

emotion, and this book's basic premise is that emotional development is intimately related to the development of language and intelligence.

However, it also goes into a great deal of discussion of child development, and evolution, and theories about language. It's a lot more multidisciplinary than some of the topics we've discussed so far. I am going to try to concentrate on the brain-related aspects of the book, but you may find that the topic is not quite as brain-focused as you might like. And it's fine if you don't find this episode of interest; but I hope you will.

Also, since this episode is about theories of brain development, you might find it useful if you haven't already listened to [Episode 4—\*The Great Brain Debate\*](#)—to go back and listen to that episode, as the information about brain development that's discussed in that episode is relevant to this episode. I will try to make references back to the key points, but I can't really duplicate everything. It is my intention to make episodes as free-standing as possible, but of course I can't really make them completely unconnected from each other.

Before I get into my discussion of the book I want to say something about the authors. Dr. Greenspan is a professor of psychiatry and pediatrics, and he is one of the world's leading authorities on clinical work with infants and young children. He has done a great deal of work with children with autism and has written several other books on these subjects. Dr. Shanker is an authority on the philosophy of Wittgenstein—who was a philosopher very much concerned with questions of language—and he has been at the forefront of ape language research and child language studies.

So, they bring a unique breadth of experience to this subject. It's quite a deep book, and I'm sure that my discussion of it will be regarded as superficial by anyone who's ever read the book. But I think you will find the main ideas very

interesting. And, as always, I appreciate your feedback, which you can send to me at [docartemis@gmail.com](mailto:docartemis@gmail.com), or visit the website at [brainsciencepodcast.com](http://brainsciencepodcast.com).

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## DISCUSSION

Dr. Greenspan and Dr. Shanker begin *The First Idea* by saying that they are formulating a hypothesis “about the evolution of symbols, reflexive thinking, and language skills that challenges the prevailing theory.” The hypothesis itself is fairly straightforward. It basically is the proposal that emotions are intimately related to the development of intelligence and language.

The clue that led to this theory is the observation that children deprived of early nurturing develop problems in social language and thinking capacity. Dr. Greenspan published a paper back in 1987 showing that early problems in emotional interactions were associated with a variety of language and cognitive difficulties in children. In particular, he has done extensive work with children with autism. I’ll talk more about that in a little while.

The authors propose that emotional signaling is the missing link between the level of the brain involved in basic emotions and higher cognitive capacity. In a way this challenges other views, because they are not looking at emotions as being separate but as intimately involved in higher cognitive capacities. There’s a lot of stuff about child development in this book that I’m not going to get into. However, I am going to talk about their picture of childhood development, since it helps to see how the theory works.

Dr. Greenspan says that the key step is moving from what he calls ‘fixed action level’ to a meaningful symbol; and this requires two conditions: “Relevant emotional experience must invest symbols as they form,” and, “A symbol emerges

when a perception is separated from its action.” The key idea is that meaningful words involve emotionally rich images.

This is best understood if we use a simple example. Let’s say that a guy is sitting at a bar and somebody jostles him from behind. He might have a natural reaction of anger. And there are two possibilities: he could just turn around and smack the guy; or he could stop and reflect, assess the situation, realize it was probably unintentional, and not smack the guy.

We would assume that turning around and hitting someone in this situation is abnormal behavior. But we have to realize that being able to not do this is actually a huge leap. If you look at non-humans, perception is generally closely tied to action. A stimulus leads to attack, flight, eat it, whatever. There’s not much problem solving. Early on the baby is at this stage: you stick something in front of it and it just grabs it.

Coming back to the guy at the bar, the first step is described as separating perception from action. In other words, stopping; not just smacking the guy. And there are actually three steps. At the earliest level you just have perception and action—that’s the perception fixed action stage. Then you could have perception followed by an urge to act and the emotion. And finally at the highest level you have reflection and the decision not to act.

Putting it in terms of child development, once a baby can perceive an object or a person without acting on it, then that becomes a freestanding image. This is a huge step. Then over time these images get more and more emotional content until eventually they become an internal symbol, like the idea or symbol of ‘mother’. Dr. Greenspan says, “A freestanding symbol becomes an internal symbol that continues to define itself throughout life.”

To appreciate the truth of this, just think about something like the idea of your mother and how throughout life, as different events evolve, your symbol of her is becoming richer and richer and richer. Or, think about something simple like your favorite food and the fact that this, too, is full of emotional content. This is what the authors call ‘double coding.’ An essential part of their hypothesis is that everything we learn is double-coded: it has an emotional component and then the perception itself.

So, from the standpoint of development, he says that the tough question is how do we separate a perception from the initial tendency or urge to action? He calls this emotional urge to action a ‘catastrophic feeling state,’ and he points out that this is at the primitive motor level of the nervous system. He claims that a key step in learning is learning to tame these catastrophic emotions.

How does this happen? Well, around 6 months of age the baby starts to learn to transfer these catastrophic emotions into interactive signals. In other words, smiling at his mother and getting attention—things like that. By 8 months he is capable of a back-and-forth emotional signaling, and by 11 months the signaling is becoming very complex.

But what if the caregiver is unresponsive? They’ve actually done this in the lab—although not very often because it has bad effects. But they’ve seen that the baby will at first try harder and harder to get the caregiver’s attention, and then eventually he just gives up and begins to show a very depressed demeanor. There’s an important conclusion from this observation, and it is that the baby needs the experience of back-and-forth emotional signaling.

There’s a lot of detail about child development and emotional development in the book that I don’t have time to get into. I recommend reading the book if you’re interested in more detail in this area. The key idea is that the baby learns “to signal with his emotion his intent, rather than engage in a complete fixed action.”

For example, if he acts angry and signals like he's about to hit or bite, but then his mother responds and he doesn't actually hit or bite. So, by having a caregiver who's responsive he learns to modulate the intensity of his emotions. Obviously the converse—a poorly attentive caregiver—has a bad effect.

The baby is learning that negotiation involves interaction between two people. This means it's important that the caregiver, or mother, is responsive, but it doesn't mean you have to let the baby have everything it wants. The key is the responsive interaction. So, instead of the so-called "fixed stimulus response" the author proposes that this involves a variety of problem solving interactions between two people. For example, when the mother is trying to get the baby to eat and she might offer it a certain thing it doesn't want to eat, offer it something else, or do things to make it eat; but it's a two-way interaction.

Another point that he makes is that this emotional interaction is just as important for the caregiver as it is for the child. It takes time to develop confidence in your ability to understand what your baby wants, because each baby has different personality levels. And he wonders about the implications for busy societies where fewer parents are logging enough time to gain this confidence.

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So, this is the first step, which is to not just do something immediately in response to an emotion. The hypothesis he proposes here is that "an idea is an image that has been freed from a fixed immediate action and is invested with affects or emotions that give it meaning." So, the 'first idea' referred to in the book's title is the emergence of the ability to invest a free-standing image with emotional meaning, which makes it into a meaningful multisensory affective image (and that's his language.)

The basic idea is that the image has an emotional and a sensory component. And he says the content of the first idea would be as diverse as the emotions of early humans. And then symbols come about when perceptions are separated from action. He says, “This is achieved by co-regulated emotional interactions with other human beings. Ongoing co-regulated emotional interactions provide emerging and later symbols with meaning throughout life.”

When he uses this phrase, ‘co-regulated,’ it starts to sound very academic, but the idea is that it’s a two-way communication. My emotional signals to you are having an effect on you, and then you in turn make emotional signals to me that affect me. That’s what’s meant by co-regulated.

Now, Greenspan says that his position is different from Damasio—the researcher who’s well-known for his work with the importance of emotions in intelligent behavior—because he says that Damasio is treating emotions as if they are predetermined and really separate. He challenges that most contemporary viewpoints about emotions remain Cartesian—that is, separating emotion from everything else—because they regard emotions as separate from intellectual function.

He’s really arguing for a model that integrates emotional and cognitive development. He calls this model the functional emotional (f/e) developmental capacity model. I would say getting past some of the language might be an obstacle for someone reading this book as a lay reader, although he really does do a good job of defining terms as he goes along.

The main point is that this functional emotional model explains several things. It explains how emotions enable a child to master symbols, the critical role that emotions play in the development of intelligence, and how emotion provides purpose to the mind’s different processing capacities. He also proposes that higher levels of emotional interaction are the key for the ability to form social

groups and societies, and that we should give emotions a more important role in both the development of mind and the development of society.

I'm not going to talk a lot about this model, but I am going to talk about a few points. One is that in this model it is proposed that each baby has its own unique experiences and emotional responses. For example, some are more sensitive and others are more withdrawn. So, at the beginning you have emotions being a physiological system receiving input from the senses. Then, through interactive experience emotions become a complex tool for creating an internal mental life. And that just means that emotions are a key part of the image you form of the world.

He goes into detail about all of the particular stages beginning with, for example, the earliest stage is the baby just learning to turn its head when it hears its mother's voice; all the way up through stages involving language; up to higher levels in which a person can recognize other people's points of view relative to one's own and progress past just black-and-white thinking.

The key idea is that each stage involves a mastery of a combination of emotional and cognitive—that is, intellectual—abilities. For example, the baby first learns causality through emotional signaling with its caregiver. It learns that it smiles at its mother, the mother smiles back. So, at each stage new cognitive skills are learned from emotional experiences.

In this model it would be argued that you can't be fully intelligent without experiencing deeply and fully the full range of life's emotional experiences such as loss, love, and competition. So, it takes time to have the kind of intelligence that we call wisdom. In the book there are a lot of examples from childhood learning such as problem solving, when the toddler learns how to get his parent to take a toy off the shelf by pointing, etc.



The examples in the book help us to consider how many ideas really get transmitted to children before they even have any language. And our social life depends on the ability to pick up all sorts of non-verbal cues. Support for this approach comes from the author's work with autistic children. Basically he argues that they have a problem—that's biologically based—with learning the co-regulated emotional signaling, because they have a problem with connecting emotion to their emerging ability to plan and sequence actions.

Now, he doesn't talk a lot about consciousness in this book, but in the context of child development he does say that his model is proposing "language does not create consciousness. It provides a new way of labeling and expanding consciousness." I think this really fits well with the growing evidence that animals are conscious.

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At several points in the book he talks about the evolutionary implications of this theory. For one thing he is arguing for gradual emergence of the abilities that we call human development, which he argues fits growing archaeological evidence about the abilities of early hominids. His key idea is that a change in caregiving practices, not a genetic mutation, was what led to us: the key caregiving practice being the interaction between the baby and the caregiver. And this is really supported by the growing evidence about emotional signaling ability in other animals, especially non-human primates.

It's really remarkable how complex the emotional signaling is between chimps, bonobos, and other primates. It might even represent something similar to what our ancestors were capable of. You might have heard recently on the news that the discovery was made that chimpanzees have been using tools for over 4000 years, and that this has the implication that perhaps tool using was passed on from an earlier common ancestor. 4000 years to a common ancestor is a pretty

big leap; but the point is that this transmission would be a cultural one, not a genetic transmission.

In fact, in Dr. Greenspan's model the most advanced stages in his functional emotional development scale don't even arise until ancient Greece. He is emphasizing the role of cultural evolution and, probably just as importantly, he's arguing that it is continuing. This challenges long-held assumptions that we have not evolved at all since the emergence of *Homo sapiens* about 600,000 years ago.

It also challenges the extrapolations that evolutionary psychologists like to make between early humans and modern behavior. I'm not taking any sides in this debate, but I appreciate that this theory seems to integrate a lot of recent research, and I find his examples from childhood development to be very compelling. The idea that everything we learn is double-coded with emotional and perceptual information fits experience. Few would argue that book learning is just as good as doing.

Thinking a little bit more about evolution, the theory is challenging the assumption that all normal humans are born with the same mental capacity. It also challenges the trend to see all human abilities as being genetically predetermined. This is a controversial area because, as Steven Pinker points out in *The Blank Slate*, people on both sides of the political spectrum have a vested interest in clinging to particular viewpoints. For one thing, these viewpoints have implications about what our responsibilities are as a society.

From a practical standpoint it seems clear that people are different in their aptitudes for different endeavors. Yet in recent years it has become politically incorrect to acknowledge this. My husband is an engineering professor, and he is teaching at a school where they're basically not allowed to tell anybody that they don't have the aptitude to be engineers.

Fortunately people still do have to try out for basketball. No one considers that everyone could be a pro basketball player; so why do they think anyone could be an engineer? Do you want it to be such that anyone can go to medical school? To me that's kind of a scary thought. I'd like to think that my doctor actually has the aptitude for medicine.

In [Episode 4](#) of this podcast we talked about the book, *The Great Brain Debate*, and how neuroscience is revealing surprising levels of neuroplasticity, especially in children. Here Dr. Greenspan<sup>1</sup> is making the key point that his research indicates the importance of being aware of how critical interactive emotional experience is in the emotional and cognitive development of the child. And this really fits with what we talked about in Episode 4.

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Another area where the theory proposed in *The First Idea* challenges current viewpoints is in the area of language. He explicitly states that he's challenging Chomsky's view of how language develops. Don't worry about it if you don't know who Chomsky is, because I'm going to tell you what you need to know in just a minute. One aspect of this challenge involves the question of how important language is, both in communication and in the emergence of intelligence.

There's a lot in this book about the research with chimpanzees and bonobos—and especially bonobos. This research shows that non-human primates are capable of surprising levels of communication without any human language. And the research shows that their communication begins with emotional interactions between bonobo babies and their mothers.

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<sup>1</sup> There were several occasions when I accidentally called Dr. Greenspan Dr. Greenfield. The author's correct name is used throughout this transcript.

In the book he mentions the increasing evidence of the use of tools by chimpanzees and our pre-human ancestors. And, as I mentioned about the recent discovery of the fact that chimpanzees may have been using tools for thousands of years, this model argues for the possible role of cultural evolution, even before the emergence of modern humans.

The key, according to the authors, is this so-called co-regulated emotional signaling, because as the communication becomes more complex and differentiated it becomes the key to the cultural evolution of human intelligence. They're basically arguing that as the functional capacity for co-regulated communication increases it leads to changes in the nervous system. Now, this would have at one time been considered a very heretical idea, but it really is feasible according to current knowledge about the nervous system.

How does this relate to language? They're arguing that language is not a result of a genetic mutation but rather developed through a series of gradual increments in complex emotional gesturing, leading finally to this representational thinking. In this model, language acquisition occurs through a prolonged process of preverbal communication that takes place in the first 18 months. Again, this point of view is supported by the evidence he has from his work with autistic children.

Those that don't master the preverbal emotional signaling stages also fail to acquire normal language and other cognitive skills. This evidence argues against the hard wired theory of language acquisition. Of course, we now appreciate that speech is not the only form of language, and we no longer assume that lack of speech means lack of reason. Think about the complex interactions of bonobos. But the question of whether language is necessary for human intelligence remains unsettled. There's a lot of emerging evidence that challenges this long-held assumption, but I'm going to have to save that for a future podcast.

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Dr. Greenspan points out that this theory is a radical departure from the usual Western thinking because it places emotion at the very heart of language development. This challenges Chomsky, and Steven Pinker's claim in *The Language Instinct* that language "develops spontaneously." I've read a bunch of Pinker's books, including *The Language Instinct* and *The Blank Slate*, and I highly recommend them.

I think the different point of view here is that Pinker did all his work with normal children, and he might have had a tendency to think that because certain things like the emergence of language were ubiquitous in his population, they were hard wired. Here Dr. Greenspan is claiming that it's a mistake to overlook the role of emotion in language development. He has convincing evidence that comes not just from his work with autistic children but also his work with children that have been deprived of early emotional interactions for other reasons, like being in an orphanage.

He discusses various models of language development in great detail. But the key point of our discussion is that this model claims to clarify the critical role of emotions in the interactional process of language development. Greenspan sees emotional gesturing as "the glue that binds biological and communicative processes together in the development of language skills."

If we recall the examples about brain development from Episode 4 we can see that the mechanistic models of Chomsky and Pinker could be valid in the sense that certain areas of the brain are probably hard wired to expect language. But then they have to get the necessary experiential inputs in order to develop properly. If you haven't listened to Episode 4 yet, I'll give you just a brief review of one of the examples.

In the development of vision it has been shown that various animals are born with certain connections to the visual cortex of the brain that expect sort of bands

of input from the left and right eye. However, if one eye is covered at a critical stage, then the cortex becomes completely dominated by the uncovered eye. And then later, even if the other eye is uncovered, no inputs can reach the cortex because there are no longer any connections.

This same idea would apply here. We can see the brain as being hard wired for language but that emotional interactions are a part of these connections developing properly. That's not all that different from what we see with regard to learning specific languages. One of the things that Pinker's work has shown is the idea that people start out able to make all the sounds of different languages, but they gradually lose these abilities if they aren't learned.

So, Greenspan's work is not really contradictory to Pinker's, it's just saying that there's a need to integrate the importance of emotional development into the language development. To sum it up, the theory is saying that the experience the brain gets in order to develop normal language must include interactive emotional signaling that gradually increases in complexity.

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We've talked a little bit about evolution and language. Another issue confronted by this theory is intelligence. Recent research has highlighted the importance of emotions, but researchers like Ledoux and Damasio have continued to see emotion as a subcortical discharge that is separate from the cortical reflexive process.

Again, in contrast, this theory defines intelligence as "the integration of subcortical and cortical processes." The authors argue that true intelligence integrates all the so-called types of intelligence: social and emotional skills, language skills, visuospatial thinking, academic skills, and many others. They

argue that this integration is necessary for the emergence of creative and reflexive thinking.

Another implication, according to them, is “understanding the emotional roots of intelligence suggests a more universal model of intelligence that can be applied across species.” If we start to see this basic ability of emotional signaling as the basis of intelligence then we start to see intelligence as being a continuum across species. And this really fits a lot of the different evidence, including the evidence of complex signaling between chimps and bonobos.

Their conclusion is, “Humans are not different because they symbolize the higher levels. They are different because they are more emotionally nuanced and continuous in their interactions.” So, again, the key idea is that this theory challenges the view that emotions and cognition are separate, and proposes that emotions integrate the different processing areas of the mind. In this theory emotions are the glue that holds the mind together.

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This was the longest episode that I’ve recorded so far, despite my attempts to simplify the complicated ideas in this book. As you can see, a simple hypothesis that emotional signaling is the basis for the development of language and intelligence leads to a lot of interesting implications that could be discussed at great length.

I hope you will leave some comments at the website at [brainsciencepodcast.com](http://brainsciencepodcast.com) or send me email at [docartemis@gmail.com](mailto:docartemis@gmail.com). I am particularly interested in getting your feedback about the length of the episode. I would generally not aim at making them quite this long, but I would like your opinion.

Thanks again for listening. I hope to be back with you in about two weeks.

[music] Transcribed by [Lori Wolfson](#) All errors or omissions responsibility of the transcriber