

# BRAIN SCIENCE PODCAST

*With Ginger Campbell, MD*

## [Episode #7](#)

Interview with Dr. Stuart Shanker, Co-author of *The First Idea: How Symbols, Language, and Intelligence Evolved from Our Primate Ancestors to Modern Humans*

Placed on-line: March 8, 2007

[music]

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

[music]

## INTRODUCTION

This is the *Brain Science Podcast*, [Episode 7](#). Today I have an interview with Dr. Stuart Shanker, co-author of [The First Idea](#), which is the book that I talked about in [Episode 6](#). *The First Idea* proposes that emotions are an intimate part of cognitive development: that emotional signaling is the first step toward the development of language and intelligence.

In this interview with Dr. Shanker I ask him about what he learned from his exposure to bonobos at the Language Research Center in Georgia. Bonobos are a rare chimpanzee, and they are different from the common chimpanzees in that

they are smaller and less aggressive. Their theme might be described as ‘make love, not war’—and this is literal.

The idea that any species of chimpanzees has anything resembling language is quite controversial, and has been challenged by writers like Steven Pinker. I don’t want to take sides on this, because I think the key idea is that these chimpanzees have some incredible abilities and they do have the ability to communicate, whether or not what you want to call what they do language.

Before I get into the interview I want to thank those of you who have been sending me emails. It’s pretty cool to get emails from people such as Francisca in Italy, and people in Australia and the Netherlands. Most of the feedback I’ve gotten is people wanting the podcast to be longer, not shorter—probably because anybody who thought it was too long didn’t make it to the part where I asked for the feedback.

But anyway, I really appreciate your feedback and I would really like for you to visit the website and leave more comments. The website is [brainsciencepodcast.com](http://brainsciencepodcast.com), and my email is [docartemis@gmail.com](mailto:docartemis@gmail.com).

Let’s get into the interview.

[music]

## **INTERVIEW**

**GC:** Today I have with me Dr. Stuart Shanker, who is a professor of philosophy at York University in Toronto, Canada. He is the co-author of the book, *The First Idea*, which he wrote with Dr. Stanley Greenspan. Dr. Shanker, I appreciate your being with me this morning. And I’m going to apologize to our entire audience for making you redo this when I wasn’t recording.

Your book is a very challenging book. It was a very ambitious book and I found it was very challenging to try to summarize it in a 30-minute podcast, so I wasn't able to talk much about the primate research. So, I appreciate your taking the time to talk to me. Can you start out by telling me again just a little bit about yourself?

**SS:** I am a Professor of Philosophy and Psychology at York University and I am the President of the Council of Early Child Development, which is a large international organization. Our mandate is to translate the latest discoveries in brain science into practical programs and measures that will enhance the developmental potential of every single child. I think what we're going to see in the 21<sup>st</sup> century is a revolution in how we enable every single child to maximize their developmental potential—whatever that potential might be.

Our science is now at the state where we can identify subtle problems or compromises very early in a child's life—even before they turn one year old—and begin intervention techniques that are incredibly effective at either mitigating or even preventing a large range of developmental and psychological disorders. So, I think what we're going to see in the 21<sup>st</sup> century is this massive shift to preventative developmental programs which are designed to pick up and, whenever possible, prevent problems before they get really serious. That's essentially what we do in the Council.

I also run a research institute at York University; and this is a developmental neuroscience institute. We specialize in working with young children that have been diagnosed with autism, and here we give these kids a very intensive therapy that was developed by Stanley Greenspan, called DIR. What we're interested in is whether, if we give these children therapy at a young enough age, we can return them to a healthy neurodevelopmental trajectory.

In other words, can we get their brains back onto a healthy developmental growth pattern? Our research is very exciting, and it shows us that at this point we're only just beginning to see how, if we can get to children at a young age, we can have a remarkably robust effect on helping them overcome their challenges.

**GC:** We were talking—when I wasn't recording—about how you got from philosophy to what you're doing now. I think your story is a good one for young people that haven't gotten their careers started yet, of how your career can go in a surprising direction. Can you tell me again a little bit about what you did at Oxford, and how that ended up where you are now?

**SS:** Well, when I was at Oxford I was specializing in the philosophy of an Austrian called Ludwig Wittgenstein, and I was actually working on Wittgenstein's writings in the philosophy of mathematics. But he was working in a very narrow area that we would today see as the sort of foundation of artificial intelligence—the whole idea that you could use computers to model how a child's mind develops. And Wittgenstein started to work extensively in the labs at Cambridge with young children, because he felt that the mathematical models he was looking at were too divorced from the reality of how kids really do develop.

And so, what I did at Oxford was I arranged for Jerome Bruner—who was Chair of Psychology at Oxford—to teach me developmental psychology so that I could, quite literally, follow in Wittgenstein's footsteps. And eventually what happened was I ended up becoming a psychology professor and running a research institute on child development, and now running a big organization that tries to translate what we've learned in our lab into programs that we can apply in communities across the country.

**GC:** How did you get involved in primates and bonobos?

**SS:** Well, the bonobo story is a very interesting one. In the 1930's Wittgenstein began writing about the work of Wolfgang Kerler, who was studying chimpanzees in Tenerife. Wittgenstein was very interested in Kerler's research on chimps as a way of learning about the origins of the human mind. And, coincidentally, as I was working on this material I was asked to write a review of the work of Sue Savage-Rumbaugh. Sue was at that point a primatologist at Georgia State, and she was working with this new species of ape called bonobos.

Up until the late 1970's, language research with chimpanzees had really not been very promising. What happened in the 1970's was a Japanese scientist called Takayoshi Kano discovered this new species of ape—a bonobo—while he was in the Congo Basin. There were very few of them left. In fact, they had probably already passed the point of extinction—which means there are too few of them left in the wild for them to survive as a separate species.

Bonobos are a fascinating species because they are our (human beings') closest living relative on earth. They have about 99% of human DNA. Even more important for us is the fact that their social structure is remarkably similar to what we believe was the social structure of early humans. So, for scientists like myself—that are interested in the origins of the human mind and the kinds of experiences that promote the development of the human brain—bonobos are the best model we have where we can study and infer from what we see how we think very early humans were nurtured and what kinds of experiences promoted the development of their brains.

What I mentioned to you before is important here. When we were studying bonobos, one of the things that really first intrigued us was the fact that they are partially bipedal. What that means is they will spend part of the time walking around on two legs. And they use their two arms that have now been freed up to carry tools or to carry food.

And we think this is exactly what happened around five million years ago when *Australopithecus*—who is our most distant hominid ancestor—started to come down out of the trees and walk around on two legs. Bipedalism gave humans an extraordinary advantage over all other primates. It also set in motion a series of social and physical changes which led to the gradual increase in the size of the human brain: particularly the prefrontal part of the human brain, the prefrontal cortex.

So, we see two things happening in human evolutionary history that to some extent were in conflict with each other. One was that they were becoming more and more bipedal; so they were spending more and more time walking around just on two legs and using their hands for things like making tools and throwing weapons. And they had a larger and larger brain; which, if you think about it, sets a limit on bipedalism. The problem is that the ancient hominid female could only deliver a baby with so big a head—with so big a brain—and still retain the capacity to walk on two legs.

So, nature needed to come up with some sort of a solution; and the solution it came up with was to give birth to the human baby prematurely. Now, this is a very famous hypothesis—it's called secondary altriciality—and it was made famous by Stephen Jay Gould. And basically the hypothesis is that human babies are born around nine months prematurely, when their brain is still fairly small and is only one-quarter the size of an adult brain.

The child then goes through an extraordinary explosion of brain growth in the first two years of life: roughly it grows about 80% in the first two years. And it is quite clear to us that the child has to go through certain kinds of experiences in order to maximize this very early development. And this was one of the things that we were most interested in when we started studying bonobos: What kinds of experiences did they go through and how similar were those to the kinds of experiences that we see in baby humans?

In the work that I did with Sue we were working with apes that have really quite extraordinary linguistic abilities. Their linguistic abilities roughly range from around that of a two-year-old to that of an eight-year-old, depending on various factors: Depending on what you're talking about—if it's something that interests the ape—and then depending on their emotional state at the time.

For us the critical question was how was this possible? How was Sue able to achieve these extraordinary results with this ape that earlier researchers had not been able to achieve with chimpanzees? They'd had success with chimpanzees, but nothing like what Sue had accomplished with bonobos. Well, you could say that part of the reason is simply because bonobos are closer to us in terms of the overlap of DNA. But they're not that much closer; because chimps have about 98% of human DNA.

**GC:** Aren't chimps and bonobos both of a branch where they branched off from each other after their ancestor branched off from our common ancestor?

**SS:** Yes, that is correct.

**GC:** So, technically speaking, even if the DNA is more similar, chimps and bonobos would be about the same distance from us on the evolutionary tree.

**SS:** Yes. But one of the things that does intrigue us is that the social structure of bonobos is very different from that of chimps. Bonobos are a much more matriarchal society. And they also lived in groups that were of about 60 to 70 in the wild, which is probably roughly what our human ancestors lived in. So, for some scientists the reason why bonobos are a better model for early humans is because of their social structure, rather than because of their DNA structure.

Now, for us, when we looked at Sue's research the thing that really struck us was that she used a totally different paradigm—a totally different method for trying to get the bonobos that she worked with to have language skills—than what was

used with chimps. With chimps there was a very conscious attempt to model the linguistic behaviors that you wanted them to acquire. So, they used in effect a very intensive form of behavioral modification, where you would show a behavior and then just keep on repeating it until the ape did something approximately the same, and then reward the ape.

**GC:** There's a lot of controversy over whether that really is language. Right?

**SS:** Yes. It is a problem. I don't know if you want to talk about that or not.

**GC:** Tell me again about how you first met Sue; because that was in the part that I accidentally didn't record, and I think it's really important. It's important that my listeners understand that you started out as a skeptic.

**SS:** Well, what happened was at Oxford we were taught that only humans can have language because only humans have the genes that regulate the development of language systems in the brain. And so, a priori it meant that no ape could possibly have language. So, I wrote a very critical review of Sue's research in which I said it was very interesting what she had accomplished because it showed us that apes are capable of remarkable cognitive skills—they can memorize large numbers of symbols—but that that's not language, it's just sophisticated communication: that what she didn't seem to understand was the difference between communication and language

And Sue responded to that article by calling me. She had been offered by the journal the opportunity to respond in print to whatever I said. And she said to me on the phone that she was prepared to waive that opportunity, and instead invited me to come down to Georgia and to spend one week alone in the cages with the apes. She said, 'You can do whatever you want, you can run whatever tests you want, and at the end of that week it's up to you to decide if you want to write your own response to the article that you just published.'

So, I arranged to go down to the Language Research Center with a linguist. And we had written up all kinds of tests that would enable us to tease out whether the apes were capable of understanding grammatical constructions—that's really what we wanted to know—or if they were just memorizing words. And Sue actually allowed us to set up testing sessions where we had a three-year-old little girl and one of Sue's bonobos, Kanzi, sit beside each other. And we had—it's called a corpus—we had 650 sentences we had prepared in advance that would allow us to compare Kanzi's grammatical competence with that of a three-year-old.

And the short answer to what we discovered is that there was virtually no difference at all between their grammatical competence. There were some interesting differences in terms of motivation, but in terms of what they understood there was very little difference at all. And so, Sue was right. I ended up writing my own response to my article. It turned into a book that I wrote with Sue called, *Apes, Language, and the Human Mind*.

**GC:** This is a particular area that I'm interested in because I've been talking about what is intelligence. And it seems to me that one of the points of *The First Idea* seemed to be that language is not the basis of intelligence, it's a consequence of intelligence. You argue in that book that it's the emotional signaling that leads to the ability to have language. The bonobos do a lot of emotional signaling, right?

**SS:** OK, so now the question that intrigued us was: Now we've got a case where we appear to have an ape that can match the linguistic ability of a little child. How was that possible? How did that happen? And what Sue had done was so different from what any other ape language researcher had ever done. She never once sat down and tried to train the bonobos how to use a particular symbol.

Instead all she did was she raised them in exactly the same way that you would raise a baby, just by interacting with them, by doing all the things with them during the day that you would do with a child. And they had these lexigram boards—the symbol boards—as a part of this. Because the apes don't have the same kind of vocal structure that we have, the scientists at the Language Research Center had created this lexigram board as a tool for communication.

But the key here was that the things they were doing during the day were bath time, preparing meals together, going on hikes. It was just normal day-to-day interactive routines in which language was embedded in their ordinary activities. And the motivation for the apes to learn these symbols came from their interest, and their excitement, and their pleasure in the day-to-day activities that they were engaging in with Sue.

Now, when we came in we were scientists who were working at that time with little children who were having trouble mastering language. And the thing that we found overwhelming was that when we looked at these apes, what jumped out at us was that their patterns of emotional signaling were virtually identical to what we saw in young kids that were learning how to speak.

In other words, for us it wasn't so much that they had X number of words or that they had X grammatical symbols. That wasn't really what made us excited. What we were excited about was to see that these apes were totally unlike any other ape we'd ever seen in terms of their capacity to engage in quite prolonged sessions of emotional signaling back and forth.

So, what do we mean by emotional signaling? Well, just think about the way a mother uses her voice, or her facial expression, or her eyes, or her hands to tell her baby do this, let's do this, isn't this fun: all this back-and-forth signaling that babies start to do at a very young age—within the first couple of months of life—with their mother. And at around the age of two months babies start to initiate

these emotional signals. They might make a happy expression or move their hands to tell mommy, 'I want to play now,' or, 'I want to have something to eat.'

This is something we had never ever seen in a non-human primate—this ability to initiate an interaction with an emotional signal. Yes, we had seen apes respond to emotional signals, but we'd never seen them initiate. But what we saw with Sue's bonobos was this extraordinary social emotional cognitive development where they were initiating interactions using emotional signals, where they were engaging in these interactions for extended periods of time. I've seen them do it for half an hour at a stretch; holding their attention, going back and forth, back and forth.

And so, to us what was clear was that their language abilities were a downstream effect; a consequence of this breakthrough in their emotional development. And the reason we were excited about it was because we were convinced that this is exactly what was going on when the human brain suddenly started to explode. It was this discovery of emotional interaction and the creation of more and more sophisticated and complex ways of signaling your emotional states back and forth between caregiver and baby.

**GC:** That's the thing about the book that I found very fascinating and very convincing. Can you give an example, say, from your own personal experience with Kanzi or one of the other bonobos?

**SS:** OK, here's a great one for you. One day—this was about the second or the third time I had gone down—and by this point the apes knew me fairly well. I had gone out with one of the graduate students and Panbanisha. Panbanisha is Kanzi's younger sister. And we were walking through the field, and Panbanisha started to vocalize to me. She came and quite literally got my hand and pulled my hand over to where she was standing. I had no idea what she was trying to tell me.

Now, in itself this was fascinating, because it was clear that she had something she wanted to convey, and this was entirely self-initiated. We were just walking through the woods. But I didn't know what the hell she wanted. And so, I turned to the grad student and asked her, 'What's she trying to tell me?' And we had a board with us, so the grad student gave Panbanisha the board. And Panbanisha started pointing to the symbol, 'bad,' 'bad,' 'bad,' and then looking down. And what it was, was a poisonous mushroom.

It was unbelievable. She was telling me that this mushroom was dangerous. But I didn't quite believe this because I didn't think that they had that kind of capacity. Because it meant that she somehow understood that I wouldn't know this, and wanted to convey this information. So, then I started to ask her with the board. We started to say, 'Well, is there something else bad?' And then we spent the next hour with this ape leading me around showing me good things and bad things using the board—those things that were fine to eat and those things that weren't.

And so, I remember I was talking to a scientist late that night and I was saying, 'This is just unbelievable.' Not simply because of the communicative advance, and not simply because she was using her voice, her gestures, and her eyes to communicate to me, but also her knowledge: her knowledge of the forest, her awareness of my ignorance—she knew that this was not my environment. I think we talked about this a little bit in the book. It was an extraordinary experience for me.

**GC:** Yes, you had a lot of great examples in the book, and like I said, I didn't really have a chance to mention them. And you said you wrote another book that's more specifically about this subject?

**SS:** Yes. Sue and I wrote a book called, *Apes, Language, and the Human Mind*. You know, scientists didn't want to hear this. You alluded, Ginger, at the

beginning to the fact that there's been a lot of controversy about whether or not this is language. And these are arguments we've had I guess for 20 years now, where there were a bunch of scientists who'd followed the lead of Noam Chomsky—by the way, I was a Chomskian in grad school—saying this can't possibly be language.

And it was kind of interesting. The reason we wrote that book was that it's a case where scientists get all excited about the wrong issue, because at the end of the day it really doesn't matter what you call it. What mattered was that here you had apes doing the most extraordinary thing, and what we needed to know was how was this possible. What were the processes that enabled them to make this incredible communicative leap? And so, for us the key was to understand the role of emotion and emotional interaction in the development of the mind.

What we do in my institute right now is we're looking at the role of emotion in the development of the brain. This is a slightly different question. But we see that emotions release certain chemicals that strengthen synaptic connections. And so, it turns out that at a molecular level there's a very strong reason why we were seeing what we were seeing with the bonobos.

Anyway, that first book was just our attempt to try to understand why everybody is hung up about this question of whether these animals have language or not—is it somehow a threat to our feeling of human uniqueness?—and, get over it, and let's do the real science. And the real science is to figure out how were these things possible and what do we learn from them.

Now, let me just say something about that. A lot of the work we do now is work with kids that have trouble getting language; and it could be anywhere from very mild to very severe. What we see over and over again is that there is a block in connecting their emotions up with their communication. And what we have to do

in our therapies is somehow mobilize their emotions in order to forge these connections.

And once we do that—as soon as we can get a kid to hook up, say, their emotional response to something with the use of a symbol—then language develops on its own. So, if what we're interested in is a child's language development or a child's cognitive development, the way we approach it is by working on their emotional development.

**GC:** That's what I find really fascinating about the work. In fact, I think that's why I picked this book to put on my podcast. Because you are, I think, pioneering the whole field of the fact that emotions aren't something separate, they're just completely part of what makes us intelligent.

**SS:** Ginger, that's absolutely the perfect way to put it. That's exactly what we think.

**GC:** Yes. Well, this has been great. I'm sorry about missing part of what you said at the beginning, because it was good.

**SS:** Don't worry about it.

**GC:** I'd like to talk to you again; maybe in the future talk about Wittgenstein and Chomsky. I don't think my listeners are really philosophy types, so we'd sort of have to start from scratch. I barely know a little bit about both of them. But I hope we can talk again in the future. Is there anything else you'd like to say?

**SS:** Just to tell you I love that you're doing this. I loved what you said to me before we got started. We are at a stage right now where there have been some incredible breakthroughs in brain science in the last 10 years, but they're written at such a level of technicality that the public doesn't really understand it. And so,

if somebody like you comes along and makes the effort to explain these ideas, it's great.

And they can all be explained in terms that we can all understand. You don't need to have a PhD in neuroscience to understand the importance of emotion and the importance of social interaction in the development of the brain. But scientists are terrible at doing this themselves. We just don't have those skills. So, I really do appreciate your doing this. And I would love to do it again sometime.

**GC:** Thank you.

[music]

Before I close I'd like to thank Dr. Shanker again for taking the time to be on my show. He was a very gracious guest. Also, I appreciate the fact that he really seems to get what I'm trying to accomplish with the *Brain Science Podcast*.

I'd like to have your feedback about the interview and whether you'd like to hear more interviews in the future. I know that the sound was a little noisy, and I think that was mostly at my end; so I'll definitely work on improving that.

As always I'd like for you to leave comments at the website at [brainsciencepodcast.com](http://brainsciencepodcast.com), or send me email at [docartemis@gmail.com](mailto:docartemis@gmail.com). At the website there is a blog post for each episode, so you can leave comments regarding the individual episodes, or even start discussions or ask questions about the individual episodes.

Also I have added a Frappr map. It's fun to see where all the listeners are coming from. I've heard from people from Italy, Australia, and the Netherlands, as well as all over the United States. I think that's pretty cool.

The website has an RSS feed and as I get more subscribers to that feed I'll try to start adding more content to the site in between podcasts. If you're going to sign up for the feed be sure to do it using the bright orange button that is usually at the bottom of each of the podcast Show Notes. That way it will go through FeedBurner and I'll actually be able to know how many of you there are.

Thanks again for listening. The next episode should be out in about two weeks, and I'm planning to discuss neurotransmitters. I know a lot of you have been wanting me to talk about brain chemistry, so that's going to be the episode. Until then, I hope you will check out my other podcast, *Books and Ideas*, which you can find at [booksandideas.com](http://booksandideas.com).

[music]

The *Brain Science Podcast* is released under a Creative Commons 2.5 No Derivatives Attribution license.

Transcribed by [Lori Wolfson](#)

All errors or omissions responsibility of the transcriber