

History of an Idea: 4-BrainMind Evolution of Language Model

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Speaker's Notes Draft -- Do not quote, etc. (in print)

A. Introduction

Its been a bitch figuring out how to tell a huge story in a small amount of time, so I thought the best thing to do would be to just tell you the history of how my model for the evolution of language was conceived.

B. UCLA Training and Early Fieldwork

In my linguistics training at UCLA during the early heyday of Chomskyanism, I never questioned the way origins theories were presented. The whimsically named Bow-Wow, Ding-Dong, Yo-He-Ho and other speculations were each somehow important, yet none was sufficient to show how the uniqueness of human speech came about. What I didnt notice at the time was a huge gap: there was no evolutionary theory of language to match what was going on in other major fields such as biology.

I'm sorry to say that I was probably the most unprepared linguistic fieldworker that ever went to the field as I spent four years on the Northern Cheyenne Reservation in the early 70's as a linguist and administrator for a federal bilingual/bicultural education program. Imagine learning the Chomskyan view of autonomous language and then going out and working with real live people instead of drawing trees and making up data! I came back from that experience a very different person and linguist.

C. UC Berkeley

Returning to training after fieldwork experience, I met three people at Berkeley whose influence would be crucial to my next directions. My wife, Marilyn Silva, who encouraged my burgeoning different view of the world; Syd Lamb, who gave me an underground paper by an anthropologist studying "Psi, Speech, and Thought Formation during Conversation" which would change what kinds of things I thought were publishable; and a Cheyenne- Chickasaw man with a law degree from Harvard, James Sakej Youngblood Henderson, who with his wife Marie Battiste adopted me as their friend and gave me entre into Indian America.

D. The Cheyenne Tower of Babel Teaching

Something Sakej told me early on kept resounding in my head over the years, because it implied that linguistics was paying attention to only one part of language -- that of the waking and working state -- and ignoring something else that was vital.

"Long ago, humans and spirits and animals and plants all communicated in the same way. Then something happened. After that, we had to talk to each other with human speech. But we retained the Old Language for dreams, and for communicating with spirits and animals and plants."

Since such uses of language, though language in decidedly alternative modes, happen in alternative states of consciousness such as dreams and prayer, I thought, perhaps that would be a good distinction to begin with when looking at language in a larger perspective.

E. Brainwave Biofeedback Research

Positing different levels of consciousness for language led me to brainwave research going on in biofeedback labs, since some alternative states of consciousness have distinctive brainwave signatures, usually involving a decrease of beta (fast-wave processing) and a corresponding increase in slower processing speeds, such as alpha or theta.

Here are the major accepted biowave levels used in biofeedback (higher numbers indicate more information being processed, in cycles per second):

- a) Delta -- 0.1 - 3 cps -- bodily processing, esp. in dreams
- b) Theta -- 4 - 7 cps -- emotional processing
- c) Alpha -- 8 - 12 cps -- background hearing & vision
- d) Beta -- 12 - 40+ cps -- foregrounded concentration of vision and hearing

It is important to remember that we are usually, even while in waking state, in some mixture or another of these levels at any given time -- seldom if ever just in one alone. It is the mixture of levels that is most important.

F. Four Functional Brains Out of Three Physical

At the same time, I learned that -- unique among at least land animals on Earth (cetacean data is in no way complete) -- we have created two functionally different hemispheres out of one cortex -- the cortex that we share with other mammals. Underneath the cortical cap of the brain, we have two other brains that we share functionally with other creatures of Earth. They are, in evolutionary order:

- a) R-Complex (Reptilian Brain) -- physical/motor orientation to the world, unconscious gesture
- b) Limbic System -- processes emotions
- c) Cortex -- undifferentiated at birth, lateralizes between 2 - 13 yrs.
Afterwards:

c or c1) Right hemisphere -- spatial sense, background hearing and vision; some say grammatical morphemes

d or c2) Left hemisphere -- elaborated vocabulary and syntax, fine motor movement, focused vision and concentrated hearing, literacy; some say lexical morphemes

G. Integrating the spacetime of the brain

Further, one hemisphere seems to specialize, in a biological process that takes about a decade called hemispheric lateralization, in a way that typically results in more of the faster speeds happening in the left and more of the slower speeds happening in the right (much of the time for most people).

Certain similarities of patterning began suggesting themselves to me regarding the Space of the Brain and its Timing. For instance:

Emotions are known to be processed in the limbic system, and are known to be processed in the theta range (especially for simpler emotions such as anger, as opposed to word-mediated ones such as hatred).

Evolutionarily earlier seems to include slower brainwave rhythms, and the two things we have that we don't see in the rest of nature -- a lateralized left hemisphere and a lot of high-speed beta functioning -- seem together to be the most evolutionarily recent.

A developmentally interesting fact: babies predominate in slower waves and begin producing faster ones with age and experience.

These considerations led me to wonder whether there was some relationship that could be posited between the four functional brains and the four brainwave speeds -- not in any absolutist sense that no other brainwave speed than that one can go on in a functional brain, but that each brain has its own neutral or home speed of a particular character. In this very general sense, the oldest brain is home to delta speed; the limbic system is home to theta; and R & L Hemispheres are home to alpha and beta, respectively.

H. Piaget's Levels of Thinking

I had published the above speculations in the late 70s, and it wasn't until the early 90s while teaching a course on Piaget that I realized the importance of his theory to my own ideas. His theory of human cognitive development shows four levels of thinking that unfold over time:

- a) Sensory-Motor -- operating physically on the world; 0 - 2 yrs
- b) Pre-Operational -- getting on top of emotions with rationality; 2 - 7 yrs
- c) Concrete Operational -- social ways of thinking (often denigrated as magical thinking: 7 -12 yrs
- d) Formal Operational -- formal thinking; 12+ yrs, if ever.

The similarities began to scream out at me, including how closely the numbers connected with brainwave cps resembled the numbers connected with childhood years in Piaget's scheme.

I. More Integrating

It then began to strike me that the patterned similarity I saw between brain timing and modes of thinking might be more than coincidental -- that Piaget's levels could be describing the kind of thinking that goes on in the different rhythms in the brain, as with the link between theta and the limbic system and Piaget's pre- operational stage of human development, where kids are learning to cognitively get on top of their emotions.

Mapping Piaget's scheme onto my brainmind model of similarities allowed for the possibility that each functional brain has its own qualitatively different kind of thinking going on at a particular rhythm or speed. Again, this is not absolute, since I posit each brain taking in slower, more analogue input and putting out faster, more digital output.

In thinking of how the body communicates with itself, it dawned on me that as well as qualitatively different levels of thinking going on, each kind of thinking could be associated with a qualitatively different kind of languaging as well.

J. Four Relationship Modes of Languaging

And once I started going in that direction, the following natural modes of language relationships suggested themselves:

a) Bodily intimate -- as with twins and other multiple births, and to a lesser extent the parent/child bond and otherwise long intimate experience.

This is a physical mode having to do with gestures & facial expressions, the bodily contribution to the total meaning taken in mostly visually (kinesthetically when touching)

b) Intimate -- with extensive shared experience, where the nuanced emotional tunes of HOW one says something is often more consequential to the relationship than what one actually says.

This mode can be characterized as consisting of very holistic utterances, highly abbreviated and telegraphic (including interjections, tone of voice, etc., often ignored in language study) when compared to formal standards

c) Social -- friends/acquaintances level, morphology & simple syntax, idioms

In this mode, for instance, no morpheme indicating alcohol is present when someone talks about falling off the wagon, and yet the force of the whole phrase means that). Meanings are less holistic than in the Intimate mode, yet less analytic than in the Formal mode.

This mode is mostly learned (the way we were socialized into Cash English and Standard English in schooling), not naturally acquired like the other levels.

d) Formal -- how strangers talk with each other in the same language (academe), full of elaborated vocabulary and syntax.

Looking at it this way, two considerations struck me: Much of linguistics seems to be based on formal stranger-talk, something hardly possible before cities 6000 years ago. Right there the usual synchronic view of language would not seem to lead to evolutionary understanding.

But perhaps there could be other languages spoken and understood by each evolutionary functional brain, not just the most recent. And they would be qualitatively different, with qualitatively different kinds of grammar (more holistic and analogue), and backed up by qualitatively different kinds of thinking, a la Piaget.

Perhaps we could see these different levels at work now in different languaging modes -- some verbal, some non-verbal; some geared toward production of forms and some toward the comprehension of intended meaning:

Examples of Utterances in Different Languaging Modes

- a) Bodily: shrug, possibly with open hands out
- b) Intimate: M-m-m (voiced tune with low-hi-mid intonation with optional shrug)
- c) Social: I dunno. (low-hi-mid intonation, optional shrug)
- d) Formal: I do not know. (in extended low-hi-mid-low intonation with optional shrug)

Looking at it this way, it can be seen that animals communicate in social mode but not formal mode since the characterization is the same for animal utterances as for human idioms -- in essence: the intended meaning comes from the entire utterance, not from compositional parts. And they often communicate the purer emotions (excitement, anger, etc.) in ways understandable to us, often using facial expressions and gestures and postures that we find quite meaningful.

The closer our relationship with another being, and the more experience we have shared with them, the less is needed of formal ways of speaking and the more of nuanced understanding is shared with the merest of tonal or gestural change. Coming from a meaning-first approach, languaging becomes more compositional and elaborated the less people know each other.

K. Applying the 4-BrainMind Model to Evolution of Language

The last piece of the puzzle fell into place after being on the Evolution of Language List on the Web a while, when I realized that the profession of linguistics has no accepted evolutionary theory of language -- though lots of speculations to be sure, which I categorize below according to the categories motivated above.

a) Gestural/Visual (Delta)

Hand and body gestures

We had hands for millions of years before we had speech, and neuro-research has shown that speech and sign occur in the same places in the brain. Gordon Hewes and others have eloquently argued this gestural view as important to understanding the evolution of language. These are produced gesturally but received visually/kinesthetically.

Grooming

Others have proposed grooming as important: that talk came out of intimate touching and cooing by our hominid ancestors, which would argue for a relationship more intimate than that of strangers to each other as being basic to understanding the evolution of language.

A kinesthetic base for language

An insight from Native America could be useful here, which contrasts a Blackfoot/English bilingual individuals perception of an important difference between the two languages: When I say the simplest thing in English, like "I'm going to ride a horse", I get images coming up in my mind. When I say the same thing in Blackfoot, however, no images come up -- just feelings of movement.

His observation illustrates how Native American languages and thinking may be based more on the kinesthetic level rather than the visual level more common to Western languages, and that what is often dismissed in Native American translations into English as quaint metaphor are actually the nuances of kinesthetic thinking, as well as a focus on similarities rather than differences.

b) Emotional (Theta)

Pooh-pooh!

The Pooh-Pooh speculation is that speech arose from spontaneous emotional interjections, such as not believing someone or a rock falling on your foot. Note that interjections are not inflected or otherwise modified in the way words in higher levels of language can be (*I ow, *you ow, *we ow, etc.).

Song

Song itself has been speculated to be the precursor of speaking: that song minus music is speech (less minus for tone languages), and that song minus speech is music -- that song seems to have preceded speech, rather than being what you get when you put together two separately evolved abilities. Lee Ann Hinton, in *Flutes of Fire*, observes that song unites while speech divides, and gives us a compelling description of attending in northwestern Mexico a meeting of women from diverse locals and languages who could not talk to each other well, but all joined together on many levels in song.

Yo-He-Ho

The Yo-He-Ho speculation, on the other hand, claims that speech arose from hominids singing while working, to keep the emotional spirits up and to synchronize in tempo with each other, so therefore perhaps this one actually belongs between categories b) and c).

c) Aural/Social (Alpha)

Bow-Wow and Ding-Dong

The Bow-wow speculation claims that speech began by imitating the sounds of other animate creatures, while the Ding-Dong adds the importance of imitating the sounds of inanimate objects as well.

Yoo-Hoo

In the Yoo-Hoo speculation, on the other hand, (and let us not forget how well Yoo-Hoo goes with Ding-Dongs!) human speech arose out of and was elaborated from simple calling to each other.

d) Formal (Beta)

none -- no other creatures sustain beta processing

Integration

Taking an independently motivated set of levels of functional brains, brain timing, levels of thinking and levels of languaging according to similarities of patterning, and then using them to order pre-existing speculations, each of which was necessary but not sufficient, now yields an evolutionary flow to an otherwise random listing found in many texts.

It also allows for the possibility, in essence, that each of these levels is a timespace language dealing with different nuances of the world all at once -- and the multimodal blending of them all at a given time is what we often call consciousness.

L. Language

Each level of similarities, which I usually choose to label Beta, Alpha, Theta, Delta, is in effect a different language with its own unique grammar, as well as a way of thinking and of relating to other human beings and the rest of Nature. The levels are in dynamic interaction with each other, except in writing. Lets examine what this model says about the notion of language in a way which might be useful to our profession.

A. Complementary Synthesizing

The following oppositions are often taken as binarily dichotomous by linguists, and other times in a complementary way:

Production &/or Comprehension

We are trained that these pairs of terms are both true at the same time. Som of the above levels we associate more with a hearer understanding the speaker (from posture, expressions, gestures, tone of voice, and hearing phonemes), and some we associate more with the production of forms as a speaker (phonetics).

Form &/or Meaning

While we laud the balancing of these, we too often use meaning in a purely utilitarian way, to check whether two forms are same or different. Lost from a form-primary practice is the sense of the whole which we encounter on a daily lived basis -- a dynamic meaning-flow between participants in a relationship (other than strangers) with each other, who pay little attention to the actual forms except in breakdown f that meaning-flow.

Speaker &/or Hearer

Years ago I came across some research on perception done by AT&T researchers, who concluded that in face-to-face communication, 55% of the impact is bodily, 38% is emotional tone of voice, and 7% words -- which fits the similarities of this model beautifully, with the more unconscious levels being more powerful than the words to perceived meaning (however much we might wish to quibble with the percentages themselves). The very focus of the word impact is on the hearer, and therefore more about understanding the meaning than about production properties of linguistic forms per se by the speaker.

Verbal &/or Non-Verbal

Production relies more on the verbal and comprehension relies as much or more on the non-verbal for congruence and multimodal accuracy of the speakers meaning.

Synchronic &/or Diachronic

We know that any use of language unconsciously derives from both simultaneously.

B. Unbalancing the Balance

Yet, in practice, a bias toward the form and the verbal speaker production side of the equation is very congenial to a current synchronic view of language quite workable for most linguists -- that language is a convenient shorthand for human language just like *can't* is for *can not*, and language is what sets us apart from the animals.

This prevailing synchronic conception of language is good for most purposes, but a lousy tool for investigating the evolution of language, since animals cannot qualify for having language unless they have the properties of an elaborated human language at the stranger-talk level, which we may have only begun with the advent of cities. It is biased toward adult production, even though we know animals and children comprehend far more language than they can produce.

C. Rebalancing

Obviously, a diachronic conception of language will work better for evolutionary concerns, one which looks at similarities between us and animals instead of simply the differences -- one more about the meaning side of the equation, the way we as hearers understand what someone else is saying by interpreting their posture, gestures, facial expressions, tones of voice and their modulations against what you know against a backdrop of experience in a relationship with this individual, and which at the same time explains how Kanzi the bonobo chimp and our own pets share most of an evolutionary history with which explains our rapport with them and their intelligence on so many levels except the formal one.

M. Conclusion

Using indigenous wisdom as a starting point for this historical journey, with its teaching distinction between a synchronic and diachronic view of speech and the Old Language in non-rational states, finding ways of distinguishing the non-rational states, finding that they have more to do with comprehension than production, finding distinct levels of thinking which are similar to brainwave levels and seem to favor specific parts of our evolutionary brains, led to motivating different modes of language, each with its own

kind of grammar, which then allowed putting separate origins speculations into an evolutionary flow.

This presentation is not yet a formal scientific theory, nor a hypothesis -- its a model of similarities, of cognitive patterning, brought in as a possible spotlight in a very murky corner of the profession of linguistics. Thank you for your attention.
