Subject: Re: Essay: Evolving Language
Date: Sun, 17 Jul 2005 20:06:
Discussion between Sue Savage-Rumbaugh and Robert Karl Stonjek

Robert Karl Stonjek RKS wrote:
RKS: Look up (google) "Amer-Ind gestural code" for instance. Tribes having never met and not knowing each other's language could non-the-less communicate in this way. It was a common form of communications with whites, especially on first contact. The exact quote that I had in mind is: "Gesture, for example - the nongramatical expressive movements we all make [shrugging shoulders, waving good-bye, brandishing a fist, etc] - is preserved in aphasia, even though Sign is lost, emphasizing the absolute distinction between the two. Patients with aphasia, indeed, can be taught to use "Amerindian Gestural Code", but cannot use sign, any more than they can use speech.[Seeing Voices by Oliver Sacks, P.75 of the paperback edition]
I would further add that if a language used by non-human primates can be taught to aphasiacs then this is proof positive that that language is gesturally based, or an extension of gestural code and not a language in the sense of that used by humans.

SSR: 1. You are talking about 2 different kinds of things above. First a common sign language between Amer-Ind tribes (most indigenous peoples have common languages that go between tribes) and expressive movements that have some relation to sign, but are not formalized as signs -- such a system cannot effectively communicate between different groups who have different languages. I have tried.

RKS:
Obviously formal sentences can not be easily communicated, but simple gestural code is very effective. The deaf can make themselves understood to non-signers very effectively on a daily basis and have done so for millennia. Explorers discovered numerous new tribes throughout history and managed to not only communicate with them, but to initiate trade, get directions etc - all using simple gestural code.

The gestural code referred to by Oliver Sacks can be taught to deaf aphasiacs who have lost the ability to sign, indicating that this level of communication is not mediated by the human 'language' centres.

RKS:
55 Year old men do not normally play chasings. Second, there is only one possible solution to "Tomato"; "Microwave" and "get". You can not extract a microwave from a
tomato. The only other possible interpretation is to ignore part of the sentence eg "get any tomato"; "get anything that is in the microwave". In normal communication we do not parse entire sentences if they are mundane and predictable, so if you slip in an absurdity most people don't even notice, as has been amply demonstrated many times.

SSR: That is not the case. If you DO NOT understand the syntax of the sentence you can a) go to the micro-wave and b) get the tomato. As the monograph demonstrated, when syntactically ambiguous sentences such as "Go to the microwave and get the tomato" were heard -- you got ambiguous behavior. Such a sentence has the 3 words you argue above -- Tomato/Microwave/Get -- yet Kanzi did not go to the microwave and get the tomato, he gave the tomato that was in front of him and he went to the microwave --- if you are going to make the kind of limiting statement you do above, you have to account for this behavior as well -- which you have not done.

RKS:
This is not a question of syntax - Kanzi had to ignore part of the sentence completely ie the 'microwave' part. The sequence or syntax is inconsequential for the remaining two words "Tomato" and "get".

"As the monograph...."
Neither the word "tomato" nor the word "microwave" appear in the monograph.

SSR: Thinking of sentences as puzzles to be solved rather than as strictly syntactically perfect beasts that may be required for a computer to digest, changes things considerably. If you said to Kanzi "get the microwave that is in the tomato" would he still go and fetch the tomato that is in the microwave or would he be puzzled?

That is precisely what I said to him and he was not puzzled. It caused him to ignore the tomato in front of him and to get the one in the microwave. Without the grammatical recursion, he did NOT do this. This is clearly demonstrated in the SRCD monograph, have you seen it?

RKS:
I couldn't see anything that directly supports your case - to exactly which part of the monograph do you refer?

SRS: If A chase B and B chase A are both common activities, then syntax may have been parsed. I think you'll find that if syntax is the cue and the sentence is, say, "Kanzi chase me" and "me chase Kanzi" that the will be just as effective if truncated to "chase Kanzi" or "chase me" or me chase" or Kanzi chase" indicating the syntax that is relied upon. If Kanzi is relying on only the simplest form of syntax, the order of objects in the sentence, then,
Kanzi me chase;
chase Kanzi me and
Kanzi chase me
will all have the same effect ie Kanzi will chase the inquirer.

We have tested these things as well and you are incorrect. Please see the SRCD monograph for extensive data on this point. If you wish to disagree with the data and show why it is flawed -- you have that right, but you should not simply 'make up' statements about what Kanzi will do in the absence of data, while ignoring published data collected under blind controlled conditions.

RKS:
I didn't see anything that directly relates to these points.

SRS: If Kanzi has truly learnt a syntactical grammar and relies upon it to understand sentences then the above examples will evoke a query. If Kanzi solves the sentences on-the-fly, like my aphasic stroke victim, then altered syntactical grammar will evoke no special response. Humans normally do both, only picking out key words when attention is lowest, parsing the entire sentence and checking for syntactical cues and syntactical (and grammatical) accuracy when attention is highest.

The only query such sentences might evoke is a strange glance -- which indicates, why are you talking like that? Kanzi does not operate like a computer, but like a person.

RKS:
A 'strange glance' satisfies "...will evoke a query."

Further, if one was testing the veracity of this, then it can be postulated that if Kanzi has learnt a particular syntactical grammar and is not simply solving sentences by trying to match a jumble of words with current conditions, then familiar syntax will be responded to in a testable quicker interval than unfamiliar syntax, as in the above example. A human would hesitate when responding to the unfamiliar grammar but will respond immediately (or quicker) if the grammar is correct (or familiar).

SRS: That is correct. Kanzi does respond more quickly to appropriate grammar.

A simple testable setup would include something like the following. Presented with a problem such as "place the red box on top of the black box" and a reward, Kanzi should solve the correctly phrased sentence quicker than logical but unfamiliar sentence such as [{red-box}, {black-box}], {place on top of} where [{item}, {item}] defines the order and {action} defines what is to be done. If the inverse is not possible (the microwave can not be inside the tomato, so there is only one logical way to interpret any sentence that includes 'microwave' tomato' and 'in', then no true test of grammar has been performed as the falsifiable option is absent).
I have not published this, but my study of the tapes in the monograph indicated that Kanzi parsed the grammatical sentences more quickly than the the ambiguous ones, but he also parsed them more correctly so I focused on that. The quickness of the correct parse was seen most clearly in his glances, the actual time to travel and get something and return with it varied of course. What is needed right now with Kanzi is an EEG measure of grammatical parsing.

RKS:

fMRI may be more instructive. It would be interesting to see where in the bonobo brain grammar is processed.

Rigorously demonstrating any ability of an animal to a scientific standard is always going to lag behind an animal's actual ability. I am relying on popular books that can include the experimenter's/observer's own first hand observations that may have occurred consistently except in experimental setups. Books such as yours and Irene's, Frans de Waal's, Bernd Heinrich on Ravens (Mind of the Raven) and so on. The counter argument is that if we were to believe everything that enthusiastic observers such as Russon on Orangutans then humans are no different from other primates. Anne's book "Orangutans: Wizards of the rain Forest" is a brilliant and inspiring little read :)

SRS: You should not reply on my popular books, you should rely on scientific publications. Please look at the SRCD monograph.

RKS: But are we looking at the entire paradigm in the best possible way? The general impression I get is that there must be some baseline above which we wish to prove that a particular animal has progressed toward human competence. Of course we can all pretend that we are more objective than this, but lets face it - why else would we be asking questions regarding a human-like language?

The other way to look at the same problem, without trying to change our nature, is to ask "if a human brain/mind were to be simplified as much as possible, what would the result be?" In other words, what superfluous flair can be truncated - what are the most essential abilities and are these shared by other animals?

This simple reversal, back from humans rather than up from non-human primates, is a powerful paradigm shift. We are asking how language can be cut down in complexity but still function nearly as well, or as well in all but specialised cases. Think about it, how many words do you really need to communicate your intention, considering that you are in a colony of conspecifics that all know you and visa versa, that know what you probably want before you say it etc. Say you have a limited set of desires, wants and needs. Think about how truncated ordinary communication can become for ordinary things in the family where everyone knows each other intimately) compared with the same simple requests etc when among people of entirely different backgrounds?

In his book "The Language Instinct", Steven Pinker reproduces some transcriptions of the Nixon tapes (P.222-223) They are all but incomprehensible because of the truncation of
expression common when people are familiar with each other and the subject of discussion.

Now, if you were designing a simpler, cut down version of the human you can see that syntactic grammar can be cut out completely and communication can proceed just fine. The grammar is only needed when two minds need to share thought - to extend the mind so to speak). But for simple communication...

SRS: No that is not the case. I used to make that argument myself -- but as Kanzi began to acquire grammatical competency I saw that it was wrong. There is a real need for grammar.

Lets say I want a banana. Simply indicating "banana" is sufficient to make this intention known. It is unlikely that I want a banana for anything other than eating, and unlikely that I would even mention it unless it was directly relevant. If there is no banana present then I either want to tell you where they are to be found or I want you to tell me where I can find one. Social protocols, already as complex as language in chimp and bonobo societies, determines the meaning and/or context of my single utterance.

Kanzi frequently wants a banana to be given to someone else, or to be saved for later, or to be hidden -- the kind of truncation you are referring to is too simplistic to account for the kinds of things that happen daily among bonobos here.

RKS: Much of what we say is superfluous to a chimp or bonobo - they simply don't need it EXCEPT when communicating with humans.

SRS: This is simply NOT true. I don't know what you say to a bonobo or a chimp, but what I say is not superfluous. More importantly I work with 2 groups, one that human language comprehension with syntax and one that does and vastly different kinds of things are said to them and they respond in vastly different kinds of ways. There is very little co-operative behavior, apart from what is routine that I can request of the nonlanguage group, but I can request nearly anything of Kanzi's group.

RKS:
I note that in the monograph you say:

"On another occasion, Matata's vocalization from far away suddenly set Kanzi to climbing as high as could inside the building to look out of the monitors in a specific direction. When Sue sent someone to find out what was there, they found a man up in a telephone pole.

We find it difficult not to suspect that Matata came to the United States equipped with a language of some form, though it is not the same kind of language that Kanzi and Panbanisha and Nyota have acquired. Matata is able to express needs, wants and events of general interest (for example, there is a man on the telephone pole)."
In the context of the Bonobo environment where trees are common, communication of concepts such as "animal in the tree" and "animal on the ground" need to be communicated quickly and simply. It is likely, then, that a single call indicates "(non-conspecific) animal up high", which is what Matata may have called. The full sentence "is a man on the telephone pole" is a somewhat optimistic interpretation.

SRS: Take the razor out and see what you can trim off the human communication protocol to be left with a non-human primate can utilise, extend what is left to its logical limits and then ask if Kanzi has more than this.

YES, a thousand times yes. Let me give you a simple example,— when Kanzi was recently being moved they lifted the cage in which he was confined off of a large truck with a fork-lift. He did not like this and began to rock the cage sufficiently that it was about to fall. They asked me to "calm him down" -- I ask Kanzi to calm down and he ignored me. Then I explained to him that if he did not stop rocking the cage it would fall off the fork lift and that they could not lower it unless he stopped rocking because the machine would not do that. If he stopped, they would lower it and he could go in the building with me. He immediately stopped. He had never been in such a cage before, never been in the new building, never been on a fork lift -- etc.

I could not do this with the other bonobos that do not grasp language. Do you think that Kanzi only understood fall--if so then I could offer thousands of other examples, each different and unique that were moderated by language and language alone, with syntactical structure. The most intriguing example however, was the first one in which Kanzi convinced me of the power of syntax when I said "Knife hurt Sue" as opposed to "Knife cut Sue" -- have you read that? Did I send you any recent papers with many more examples?

RKS:
The syntax of the two sentences "Knife hurt Sue" and "Knife cut Sue" is exactly the same. The differentiation between the two sentences shows that Kanzi parsed the entire sentences rather than picking out key words or making assumptions from the auditory shape of the sentence or other such cues.

Syntax considers how words are placed together to form a sentence - mainly the word order.

Whatever the focus of the evolutionary pressure to increase brain size is, this must be the same focus toward which language evolved. Something in the human environment favours larger brains and when the increase in brain size is no longer practicable we have simply linked up brains by allowing the thoughts of one brain to spill out and mix with the thoughts of other brains. We live in the resulting mindscape.

SRS: Yes we live in a mindscape alright and Kanzi, Panbanisha and Nyota live there with us a well even though they do not have brains as large as ours. I imagine Flores man with his small brain lived in that mindscape also.
RKS: I think you might be forgetting the child mortality rate among humans. The reason it is so high (in the absence of modern medicine) is due to the huge scull that must be passed through the female's pelvis. Any bigger and the mortality rate would cause a population decline (in pre modern medicine). Indeed, evolutionarily we are at the maximum now (but with the advent of modern medicine and the caesarean birth the brain could grow bigger, but natural birth would eventually become impossible).

SRS: No I am not forgetting this, I have watched enough bonobo births and written on them to be forever reminded of this. What is being overlooked is that the pelvis can change. It is thought that this would impede walking, but compensations could be made by the body to accommodate this, on the child could be born in even a more premature state, or the skull could be more flexible at birth, all kinds of things could happen. To say that evolution cannot drive a larger brain is simply not accurate. Moreover the mortality rate is high among apes as well.

RKS:
Perhaps we could say that evolution found a simpler solution to the brain size problem - combine the resources of many brains using a language that allows inner states to be shared (broadcast). In this case the brain only ever needs to evolve to a size sufficient to accommodate language (in the form found in humans). The current size of the human brain may well be bigger than it needs to be. It is far more difficult to get a culture started than to be born into one and integrate into it. There may simply have not been enough time after culture complete with language first made the need for a bigger brain redundant and the present, but in time the brain will most likely shrink as the required capacity falls even further.

Kanzi and other Bonobos may show that they are closer than they should be because human culture already exists, but left to themselves, and assuming that they evolved in a similar manner to that of humans, they may have to evolve a brain almost as big as a human's (with regard to ratio of brain to body mass) before a culture develops in which a brain 1/3 less in size is more than competent.

I note the complete absence of any contemplation of the extraordinary brain capable of initiating language, culture and so on as compared with the relatively moderate brain required to sustain it.

One might observe that it takes an Einstein to initiate a General Relativistic model of gravity, but those with only half his mind to sustain it.

RKS: The seeds of the extension were there, and no doubt can be found in the likes of Kanzi. But Bonobos could easily evolve larger brains, so the pressure to evolve a human-like language ability is absent.

SRS: They don't need to evolve the brain power to do this, they already have it.
Consciousness-subconscious issues have not been raised in our discussion thus far and when viewing behaviour objectively are rarely ever relevant. The bridge between two entirely different systems is a small leap. It is clear that connectivity is liberally shared in the human brain. Shortly after birth and for some time after we lose huge numbers of neurons and even more connections. The brain forms more like a sculpture with the excess chipped away.

I am aware of this data.

As language could not possibly have evolved from a single form of communication, such as vocal communication, then it is pointless starting with the vocal chords and following them through the brain in the hope of finding some extension of voice control that is the roots of 'language'. One will arrive at a non-vocal controlling point, a point which the visual researchers who started with the eyes and worked in will have also reach, but a point that is not visual either.

You have started with a thesis which you are determined to defend at all costs. It is inhibiting your thinking. Bonobos surely have something like language in the wild though it is much less individuated than our language and much less object focus. But it likely has grammar and a shared mindscape. You and I have had very different experiences and come, as a result, to very different conclusions about language. Of course, I don't know how much of yours is based on actual encounters with apes in complex worlds, but I know how much of mine is based on such hard facts, not speculations of humans who keep the world of apes at bay.

RKS:

The question is whether Bonobos have a form of communication, and we can safely say that all mammals and birds can communicate with each to varying degrees, that is simply an extension of, say, simple preset vocal communication (the bark), or a global innate communication protocol that can express through any available channel eg by vocalisation, symbolic representation, gesture, behaviour or whatever. The second question is whether the more sophisticated form of communication is routinely expressed in their native environment or is only stimulated when in a special environment. It seems to me that calls such as Matata's "animal-high" could well be innate vocal based. But it is unlikely that the advanced language of Kanzi could progress far in an environment where day to day survival must take up a substantial portion of his available cognitive abilities. Humans suffer from the same restriction but to a lesser degree, though it seems we had more spare time in our tribal days than in the farming era that followed. The monograph shows that very intensive training have profound effects on some bonobos but not others, with various levels of language acquisition and the abstract concepts that can be communicated with that language shown by various individuals. By contrast, if aliens scooped up a batch of humans and spirited them away to their labs they may find that almost none of them could understand or even be taught advanced general relativity concepts and math (partial differential equations). But most of the children of those 'wild born' Earthlings, under intense training, could be taught the math. That such intense training is needed shows that advance math is not innate and that humans don't communicate in a simpler form of calculus in their native environment, though some, around 0.01% or less, do (and this is responsible for most of our advanced technology).
So, we might ask, why do humans have an ability to perform partial differential equations when so few actually perform them??

The question is no different with the bonobo, but we must also ask what your work is angled toward. As far as showing what the earliest humans must have been like and the capacities they must have had - the clay from which evolution would sculpt the human - it is very instructive. But if the aim is to show that Kanzi and others both have a human-like language and that that language is actually expressed in some simpler form in the wild seems to me to be an unsustainable extrapolation, as the calculus thought experiment expresses.

If we are to share minds, and assuming that is the point of the complex human language, then the point of origin of that language must be a point that is accessible to every part of the human brain/mind that has anything worthy to communicate to others.

SRS: Not exactly -- languages are not fully translate-able into one another as culture plays the central stage. See our new book Kanzi's Primal Language (Segerdahl, Fields and Savage-Rumbaugh)

RKS:
I was referring to central access that a language has ie to vision and all other senses, to all effectors, to inner states, to imagination and so on. Languages tend not to use words which have the minimal meaning but use compounds that express more complex concepts. The combination of concepts may well be different between languages, but this was not the point I was making. I was outlining that when I speak, for instance, the source of those words has access to all of the above. Conversely, I can ask a person about just about anything via language, indicating that the language or prelanguage centre has general access (eg consciousness).

Such a convergence may also precipitate the more exotic forms of consciousness that may well be unique to humans, the introspective abilities and so on. The one thing human-like language, higher consciousness (or "human" -consciousness, or any of several other names depending on the author eg Pinker, Damasio etc), introspection and so on have is the need for a single point of access to all other points that are included in consciousness, introspection, and language.

SRS: You can speculate about what is unique to humans, but have you lived in remote human groups, have you lived in bonobo groups --- and have you communicated about exotic things or tried in such cases-if not you may find that your speculations are not based on the kind of hard boundaries that you envision.

Best wishes,
Sue