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The Language Instinct

Melvyn Bragg : Hello, Jean-Jacque Rousseau said that we differ from the animal kingdom in two main ways. The use of language and the prohibition of incest. Language and our ability to learn it has been held up traditionally as our species most remarkable achievement, marking us apart from the animals. But in the 20th century our ideas about how language is formed are being radically challenged and altered. To discuss how and why, I'm joined by Dr Jonathan Miller, Britain's most celebrated polymath. He started a career in medicine because of his interest in language, since then he's been a performer, a broadcaster, an author, which he still is of course, a film and opera director. He's just curated his first art exhibition "Mirror Image", at London's National Gallery, and professor Steven Pinker , one of the worlds leading cognitive scientists and also one of its most controversial, who's radically re-written how we view language in the 20th century. Currently Professor of Psychology, and Director of the Centre for Neuroscience at Massachusetts Institute for Technology. His books, most recently "How the Mind Works", and "The Language Instinct" promote his vision of a computational theory of the mind and the innateness of language.

Steven Pinker you claim that language is innate, let's start with a basic building block like your colleague at MIT Noam Chomsky, how do you prove that it is innate?

Steven Pinker : You have to establish it with many different kinds of evidence, because there isn't any single discovery that establishes it completely. For starters, one has to ask how particular languages are learned. Obviously no individual language can be innate, English isn't innate, Japanese isn't innate, none the less, in order for the child to acquire English or Japanese they can't just repeat back sentences like a parrot , they have to analyse it into units that they can then recombine to express brand new ideas, and I think any attempt to simulate language acquisition say as a computer program or as a mathematical model, always has to build in at least some assumptions about what are the units in language worth paying attention to, and that's how the child gets off the ground, by listening to speech and looking for things like nouns and verbs and subjects and objects as the patterns worth paying attention to.

Melvyn Bragg : You're saying language is part of what we have, just as we have something in the brain that makes the muscles work? We have something in the brain which makes language work?

Steven Pinker : That's right. I think there is a... the brain develops circuitry that's optimised for extracting words and grammatical rules from parental speech. I think you also see evidence for it in the universal design of language, that the 6000 languages across the planet aren't just any old computational systems but they are built according to a common plan.

Melvyn Bragg : What's a common plan, briefly?

Steven Pinker : Er, that there are words which are arbitrary pairings between a sound and a meaning, which are composed of things like vowels and consonants, which themselves don't have meaning but which can be ordered in different ways to multiply out the set of words that you can have in a language, that there are rules for combining the words and the words are categorised into grammatical part of speech categories such as noun and verb. They have roles that express who did what to whom, by being labelled as subjects and objects. There are mechanisms for inflecting words, that is modifying them according to their role in the sentence.

Melvyn Bragg : So this is over 6000 languages. Jonathan Miller what's your view of the innateness of language?

Jonathan Miller : I can't help quoting someone I met in the US some years ago Lila Gleitman , who said that, "If a visitor were to come to the Earth, it or he or she would be struck by the fact that the various languages that we think of as so separate, so different and so difficult to learn once you're trying to acquire a second language would simply appear to him like dialects of the same language". But as Steve was saying, they have a common design structure, which I think are not so much the result of our having language inside us, but that language is built on to certain fundamental inherited assumptions about the way the world is. The world contains things which act, things which are acted upon , and in a sense language is structured upon certain structural assumptions that we have, and we'd better have, about how the world is, otherwise we wouldn't do very well in it.

Melvyn Bragg : Is there any way of calculating, perhaps this is a silly question, Steven Pinker, is there any way of calculating *when* it became innate? I mean at what stage in our evolution it became innate?

Steven Pinker : You can put a late boundary on it, and that's because all of the cultures and the ethnic groups in the world have, as far as we know, identical language abilities. They began to split apart say 50,000 years ago at the latest, and that's when they stopped interbreeding until the last couple of hundred years, and so unless you had massive parallel evolution in the different branches of humanity, it's a good bet that the language ability was in place before our species fragmented, before the New Guineans went to New Guinea and so on. So put 50,000 years as the late boundary. In terms of the early boundary, obviously that's much harder. There have been attempts to reconstruct the evolution of language from the anatomical signs that are left behind in skeletons. Things like the diameter of the canal that carries the nerve to the tongue. The diameter of the canal in the bone that carries the nerve that controls the breathing apparatus. Each of which has been modified in the course of evolution presumably in the service of the control over the breath and the tongue that's necessary for language.

Jonathan Miller : Yeah, I've never been convinced by that particular.... by the anatomical argument, because it goes against the idea of the arbitrariness of sign, because in fact, one is constantly struck by the fact when people are disabled that they can make themselves understood, for example laryngectomy patients can do speech by burping, and they can articulate it and people can speak with severe injuries to the jaw and to the tongue. So it makes one feel that the linguistic ability must be some sort of abstract structure which can make use of whatever there is, and you can see the extraordinary eloquence of the deaf when using sign, which makes it look as if, it's something upstream of the anatomical capabilities of the larynx or the tongue or the jaw, and I think when people go searching for whether the larynx is high enough up the neck to allow these flows of sound and flows of air, I think they're looking at the wrong thing.

Melvyn Bragg : So what should they be looking at? I mean, where do you think it does begin?

Jonathan Miller : Well, I don't think you can look in where it's implemented because we don't have the soft tissues of pre-Pleistocene brains to look at, nor do we know enough about how brains are organised now to be able to say how it happens. I mean we talk about these areas which are not exactly responsible for language, but certainly are vulnerable, linguistically, when... you know... when Broca's area, so-called, when that goes, people lose the capacity to utter speech in a certain way, in certain areas, the temporal lobe, go, people lose the capacity to understand language. Now that's really all we know, people can, sort of, cut sections to their hearts content, and we still can't see from the circuitry how it does it.

Melvyn Bragg : If that's so, Steven Pinker, what argument, what hard argument, can you bring to bear against a hypothesis that language began by people reacting to things grunts, fear, turned into words which said run, as it were, it's ridiculous, but that sort of thing? Is there any... given what Jonathan's said, which seems to me to be quite convincing, is there any reason why that could not have been the start of it, rather than it being this word innate which is a beguiling almost magical word, almost sort of divine word?

Steven Pinker : Well, those two ideas aren't incompatible because even if it's innate in modern Homo Sapiens, it may have had... it must have had some kind of origin in our evolutionary ancestors, and that origin could have been a conversion of calls such as for fear or warning, affiliation and so on. We certainly now that the calls and the equivalents of animal calls that we still have, moaning, sighing, laughing, shouting in pain, and so on are controlled by different parts of the brain than the ones that control voluntary articulate speech, and that even... that attempts to get primates to communicate have been quite unsuccessful at getting them to control the vocal apparatus. So it's reason to at least be puzzled as to what origin is. The obvious thing would be that language would come out of these calls and grunts, but they seem to be... they have nothing to do with one another, at least in the modern human brain.

Melvyn Bragg : What about the brain, Jonathan, is there found, in the mechanism of the brain, something in which this is located which you feel is... has always been there or...?

Jonathan Miller : No, no, I mean all that we know is something about the vulnerability of the brain, and I think it was the great pioneer, neurologist Jackson, who said that one mustn't confuse vulnerability with responsibility. The fact that when you knock something out that certain linguistic abilities are injured, doesn't mean that the part that

you've knocked out is responsible for broadcasting those capabilities. It's obviously a massively interconnected network which is vulnerable at certain points, and at the moment, we really have the very, very vaguest idea of the actual implementation of it. That doesn't mean that therefore we have to go looking for something else. It can't be implemented by anything other than brain, unless you start to invoke all sorts of weird sort of psychic substances, which they did of course at the time of Descartes, you know, and thought there were spirits and things.

Steven Pinker : I think that's absolutely right although it's changing now that we have new technologies for functional neuro-imaging, and I think in the next 5 years there's going to be some interesting discoveries about parts of the brain that we may not have looked at so far, based on the literature from brain damage, but which may turn out to play an important role in language.

Jonathan Miller : Well I think that's certainly true that neural imaging, shows that there are more parts involved than we thought before. I mean the progress is often equated with technical discoveries, but the funny thing is that Chomsky's revolution was achieved without looking at the brain at all, and was achieved by having a new approach to the subject. In other words, to language, but in effect a comparable approach to language was already fairly firmly in place by the 17th century, as a result of these strange Jansenists, outside Paris, the Port Royale linguistic philosophers who were actually proposing that there was in fact some sort of native structure to language. Now, in a sense, what Chomsky did, in the 1950's & 60's could have been done by the Port Royale people in the 1670's, because of them had the same material to look at, which was simply, how do we talk and what is the structure of language, and I think that although it's interesting to see what's going to happen in the brain, I think that the big advance has been the result of listening more carefully to what we do when we talk to one another.

Steven Pinker : Yeah, I agree.

Melvyn Bragg : When we talk, what's the is there a clash d'you see Jonathan between culture and biology? I mean just to chuck in a couple of little things, we know that a young boy in Russia brought up with wolves and young brought up with chickens, they only were able to communicate with the signs and reflexes they'd heard from these animals, does that tell you anything about the culture passing on language?

Jonathan Miller : Well, I mean it tells us what Steve said at the beginning, that people don't inherit Japanese, what they or English or French, in order to be competent performers of one or other of those they must be exposed to it. But they wouldn't be competent performers of it unless they had this innate capacity to acquire language very rapidly, much more rapidly than could possibly be explained by sort of trial and error learning, but that's not I think where the controversy arises between culture and biology, I mean we know linguistically that this is...

Melvyn Bragg : So where do you see the centre of that controversy between culture and ...

Jonathan Miller : Well, I think that ... and I think this is where Steve differ to some extent, I think there has been a sort of vast trade of evolutionary psychology, which I think has over stressed the extent to which we are in fact creatures of our hereditary rather than creations of our culture, as well.

Melvyn Bragg : Steven Pinker?

Steven Pinker : Yeah, I would see our discussion of language as being a model for how to look at the interaction of biology and culture elsewhere, namely that what biology gives us is, is an ability to learn in certain ways, to pay attention to certain aspects of the environment and ignore others, to have certain goals, to analyse the world in certain categories, and just as we don't inherit Japanese, but we inherit an ability to acquire a range of languages that includes Japanese, we may inherit a way of parsing the cultural world to pay attention to certain aspects of behaviour, to be able to learn certain things easily, and certain things not at all. So I don't even like thinking of biology and culture as two complementary ingredients, because they're really two different categories. Culture is one of the things that happens when you have an innate learning ability in a species, and then you let the members of the species interact and bump into each other, and culture is what emerges as a result of that interaction.

Jonathan Miller : No but I think there has been a frightful disparagement on the part of people who have perhaps drunk too deeply at the wells of neurobiology, a disparagement of what, for example, one couple of authors, have attacked as the standard social science research model, indicating that social studies and sociology are sort of

derelict enterprises, and that if only sociologists were to direct their attention towards, for example Game Theory and to genetics and notions of inclusive fitness, and so forth, we'd have the human sciences down to a T, and I think it's a philistine approach to the extraordinary varieties of culture. Of course, they co-evolve in some way, but I don't think that culture is on this, sort of, short leash of hereditary compulsion, which some people imply. It leaves the study of history in a state of derelict shame really, I just don't think it's right!

Melvyn Bragg : Steven Pinker?

Steven Pinker : Yeah, I think of it differently. The leash metaphor isn't particularly appealing. I think of it more as that biology provides the elements and the rules of combination, perhaps it's the rules of chess and culture is the actual. . . . is a particular game of chess, and that, it's not so much that social sciences are derelict enterprises, but just that they shouldn't float free of the rest of knowledge, in particular knowledge of science. That ultimately they should be connected to the natural sciences via an understanding of human nature and the innate learning abilities that give rise to culture when you watch people interact over large spans of time.

Melvyn Bragg : I've had a sneak preview of your forthcoming book, Steven Pinker, "Words and Rules: The Ingredients of Language", and you talk about the combinatorial system of language, that was first put forward in the Enlightenment. Can you tell us why you think that is so extraordinary?

Steven Pinker : The extraordinary thing about language is the vast range of thoughts that we can communicate, it's not just that we have a list of a dozen messages that we can bark at each other, but we can talk to each other about theories of the origin of the universe, or the latest twists and turns in the Monica Lewinsky scandal or the football scores or soap opera plots, or cosmological systems, what's the secret behind our trick to convey so many different kinds of ideas, and I think the secret is combinatorics , that was language allows us to do, is take a fixed stock of ideas, the ones that we have words for, but then to combine them in phrases and sentences in which the meaning of the sentence can be computed from the meanings of the words and the way that they are arranged. Because the number of messages grows geometrically or exponentially, with the length of a sentence, it means that you can get truly enormous numbers of thoughts that can be expressed even with a finite set of tools as long as the tools allow for, combining the nouns and verbs into bigger strings.

Melvyn Bragg : There are lunatic statistics aren't there? That in 20 word sentences you can have one hundred million trillion variations of a 20 words sentence, and the this is more than double the seconds since the universe began, something idiotic like that?

Steven Pinker : Yes, yes, many orders of magnitude more, and it's simply because of the mathematics of combinatorics, you can get mind boggling numbers

Melvyn Bragg : So where does that lead us? You can't get your mind round it but where does it lead us? It's such a... why is there that vastness, that infinity, how do you, not account for that.... what does that say to you?

Steven Pinker : It reflects back on the thoughts that we put into language. The reason that we have this mechanism for converting thoughts into so many different noises is that we have so many different thoughts to begin with, and I think that the. . . perhaps even the essence of human intelligence is to be able to imagine brand new scenarios, to put things together that other members of the species haven't put together before. Language is just the medium by which we share those combinatorial thoughts. So it's a way of taking combinatorial thoughts and converting them into combinatorial noises, so we can get them from one head into another.

Jonathan Miller : But it also creates the possibility of having thoughts which were not actually conceivable before, not just simply expressible.

Steven Pinker : Yes.

Jonathan Miller : I mean it may well be you know I think Forster once said, "I don't quite know what I think until I hear myself say it". Now there is a sense in which new thoughts get created as a result of utterances of an unprecedented form. Which goes back to really what I was arguing earlier that if in fact there is this vast combinatorial possibility, I think von Humboldt pointed it out, the possibility of using limited resources to express

an infinite series of thoughts, and that was already in place at the beginning of the 19th century. In a way that reinforces what I was saying about the autonomy of culture, that if in fact using this biologically inherited device of a vastly combinatorial system which allows us to express infinitely more than was previously thought to be possible, then it does start to float free of its biological basis. It's still is. . . . it's anchored in it, but never the less it becomes possible to create a cultural artefact which is entirely within the medium of language, which actually transcends what was previously thought to be possible on the basis of its biology.

Melvyn Bragg : Is this actually bringing in the imagination?

Jonathan Miller : No, an imagination is a sort of loose and rather unfocussed concept which perhaps includes some of these things. But I think it indicates the autonomy of what in fact begins to appear in language.

Steven Pinker : Well, they're different ways of, I guess looking at the same phenomenon, because we agree what the phenomenon is. It is autonomous in the sense that any particular idea can be thought for the first time and communicated for the first time, although the elements and rules of combination that allow us to have those thoughts are in a sense specified by the mental apparatus that we inherit, and indeed even an infinite combinatorial apparatus doesn't cover everything, just as the integers are infinite, but they don't include the fractions, an infinite combinatorial scheme for having thoughts, also leaves possible that there are certain kinds of thoughts that we can't think, or have great difficulty thinking even though the ones that we can think are, as you point out, open-ended and infinitely creative.

Jonathan Miller : But it is interesting how thoughts which perhaps at the time seemed unthinkable, I mean one knows for example that Newton virtually bust his head trying to think of the mathematical concepts which enabled him then to think to the point where he could create the Principia. Now a pretty smart 1st year physics student finds the Principia which was almost unreadable by more than 2 or 3 of Newton's contemporaries, he finds it perfectly easy to understand it. So that this creates this vast autonomous mathematical culture, and I think that language also creates this enormous autonomous culture in which we speak to one another, although, of course it's rooted in biology, how else. . . . where else can it be rooted?

Melvyn Bragg : What part does philosophy play in this?

Steven Pinker : A lot of philosophers believe that philosophy is just the advancing edge of science and that the problems that the scientists think aren't worth thinking about yet are the ones that the philosophers worry about. As soon as they start to get answered, the philosophers get bored with them and they slough them off to the sciences. There are also, though, some problems that. . . traditional philosophical problems that don't seem to be yielding to science and these might even be examples of the unthinkable thoughts that our combinatorial apparatus for cognition leaves out, and I. . . in "How The Mind Works" I reiterate an argument from Colin McGinn that some of the mysteries that haven't become less mysterious over time, the ones where you and I could have a debate with Aristotle and we would be speaking on the same terms, maybe cases where the very nature of thought doesn't allow us to see a problem from the right perspective. It's thought that perhaps the problem of "sentient subjective experience," "why does neural firings give rise to something that I actually experience as redness and pain and saltiness, could be a kind of problem where limitations of our brain never allow us to be completely satisfied with any answer.

We know that it must be the physiology of the brain to this...

Jonathan Miller : Yes what else? Yes.

Steven Pinker: ...sensation of saltiness. But what bridges that gap between the physical and the subjective may be something that we don't have the mental categories to appreciate.

Jonathan Miller : And yet you see there are these sort of radical eliminativists, both East and West coast in the US, who think that they're really. . . . that consciousness and redness and saltiness and fear are epiphenomena, and that what's really going on is brain writing, and that once we get brain writing down, we'll have got it, and then you wonder what they do when they're off-duty, these people, when they're getting redness and saltiness and fear and lust and so forth. But I agree with Colin McGinn and in fact others, that there may be some sort of fundamental

mystery about how it is that grey salty porridge by firing electrically, can make the owner of the grey salty porridge see red.

Melvyn Bragg : What role do you think the unconscious plays in language Steven Pinker?

Steven Pinker : Well most of language processing is unconscious, none of us has any idea what the rules are that allow us to string words together in well formed sentences to make ourselves understood. So I think with most cognitive processes, what we experience subjectively is a tip of the iceberg, and it's an interesting scientific question why certain aspects of the process should be things that we can talk about and ruminate about and reflect back on while the rest goes on beneath the surface. It needn't be Freud's answer that what goes on beneath the surface is socially unacceptable or too painful to witness. There maybe good engineering reasons why you want to have some subset of the information processing in the brain, sort of mutually available, the language system can talk about some aspects of the perceptual system, and the decision making system has access to the results of those computations, where the rest you farm out to autonomous processes that can just spin away in their black boxes and not bother these other parts of the brain.

Jonathan Miller : Yeah, you see I think that the popularisation of the Freudian unconscious has actually done almost irreparable harm to the more interesting unconscious with which people like Chomsky deal, and others you see, and the funny thing is that the where as Freud's notion of the unconscious is a custodial repressive one, in which you keep things under lock and key because you don't want to hear them talked about, and because they're dangerous and subversive and disruptive to society, but actually long before the Freudian unconscious was developed, a much more interesting, what I would describe as an enabling unconscious, the conscious. . . . the unconsciousness that allows us to do things like speaking or sleeping on a problem and coming up with it the next morning, remembering things surprisingly after a journey, suddenly you remember, "Oh yes I had seen that, I had see that", there's a vast amount of stuff. This notion of the enabling unconscious was already in place by the 1870's. There were two scientists in England, William Benjamin Carpenter at university College and Thomas Laycock, who had actually already formulated a notion of what was called then either "the reflex functions of the brain" or a wonderful clumsy term called "unconscious cerebration". So that the idea of an enabling unconscious was fully in place until the Freudian unconscious with all its sort of naughty connotations of Freudian slips and naughty thoughts replaced it in the public imagination, and actually if it hadn't I think been for behaviourism, in the 1920's, the enabling unconscious which was already formulated by the end of the end of the 19th century, would have actually brought the cognitive revolution into existence long before it did. As it was we had to endure this ghastly drought of behaviourism, with watching rats running mazes, and you know, giving monkeys rewards and punishments, and stopped people thinking cognitively.

Melvyn Bragg : Finally can I ask you Steven Pinker, with street language and street slang and computer language and different scientific languages growing, just. . . do you see more and more languages? We talk about the disappearance of languages, the disappearance of certain tribes and cultures. Do you see more and more languages evolving, more complex and more different?

Steven Pinker : Certainly within a language such as English, we mourn the loss of certain words, the distinction between lie and lay, the distinction between infer and apply, and disinterested and uninterested. But new words are being bred all the time to maintain the richness and the diversity, and fortunately it is something that will be preserved in English, which won't replace the vast number of languages in New Guinea and Russia and Alaska and Africa and so on that will be lost. So there is an increasing diversity within a language but a loss of different languages.

Melvyn Bragg : When we lose those languages, finally, finally, in those places, are we losing something valuable, or are we losing as Jonathan said earlier in the programme, a dialect?

Steven Pinker : No I think we're losing something very precious. It's like losing a species, but each language is an astonishingly rich and beautiful system, that captures something about the culture of the people that speaks them, and it's a great tragedy for these species.

Jonathan Miller : I did say that they were dialects only to Martians! They're important if they are languages to us!

Melvyn Bragg : Yes, and I slap myself on the knuckles for saying *only* a dialect as I spent quite a bit of time preserve the dialect of the North West of England, the extreme North West of England, which is a great loss to civilisation, thank you very much Steven Pinker and Jonathan Miller, and thank you for listening.