



[SUMMARY](#) [TRANSCRIPT](#)

*Introduction:* You're listening to Radiolab from WNYC and NPR.

ROBERT KRULWICH: Okay let us begin—

SUSAN SCHALLER: Hello hello.

ROBERT KRULWICH: With an unusual encounter which comes from this lady here.

SUSAN SCHALLER: I'm Susan Schaller and where do you want me to start?

ROBERT KRULWICH: Her story starts; actually it starts kind of abruptly.

SUSAN SCHALLER: I was indeed riding a bicycle to high school. And a catering truck hit me and I was put in the hospital with a concussion. I was seventeen years old. And the concussion is bad enough that it slowed my brain enough that I couldn't read. And so naturally I couldn't go to school.

JAD ABUMRAD: Which sucked for her.

SUSAN SCHALLER: At seventeen I was very much a nerd and I was bored out of my mind.

ROBERT KRULWICH: So imagine Susan sitting there in the hospital. One day one of her friends...

SUSAN SCHALLER: A friend of mine who was just a little older and had graduated the semester before me suggested going to the nearby university and crashing classes—

ROBERT KRULWICH: Now wait a second why would you go—if your brain was working slowly why wouldn't you go swimming?

SUSAN SCHALLER: Well I couldn't read but I could listen and I could hear and the person was saying "oh it's a lot better than high school."

JAD ABUMRAD: So one day she was at this college.

ROBERT KRULWICH: Just kind of wandering down a random hallway.

SUSAN SCHALLER: And I opened the first door on the left. That was the accident that changed my whole life; just picking that door.

ROBERT KRULWICH: At the front of the room there was this older guy. He was thin he was bald and he was tracing shapes in the air with his hands.

SUSAN SCHALLER: It was as if there were pictures being painted in the air and then they immediately disappeared. Then another picture appeared. I was mesmerized.

JAD ABUMRAD: Wow.

SUSAN SCHALLER: The professor was signing.

ROBERT KRULWICH: This class was actually one of the first classes to teach sign at a regular hearing university, ever.

SUSAN SCHALLER: I had also walked into history but didn't know it.

ROBERT KRULWICH: Fast forward five years Susan now is fluent in sign. She moves to Los Angeles. It's the late 1970s.

SUSAN SCHALLER: And I was snatched and put into interpreter training programs because at that time they were very, very few interpreters. And I found myself in a classroom.

ROBERT KRULWICH: In a community college.

SUSAN SCHALLER: In something called a reading skills class.

ROBERT KRULWICH: So she walks into the class. She sees kids all over the classroom making big excited gestures one to the other.

SUSAN SCHALLER: And at the door I saw this man holding himself.

ROBERT KRULWICH: Kind of off by himself.

SUSAN SCHALLER: Making his own straitjacket.

ROBERT KRULWICH: She went over to the instructor and she pointed at the guy and she said, "Who, who's that guy over there." And the instructor said, "Well, he was born deaf. His uncle, he has this kind of insistent uncle who, who brings him here every day. We, we don't know exactly what to do with him though."

JAD ABUMRAD: What did this guy look like?

SUSAN SCHALLER: He was a beautiful, um, well now I know, I don't know if I would have had that in my head at the time, beautiful looking Mayan. You know, high cheekbones and black hair, black eyes.

ROBERT KRULWICH: And something about his eyes caught her attention.

SUSAN SCHALLER: He was studying mouths and I walked up to him and said, "Hello my name is Susan."

JAD ABUMRAD: And this is where things start to get a little weird. He looks at her. And instead of signing his name whatever it was.

SUSAN SCHALLER: He brings up his hands...

JAD ABUMRAD: Signs right back to her,

SUSAN SCHALLER: "Hello my name is Susan."

ROBERT KRULWICH: Susan like shakes her head and says, "No, no, I'm Susan."

JAD ABUMRAD: And he responds, "No, no I'm Susan."

ROBERT KRULWICH: Everything you said, he tried to say.

SUSAN SCHALLER: Exactly. I call it a visual echolalia. And I remember thinking—

ROBERT KRULWICH: Why is he doing this?

JAD ABUMRAD: I mean Susan did he, did he look like he had some kind of disability or condition.

SUSAN SCHALLER: He was uh, he was intelligent. I wouldn't have been able to answer if you asked me "how can you see intelligence?" But you can actually see intelligence in people's eyes

ROBERT KRULWICH: He was just missing something.

SUSAN SCHALLER: To copy me meant that he didn't really know what I was doing.

ROBERT KRULWICH: And that's when it occurred to her

SUSAN SCHALLER: This man doesn't have language.

JAD ABUMRAD: Wait how old was this guy?

SUSAN SCHALLER: He was 27 years old.

JAD ABUMRAD: And in all that time no one had taught him sign language or anything?

SUSAN SCHALLER: Well he didn't know he was deaf. He was born deaf. He didn't know there was sound.

JAD ABUMRAD: Really?

SUSAN SCHALLER: 27 years no idea that there was sound. He could see the mouth moving. He could see people responding. He thought we figured all this stuff out visually. And he thought, "I must be stupid."

JAD ABUMRAD: And so here's the question for our hour. This is Radiolab. I'm Jad Abumrad.

ROBERT KRULWICH: I'm Robert Krulwich.

JAD ABUMRAD: Words. What do words do for us?

ROBERT KRULWICH: Are they necessary?

JAD ABUMRAD: Can you live without 'em?

ROBERT KRULWICH: Can you think without them?

JAD ABUMRAD: Can you dream without them? Can you...

ROBERT KRULWICH: That's enough.

JAD ABUMRAD: Can you swim without them?

ROBERT KRULWICH: No, no, that's enough.

JAD ABUMRAD: Alright, back to the story. So this man that Susan met, we don't actually know his real name but when she wrote about him in her book, A Man without Words, she called him Ildefonso.

ROBERT KRULWICH: There they are sitting in the classroom. She's right there with him.

JAD ABUMRAD: Of course she's wondering—

SUSAN SCHALLER: What have you've been doing for 27 years?! (*Laughing.*)

ROBERT KRULWICH: So she thinks well let me see if I can teach him some just basic sign language. In an interesting case she takes out a book and makes the sign book.

SUSAN SCHALLER: But the sign for book looks like opening up a book. So he thought I was ordering him to open a book.

ROBERT KRULWICH: So he grabs the book and he opens it.

SUSAN SCHALLER: Cuz he thought I was asking him to do something. It was very difficult. If I gave him the sign for standing up he thought I wanted him to stand up. And so I couldn't, I couldn't have a conversation with him. And it was the most frustrating thing I have ever done in my life.

JAD ABUMRAD: Wait a second, how long did this go on for?

SUSAN SCHALLER: Well uh weeks, it was weeks.

JAD ABUMRAD: Wow.

SUSAN SCHALLER: Often times when we said goodbye or just left, (we couldn't really say goodbye), I really believed that we wouldn't see each other again and I was often times very surprised when he would be sitting there at the table. And I think sometimes he looked surprised that I showed up.

ROBERT KRULWICH: But after a couple of weeks of him—

SUSAN SCHALLER: Constantly miming, copying me.

ROBERT KRULWICH: She had an idea.

SUSAN SCHALLER: Perhaps it's just possible that if I, if I died tomorrow I would have had only one really, really good thought in my life. And this was it: I'm going to ignore him.

*(Music.)*

SUSAN SCHALLER: I taught an invisible student. I stopped talking to him and I stopped having eye contact. And I set up an empty chair

JAD ABUMRAD: And then she says she would hold up to this empty chair a picture of a cat.

SUSAN SCHALLER: and I was trying to explain to this invisible student that this creature, a cat—so I'd be miming a cat and petting a cat—and then I'd sign the sign for cat.

JAD ABUMRAD: Then she would hop to the other seat, the invisible student's seat, and pretend to get it.

SUSAN SCHALLER: "Oh I know," you know with my facial expression, "Oh, I get it!"

ROBERT KRULWICH: So you're playing all the parts. You're both the teacher and the invisible student.



SUSAN SCHALLER: That's right, that's right.

JAD ABUMRAD: Wow.

SUSAN SCHALLER: Doing all these crazy things and he'd just watch me.

JAD ABUMRAD: He stopped copying her which was good...

SUSAN SCHALLER: But. I'd do this over and over and over for days and days and days...

ROBERT KRULWICH: And she says he just didn't get it.

SUSAN SCHALLER: He looked bored a lot of times.

ROBERT KRULWICH: But one day in the middle of one of these endless pretend student exercises...

SUSAN SCHALLER: Something happened.

ROBERT KRULWICH: Out of the corner of her eye, she sees him shift his body.

SUSAN SCHALLER: And he looked—It's interesting how his body was upright and he looked like something was about to happen.

*(Music.)*

He looked around the room—this is a 27 year old man— and he looks around the room as if he had just landed from Mars and it was the first time he had ever saw anything. Something was about to happen.

JAD ABUMRAD: His eyes grew wider, she says, and then wider. And then—

SUSAN SCHALLER: He slaps his hands on the table. "Oh! Everything has a name!"

*(Music.)*

SUSAN SCHALLER: And he looks at me in this demanding way and I sign table. And he points to the door and I sign door. And he points to the clock and he points to me, and I sign "Susan." And then, he started crying. He just collapsed and he started crying.

*(Music.)*

SUSAN SCHALLER: What is it that happens in human beings when we get symbols and we start trading symbols? It changes our thinking. It changes our ideas of—it is no longer the thing, a table that we eat on but there's something about symbol table that makes the table look different. Ildefonso was in love. He was in love. He was like, everything has a name. And for the first couple weeks he had this list of names that kept growing and growing.

Kid: Paper.

Kid: Eagle.

Kid: Clock.

Kid: Green.

SUSAN SCHALLER: I kept copying words for him.

Kid: Cat.

Kid: Alligator.

Kid: Cat.

Kid: Cardinal.

SUSAN SCHALLER: Gave him the sign for door.

Kid: Door.

Kid: Door.

SUSAN SCHALLER: Then I would-

Kid: Door.

SUSAN SCHALLER: Write d-o-o-r.

Kid: Serpent.

Kid: Cheetah.

SUSAN SCHALLER: And he...

Kid: Strawberries.

SUSAN SCHALLER: Folded this paper.

Kid: Paper.

SUSAN SCHALLER: As if it was—

Kid: Treasure!

SUSAN SCHALLER: Treasure and he would pull it out everyday and he would—

Kid: Lion

SUSAN SCHALLER: Carefully unfold it.

Kid: Tiger.

SUSAN SCHALLER: And he would add to it.

Kid: Orange juice.

*(10 minutes.)*

Kid: Apple.

Kid: Blue Jay.

Kid: Thinking.

Kid: Believe.

Kid: Horse.

Kid: Leaf.

Kid: Idea.

SUSAN SCHALLER: Add to it.

Kid: Lamb.

Kid: Lou. \*\*\*

Kid: Table.

Kid: Bird.

Kid: Wall.

Kid: Dove.

Kid: Name.

SUSAN SCHALLER: Add to it.

Kid: Pig.

Kid: Left.

Kid: From.

Kid: Right.

Kid: Cows.

Kid: Hawk

Kid: Left of the blue wall.

Kid: Octopus.

Kid: Symbol.

Kid: Treasure.

Kid: Words.

Kid: Eggs.

Kid: Ham.

Kid: Hippopotamus.

SUSAN SCHALLER: What is it that happens in human beings when we get symbols?

Kid: Symbols.

ROBERT KRULWICH: And that, you know, once you have begun to put words onto things you can look at a thing, say this symbolic sound, table, and the person opposite you knows what you are talking about.

JAD ABUMRAD: But she seems to be saying something deeper though, when you get the word for table than suddenly the table, like this table right here (knocking *on the table*), looks different. Like it's somehow the word changes the world, in some fundamental way. Now I don't know if that's true about the table thing, but consider what happens when you put words together, okay, when you link them up.

CHARLES FERNYHOUGH: Good, okay.

JAD ABUMRAD: So I want to tell you about this experiment.

CHARLES FERNYHOUGH: Fantastic.

JAD ABUMRAD: That I learned about from a fellow I talk to sometimes. Charles—

CHARLES FERNYHOUGH: I'm Charles Fernyhough. I'm a psychologist at Durham University in the UK.

ROBERT KRULWICH: Fernyhough.

JAD ABUMRAD: And uh, when I first read about this experiment in Charles' book—

CHARLES FERNYHOUGH: Called *A Thousand Days of Wonder*.

JAD ABUMRAD: It blew my mind out of my nose and on to the pages of the book.

*(R. laughing.)*

JAD ABUMRAD: It was a little messy.

ROBERT KRULWICH: I never want to be with you in a library.

JAD ABUMRAD: It takes a little journey to get to the mind blowing part, but luckily, well I'll let Charles explain it. The whole thing happens in a room.

CHARLES FERNYHOUGH: Yeah you're put into this room which is colored completely white. The walls are white. The ceilings white. The floors white.

ROBERT KRULWICH: So it's all white.

JAD ABUMRAD: All white.

CHARLES FERNYHOUGH: Everything's white. And you can tell where you are to the extent that some of the walls are longer than others. So on your left hand side—

JAD ABUMRAD: Are we in a rectangle, is what you're describing?

CHARLES FERNYHOUGH: Yeah, it's a rectangular room.

JAD ABUMRAD: Are you with me so far?

ROBERT KRULWICH: I'm with you so far.

JAD ABUMRAD: Okay so just to give you some of the baseline conditions here: Imagine you are a rat in this room. Okay?



CHARLES FERNYHOUGH: And somebody comes along and hides an object in one corner of the room.

JAD ABUMRAD: What?

CHARLES FERNYHOUGH: It can be anything. I mean for rats you would food.

JAD ABUMRAD: Like a biscuit or something?

CHARLES FERNYHOUGH: Yeah.

JAD ABUMRAD: You hide a biscuit in one of the four corners. You see it but before you can get to it they pick you up by your tail, spin you around a bunch of times—

CHARLES FERNYHOUGH: So you don't know where you are; you don't know which direction you are facing in. And then they right, now go find the biscuit.

JAD ABUMRAD: So if you do this with a rat, what will happen, is it will say alright let me go find the biscuit and it will—

*(Music. The pitter patter of a mouse scampering across the floor.)*

CHARLES FERNYHOUGH: Go to one corner which looks right. But of course the room also looks like that if you turn around through 180 degrees and face exactly the opposite direction.

JAD ABUMRAD: Because it's a rectangle.

CHARLES FERNYHOUGH: So they get it right 50% of the time.

ROBERT KRULWICH: Because corners of rectangles, two of them are identical.

JAD ABUMRAD: Yeah.

ROBERT KRULWICH: Alright so uh (*coughing*) should we get on with this, because I'm well aware of rectangles.

JAD ABUMRAD: I just needed to get that out of the way because the cool part is coming up now.

ROBERT KRULWICH: I hope so.

JAD ABUMRAD: What the experimenters did next is they took one of the four white walls and they turned it blue.

(*Music.*)

JAD ABUMRAD: So imagine this scenario: your in this room, you've got these four white walls, or rather three white walls.

ROBERT KRULWICH: One of them is blue.

JAD ABUMRAD: Right. Well now you're not confused anymore. You can relate everything to the blue wall. You can be like the corner with the biscuit was left of the blue wall or right of the blue wall.

ROBERT KRULWICH: I like it to the left.

JAD ABUMRAD: You now have a blue wall as a...

ROBERT KRULWICH: Navigational clue.

JAD ABUMRAD: Yes!

CHARLES FERNYHOUGH: That makes sense you know, we would all be able to do that, that's not going to be difficult for us.

ROBERT KRULWICH: Alright have we got to the good part yet?

CHARLES FERNYHOUGH: Turns out though...

JAD ABUMRAD: The rats, he says,

CHARLES FERNYHOUGH: They're still scoring fifty/fifty.

ROBERT KRULWICH: What?

CHARLES FERNYHOUGH: It's as if they can't take any notice of the blue wall.

JAD ABUMRAD: Even with the blue wall they can only find the biscuit 50% of the time!

ROBERT KRULWICH: Wait a second, can rats see color?

CHARLES FERNYHOUGH: Yeah, rats can do color.

JAD ABUMRAD: They do color pretty well.

ROBERT KRULWICH: Okay.

JAD ABUMRAD: They also do left, right just fine.

CHARLES FERNYHOUGH: But what they can't do is connect those two bits of information together.

JAD ABUMRAD: In other words they can only, well they can do left; that they can do. They can do blue but they're both separate. They can't do left of blue.

CHARLES FERNYHOUGH: These different kinds of knowledge can't talk to each other.

ROBERT KRULWICH: How does anyone know that? I mean, what rats have been interviewed for this?

JAD ABUMRAD: What? They infer this based on studying the rats.

ROBERT KRULWICH: So the rat doesn't have what? Doesn't have the neurons doesn't have the— what doesn't he have?

JAD ABUMRAD: The rat can't do it, that's all they need to know. And I'm going to make it weirder now...neither can some humans.

ELIZABETH SPELKE: I spent the first ten or fifteen years of my scientific life studying creatures who don't talk yet.

JAD ABUMRAD: That's Elizabeth Spelke; she's a psychologist at Harvard. Quite famous for her work with um—

*(Sounds from the lab.)*

Kid: Kai

JAD ABUMRAD: As you can hear—

ELIZABETH SPELKE: Babies and I was interested in their abilities in relation to other animals

Lab Assistant: Come on, get up we're going to go the monkey room.

JAD ABUMRAD: So she began the baby development lab which is filled with toys and on any given day five or six really tiny kids

Interviewer: How old is she?

Lab Person #2: She's six months.

Interviewer: And who's this?

Kid: I'm a big kid.

JAD ABUMRAD: Toddlers too.

Interviewer: How old are you?

Kid: Three and a half.

Interviewer: Three and a half, big time.

JAD ABUMRAD: So at a certain point Elizabeth Spelke decided to build a version of the white room in this lab cuz she wondered if rats have so much trouble connecting the idea of left to blue, what about uh—

ELIZABETH SPELKE: Surely...

JAD ABUMRAD: Baby humans.

ELIZABETH SPELKE: A self-respecting eighteen month old human child would succeed in putting them together, but—

Kid: No.

ELIZABETH SPELKE: What we find is that children behave just like the rats.

JAD ABUMRAD: Just like the rats

ELIZABETH SPELKE: Just like the rats

ROBERT KRULWICH: Really

JAD ABUMRAD: Just like the rats or almost just like the rats?

ELIZABETH SPELKE: Well we don't test them with food; we don't test them with digging (*R. laughing*) so in superficial ways, superficial features of the studies are different.

JAD ABUMRAD: But she says kids, like the rats, cannot connect the idea of left to the idea of blue, they just can't do it. And they can't do it at...

Kid: One.

JAD ABUMRAD: They can't do it at...

Kid: Two

JAD ABUMRAD: They can't do it at three.

Kid: Four, five.

ELIZABETH SPELKE: And we find that those children start performing like adults around six years of age.

ROBERT KRULWICH: Now I'm interested.

JAD ABUMRAD: Good

ROBERT KRULWICH: Something happens at the ripe old age of six.

JAD ABUMRAD: It is shockingly late, right?

ROBERT KRULWICH: Yeah.

JAD ABUMRAD: Well something happens at the age of six that suddenly allows the kid to connect concepts like left to concepts like blue. And the question is what? What happens?

CHARLES FERNYHOUGH: Several people have suggested that one candidate for a process that's doing this is language.

ROBERT KRULWICH: What do you mean it's language? Kids are talking, certainly at three, four, five and six. They're talking like, like uh, you know, too much!

ELIZABETH SPELKE: But they're not, what they haven't yet started to use is spatial language, and particularly the kinds of spatial language that adults would use in this situation to describe what they're doing.

JAD ABUMRAD: And somewhere around the age of six they start to use phrases like,

Kid: Left of the blue wall.

JAD ABUMRAD: And those aren't just words that come out of the child's mouth. Liz thinks that inside the child's brain, what that phrase does—

ELIZABETH SPELKE: is link these concepts together,

JAD ABUMRAD: Clink! And in that moment—

Kid: Left of the blue wall!

JAD ABUMRAD: The child leaves the rats behind.

ROBERT KRULWICH: I can't—are you—she doesn't think that kids have that—

JAD ABUMRAD: Well let me put it to you a different way. This is my best understanding of what she thinks. Her basic idea is that a child's brain begins as a series of islands.

*(Music.)*

JAD ABUMRAD: And on one island way over here, you've got say color. We can call that the blue island.

J & ROBERT KRULWICH: Blue blue, blue...

JAD ABUMRAD: That's the part of you that perceives the color blue. Way on the other side of the brain you've got the part of you that perceives spatial stuff like left.

J & ROBERT KRULWICH: Left, left, left...



JAD ABUMRAD: Maybe a third, objects, like wall.

J & ROBERT KRULWICH: Wall, wall, wall...

These things are there from the beginning, but there separate. Then you get the words left, blue, wall and then the child for the first time comes upon the phrase,

J & ROBERT KRULWICH: Left of the blue wall.

JAD ABUMRAD: And in that moment all the islands...

Kid: Kaboom!

JAD ABUMRAD: Come together. It is literally the phrase itself, she says, that creates that internal connection.

ELIZABETH SPELKE: Everybody has always talked about how language is this incredible tool for communication that allows us to exchange information with other people so much more richly and affectively than other animals can. But language also seems to me to serve as a mechanism of communication between different systems within a single mind.

JAD ABUMRAD: There you go.

ROBERT KRULWICH: Wouldn't it be just as possible, just listen to me here, that the kids brain is developing some new connections and what follows then, follows from the changes in the brain.

JAD ABUMRAD: So the words are like an after.

ROBERT KRULWICH: Yeah. After.

JAD ABUMRAD: After fact?

ROBERT KRULWICH: After effect.

JAD ABUMRAD: Well that's uh, no, no. The experimenters actually accounted for that.

CHARLES FERNYHOUGH: What the experiments did next is that they thought, okay if language is adding this extra element let's knock it out.

JAD ABUMRAD: How would you do that? Would you like shoot something into their brain that kills the language part or something?

CHARLES FERNYHOUGH: Um, there's a much simpler way of doing it and a much more humane (*R laughing.*) thing you can do.

ELIZABETH SPELKE: What we did is put adults in the room.

JAD ABUMRAD: And then she says, she gave them an iPod.

ELIZABETH SPELKE: They've got headphones.

JAD ABUMRAD: Playing through those headphones is someone talking.

ELIZABETH SPELKE: Yep

JAD ABUMRAD: And their job, while they're in the room, is to repeat what the person is saying.

ELIZABETH SPELKE: Continuously listening to speech and repeating it the whole time they were in there.

CHARLES FERNYHOUGH: It's actually a really hard thing to do if you've ever tried shadowing while someone is speaking. I mean if you tried—

JAD ABUMRAD: Can we try it? You go and I'll shadow you.

CHARLES FERNYHOUGH: Okay Jad— JAD ABUMRAD: Okay Jad— CHARLES FERNYHOUGH: I'm going to— JAD ABUMRAD: I'm going to— CHARLES FERNYHOUGH: try and start speaking now— JAD ABUMRAD: Start speaking now— CHARLES FERNYHOUGH: and I want you to say it—JAD ABUMRAD: and I want you to say it—CHARLES FERNYHOUGH: right back to me exactly as I say it—JAD ABUMRAD: exactly as I say it—CHARLES FERNYHOUGH: and without any...

JAD ABUMRAD: Oh my god, that's starting to hurt my head. That's really hard, actually.

CHARLES FERNYHOUGH: Yeah it is hard. And what that does is it knocks out your capacity to use language for yourself

ELIZABETH SPELKE: Basically battering the words out of the adult's head.

ROBERT KRULWICH: Why are they doing this again?

JAD ABUMRAD: Well they wanted to see, like, if you blasted the words out of somebody's head

ELIZABETH SPELKE: What would happen?

JAD ABUMRAD: Can they find the biscuit? Will they be able to form that simple thought left of the blue wall or would they be like the rats, who can't. And-

*(20 minutes.)*

ELIZABETH SPELKE: And we actually got really dramatic results.

CHARLES FERNYHOUGH: They went right back to being like the rats.

ROBERT KRULWICH: Wow.

CHARLES FERNYHOUGH: Yeah.

JAD ABUMRAD: But Charles, what I'm wondering is that if language allows you to construct a thought that is so basic as, "The biscuit is left of the blue wall," what is thought without language?

CHARLES FERNYHOUGH: Well I don't think it's very much at all.

JAD ABUMRAD: What do you mean?

CHARLES FERNYHOUGH: I'm going to put it a different way and this involves making quite a controversial statement. I don't think very young children do think.

JAD ABUMRAD: Like think period. (*C. laughing.*) Was there a period at the end of that sentence?

CHARLES FERNYHOUGH: I don't think they think in the way I want to call thinking, which is a bit of cheat, but let me say what I mean by thinking.

JAD ABUMRAD: Okay.

CHARLES FERNYHOUGH: If you reflect on your own experience, if you think about what's going on inside your head as you're just walking to work or sitting on a subway train. Much of what's going on in your head at that point is actually verbal. I want to suggest that the central thread of all that is actually language, it's a stream of inner speech. That's what most of us think of as thinking.

ELIZABETH SPELKE: Well on the other hand what I'm most aware of when I'm reflecting is the stuff that I can't put into words. I think that he's exaggerating the role of language here. Yes...

*(Music.)*

JAD ABUMRAD: This all really hinges on how you would define thinking, and Liz would say take a musician, like I'll give you my example Bill Evan Susan Schaller: Here is a form of thought that carries you through a definite sequence of phrases, feelings, emotions, changes. And there are no words!

ELIZABETH SPELKE: But there's something that we get access to when we gain a full natural language that we can use not only to communicate with other people but with ourselves.

JAD ABUMRAD: Test. Testing. Test. Test. Test. Test.

ELIZABETH SPELKE: Language is fundamentally a combinatorial system.

ROBERT KRULWICH: As we head up the steps. What is this?

JAD ABUMRAD: We're going to Columbia.

ROBERT KRULWICH: Columbia University.

JAD ABUMRAD: University. See we'd gotten interested in the last thing that Liz Spelke said, that language being a combinatorial thing.

ELIZABETH SPELKE: System.

JAD ABUMRAD: Right. And that lead us to Columbia.

ROBERT KRULWICH: Here's the deal—

JAD ABUMRAD: We're seven minutes late.

ROBERT KRULWICH: You have words now. You have words in combination now. Now you can play with the combinations.

JAD ABUMRAD: And that—as you'll hear—

JAMES SHAPIRO: It's just us three then right?

ROBERT KRULWICH: It's just us three.

JAMES SHAPIRO: Good.

JAD ABUMRAD: Opens up a kind of infinity.

JAMES SHAPIRO: *Head to foot Now is he total gules; horridly trick'd With blood of fathers, mothers, daughters, sons, Baked and impasted with the parching streets, That lend a tyrannous and damned light To their lord's murde* Robert Krulwich: This is Shakespeare. When I sat in middle school and they gave us Shakespeare. ...*roasted in wrath and fire, And thus o'er-sized with coagulate gore*, I was completely confused and I felt stupid.

JAD ABUMRAD: Can you just introduce yourself?

ROBERT KRULWICH: This is—

JAMES SHAPIRO: James Shapiro.

ROBERT KRULWICH: He is a Shakespeare scholar, obviously.

JAMES SHAPIRO: At Columbia University where I've taught for uh, 25 years.

ROBERT KRULWICH: And one reason why he says that Shakespeare can be confusing is often, Shakespeare behaved not so much as a write but more like uh—

JAMES SHAPIRO: Like a chemist, combining elements.

*(Music.)*

JAMES SHAPIRO: He's taking words and he's shoving them together, smashing them together if you will.

ROBERT KRULWICH: And...

JAMES SHAPIRO: Combining...

ROBERT KRULWICH: Sometimes these experiments didn't go so well.

JAMES SHAPIRO: The prince's orgulous. Orgulous has not stuck.

ROBERT KRULWICH: No.

*(J. laughing.)*

JAD ABUMRAD: What does it mean?

JAMES SHAPIRO: You got me; I mean I should know I taught...

ROBERT KRULWICH: But look what he did just by adding a little prefix "un."

JAMES SHAPIRO: There's so many words that we're now familiar with—unnerved. You know, we all know what that means but nobody had heard of unnerved, unaware, uncomfortable.

ROBERT KRULWICH: He made up uncomfortable?

JAMES SHAPIRO: He was the first to use that word...

*(Music.)*

ROBERT KRULWICH: On a stage.

JAMES SHAPIRO: Right. Unearthly, unhand, undress, uneducated, ungoverned, unmitigated, unwillingness unpublished, something that's near and dear to my heart.

ROBERT KRULWICH: Unpublished.

JAMES SHAPIRO: Unsolicited, unswayed, unclogged, unappeased, unchanging, unreal.

ROBERT KRULWICH: He made up unreal?

JAMES SHAPIRO: He was the first to use it in print or on stage.

JAD ABUMRAD: Would an audience at the time have understood what the "un" prefix meant, not real?

JAMES SHAPIRO: I think it takes you a split second. Uuuunnnnnrrrrrrreeeeaaaaallll... To kind of put that "un" on the real.

ROBERT KRULWICH: But then suddenly you got this new concept that there's something real but not.



JAMES SHAPIRO: He's taking words that ordinarily are not stuck together; things like mad cap, ladybird. Shoving them together, eye drops, to achieve a kind of atomic power. Eyesore, eyeball.

JAD ABUMRAD: He did eyeball?

JAMES SHAPIRO: Yes.

ROBERT KRULWICH: It's hard to understand how someone could think of, that up, it seems like it's always been there.

JAMES SHAPIRO: If you ask me what his greatest gift is. He's putting them together into phrases that have stuck in our heads. So truth will out.

ROBERT KRULWICH: Truth will out.

JAMES SHAPIRO: What's done is done. I could go on and on.

JAD ABUMRAD: Go on and on!

ROBERT KRULWICH: He wants you too go on and on.

JAMES SHAPIRO: Crack of doom. My favorite: Dead as a doornail. A dish fit for the gods. A dog will have his day. Fainthearted, fool's paradise, forever and a day, foregone conclusion, the game is afoot, the game is up. Greek to meet, I'm in a pickle, in my heart of hearts, in my mind's eye, kill with kindness. (*Sigh.*) Believe it or not, knock, knock, who's there?

J & ROBERT KRULWICH: Oh! (*Laughing.*)

JAMES SHAPIRO: Laugh yourself into stitches; love is blind, what the Dickens, all's well that ends well. Something wicked this way comes. And a sorry sight.

J & ROBERT KRULWICH: Wow.

ROBERT KRULWICH: That's a champion.

JAD ABUMRAD: That's pretty fantastic.

JAMES SHAPIRO: How did he create phrases that stick in the mind? That make it seem as if they always existed.

ROBERT KRULWICH: Yeah, how? You're taking out a book.

JAMES SHAPIRO: I'm thinking of a passage here.

JAD ABUMRAD: That is maybe the biggest book I have ever seen.

*(Laughing.)*

JAMES SHAPIRO: Nonsense.

JAD ABUMRAD: It was at everything least 3000 pages.

JAMES SHAPIRO: Shakespeare doesn't write a lot about process. But there are one or two places that he does, in a poem called "Lucrece". In which a woman is raped; "Lucrece's Rape." And she has to write a letter to her husband explaining what happened to her. And she's struggling to find words in which to do this and finally she picks up the pen and it goes Elizabeth Spelke: She prepares to write. *First hovering o'er the paper with her quill; Conceit and grief and eager combat fight; What wit sets down is blotted straight with will; This is too curious good, this blunt and ill. Much like a press of people at a door Throng her inventions, which shall go before.* I'll read that couplet again: *Much like a press of people at a door Throng her inventions, which shall go before.* If you want

to extrapolate from this something that Shakespeare might have himself experienced, you have a situation which all these ideas are pressing. It's like a throng of them. Who's getting through that doorway first?

*(Sound effects, crowd of people.)*

JAD ABUMRAD: It's a little bit maybe like that experience you might have at a nightmare New York club. We're you've got like thousands of people in a tiny space and everyone's trying to push their way out, and they're like, "God, let me through the door. Get out of my way!" It's just like this

JAMES SHAPIRO: Throng of images, sounds, conceits, thoughts, ideas. And they are providing the pressure that's needed to produce words.

*(Music.)*

JAD ABUMRAD: You know what?

ROBERT KRULWICH: What?

JAD ABUMRAD: This makes sense to me, this interpretation. And not just for Shakespeare, for anybody. Certainly the guy we met at the beginning Ildefonso.

ROBERT KRULWICH: Who just learned words for the first time.

JAD ABUMRAD: Yeah. I mean as you move through the world if you're sensitive at all and your observant, you're gonna get filled up with all of these things which you have to express but can't until you get those words. Then...boom! The door opens.

ROBERT KRULWICH: And thanks to James Shapiro professor at Columbia University whose newest book iSusan Schaller: [Contested Will: Who wrote Shakespeare?](#)

“Also thanks to our kids Louisa Krasner, Stella Astory, and Isaiah Harrison and also thanks to the moms that brought them in: Terrace Tripoli, Kerry Donahue and Patricia Starreck.

*(Beep.)*

SUSAN SCHALLER: Hello. This is Susan Schaller. Radiolab is funded in part by the Alfred P. Sloan foundation.

CHARLES FERNYHOUGH: Charles Fernyhough. Radiolab is produced by WNYC and distributed by NPR.

*(Music.)*

*(30:00)*

JAD ABUMRAD: Hey! I’m Jad Abumrad

ROBERT KRULWICH: I’m Robert Krulwich

JAD ABUMRAD: This is Radiolab. This hour—

*(J. & R. talking over each other, babbling.)*

ROBERT KRULWICH: Words.

JAD ABUMRAD: Power of words

ROBERT KRULWICH: So once words enter your head; once they tickle in there and we’ve just explained how that happens.

JAD ABUMRAD: Sort of.

ROBERT KRULWICH: Then they—how do you know, they're always there?

JAD ABUMRAD: What if they're not? What would happen if that throng that is in your head,  
*(Sound effects, R. laughing.)*

JAD ABUMRAD: What if all of that stuff that is in your head. Suddenly went “poof!” Got yanked right out of your head.

ROBERT KRULWICH: Hmmmmm...

JAD ABUMRAD: What would be left?

ROBERT KRULWICH: Well this got us thinking about a very famous talk at one of the Ted conferences.

JILL BOLTE TAYLOR: I grew up to study the brain because...

ROBERT KRULWICH: A talk given by a neuroanatomist named Jill Bolte. Is it Bolte or Bolt?

JAD ABUMRAD: Bolte.

ROBERT KRULWICH: Bolte Taylor. And all you really need to know is that one morning in December of 1996 Doctor Taylor woke up and she had, she had a headache.

JILL BOLTE TAYLOR: I woke up to a pounding pain behind my left eye. And it was the kind of pain, caustic pain that you get when you bite into ice cream. And it just gripped me and then it released me. And it was very unusual for me to experience any kind of, of, pain so I thought okay

I'll just start my normal routine. So I got up and I jumped onto my cardio-glider which is a full body full exercise machine. And I'm jamming away on this thing and I'm realizing that my hands look like primitive claws grasping onto the bar. And I thought "Whoa I'm a weird looking thing!" So I get off the machine. And I'm standing in my bathroom getting ready to step into the shower and then I lost my balance I'm propped up against the, the wall. And I'm asking myself what is wrong with me? What is going on? And at that moment my right arm went totally paralyzed by my side.

ROBERT KRULWICH: In fact a blood vessel in the left hemisphere of Jill's brain had popped. And that part of her brain was starting to shut down.

JAD ABUMRAD: And it was the shut down that really caught our attention.

*(Music.)*

JILL BOLTE TAYLOR: In that moment my brain chatter went totally silent. Just like someone took a remote control and pushed the mute button. So here I am in this space and my job and any stress related to my to my job it was gone and I felt lighter in my body. And then all of a sudden left hemisphere comes back online and it says to me, "Hey! We're having a stroke, we gotta get some help!" *(Audience laughing.)* And I'm going: Aaah! I got a problem! I got a problem!" So it's like okay I got a problem, but then I immediately drifted right back out. *(Audience laughing.)* And I affectionately refer to this space as "La La Land." So I'm just watching my brain become more and more incapable of functioning.

ROBERT KRULWICH: That is Jill Bolte Taylor herself.

JILL BOLTE TAYLOR: Hi Robert

JAD ABUMRAD: We actually got her into a studio.

JILL BOLTE TAYLOR: Hello Jad.

JAD ABUMRAD: Hello. Because we wanted to ask some questions about that moment when her inner voices went away.

ROBERT KRULWICH: So let's talk about brain chatter for a moment. In the story that we've told so far you're still asking yourself questions.

JILL BOLTE TAYLOR: Yeah.

ROBERT KRULWICH: Now did that stop?

JILL BOLTE TAYLOR: It, it on the morning of the stroke. I was doing this wafting dance between the right hemisphere and the left hemisphere. So language would come back on. But once I got to the emergency room and I passed out when I woke later that afternoon. I had absolutely no language."

JAD ABUMRAD: Did you know your name?

JILL BOLTE TAYLOR: No.

JAD ABUMRAD: did you know your address?

JILL BOLTE TAYLOR: No

ROBERT KRULWICH: Did you know about your summer from 1983.

JILL BOLTE TAYLOR: No.

JAD ABUMRAD: You know like my mom is sitting—

JILL BOLTE TAYLOR: I didn't know any of that.

JAD ABUMRAD: None of it?

JILL BOLTE TAYLOR: I didn't know any of it.

ROBERT KRULWICH: Just imagine she's lying in her bed. Her head is shaved. Wrapped in bandages she's had hours of brain surgery she's got tubes coming out of her mouth, her nose. She's lost her career she's lost her language

JILL BOLTE TAYLOR: And I lost all my memories

ROBERT KRULWICH: And yet she says sitting there and that's suddenly wordless space—

JILL BOLTE TAYLOR: I had found a peace inside of myself that I had not known before. I had pure silence inside of my mind. Pure silence.

JAD ABUMRAD: Pure silence

JILL BOLTE TAYLOR: Pure Silence

JAD ABUMRAD: What was—

JILL BOLTE TAYLOR: You know, not that little voice that you know you wake up in the morning and the first thing your brain says it Oh man the sun is shining. Well imagining you don't hear that little voice that says man the sun is shining you just experience the sun and the shining.

ROBERT KRULWICH: Is this the absence of reflection of any kind? Is it just sensual intake and “period?”

JILL BOLTE TAYLOR: That is exactly what it was it was. It was all of the present moment.

JAD ABUMRAD: Did you have thoughts?

JTB: I had joy.



*(R. laughing.)*

JILL BOLTE TAYLOR: I just had joy. I had, I had this magnificent experience of I'm this collection of these beautiful cells. I am organic. I'm this, this organic entity.

ROBERT KRULWICH: Did you have a dead head period by any chance?

JILL BOLTE TAYLOR: You know why I missed that by a few years, but I get that a lot.

ROBERT KRULWICH: And, and the other thing that she told us is that lying in that bed without words, she says she felt connected to things, to everything, in a way that she never had before.

JILL BOLTE TAYLOR: Oh yeah I lost all definition of myself in relationship to everything in the external world.

JAD ABUMRAD: You mean like he couldn't figure out where you ended.

ROBERT KRULWICH: How much of that was about language. A little part? A lot? I mean.

JILL BOLTE TAYLOR: Oh I would say it was huge. Language is an ongoing information processing it's that constant reminder. I am, this is my name, this is all the data related to me, these are my likes and my dislikes, these are my beliefs, I am an individual, I'm a single, I am a solid, I'm separate from you. This is my name...

JAD ABUMRAD: Now as fruity as this may all sound to pin all this on language, we have run into this idea before. A couple seasons ago. Paul Brucks, remember him?

ROBERT KRULWICH: Yeah sure.

JAD ABUMRAD: Neuropsychologist.

P: Well if you have to ask me about myself...

JAD ABUMRAD: He told me that there's a theory out there, which he believes actually, that all a person is in the end. Like all the personhood of a person, the I or the you of a person all that is in the end is a...

P: Story.

JAD ABUMRAD: A story you tell yourself.

P: What we normally think of when we think about ourselves. Is really a story; it's the story of what's happened to that body over time.

JILL BOLTE TAYLOR: I did not have that portion of my language center that tells a story curious little Jill, me, Jill Bolte Taylor climbing the Harvard ladder, through language, loves dissection, cutting up things, that language was gone. I got to essentially become an infant (*baby sounds*) again.

ROBERT KRULWICH: I mean this is the problem here.

**Radiolab**

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JAD ABUMRAD: But I mean it's not like she stayed there

ROBERT KRULWICH: Well that's true.

JAD ABUMRAD: I mean we wouldn't be talking to her if she had an as she started to recover she ran into something kinda interesting -- Which sounded to me sort of like what maybe the rats

and the babies go through in the white room. She would have these disparate thoughts and then stall out, like she couldn't bring them together.

JILL BOLTE TAYLOR: Yeah. When, when people would speak to me I would, I remembered in pictures. So if somebody would ask me who's the president of the of the United States of America, this is a huge question. So for the next several hours I'd be pondering president. President. President What's a president? President. And then I would get a picture in my mind of a president as a leader.

JAD ABUMRAD: Was it a picture of a specific guy?

JILL BOLTE TAYLOR: It's, it was, actually it's still flashes into my mind. It's, it's a picture of a silhouette of a male.

ROBERT KRULWICH: A presidential profile.

JAD ABUMRAD: Like maybe the idea of the president, basically.

ROBERT KRULWICH: Yeah

JAD ABUMRAD: So that was her president .

JILL BOLTE TAYLOR: And then I had to figure out a United States. And so eventually come up with this map in my mind, a picture of the United States.

JAD ABUMRAD: Like a line drawing. So now she's got this map. She's got this silhouette of a guy. And she said, after hours—

JILL BOLTE TAYLOR: President, United States, president United States and it was like oh my god.

JAD ABUMRAD: She still couldn't somehow bring them together.

ROBERT KRULWICH: Yeah!

JILL BOLTE TAYLOR: I didn't have the road that I had to travel in order to come up. I think it was Clinton at the time. Yeah it was Clinton at the time.

JAD ABUMRAD: Now as Jill starts to get better-

JILL BOLTE TAYLOR: This after eight years of hard work and recovery...

ROBERT KRULWICH: Finally the words start to trickle back.

JAD ABUMRAD: And when they did she says, that silence that she loved so much got pushed out.

JILL BOLTE TAYLOR: That was on of the sacrifices. For me that was a sacrifice.

JAD ABUMRAD: Well.

JILL BOLTE TAYLOR: Well.

ROBERT KRULWICH: (*Laughing*) We're doing a language show here and you're the anti-queen of our language show! You're like saying who needs it.

JILL BOLTE TAYLOR: No, no, no, no, no. But what I am saying is that in order for us to communicate with language, we pull ourselves away from a different kind of experience. I do believe that there are times when you need to let your brain chatter be quiet.

ROBERT KRULWICH: But is it fair to say that this is—please agree or disagree with this statement: I think that words and language and grammar are necessary, but not half as good as wind in my hair, as smell in my nose, and that old right brain sensual immediacy.

(40:00)

JILL BOLTE TAYLOR: Yeah, you know if uh, if I had to choose which is essentially what you're saying, if I had to choose...Um...that would be really, really, really tough decision."

(Bells. Music.)

JAD ABUMRAD: Jill Bolte Taylor is the author of, what's it called, the book?

ROBERT KRULWICH: My Stroke of Insight.

JAD ABUMRAD: Yes. Check our website <radiolab.org> for any details and if you subscribe to our podcast there is a bonus video that goes along with this hour and it's pretty great.

(Beep.)

JAMES SHAPIRO: This is a voice message from Professor Jim Shapiro. Support for NPR comes from NPR stations and the John S. and James L Knight Foundation.

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*(Beep.)*

JAMES SHAPIRO: The George

*(Beep.)*

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CHARLES FERNYHOUGH: This is NPR.

*(Music.)*

JAD ABUMRAD: I'm Jad Abumrad.

ROBERT KRULWICH: Robert Krulwich

JAD ABUMRAD: Our topic today-

ROBERT KRULWICH: Words.

JAD ABUMRAD: The power of words of language. Okay Nicaragua 1970s. That's where our next story starts. Are you with me?

ROBERT KRULWICH: Ahah.

JAD ABUMRAD: So imagine you're a kid that's deaf, in Nicaragua at this time

ROBERT KRULWICH: Born deaf?

JAD ABUMRAD: Born deaf.

ROBERT KRULWICH: Born deaf, okay.

JAD ABUMRAD: You've always been deaf and you're the only one in your family that's deaf. So you're in this situation where everybody's talking there mouths are moving, you can't hear it. And you don't know sign language cuz no one's taught you.

ROBERT KRULWICH: There was no deaf school in Nicaragua then?

JAD ABUMRAD: Nothing.

ROBERT KRULWICH: Okay.

JAD ABUMRAD: No deaf education of any kind. So if you were this kid all you've really got our a couple of gestures, really crude gestures you've worked out to talk to your family and friends, but beyond that your cut off.

*(Music.)*

JAD ABUMRAD: Like Ildefonso, the guy we met at the beginning of the show, except in Nicaragua in the seventies there were hundreds, maybe thousands of these Ildefonso's.

ROBERT KRULWICH: Really?

JAD ABUMRAD: Yeah. But then everything changes.

ANN SENGHAS: In the late seventies Hope Simosa, who was the wife of the then dictator, established a new school for special education. I think she had someone in her family who had a disability not deafness.

JAD ABUMRAD: But the school would include deaf people and that, says psychology professor Ann Senghas, was a first, because now instead of deaf kids scattered about, they were together, in the same room.

ANN SENGHAS: There were fifty deaf kids in that first entering class

JAD ABUMRAD: Preschool to sixth grade.

ANN SENGHAS: In the late seventies.

JAD ABUMRAD: And for most of them this was the first time they ever met another deaf person

ANN SENGHAS: Before the world was going on around them and everyone was all talking and they were cut off from that. And suddenly for the first time they were all there and they were what was happening and they were what there was to talk about.

JAD ABUMRAD: But they didn't have a way of talking. These were fifty different kids who'd never learned a language and had fifty different sets of like rudimentary gestures that they used.



ROBERT KRULWICH: Whoa that must have been...

JAD ABUMRAD: Yeah like fifty people with fifty different ways to try and...

ROBERT KRULWICH: Ask for breakfast.

JAD ABUMRAD: Or say they want to go outside. I mean nothing was shared.

ANN SENGHAS: It's not like the teachers were using signs in the classroom. Everything in the class was Spanish.

JAD ABUMRAD: Which none of them knew.

ANN SENGHAS: Copying into their notebooks a lot of it was going right over their heads

JAD ABUMRAD: So at the beginning things were completely confusing.

ANN SENGHAS: But, they're riding on the bus for an hour everyday, and their playing out at recess for an hour every day, and there getting together at the park

JAD ABUMRAD: And no one knows how it happened. Like maybe one of the kids-

ANN SENGHAS: Who is very charismatic.

JAD ABUMRAD: He invented a sign for say ball. He told it to another kid who was very you know socially active and that second kid then spread the sign. However it worked, over time the signs of these fifty kids used,

ANN SENGHAS: Started to converge into common system.

JAD ABUMRAD: And when you step back from all, what that means...

ANN SENGHAS: They created a language.

*(Music.)*

ANN SENGHAS: They didn't just take it from somewhere else; they couldn't just take it from somewhere else. They created their own.

JAD ABUMRAD: But how unusual is that?

ANN SENGHAS: This has happened with languages all over the world but not while people were watching.

JAD ABUMRAD: So what you're saying is this is the first time we've been able to watch a language being born.

ANN SENGHAS: Yeah.

JAD ABUMRAD: Wow. And for the last twenty years that is what Ann has been doing. She's been going to Nicaragua to that school and watching.

*(School bell, children playing.)*

ANN SENGHAS: So uh, oh you wanted to describe the, I may have gotten recording of this, but when you arrive at the school the busses come around. *(Sound of bus arriving, children playing.)* The kids are all screaming and leaning out the windows and signing to each other and the kids pile out and they line up in rows on the basketball court that's in the center of the schoolyard. And they all sing the national hymn. *(National hymn playing.)* And the deaf kids all sign the national hymn. And they all have one hand over their heart and sign with the other hand while the hearing kids sing it.

JAD ABUMRAD: Ann visited the school for the first time in 1990 about 10 years after it was formed. She'd been working at the time with a linguist—

ANN SENGHAS: Named Judy Kegel.

JAD ABUMRAD: Studying basic linguist type stuff—

ANN SENGHAS: Trying to figure how the verbs work and whether they have agreement with their grammatical objects.

JAD ABUMRAD: And along the way, her and a collaborator Jennie Pyers stumbled onto something, really surprising, about the power of certain words. So to set it up: When she got there the first time in, to Nicaragua, those original fifty kids who invented this thing had grown up already and there were these younger generations of kids coming in behind them; growing up with the language, using it, inventing new signs. And at a certain point she got curious to just compare the original signers, the older kids, to the younger kids.

ANN SENGHAS: Yeah.

JAD ABUMRAD: In terms of how they signed.

*(Music.)*

ANN SENGHAS: So we show everyone this old one minute cartoon about this guy who's trying to fly. He sees a bird flying and he puts all these feathers onto his body and he climbs up to the top of the mountain. Flaps his arms and jumps and crashes on the ground

JAD ABUMRAD: So she showed deaf kids of different generations this cartoon. And asked them pretty simply to describe...

ANN SENGHAS: What they saw.

JAD ABUMRAD: Just describe it in sign.

ANN SENGHAS: To describe the whole story.

JAD ABUMRAD: The differences were striking.

ANN SENGHAS: So um...

JAD ABUMRAD: First of all.

ANN SENGHAS: So I'll just show you an example of each.

JAD ABUMRAD: So you're opening up a movie here.

ANN SENGHAS: So this is a first cohort talking about

JAD ABUMRAD: She got out her laptop and showed me some video. First of this woman in her forties with dark hair and a colorful t-shirt. She was one of the original signers. And when you see older signers like her, describe this guy who's trying to fly, it's really spastic. It's almost like they become the cartoon. She's flapping her hands.

ANN SENGHAS: So...

JAD ABUMRAD: Moving all around.

ANN SENGHAS: A lot of full body movements. She's talking about someone who's moving in a crazy way, she's gonna be moving in a crazy way. And um...

JAD ABUMRAD: Then she showed me a young kid who was about eight with a backwards cap

ANN SENGHAS: So here's Sylvester and now he talks about the manner.

JAD ABUMRAD: When he described the man jumping and falling, it was all in the wrist.

ANN SENGHAS: All the movement is now in the hand and it's very...

JAD ABUMRAD: Stylish

ANN SENGHAS: You know they're trimming these signs down.

JAD ABUMRAD: But more to the point, there was one thing she noticed that was really unexpected, had nothing to do with movement.

ANN SENGHAS: Couldn't help noticing that they – the people, different people in the community, talked about different things in this story. The older signers tended to describe all the events in this story.

JAD ABUMRAD: And only the events.

ANN SENGHAS: And the younger kids.

JAD ABUMRAD: They would talk about the guy's feelings.

ANN SENGHAS: That this guy was trying to fly wanted to fly but failed.

JAD ABUMRAD: The kids, she says just seem to be better at-

ANN SENGHAS: Thinking about-

JAD ABUMRAD: Yeah.

ANN SENGHAS: He didn't see it move.

JAD ABUMRAD: And if you ask kids over the age of five most of them would say he's gonna look under the bed because that's where he left it and he doesn't know that it's been moved to the toy box. But here's the thing, when she asked the older signers-

ANN SENGHAS: They would say oh look in the toy box.

JAD ABUMRAD: Really?

ANN SENGHAS: They would pick the wrong one. These are thirty-five year olds.

JAD ABUMRAD: 35 year olds would get this wrong?

ANN SENGHAS: They would fail this test, yeah.

JAD ABUMRAD: Seven out of eight, she says.

ANN SENGHAS: And then all of younger signers that we worked with passed.

JAD ABUMRAD: At this point she's just confused. Like why would this be? Why can't the older people pass the simple test that involves thinking about someone else is thinking? What's going on here? And then it occurred to her, it might have something to do with certain words, because the older signers they don't really have so many words. For the concept of-

ANN SENGHAS: Thinking.

JAD ABUMRAD: I mean they have mainly just one sign pointing at your forehead.

ANN SENGHAS: Yeah.

JAD ABUMRAD: Basically you just point at your forehead with your index finger. But by the time you get to the younger kids. They've got tons of words for thinking.

ANN SENGHAS: Things like, I know something and I know that you don't know it.

JAD ABUMRAD: I know something and I know you do know it. They've got a sign for understand, believe.

ANN SENGHAS: Believe, remember, forget.

JAD ABUMRAD: How many roughly were there?

ANN SENGHAS: Ten or twelve. Wow! So from thirty years we go from just a couple to...

ANN SENGHAS: We went from knowing and not knowing.

JAD ABUMRAD: To twelve?

ANN SENGHAS: Yeah.

JAD ABUMRAD: And somehow that makes all the difference. She says the more of these "think words" you've got. The more you can think. Am I right to say that? You're tiptoeing toward that

ANN SENGHAS: Yeah.

JAD ABUMRAD: But maybe you don't want to go there all the way?

ANN SENGHAS: Yeah I'm trying to think that—I guess I, I don't think it's so simple that you could just go in and say hey I'm going to teach you ten signs today and now suddenly you're gonna have better cognitive capacity.

JAD ABUMRAD: But you are saying though that the verb, think...

ANN SENGHAS: Ahuh.

JAD ABUMRAD: Is somehow implicated in my ability to think about your thinking.

ANN SENGHAS: Right.

*(Music.)*

ANN SENGHAS: Thinking about thinking. Understanding how other people understand. That's something that having language makes you better at.

JAD ABUMRAD: There are certain words she says that don't just give you a name for something; somehow they give you access to a concept that would otherwise be really hard to get or even talk about. It's really hard to talk about thoughts, without the word thoughts. Or what is time without the word time? It's a really freaking hard concept. These words are like bridges. Somehow they get you to some new mental place that otherwise you'd be cut off from. But that's sad though these young kids have something that the people who actually invented the language don't.

ANN SENGHAS: But we went back two years later, tested the same people. And then suddenly some of them were performing a lot better than they had the two years before on the same kinds of tasks.

JAD ABUMRAD: You mean the older signers?



ANN SENGHAS: Yeah

JAD ABUMRAD: They were passing suddenly?

ANN SENGHAS: Some of them were passing, yeah.

JAD ABUMRAD: What happened?

ANN SENGHAS: What happened in the past two years?

JAD ABUMRAD: Yeah!

ANN SENGHAS: Those younger kids grew up and started hanging out at the deaf association.

JAD ABUMRAD: Wait what?

ANN SENGHAS: (*Laughing.*) So what had happened in the mean time...

JAD ABUMRAD: So here's the strange twist to the whole thing: the deaf association is this place where the older signers would hang out.

ANN SENGHAS: Yeah it's a social club.

JAD ABUMRAD: So they'd play chess, do whatever. Well at a certain point these youngsters start showing up, you know, cuz they've graduated and they wanna hang out at the deaf association too. But they bring with them, all of their new

ANN SENGHAS: Mental verbs.

JAD ABUMRAD: You know all these words for thinking. They start using it with the older kids. The older kids pick it up. Suddenly these older kids are now passing the test!

ANN SENGHAS: So there was learning that took place in adulthood that actually gives them new insight into other people's thinking and motivation and now they can pass these tasks.

JAD ABUMRAD: That's super interesting

ANN SENGHAS: So that's the story. It's really cool.

*(Music.)*

JAD ABUMRAD: Ann Senghas is an associate professor of psychology at Barnard College in New York.

ROBERT KRULWICH: The thing of course is you wonder once you've gotten these this new facility in you... There's a lot of literature about this, "My Fair Lady" is about this.

JAD ABUMRAD: "My Fair Lady" is about this?

ROBERT KRULWICH: Yeah. It's about a woman who learns proper English and she can no longer be a flower girl in Covent Garden. She's now a lady.

JAD ABUMRAD: Oooohhhh yeah, I guess it is kind of like this.

ROBERT KRULWICH: You wonder, like remember our program began with that the story of Ildefonso?

JAD ABUMRAD: Right which he heard from Susan Schaller. Ildefonso was the guy who, for 27 years, had no language, at all.

ROBERT KRULWICH: So you kind of wonder like what happened to Ildefonso once he got language

JAD ABUMRAD: Right and after that first breakthrough where Ildefonso realized things have names, Susan ended up leaving for a few years.

SUSAN SCHALLER: Let's see...it was about four years, I think, four or five.

JAD ABUMRAD: But then she decided to write a book about him.

SUSAN SCHALLER: And so I went and found him again. And he had language and I could ask him all kinds of questions.

JAD ABUMRAD: Were you able then to sit down with him and ask him about his life and really get the, sort of his biography?

SUSAN SCHALLER: Some what, some what. One area that everyone wants to know about is what it was like to be languageless. You know, what was going on in his head

JAD ABUMRAD: Yeah.

SUSAN SCHALLER: And I asked and I asked. And I asked. And he starts telling me that was the dark time in his life. Learning language is like the lights went on and I tell him well we know about language and we want to know what it's like not to have language and he doesn't wanna talk about it.

ROBERT KRULWICH: But there was a day she says when she was writing the book and she met Ildefonso in a restaurant and there he was sitting with his brother Mario, who should never met before. And she quickly learned that Mario also was deaf.

SUSAN SCHALLER: And languageless.

JAD ABUMRAD: Really?

SUSAN SCHALLER: So I was shocked and because I was so amazed going I can't believe you have a languageless brother, that's when Ildefonso said "Well let, let me introduce you to some of my friends."

ROBERT KRULWICH: So they get in the car and they drive for awhile we stop at this apartment. We walk into this small little room and there were these six Mexican men doing this mime routine.

JAD ABUMRAD: Wait all of these guys were like Ildefonso use to be?

SUSAN SCHALLER: They had no language.

JAD ABUMRAD: Wow.

SUSAN SCHALLER: They were all deaf and they didn't know they were deaf.

JAD ABUMRAD: And what, what were they doing?

SUSAN SCHALLER: One man would stand up and he would start miming. He would just start acting out a bull fight. So he'd be the bull and he'd be charging and then he'd be the matador and then he'd be somebody in the crowd watching. And then he would add a detail.

ROBERT KRULWICH: For example...

SUSAN SCHALLER: A hat.

ROBERT KRULWICH: And then they would swap so then another guy would get up to take over the story.

SUSAN SCHALLER: Then they'd start miming.

ROBERT KRULWICH: They'd reenact the matador, describe the hat, but now the second storyteller would add a new detail.

SUSAN SCHALLER: Like another person with a pair of glasses or something.

ROBERT KRULWICH: So each one would stand up take the bullfight, the same bullfight to a different point and add a detail?

SUSAN SCHALLER: Exactly, exactly.

ROBERT KRULWICH: Oh my God.

SUSAN SCHALLER: In other words it would take them maybe 45 minutes to say, "Do you remember the time when we were at the bullfight and this woman did such and such?" It was like drawing a picture.

ROBERT KRULWICH: Let me ask you a pull it altogether question. I was about to think that what a language is, is a great connector, but this last story makes me wonder. These are five men really sharing and connecting on details, so is the difference that language makes just efficiency or does it affect your heart or your whole way of? I can't tell I'm not sure anymore.

SUSAN SCHALLER: Well I'm getting Ildefonso's answer, which, when I saw him a couple of years later, after this incident, I asked him about his friends and he said he couldn't talk to them anymore. He, he wasn't willing to go through that tedious effort of all the miming anymore. But the interesting thing that he said is that he can't even think that way anymore. (*Music.*) He said he can't think the way he used to think and when I pushed him to ask about what it was like to be languageless, the closest he ever came to any kind of an answer was exactly that. I don't know, I don't remember. I think differently now.