Evolution of Language
Part 3

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CJV Intention: Origins of Human Language

▶ Review of Evelina Fedorenko MIT lab: Language and thought in the human brain

▶ A Critical Introduction to Language Evolution: Current Controversies and Future Prospects: Ljiljana Progovac, 2019

▶ How Language Began: The Story of Humanity's Greatest Invention by Daniel Everett, 2017

▶ Human Lineage: Matt Cartmill and Fred H. Smith, 2018 (Neandertals & Language)

▶ Review of Neanderthal Language: Demystifying the Linguistic Powers of our Extinct Cousins by Rudolf Botha, 2020

▶ Review The Language Puzzle by Steven Mithen, 2024

** Neandertal Language: The problem

- Theorists who will, sadly, never converse with a living Neanderthal imagine things Ns could and couldn't do linguistically.

- Theorists can only speculate on whether Ns had modern language based on analysis of non-linguistic data.

- Usual analysis = if hominin had this behavior (i.e. stone tool type, some form of symbol, some form of behavior), then conclude that they must have had language

*** <u>Experimental evidence for the co-evolution of hominin tool-making teaching and language</u> -- T.J.H. Morgan, et al., 2015

- ▶ <u>Hominin reliance on Oldowan stone tools</u>—which appear from <u>2.5 mya</u> and are believed to have been socially transmitted—<u>has been hypothesized to have led to the evolution of language and teaching</u>.

- ▶ Present an experiment investigating the <u>efficacy of transmission of Oldowan tool-making skills</u> along chains of adult human participants (N=184) using <u>five different transmission methods</u>.

6 Measures: better tools with language and teaching

▶ Across six measures, transmission improves with teaching, and particularly with language, but not with imitation or emulation.

▶ Our results support the hypothesis that hominin reliance on stone tool-making generated selection for teaching and language, and imply that

  ▶ (i) low-fidelity social transmission, such as imitation/emulation, may have contributed to the 700,000 year stasis of the Oldowan technocomplex, and

  ▶ ** (ii) teaching or proto-language may have been pre-requisites for the appearance of Acheulean technology.

Experiment: learning to knap
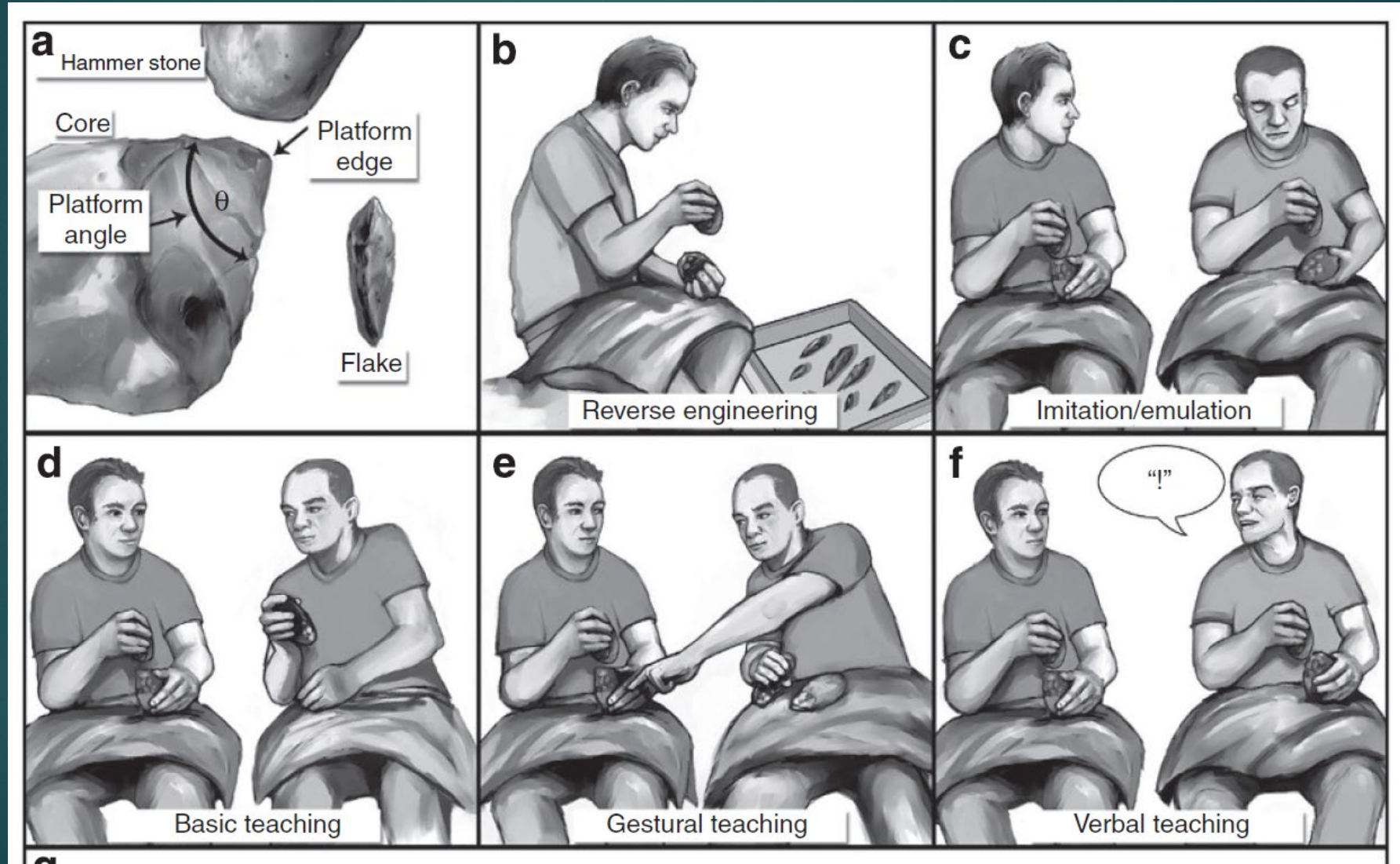
Oldowan stasis

▶ Findings support a co-evolution of Oldowan tool use and complex communication, it might seem puzzling that the Oldowan stasis should last so long. If the selective advantage was present, why did more complex communication not evolve for 700,000 years?

▶ A likely explanation is that more complex communication may well have evolved during the Oldowan, but that this alone was insufficient for the evolution of stone tool technology.

▶ *** The appearance of Acheulean tools may have additionally been contingent on the evolution of other aspects of cognition, such as technical comprehension or the hierarchical planning of actions, as well as demographic and socio-ecological factors.

Acheulean needed language

▶ Given this, <u>our findings imply that the appearance of Acheulean tools 1.7 MA reflects, in part, the evolution of mechanisms of transmission that facilitated the more effective transmission of Oldowan tool-making, but also enabled the reliable transmission of the sub-goals and techniques required to make the distinctive and regularly shaped Acheulean tools.</u>

▶ We cannot specify the form of this transmission with precision. However, given the observation that

   ▶ <u>chimpanzees are capable of some form of observational learning, yet cannot produce stone tools approaching the quality of the earliest known Oldowan examples,</u>

Acheulean needed language

▶ combined with the complexity of Acheulean technology,

▶ we suggest that teaching in the form of facilitated observation (similar to our basic teaching condition) is the minimal plausible form of social transmission for Acheulean hominins and that rudimentary forms of language are a possibility.

▶ However, although our findings suggest that Oldowan hominins would have benefitted from modern language, the suggestion that modern language evolved during the Oldowan seems unlikely given how slowly technology evolved thereafter.

Acheulean & proto-language

▶ This leaves open the possibility that the transmission of Acheulean technology was reliant on a form of (gestural or verbal) proto-language.

▶ This need not imply that Acheulean hominins were capable of manipulating a large number of symbols or generating complex grammars.

▶ Our findings imply that simple forms of positive or negative reinforcement, or directing the attention of a learner to specific points (as was common in the gestural teaching condition), are considerably more successful in transmitting stone knapping than observation alone.

2.5 Ma

▶ Whether or not simple symbolic communication was present during the Acheulean, we anticipate that the gene-culture co-evolutionary dynamic between tools and communication was, and that it would continue beyond the Acheulean, generating selection favoring the use of symbols for increasingly subtle and abstract concepts, and contributing to the eventual evolution of modern language capabilities.

▶ *** In sum, our data support the hypothesis that a gene-culture co-evolutionary dynamic between tool use and social transmission was on-going in human evolution, starting at least 2.5 Ma and potentially continuing to the present.

Proto-language and teaching at 1.7 MA

▶ Under this continued selection, teaching, symbolic communication and eventually verbal language may have been favored, allowing the ready transmission of abstract flaking concepts, such as the role of the exterior platform angle in choosing where to strike, which our findings have shown are effectively transmitted by language.

▶ Given the increased complexity of the later Acheulean and Mousterian lithic technologies, with their reliance on 'long sequences of hierarchically organized actions' and other abstract concepts, our results imply that hominins possessed a capacity for teaching—and potentially simple proto-language—as early as 1.7 mya.

▶ CJV: Implies H. erectus had some form of language

Stone tools and communication

▶ The simplicity and stasis of Oldowan technology are indicative of a limited form of social transmission, such as observational learning.

▶ This was sufficient to support limited transmission among individuals with prolonged contact, but insufficient to propagate innovations more rapidly than they were lost, and would have contributed to the stasis in the Oldowan technocomplex.

▶ However, hominin reliance on stone technology would have generated selection for increasingly complex communication that allowed the more effective spread of stone-tools.

Reminder of Separate Brain Networks

▶ Sensory systems: Visual, Hearing, Taste, Smell, Movement

▶ Memory: Working memory, Procedural, Factual

▶ Theory of Mind

▶ Domain General or Multi-Domain Processing = nonverbal IQ, difficulty computation

▶ Music

▶ Gestures

▶ Language

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A Critical Introduction to Language Evolution
Ljiljana Progovac,
2019
A Monograph

Best linguistic analysis of language evolution by a linguist

Progovac tries to find scientific basis for language evolution

▶ CJV: Progovac tries to find scientific basis for language evolution.

▶ Tries to outline a theory for showing how language developed from its most basic steps

▶ She is a gradualist who tries to outline a way that language started with small word combos that could be enhanced by natural selection.

*** How Ancient Is Language, and Did Neanderthals Have It?

▶ The question of how old language is inevitabily links to the question of whether or not Neanderthals (or other species) had language.

▶ Those who propose that language sprung into existence suddenly and recently, about 50,000 years ago (e.g. Chomsky 2005), typically claim that language characterizes only modern humans, and that there is complete discontinuity and disconnect between human language capacity and anything found in other species.

▶ On the other hand, those who propose a deeper timeline for the evolution of language maintain that Neanderthals also had some form of language. Dediu and Levinson (2013) propose that at least H. heidelbergensis had some form of language.

H. heidelbergensis

▶ Their estimate is thus that language dates back to at least H. heidelbergensis, to some 400,000–500,000 years ago.

▶ Dediu & Levinson reached their conclusions after reviewing findings in genetics, skeletal morphology, the morphology of the vocal tract, infant maturation, brain size, and cultural artifacts, proposing that Neanderthals and Denisovans "had the basic genetic underpinning for recognizably modern language and speech, but it is possible that modern humans may outstrip them in some parameters"

▶ Current acceptance that Ns had some form of language.

Language and natural selection

▶ It was Pinker and Bloom's (1990) article titled "Natural language and natural selection" that slowly but surely unleashed a host of papers and books on language evolution.

▶ Based on Darwin's work, Pinker and Bloom argue that the only way to evolve a truly complex design that serves a particular purpose is through a sequence of mutations/ changes with small effects, and through intermediate stages, useful enough to trigger natural selection.

Natural selection

▶ They point out that it is impossible to make sense of the structure of the eye without acknowledging that it evolved for the purpose of seeing; evolution is the only physical process that can create an eye because it is the only physical process in which the criterion of being good at seeing can play a causal role.

▶ Any behavior that supports prosociality & survival can evolve

Natural Selection?

▶ They <u>apply the same reasoning to language</u>: evolution can create a system as complex as human language because it is the physical process in which the criterion of being good at language (communication) can play a causal role.

▶ In sharp contrast, Chomsky and Berwick have argued repeatedly, that it <u>is inconceivable for there to exist, or to have ever existed, a human language which does not come complete with all the complexities of modern syntax/ grammar</u>. The claim is often that <u>syntax in its entirety evolved suddenly</u>, as a result of a single event… There is <u>no room in this picture for any precursors to language</u>— say a language-like system with only short sentences."

Steven Pinker

- **Steven Pinker** views language as a unique human instinct, a product of evolution, not a mere cultural invention, and argues that humans possess an innate capacity for language, a "mental module" dedicated to language acquisition, based on a "universal grammar".

- **Language as an Instinct:** Pinker, in his book "*The Language Instinct*," argues that language is a natural, biological adaptation, not something humans simply invent or learn.

- **Innate Capacity:** humans are born with an innate capacity for language,

- **Universal Grammar:** a set of underlying principles that all human languages share, suggesting a common biological basis for language.

Steven Pinker

• <u>Evolutionary Adaptation</u>: He posits that language evolved as a solution to the specific <u>problem of communication among social hunter-gatherers</u>, giving those who could communicate <u>more effectively a survival advantage.</u>

• <u>Distinct from General Cognitive Ability</u>: Pinker argues that language is a unique mental module, distinct from general cognitive abilities, as demonstrated by brain injuries that selectively impair language without affecting other cognitive functions.

Steve Pinker

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• Language as a Window to the Mind: Pinker views language as a window into the human mind, providing insights into human cognition and thought processes.

• Chomsky's Influence: Pinker draws on the work of linguist Noam Chomsky who also argued for an innate capacity for language, and the concept of universal grammar.

Sudden (Saltationist) Approaches to Language Evolution

▶ Many researchers have advocated an abrupt, saltationist view of language evolution.

▶ The most influential saltationist approach to language evolution has to be that of Noam Chomsky and Robert Berwick, who have argued persistently that syntax in its entirety evolved suddenly, as a result of a single event, such as a genetic mutation.

▶ They maintain that it is inconceivable for there to exist, or to have ever existed, a human language which does not come complete with all the complexities of modern syntax/ grammar.

Mutation change produced language

► In Berwick and Chomsky (2011) they assert that "the simplest assumption, hence the one we adopt…, is that the generative procedure emerged suddenly as the result of a minor mutation… There is no room in this picture for any precursors to language— say a language-like system with only short sentences."

► This view seems to rely on the bulk of language, or at least syntax, being innate (biologically endowed).

Chomsky's Knot

▶ This view <u>rejects natural selection as a relevant force in evolving language</u>.

▶ In other words, according to them,

  ▶ (i) in order for syntax to be evolvable, syntax itself has to be extremely simple, and,

  ▶ (ii) given that syntax must be super simple

  ▶ (i)], syntax must have arisen through one single, minor mutation.

  ▶ <u>This is <u>a circular, entangled argument</u>, referred to as <u>Chomsky's Knot.</u></u>

Merge

- Berwick and Chomsky (2016) claim that the only serious way to approach the question of language and its evolution is to adopt the Strong Minimalist Thesis (SMT), according to which syntax reduces to a single (optimal) operation Merge, presumably brought about by that one single minor mutation.

- In this sense, this view can be characterized as the "All you need is Merge" view: Merge = when two syntactic objects are combined to form a new syntactic unit

A non-falsifiable hypothesis

▶ The inability to solve the Merge Problem: Their view is that syntax cannot be decomposed into primitives or stages, because it is an optimal undecomposable block, which has to exist exactly in this optimal form and no other way.

▶ The typical claim is that all languages are syntactically identical, and that any variation observed is only superficial, and therefore inconsequential for the theory of syntax, or for any evolutionary considerations.

Linguistic variation

▶ To my mind, this claim has had another undesirable effect on the field of theoretical syntax, namely the idea that you can figure out these elegant and optimal principles of syntax by looking at one language alone, and this language is typically English.

▶ I strongly believe that the study of syntax should return to its more modest but falsifiable claims, and to its in-depth investigation of the patterns of syntactic variation.

Merge

▶ Finally, an important consideration for this saltationist approach has to do with how it can be tested or falsified, and how it can be made relevant to the language-brain-gene linkage.

▶ The idea adopted by Berwick and Chomsky is that there occurred one mutation in one individual, which then rewired the brain in a certain way that provided Merge.

▶ As put in Berwick and Chomsky (2011, 40– 1), "in the very recent past, maybe about 75,000 years ago, … an individual … underwent a minor mutation that provided the operation Merge," which brought about recursive structured thought.

Per Chomsky, Language = thought

▶ It was at some later stage that the language of thought was connected to the external speech, "quite possibly a task that involves no evolution at all."

▶ Two claims are salient here:

    ▶ first, that syntax emerged as one single undecomposable package, and,

    ▶ second, that it emerged in the realm of thought, and not in the realm of speech/communication, consistent with the claims within this approach that syntax, or language in general, did not evolve for communication, but rather for inner speech.

The 1 mutation guy had no one with whom to communicate

▶ In sharp contrast, Progova builds an argument that communication pressures shaped human language, leaving evidence of evolutionary tinkering in its very design.

▶ As for Berwick and Chomsky (2011), one reason for their proposal that syntax and Merge were initially useful only for thought, but not for communication, has to do with that one lucky person in their evolutionary scenario who got the Merge mutation.

▶ Their argument is that this one single person would not have had anybody to communicate with, and that communication could start only much later, after this mutation was passed down through several generations.

Multiple genes-with-small-effects vs 1 mutation theories

▶ <u>This kind of conundrum only arises if you insist that language/ syntax arose as one single event/ mutation</u>, and moreover as a completely novel mutation, but <u>not if you envision an incremental, gradualist approach, invoking multiple genes-with-small-effects</u>, as per Pinker and Bloom's (1990) and Dediu and Ladd's (2007) proposals.

Untestable

▶ In sum, the <u>approach a là Chomsky and Berwick is untestable</u>.

▶ It addresses the genetic basis for language), although in a trivial way, by proposing one single (unspecified) mutation as the basis for all language.

▶ It <u>does not seem to operate with specific and testable hypotheses that addresses the language-brain-genes issue</u>.

Gradualist Approaches to Language Evolution

▶ Many researchers have advocated a gradualist view of language evolution, and syntax in particular, although not necessarily natural selection, including Pinker, Hurford, Progovac.

▶ Reconstruction of Earliest Vocabularies (Heine and Kuteva): Their assumption that languages reveal evidence of past changes and stages in their present structures.

Nouns first, then verbs

▶ Heine and Kuteva reconstruct a stage in evolution in which only nouns and verbs were used (with nouns emerging earlier than verbs), but no other categories.

▶ According to them, nouns and verbs are the only items that are crosslinguistically stable.

▶ Progovac proposed a gradual emergence of syntactic layers in language evolution, starting from the minimally complex intransitive (no object) small clause, gradually adding others, to accommodate transitivity, verb finiteness/ tense, etc.

*** A Gradualist Scenario for Language Evolution: Precise Linguistic Reconstruction of Early Human (and Neandertal) Grammars -- Ljiljana Progovac, 2016F

▶ Propose that the earliest stages of syntax/grammar provide are conserved in modern languages, and were present in Neandertals and the common ancestor.

▶ Progovac provides a fragment of this proto-grammar, which includes flat verb-noun compounds used for naming and insult (e.g., rattle-snake, cry-baby, scatter-brain), and paratactic (loose) combinations of such flat structures (e.g., Come one, come all; You seek, you find).

▶ This binary platform is found in all languages, and can be shown to serve as foundation for any further structure building.

** Using the Linguistic Framework of Minimalism: Reconstruction of Earliest Grammars - Progovac

▶ The idea that a sentence is built upon the foundation of a small clause is one of the most stable and insightful postulates in this syntactic framework

▶ The "two-slot SC/VP" refers to a minimalist proposal suggesting that the most basic, foundational structure of language is a intransitive structure with two slots, often represented as a verb phrase (VP) or small clause (SC) (subject + verb)

▶ The crux of Progovac's syntactic reconstruction is that the two-slot SC/VP (i.e. eat fish) provides the common core that languages share, and a starting point for syntactic elaboration = existence of "living fossils" of such an intransitive two-slot small clause stage; how syntax can be decomposed into primitives, and thus subjected to a gradualist approach. Best bet at getting at some specific and testable hypotheses regarding language evolution.

Living fossils in language

▶ Progovac considers that <u>the best fossils of this proto-syntactic two-slot stage are verb-noun compounds, such as English</u>: cry-baby, kill-joy, tattle-tale, turn-coat, scatter-brain, tumble-dung (insect), These are <u>essentially small clauses created by the two-slot grammar</u>, with just <u>one verb and one noun</u>, without a possibility for any elaboration, or for distinguishing subjects from objects.

▶ You suddenly <u>have</u> <u>the power to create many novel expressions, including insults,</u> and to capture a trait of a person with only two basic proto-words.

▶ Clearly, this reconstructed intermediate stage of grammar would not have been useless (consider the frequent objections to Darwinian approach in the form of 'what use is half an eye?'). This half clause, so to speak, would have had a great utility, much more utility than proto-language with isolated words alone, and much less utility than more complex (transitive) grammars,

Gradualism

▶ <u>Progovac</u>: The very idea behind the gradualist approach is that the postulated proto-grammar provides a foundation/ scaffolding for building further, more elaborate syntactic structures, and that the nature and extent of subsequent building can vary from language to language, from construction to construction. This kind of variation and variability is exactly what a gradualist approach predicts.

▶ The availability of fossil structures allows one to address the brain-language-gene linkage by performing neuroimaging experiments to measure their differential processing demands on the brain, in comparison to their more fully articulated (hierarchical) counterparts.

Dediu and Levinson (2013): language from H. heidelbergensis

▶ Based on the comparative evidence, Dediu and Levinson (2013) propose that at least H. heidelbergensis had some form of language.

▶ "Language as we know it must then have originated within the ~ 1 million years between H. erectus and the common ancestor of Neandertals and us."

▶ The authors conclude that Neandertals and Denisovans "had the basic genetic underpinning for recognizably modern language and speech, but it is possible that modern humans may outstrip them in some parameters".

Chomsky reversal

▶ Berwick and Chomsky (2016) in their latest work have (quietly) shifted their view on this.

▶ While they do not acknowledge this, they have significantly shifted their estimated date of the emergence of language to up to 200,000 years ago), from the previous "just a bit over 50,000 years ago" (Chomsky, 2005; see also Berwick and Chomsky, 2011). Not only that, but Berwick and Chomsky (2016) no longer claim that Neanderthals did not have language. Instead, they now say that it is the "$64,000 question whether Neandertals had language".

▶ Dediu and Levinsons (2013) estimate that language dates back to the common ancestor of humans and Neanderthals, to some 400,000-500,000 years ago.

What can linguistic theories contribute: Reconstructing early stages of grammar

- Supporting the body of research advocating a gradualist, incremental approach to the evolution of syntax and language in general, we find approximations of such grammars ("living fossils") in various constructions in present-day languages.

- One good example are verb-noun compounds, such as English: cry-baby, kill-joy, tattle-tale, turn-coat, scatter-brain, tumble-weed, tumble-dung (insect);

- These are essentially small clauses created by the two-slot grammar, with just one verb and one noun, without a possibility for any elaboration, or for distinguishing subjects from objects.

Two word compounds

▶ Bickerton had the insight that in speaking in these simplified ways we can still access the proto-linguistic mode of communication. Agree with his view that syntax emerged compositionally, by combining words that were available in the one-word stage.

▶ Two word compounds, which depend on context, i.e. chicken eat.

▶ In my view, protosyntax is real language, so much so that it is found in various "fossil" constructions across present-day languages. When we say killjoy, or scarecrow, or Easy come, easy go, I think we would all agree that this is real language, although it shows a much simpler syntax.

Insults

▶ Among the fossil verb-noun compounds, the <u>ones that specialize for insult predominate.</u>

▶ However, two-word combinations would have had a myriad of other communicative benefits, including in cooperative endeavors, such as hunting, gathering, and child-rearing.

▶ (Aphasics can still curse, a right hemisphere ability)

2 proto-word combos can capture human traits

- Even considering insult alone, one is struck by the remarkable increase in expressive abilities brought about by the simplest of syntax.

- While it would have no doubt been possible to insult with single words (as it is today), in a one-word stage one is severely limited to insults such as: ass, fart, shit, snake, spit, stink.

- Now compare this one-word potential for insult with the possibilities that open up in the two-slot stage

Two word clauses

▶ Examples: kill-joy, hunch-back, tattle-tale, scatter-brain, cut-throat, busy-body, cry-baby, break-back, fill-belly (glutton), lick-spit, pinch-back (miser), skin-flint (miser), spit-fire, swish-tail (bird), tumble-dung (insect), fuck-ass, fuck-head, shit-ass, shit-head.

▶ You are able to capture a (complex) trait of a person with only two basic proto-words

Social and Sexual selection

▶ Coining compounds, i.e. kill-joy, tattle-tale, would have been an adaptive way to compete for status and sex in ancient times.

▶ Their successful use would have enhanced relative status first by derogating existing rivals and placing prospective rivals on notice, and second by demonstrating verbal skill and quickwittedness.

▶ Those individuals who were just a bit better at this game would have left more offspring and thus passed on, generation after generation, the genetic make-up that supports this ability.

Strong emotions may have been first words

▶ Darwin (1872) points out that <u>strong emotions expressed in animals are those of lust and hostility</u>, and <u>that they may have been the first verbal threats and intimidations uttered by humans</u>

▶ <u>These</u> <u>processes of competition and selection must have been even more pronounced and overt in the early linguistic stages</u>

▶ <u>Even if only a fraction of physical fighting in a community was replaced by verbal dueling, this would have ultimately contributed to a better survival of the whole community,</u> but also of the more verbal individuals, at the expense of the more violent ones.

Two words at 500 Ka

▶ If the protosyntax stage already characterized the H. heidelbergensis species, this would place the emergence of the flat proto-syntactic stage to at least as far as <u>half million years ago.</u>

▶ <u>In fact, my proposal also cannot exclude the</u> <u>possibility that H. erectus also had some form of proto-language, especially considering that their brains doubled in size at 2 Ma</u>. There was nothing else at that juncture that would have required as <u>much brain capacity as the early stages of language</u> would have, accompanied by a great increase in expressive abilities and vocabulary size.

Concrete to abstract

▶ In the hypothetical community of 150 hominins, one suddenly has power to create many novel insults, nasty and witty and often humorous, combinations that have never been heard before.

▶ One is able to capture a complex trait of a person with only two basic protowords. Remarkably, even with the verbs and nouns that are crude and concrete, one can create concepts that are quite abstract.

▶ Maybe our ancestors first stumbled upon one or two combinations like this, but then started to actively seek new ones. The point of no return.

Better words, more sex

- It is not difficult to imagine how some of these hominins would have been better at this game than others, skewing the genetic evolution in their favor.

- ** Coining compounds akin to the ones illustrated above would have been an adaptive way to compete for status and sex in ancient times.

- Their successful use would have enhanced relative status first by derogating existing rivals and placing prospective rivals on notice, and second by demonstrating verbal skill and quick-wittedness.

Rivalry and mate choice

▶ Darwin (1874) identified two distinct kinds of sexual selection, aggressive rivalry and mate choice, both of which seem relevant for the proposed use of these compounds.

▶ Based on Darwin (1872), Code (2005) points out that strong emotions expressed in animals are those of lust and hostility, and that they may have been the first verbal threats and intimidations uttered by humans.

▶ In medieval times alone, thousands of such compounds were coined. Such abundance, indeed extravagance, is usually associated with display and sexual selection, the force that also created the peacock's tail.
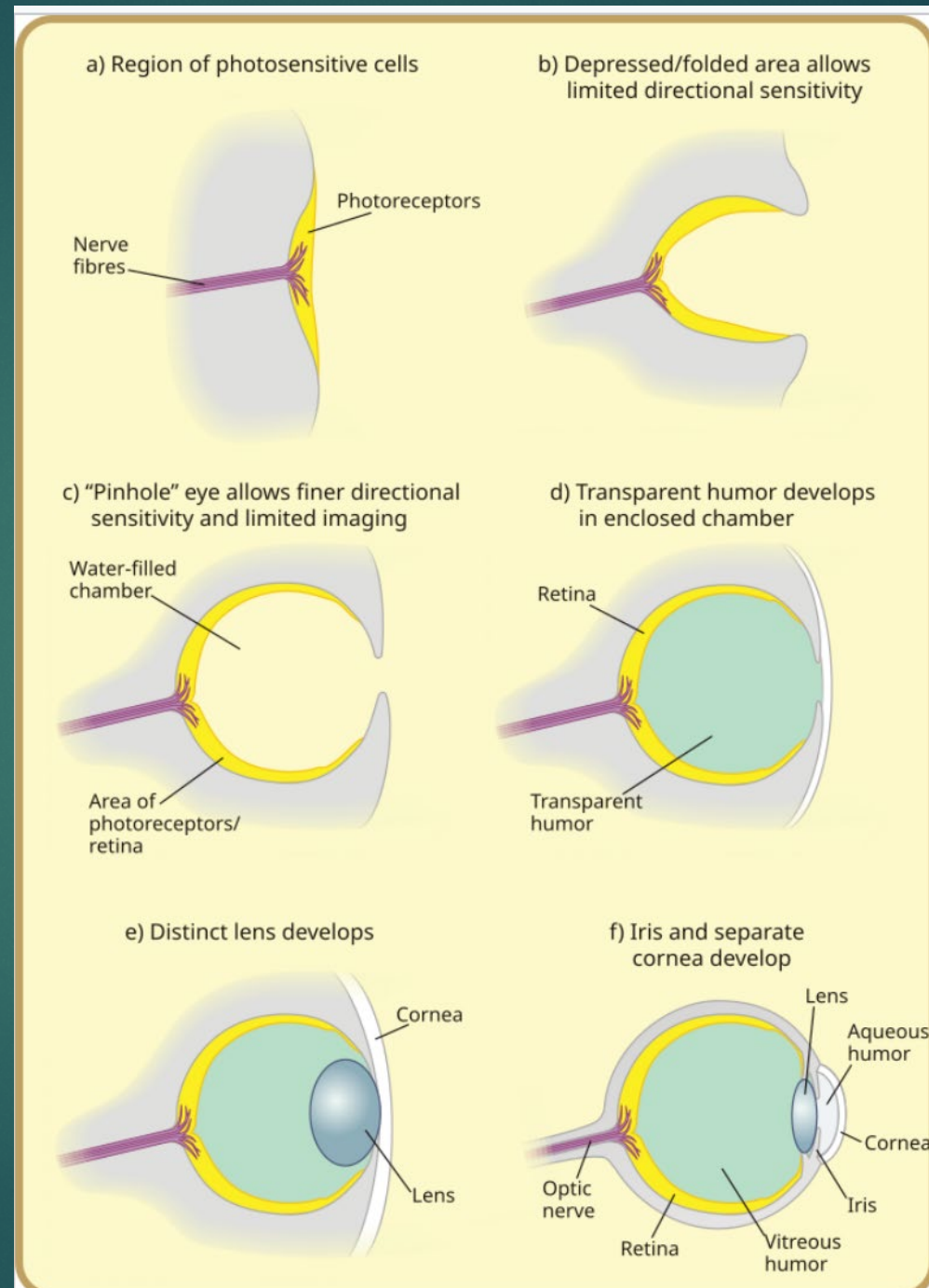
Just like evolution of the eye

▶ Code (2005) reports on neurological evidence that swearwords are stored separately from the other words, activating both the structures of the brain where digital language is processed and the structures of the brain which process laughing and crying.

▶ CJV: Aphasics can still swear.

Just like evolution of the eye

- Of all the ideas explored regarding the evolution of language, the one that continues to meet with most resistance is the idea of sexual selection, or even just selection.

- Objections are typically of the kind that human beings, unlike animals, are cooperative rather than competitive (and, by extrapolation, polite, rather than rude and derogatory), and that we should explore the ideas of cooperation in language evolution, rather than competition.

Stages of evolution of the eye

a) Region of photosensitive cells

Nerve fibres

Photoreceptors

b) Depressed/folded area allows limited directional sensitivity

c) "Pinhole" eye allows finer directional sensitivity and limited imaging

Water-filled chamber

Area of photoreceptors/ retina

d) Transparent humor develops in enclosed chamber

Retina

Transparent humor

e) Distinct lens develops

Cornea

Lens

f) Iris and separate cornea develop

Lens

Aqueous humor

Cornea

Optic nerve

Iris

Retina

Vitreous humor

Biological vs cultural evolution in language

▶ This is usually tied to the idea that language should be studied through the lens of cultural evolution, rather than biological evolution.

▶ And yet, the charge is to explain how human beings became genetically predisposed/preprogrammed to learn and use language, which leads to the inevitable conclusion that somebody's genes had to have been favored over somebody else's genes.

▶ There are no real obstacles for studying language evolution as proceeding in incremental steps, consistent with the many-genes- with-small-effects approach

Language and genes via selection

▶ To conclude, this section goes over a specific scenario which brings language and genes directly together, via (sexual) selection.

▶ The idea is that those who were just a bit better at playing the language game, and a bit more persuasive, would have left more offspring, thus propagating their genetic make-up at the expense of all others, generation after generation.

▶ And this competition and selection would have started already at the earliest stages of language use.

What About Neanderthals and Other Species?

▶ Given our current state of knowledge, the possibility that Neanderthals had language has not been proven, but it has certainly not been disproven either, with some most recent findings leaning in the direction of this possibility.

▶ For example, Dediu and Levinson (2013) have proposed that Neanderthals had some form of language, estimating that language dates back to at least the common ancestor of humans and Neanderthals, H. heidelbergensis, to some 400,000- 500,000 years ago. They reach this conclusion after reviewing recent comparative (cross-species) findings in genetics, skeletal morphology, the morphology of the vocal tract, infant maturation, Broca's area, brain size, and cultural artifacts.

Two slot beginnings

▶ It is likely that H. sapiens exhibited only the two-slot paratactic grammar before the dispersion to different geographical locations, which would in turn mean that their ancestors, such as H. erectus and H. heidelbergensis, could not have had more than that either.

▶ The two-slot platform, i.e. the ability to combine two words or two clauses paratactically (without conjunctions), is a deep, conservative property of language that could have been in place in the common ancestor(s) of humans.

Heidelbergensis and Neandertals

▶ On the other hand, the profound variation in the expression of hierarchical phenomena suggests that these diverging hierarchical solutions are a later add-on, which did not emerge only once (in Africa), but instead multiple times, and independently, either within Africa, or after the dispersion from Africa.

▶ This reasoning leads to the conclusion that H. heidelbergensis did not command hierarchical transitive syntax, but could have commanded "only" the basic two-slot platform. This would be consistent with the slightly smaller size of the H. heidelbergensis brain, in comparison to that of either humans or Neanderthals. Neanderthals would have, in that scenario, inherited this paratactic grammar, but could not have inherited hierarchical grammar from H. heidelbergensis.

More insults

▶ But this does not mean, of course, that Neanderthals could not, or did not, develop their own kind of hierarchical syntax independently, or perhaps some other kind of language complexity, which may have even surpassed that of human language.

▶

▶ If it was there at that juncture, this kind of two-slot proto-grammar would have allowed H. heidelbergensis and Neanderthals, among many other communicative opportunities, to hurl insults at each other in the form of flat compounds (e.g. cry-baby; scatter-brain; cut-throat; crake-bone; fill-belly; hunch-back).