The Myth of 'Function defines Form' as the Null-Biological Adaptive Process

and the Counter Linguistics-based Response:

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Accumulative Lecture & Topics for Research

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Abstract

This accumulative lecture serves as a springboard for discussion leading to data-collection and analyses of the type of linguistic corpora which demonstrate the fact that language, in its most 'narrow sense' of the term—viz., as a *phonological/syntactic categorial representation* buttressed by and resting upon *recursive design*—seems to defy all common-sense *adaptive* notions of the type championed by Darwin. Of course, Darwin got it right! There is no other theory. But his theory was not designed to handle, as Stephen Jay Gould terms, 'punctuated equilibrium'—a phenomenon which doesn't at all abide by otherwise bottom-up, environmentally determined pressures of the sort Darwin spoke of. Well-accepted terms of the day such as 'adaption', 'evolution', and 'biological pressure', would soon become replaced by 'exaptation', 'skyhook' (a top-down processing as opposed to a bottom-up 'crane'),[2] and 'non-biological' accounts (of the sort Noam Chomsky would refer to as 'hopeful monster').[3] But, in a more general footing, there may be some evolution left to language after all. It's just the case that there is *nothing* left to the narrow scope of language as defined above—language as a narrow-defined instrument of 'recursion'.[4]

Exaptation is a trait which can evolve for one trait but then become highjacked for another. Even this notion of exaptation would become challenged by 'punctuated

[1] Final accumulative lecture: Spring 2020 semester (in response to campus closure due to the Covid-19/Corona virus).

[2] See Daniel Dennett's *Darwin's Dangerous Ideas* (1995) for top-down 'Skyhooks' vs. bottom-up 'Cranes' analogies.

[3] A term first used by Goldschmidt, a German-born American geneticist—a term which suggested that gradual, evolutionary pressures could not bridge the gap between micro and macro-evolution. That some other phenomenon outside of gradual feature displacement and change had to be involved. Until today, a phenomenon completely unexplainable.

[4] See Fitch et al. (2005) 'The evolution of the language faculty'.

equilibrium', (something bordering a *hopeful monster*). Claims of language/speech in such a capacity began to challenge the most common of notions related to how things get acquired, learned and processed. It would certainly defy the radical behaviorists' hypotheses that all of learning takes place within a singular crucible—a common melting-pot intuition that all belong to the *mechanical* world of clocks, language just being another sort of clock (with gears and levers, not unlike the 'brain-as-computer' metaphor which would later be discredited).

This lecture presents the idea that the generally accepted Darwinian adaptive-notion that 'function defines form' is not completely accurate, and, in most cases, is simply wrong—at least for language as defined in its narrow scope. Conversely, what we show is that for speech & language 'form defines function'. We shall use this analogy as a simple **pedagogical device** in order to reveal some interesting phenomena found in language. Indeed, 'speech is special'.[5]

1. Introduction

The most striking *property* of human language, a property which indeed heralds language as a quite unique 'species-specific' entity, is perhaps best expressed as that 'human kernel of deepest predispositions'—that which freely comes to us as an innate structure, bewildering to the keenest observer, which lies hidden in the deepest recesses of our human mind, but without which no human activity as we know it today could be performed. This kernel is a property which defies all common-sense environmental and empirical notion. For instance, take the very claim made when dealing with human speech: the question 'How could it be possible that two people might hear the *same* sound *different*?' Clearly, one would think, the mere fact of listening, as all humans can do if they are aware and sensitive to their surroundings, should be capable of hearing their surroundings in the same ways. But indeed, this is not so with language, and not so with speech: two people may in fact hear the same sound different, or processes grammatical constructs differently. It seems 'Speech is Special. Language is special'. So, how can this be? A rather different account is needed. One that explains this disconnect between subjective illusion and objective reality. Indeed, language is something like an illusion since it is category-based—and the ability to construct abstract categories, (that quintessential human property), is the ability to generate recursion. This notion to the untrained eye is indeed strange and seems even *absurd* when pitted against all common-sense thinking. It is an idea that posits (i) internal language-specific parameters which (ii) innately emerge from out of a developmental-maturational trajectory. Both of these points (*innate structure* untethered to the environment, and *maturation* thereof) are not what one would expect from associative & strengthening reflex

[5] See (Haskin's laboratory) Philip Lieberman's 'speech is special' hypothesis: https://www.the-scientist.com/features/why-human-speech-is-special--64351.

of the type reliant on frequency of input/activity. While the distinction may be subtle, it certainly renders non-trivial results.

This lecture serves as a research prompt-option and allows students to develop spin-off proposals leading to final exams/research projects. The prompt is wide-ranging in scope and can cover any aspect of what would typically be presented in any introductory/undergraduate linguistics course. Aspects which fall within the scope of this prompt include:

(i) Structure,
(ii) Phonology,
(iii) Syntax.

The 'baseball-glove' analogy.

In discussing 'function & form' analogies (typically as they play out in biology), I like to use the 'baseball-glove' analogy. In a perfect Darwinian world, the baseball-glove analogy should be extended to all the natural world. But it is not. Let's play this out below (no pun intended!).

Let's first consider the *catcher's glove*, an extremely heavy, clumsily designed glove. Why? Well, the glove has evolved over the years (a Darwinian explanation) in order to keep-up with the increasingly powerful pitchers who, at times, can consecutively throw the pitched ball well exceeding 100 miles an hour. For that reason, added pressures forced adaptive measures in order to secure functional success—viz., to protect the catcher from hand damage. In this manner, indeed, function (consecutive fast-ball catching) helps shape and define the form (a bulky, high-padded catcher's glove). Catcher's gloves: they are a wonder to handle. I have one myself. But a catcher's glove is not my optional choice-option, say, if I need to play outfield, where I would be running with that heavy glove all over center field. So consider now the outfielder's glove: svelte, slim, light-weight….very easy to run with such a glove. Of course, all that bulky padding a catcher's glove has doesn't serve a function in outfield, where fly-balls are caught high in the air, with only a falling velocity. This is a perfect biological adaptive characteristic (something Darwin would espouse for, say, as in the evolved shape of a finche's beak).[6] To further the analogy, let's look at the first-base man's glove. Notice how the glove is over-extended, much longer in reach than the outfielder's glove. Why so? Well, consider the (environmental) role and function of the first-base position. So, most of the time, the function of the first-base man is to secondarily catch a ball first hit to the infield (the second-base man, shortstop, or third-base man), whereby the batter is running to outpace the thrown ball to first base. It is a race between ball and batsman! Any extra few inches of netting in such a glove with the sole purpose to catch the ball as early as possible would provide a much-needed benefit, an 'advantage' to its function. Once again, the function shapes the form: it defines it.

[6] See https://news.harvard.edu/gazette/story/2006/07/how-darwins-finches-got-their-beaks/.

This is the story one usually employs for any adaptive (Darwinian) mode of evolution. For those linguists who espouse a *functional theory* to language (functionalism), they are likeminded in their treatment to the form of language—viz., form serves a functional niche. Yet, as we will see below regarding structure-phonology-syntax, this 'function defined form' application doesn't subsume certain narrow properties of language. Given our baseball-glove analogy, the reverse order of 'form defines function' (as found in language—or, 'internal to external') would have it that based on the glove one is wearing, that (internal) glove would define the nature of the (external) ball thrown to it. (Extending the analogy via fruit: If you have only a *grape* catcher's glove, and, say, I throw to you an *orange*, well, the orange would change midstream into a grape once it is caught. The form shapes the function. Very strange indeed. But this in fact seems to be what happens with certain *quirky* instances of language). This is the topic of the lecture—topics which can be extended to cover a wide-range of other linguistic data which speak to the reverse order of form defines function.

In order to see how the reverse-order of 'internal/form defines external/function' gets applied in narrow realms of language—how it holds contrarily to common-sense notions of 'function defines form'—we look to the following three topics aforementioned.

2. Structure

Regarding structure, the most obvious aspect would be to examine what the *level of frequency* plays on determining whether a structure is valid or not. For instance, in any Darwinian explanation of adaption (a 'function defines form' explanation), one would expect that the more a speaker hears or uses a specific construct, the stronger its reinforced usage shapes and maintains the acceptability of the structure—usage reigns king in such a functional, adaptive theory. However, after taking only a quick cursory glance of what actually takes place in language, we see that some high-levels of 'frequency-usage' (as found in the input) do in no way guarantee the same, parallel high-level of 'acceptable-usage'—viz., function doesn't seem to follow form. This is discussed within structure/syntax seminars which show how, e.g., high-frequency phrases such as [That's] (as in [[that's] nice], [[that's] good], [[that's] John], etc. doesn't facilitate the parallel phrase, **'I wonder what [that's] up there'*, where the full-form phrase [that is] is rather required (*I wonder what that is up there*) (where *marks for an illicit structure).[7]

An even more obvious and ubiquitous example deals with child structure—viz., the highest frequency-based word as found in the young child's English input would be the word 'The' (in fact it is marked as the highest frequency word in the English language), yet, for young child

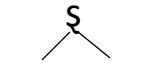
[7] For 'Progression of structure', see §[3] found in the link to the paper: https://www.academia.edu/42204713/Notes_Reflections_on_Syntax_Note_1._A_Note_on_the_Dual_Mechanism_Model_Language_acquisition_vs._learning_and_the_Bell-shape_curve.

language acquisition, the word 'the' is one of the last acquired by the child (typically a stage-2 acquisition acquired at around 30-36 months of age).

And perhaps the nicest example comes to us via phonology (specifically, the internal syllabic-template). With syllabic templates—something the resides in the mind of a speaker, as a parameter, innate and prone to maturation—we see overwhelming data which purport to 'form defines function'. Imagine a young child at a given stage where she can only generate a template that captures Consonant and Vowel sequences, a CV-stage. Well, if the external/function input provided exceeds this internal/form CV template, some sound would have to be sacrificed. Form defines Function! For example, let's consider what a syllabic template might look like (very informally), and see if we can briefly show some data which would be accounted for and mapped by such a template.

Syllabic Template *(See §4 for similarity with syntactic tree-template: both are recursive).* [8]

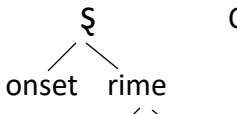
(i) CV-stage: at this stage only CV utterances surface.



C V

/k æ/ = 'cat' /kæ/ (mama, look a kæ; a /kiki kæ/)

(ii) CVC-stage: at this stage only CVC utterances surface.



V C

/k æ t/ = 'cat' full CVC with final /t/ coda.

When looking at early child speech patterns, developmental linguistics find a robust stage of utterances which defies the parental input. Young children at stage-1 say /kæ/ for cat 'kæt', whereby they drop the final consonant /t/. At a slightly latter stage, the child then is able to say cat as CVC /kæt/, etc. The ubiquitous example of /ki:ki/ for 'kitty' also suggests a geminated/duplicated CV:CV-template stage (where both vowels and consonants are mere duplicate copies of one another). (For phonemic/syllabic stages, see §7.1 below. (For syntactic template, see [§4]).

As an extension, imagine a child caught in the CVC-stage (only one initial consonant) trying to grapple with the production of CCVC 'school' /skul/ (an initial consonant cluster). Surely, one of

[8] See footnote 13 (and link to paper) for the 'recursive nature' of syllabic/syntactic tree-templates.

the two initial consonants would have to be sacrificed: which one? For that matter, we have to turn to phonemic development (see §§3.1, 7.1 below). Since plosive /k/ is acquired before fricative /s/, the /k/ wins the *musical chairs* contest and gets seated within the only C-seat available. In fact, this is the right way to think about such an 'external' race model, as based on the number of 'internal' chairs/syllabic slots available. This is most certainly a 'form defines function' sort of game.

Hence, in sum, there does seem to be quite a disconnect, at least in Darwinian adaptive terms, between usage-'function' (external frequency of…) and 'form' (internal representation of…). This notion seems to strike at the heart of the null-biological adaptive assertion that 'function defines form'. Indeed, while such null-hypothesis assertions do normally fall-out from biological-determined systems, it just doesn't seem to do so for language. While language is seen as being steadfastly embedded within the biological system—a Darwinian pursuit (e.g., the so-called 'biological basis for language')—there does seem to be a very narrow range of language properties which don't fall within the Darwinian scope of bottom-up adaption. This very narrow range has everything to do with *recursive syntax* (recursive structure)—a phenomena of structure which rather seem to have non-Darwinian 'top-down' properties[9].

3. Phonology

Regarding phonology, the problems with a bottom-up Darwinian assertion that speech proceeds 'from external environment to internal representation' is that it just doesn't seem to work that way around. Rather, as can be seen in data which show for second language speech errors (so called L1-transfer, or L-1 interference), speech is not simply a reinforced act or rehearsal of mapping speech output (external function) to speech representation (internal form). Let's examine two data sets below (child language speech/phonology (L1), and second language speech (L2)):

3.1 Child phonology (L1).

It often comes at a surprise (but seldomly to parents of young children) that young children can't simply repeat a phonological string (say, spaghetti') when asked to do so. What one finds is that the input of 'spaghetti' typically gets mangled and pronounced in output as 'bazgedi'.[10] This inability to match input to output, what I call 'the child's inability to be conservative' suggests, theoretically, that the internal form of the child has been somehow outpaced, mismatched by the external complexity of the input. Hence, the input-output mismatch. This is a classic example

[9] See Hauser, Chomsky, Fitch (2002). http://www.public.asu.edu/~gelderen/Hauser2002.pdf.

[10] For phonemic/syllabic stages of child speech development, see https://www.csun.edu/~galasso/Ling417LectureIExamReviewChapteronPhonology.pdf (§13.3, ex. 36).

of how children's staged-development of **syllabic** complexity matures over time, with simple CVC (consonant-vowel-consonant) sequences found in form subsequently affects the function—viz., what is a CCVCVCV pattern /spəgɛti/ turns into a CVC-CVCV pattern /bəz-gɛdi/. This is a form-to-function compromise given that children, at certain stages of syllabic development, can't produce CC-clusters (initial consonant clusters CC___). This is not unlike our example of a grape turning in to an orange, or a 100mph fast-ball pitch turning into a slow-descending high-fly, as determined by the nature of the glove being used in the catch. (funny!).

Perhaps the most infamous example is what is found in the production of the phoneme /r/ (à la Elmer Fudd—e.g., 'I'm gonna kill that crazy wabbit' (rabbit)). Given too that young children famously pass through stages of **phonemic** development, /r/-initial words (as found in the input) get produced as /w/, since the phoneme /w/ (a bilabial) is earlier acquired over the rhotic-R. (/w/ is stage-1, /r/ stage-2). So again, input might not necessarily map onto the output whereby roller-skate (noting the CC-cluster for 'skate') rather turns into 'wowo-kate'. This is a clear example of what is sometimes referred to in philosophy as the 'Ghost in the machine' where the order of the day in Aristotelian philosophy saw the world as a gathering of external forces made precise in our nature-to-senses mapping (a pure empirical enterprise). Even Newton comes down on such function to form—(with the caveat), at least until he realizes that it doesn't entirely work (i.e., that bodies can't just be extended features which behave in classical clock-like formation, but rather that forces, 'action at a distance' mysteriously are involved. This idea of hidden internal operations which would influence external objects was seen as a 'Great Absurdity'. Of course Newton had no physical explanation for this but he would eventually have to conclude that some internal ghost to it did exists (e.g., gravity, or 'action at a distance'). In so doing, Newton would eventually *exorcise* our classical notion of *body* and leave the (quantum-mechanic) *ghost* intact.(See Chomsky 2002, Chapter 2 for discussion).

3.2 Second Language phonology (L2)

Second language (L2) speech shows if not exact but similar errors. Of course, the speaker of an L2 already has at her disposal the whole phonemic inventory of her L1 speech. So, while e.g., syllabic developmental problems, or even phonemic development problems may not show up, other types of errors related to so-called L1-transfer/interference might.

For instance, let's take **syllabic considerations** first. Imagine a language (such as Japanese) which has a very low to zero form allowance/tolerance for CC-clusters in initial position (while they may show up in medial position if other stress constraints are followed). The Japanese L2 production of 'love story' often gets produced as 'loba sutori'. This is an interesting case of so-called L1-transfer or L-1 interference. There are two aspects which we can address here:

(i) First, the Japanese language may reduce an otherwise English CC-cluster of /st/ found in the word 'story' and rather produce it as 'sutori'. This makes sense only if we keep to a form defines function scenario. Specifically, sense Japanese doesn't have CC initial

internal form representations, the input will have to be modified in order to match the internal mapping—hence, CC__ → CVC, whereby CC /st/ gets torn apart with an added insertion of a vowel /u/ between /s/ and /t/ /suto/ori) (CC becomes CVCV).

(ii) Second, one other point of interest is the noted replacement of the phoneme /v/. Japanese doesn't represent this phoneme in their speech inventory. The closest phoneme would be the /b/. In other words, the Japanese baseball glove for /v/ doesn't exist. Hence, they can only catch an incoming /v/-pitch with the /b/-glove. This is the perfect example of form defines function—where the internal form/representation defies the input and changes it to match. Where the form defines function. (Similar problems arrive with Arabic, where their phonemic form inventory doesn't allow for the function of a voiceless /p/ e.g., where 'police', or 'palm tree', etc. get pronounced as 'bolice' and 'balm tree').

As we see below, both syllabic as well as phonemic considerations of *form* enter into the equation of whether or not the *function* of a speech sound can be copied by an L2 speaker.

Other instances of phonemic considerations can account for why Spanish L1 speakers speaking L2 English don't assimilate /s/ to /z/, as in the example 'cars' where English L1 speakers assimilate the voicing properties of the adjacent /r/ across to the next sound /s/, changing */kars/ to /karz/. This is a subtle but quite interesting observation. The fact of the matter is that Spanish simply doesn't have as an L1-form the phoneme representation for /z/. They might have the spelling for 'z', but they don't have the sound /z/. (They simply don't have the /z/-glove). Lopez sounds Lopes, zero, sero, zebra, sebra, etc.

Furthermore, the Spanish 'sh' (/š/) doesn't exist. Its closest catcher glove would be 'ch' /č/ when in initial position (/s/ when in final position, as in Inglis for English), so that the external sound/**function** of the word 'shower' turns into the internal representational sound/**form** 'chower': e.g., 'first I'll take a chower and then we'll go chopping for choes'.

One can imagine many L1-transfer problems which might show up in the early-school years having to do with bilingual Spanish to English education given these observations. (Even L1-transfer could undermine English L2 spelling). An L1 Spanish child spelling 'shoe' as choe, etc.

In sum, phonology offers us an intriguing window into the contrary 'form-defines-function' analysis. One might rather think the most obvious *environmental* aspect of language is that of sound/phonology, and that the once assumed (radical) behaviorist and naïve 'tape-recorder' theory of language would suggest all a speaker need do is <u>observe, listen, really listen hard</u>! to one's surroundings, and the correct picture would emerge. This is the erroneous Aristotelian tradition since debunked as early as Galileo, Descartes, and as recently as Chomsky. Chomsky, in this sense that indeed (innate) form defines function, is in clear accordance with Plato (vs Aristotle), Descartes (vs. John Locke), Galileo, and famously against B.F. Skinner.

4. Syntax (Child Grammar)

The examples of how form defines function I'd like to offer here regard the syntax of so-called functional categories (such as INFLectional {s} for plural, Possessive {'s}, Present AGREEment/Tense {s} (a lot of {s}'s in English morphosyntax), but likewise what happens to Case (I vs Me), Auxiliary verbs (Do, Be, Have). Etc. Let's take each in turn.

a-Plural, b-Tense, and c-Possessive {s}[11].

a. The omission of **Plural {s}** examples is ubiquitous in the child data.
e.g., two car, two spoon, more cookie…

b. Daddy drive car (where {s} in 'drives' is missing). Mommy cook pasta. Him do it.
c. That daddy car (daddy's car). Mommy sock. Where boy bike? Why you cry?[12]

INFLection

In sum: If we look to the **inner-template form** of inflection as elements of language such as Tense, Agreement markers, Possessives, etc., we find that not only are such elements categorical/abstract in nature, but they also occupy a particular inner-template position in the morphosyntactic template/structure—viz., they occupy the 'edge' position. This can be shown by the use of syntactic brackets [ ] (a variant notation of tree diagrams).

Consider below:

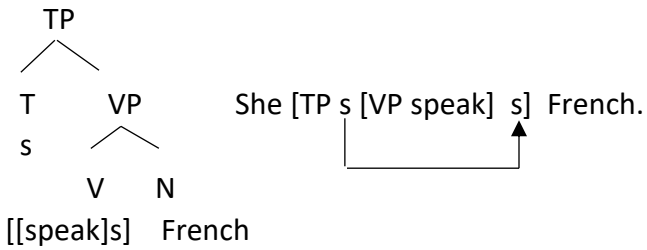
(i) Tense: [[drive]s] ('Daddy drives')
(ii) Agreement (number): Two [[car]s]
(iii) Possessive: [[boy]'s] ('Boy's bike')

[[stem] affix]: what we find of INFL affixes is that this edge slot [[ ] edge] corresponds to Broca's area of the Brain (found in the Front Left Hemisphere (FLH)). See the literature on the **Dual Mechanism Model** for consequences of Broca's area maturational development, and the delayed onset of young child language INFL.

[11] See Radford & Galasso (1998) for some data on the development of 'form to function' having to do with Possessive structures. https://www.csun.edu/~galasso/arjg.pdf

[12] Notice Aux 'do omission in 'Why _ you cry?' (Why ~~do~~ you cry?) but its realization as a main verb in 'Him do it'. The contrast between the two can be phonological (since they are equal), but rather the distinction between [lexical] vs [[ ] functional].

***Note on Syntactic Tree.** Consider below how syntactic trees resemble syllabic trees (both being recursive in nature)[13].



Likewise, functional words such as 'the', Aux verbs ('do-be-have'), similarly would occupy edge-related properties, being categorical/abstract functional items.

These example above are notoriously classic in the early-child syntax literature. They represent the mismatch between input and output. Clearly, no parent speaks to their young children in this matter. Where is the evidence for such utterances coming from, if not from the input? Well, in Chomsky's theoretical position, it's coming to the child as residual approximate structure, albeit incomplete, but via the only internal form of a template-structure the child has to utilize at the given time of syntactic development (what is typically referred to as a lexical stage-1 which precedes a functional stage-2).

Other examples such as Aux(iliary) omission come in form of such utterances below:

Aux omission.

What _ you want? (where _ indicates the place where an Aux-verb 'do' should insert).

What _ daddy doing? (_ omission of 'is')

But while early lexical stage-1 utterances deleted auxiliary 'do', they have little problem with the main verb 'do': e.g., Mommy, him do it. Me do it. Etc, Only the Aux 'do' gets deleted.

[13] See link below: §[27] p. 10, and §[31] p 13 for how phonology takes-on recursive properties (trees):

https://www.academia.edu/42273106/Reflections_on_Syntax_From_Merge_items_to_Sets_categories_._Movement-based_Theoretical_Applications_Morphology_down_to_Phonology

What this interesting contrast tells us is that phonology plays no role here (since both words 'do' sound the same). Rather, it is about the syntax. While the early child may have a main-verb-'do'-glove to catch incoming main verbs such as 'I do it', etc., they don't yet have the auxiliary 'do'-glove, as in the first 'do' in the utterance 'What ~~do~~ you do'? This certainly goes against a common-sense 'function-defines-form' analysis since, clearly, as one might suspect, given the child can say 'do', all bets are off and so the child should be able to say 'do' across the board, given that 'do' is now perceived in the input/environment. But this simply is not what happens: there is a clear demarcation in form having to do with *main verb* 'do' vs. *auxiliary verb* 'do'.

Notice how in the expression 'How do you do'? one can easily deleted in spontaneous speech the former Aux 'do', but never the latter main verb 'do'—e.g., How_ you do? vs *How do you_? These are the types of data worth considering as linguists grapple over the form-function debate.

Our final example comes to us via the most frequently heard word in the English language, as mentioned earlier in this lecture, the word 'The'. Given that *frequency* reigns king in evolutionary circles, the opposite of the axiom 'if you don't use it, you lose it!', it becomes quite telling that young children (at the lexical stage-1) don't produce this word (examples below):

a.Daddy look, __ car! (where _ indicates omission of 'the')

b.What _ _ boy doing? c. Me want _ bike. Etc. (in ex. b, _ _ double deletion of <u>is</u> <u>the</u>).

Clearly, the bombardment of the word 'the', one would think, should have some effect on the child's functional use of the word 'the': 'Function defines Form'. It's common sense. But it doesn't happen. Rather, the child must await her internal form of being able to handle/perceive the semantically vacuous and rather abstract notion of such functional categories before the function becomes realized. For the child, the form shapes the function, the form defines the function…

5. Instances when 'function' does define 'form': environmental factors, dynamics due to Time, Space, Informalism.

Having looked at the above data which exhibit an internal-to-external model, a 'function as defined by form' theory, there do exist plenty of occasions where language seems to give-way to environmental factors from the outside. Real Darwin at work. These factors typically come in the manner of time, space, and informality (just to name a few)—all second-level environmental factors: so-called peripheral pragmatics.

Time Constraints. Regarding 'time', the most obvious examples we can examine have to do with *abbreviation*, so-called '*wanna contractions'*, *diary drop*, and *gapping*.

Let's take each in turn:

5.1 Abbreviations certainly take into consideration both *time* as well as *space* constraint which would be imposed via the environment. For example, my name [Joseph] (when in its full form is not only bi-syllabic, but carries quite a nice spelling convention (such as the 'ph' for the phoneme /f/). The abbreviated form 'joe' (or the endearing 'joey') whether due to informality, rapidity, and/or to facilitate ease of pronunciation, certainly comes to us via the bearing of environmental pressures. As an exercise, think of all the abbreviations we us in our daily speech.

Language & technology: This takes us to a topic which many first-year linguistics students might want to examine—the role of technology and language. Examples of how external/environment factors of tech affects language can readily be seen in **texting** and other abbreviated forms of language such as the use of picture-language (a modern form of the ancient pictograph) called **emoji.** Consider emoji, where language (speech, syntax, structure) is completely missing and where iconic representations take-on a 1-to-1 picture-to-meaning (or emotion) relation. This is an iconic representation as found in still photography.

One very nice topic of inquiry might be to see how language can be or has already been shaped by texting. Examples of abbreviated text SMS include acronyms/**initialism** (examples provided by my tech-savvy son Nicolas): Examples of Initialisms:

LOL (laugh out loud)	SMH (so much hate)	GG (good game)
GTG (got to go)	THX (thanks)	LMAO (laughing my ass off)
BRB (be right back)	TTYL (talk to you later)	*CYA (see ya)[14]

These initialisms must be pronounced letter by letter and not read as a whole word. Other more common examples we find in society include acronyms which are read as a whole words which include NASA (pronounced /næsə/), WHO (Word Health Organization)—when read as a word 'WHO' /hu/ becomes an acronym, when read as individual letters W-H-O becomes initialism.

Other examples of initialisms include ETA (Expected Time of Arrival), GMO (Genetic Modified Organism), FBI, CIA, NATO (when read letter by letter, an acronym when read as a whole word). SWAK (sealed with a kiss) was a popular acronym during WWI with soldiers sending letters back home to their families and love ones.

My favorite is XXX, OOO (hugs and kisses) which is a different notation all together, more symbolic in nature (with iconic hints to meaning), such that X = hug (crossing of arms) and O= kiss (a pictograph suggesting the rounded mouth to delivered a kiss).

[14] *(Note the reduced/abbreviated spelling of 'you' as 'ya' (which would fall into our 'informalism' category)).

The X was common in the middle-ages meaning 'kiss' to show faith and honesty. The X may in fact go back to the symbolic meaning of Jesus Christ—to cross is to anoint. Christ is the anointed one, one who is crossed. (Also, consider 'Christ on the Cross'—There is a double significance here).

On a lighter note, consider Chris (X), as in 'criss-cross-apple source' (a way of sitting among children with legs crossed). Lovely!

5.2 'Wanna Contraction' (a special note).

The so-called 'wanna contraction'—like all contractions (such as it's (= it is), don't (do not), ain't (am not—*notice the phonological shift in 'ain't vs. 'am not' typically found with irregular formations)—such examples provides another instance where rapidity, facilitation and/or ease of speech due to brevity restrict the full form of words. This is another example of how environmental factors can impact internal language. But recall that whenever we say 'wanna', as in 'I *wanna* go home' we tacitly know that what we are really saying, despite the (external) 'wanna' speech reduction, is the (internal) infinitive verb 'want to'… 'I want to go home'. Wanna contractions are products of reduced speech, as found in the objective-side of language. There is a hidden subjective, deep and covert silent structure which underlies the overt production. Let's consider this note below:

A special syntactic note on 'wanna contractions'.

Consider the two forms (A, B) below:

A. Who do you want to help?

(1) Who do you wanna help? (OK 'wanna' contraction)
(2) You do want to help who? (base underlying structure before movement)
(3) Who_{ii} do_{i} you ~~do~~ want-to help ~~who~~?
   i. Showing Aux inversion of 'do' (from post-subject position)
   ii. Showing Wh-movement of 'who' (from sentence-final position).

B. Who do you want to help you?
(1) *Who do you wanna help you? (*NOT OK 'wanna' contraction)
(2) You do want who to help you? (base structure before movement)
(3) Who do you do want ~~who~~ to help you?

*(Such irregulars with phonology shift must be stored as separate entities, unlike regular formations 'dream> dreamed' (with no sound shift). Irregulars become different words in terms of storage & retrieval: (e.g., keep>kept, dream>dreamt, bath>bathe, write>wrote etc.) This distinction is addressed in the Dual Mechanism Model.

Notice this special syntax note showing how while the wanna contraction is licit in A1, the form in B1 is illicit. Why might this be? Well, like in white-collar crime when the investigators say 'Follow the money!, what we must do for this syntactic crime is 'follow the movement'. So, let's follow the movement (as found in (i), (ii)) and see where and how 'wanna' gets blocked in (B).

If you examine the movement in (A), the underlying original syntactic slot 'who' occupies a slot which doesn't interject between the 'want' and 'to' elements: ('who' comes at the end of the sentence). In other words, 'want' and 'to' remain as an adjacent string (as 'beads on a string') in the surface phonology. In this manner, due to deep-structure adjacency, the two elements can join together in surface speech and form a single 'wanna' (= want to). Note however, how this is not the case in example (B). In (B), we see in the deep/base structure that the elements 'want' and 'to' are in fact split-up by the intervening element 'who' (which has since been moved). So, a strange phenomenon takes place—even though a word has moved from out of its base position, some kind of a syntactic trace (or an *empty category*) has been left behind, thus syntactically blocking the 'wanna' (want-to) formation. Look closely at what we have in (B): <want ~~who~~ to>. It's the moved ~~who~~ which blocks the contraction; viz., in (B), 'want' is no longer adjacent to 'to'. Empty categories are interesting, they hold a psycholinguistic effect on us:

I'd say: '*There's a ghost in the machine*'!!!

5.3 Telegraphic speech, Diary drop, Gapping

Telegraphic Speech

Telegraphic speech (Radford 1990) is a reference to early child sentence structure whereby the young child exclusively omits functional words & categories—like the words 'the', auxiliary verb 'do', and the functional categories like Tense, Agreement, Case, (while sometimes displaying unfixed word order).

Let's note that the very term comes from the idea that language can adhere to certain (environmental) constraints—for example, if one were to send a telegraph whence each word carries a cost. To spend the least amount of money on words, one could easily imagine which words to dispense of and which words to keep in order to secure communication. Essentially, very expensive words would be **functional words/categories** (viz., they don't deliver much of a punch in the way of communicative meaning—in fact, the very notion that languages have such words at all seems to fly in the face of any putative Darwinian theory of language as 'functional', in the sense that language has evolved for the sole purpose to communicate with others. This theory is referred to as **functionalism**—the theory that language is evolved and designed to serve a communicative/functional a niche). Recall, functional words such as the determiner 'the', auxiliary verbs (sometimes called 'helping verbs') 'do-be-have', along with Case (I vs Me), or even Tense (since many languages of the world don't mark for inflectional Tense), suggest that

such words are evolutionarily expensive since they seem somewhat redundant and out of touch with meaning. Regarding redundancy, why should a language have to mark plural twice, both on the noun and adjective, as in Spanish, or between a plural determiner 'two' and nouns 'cars'? as in English. Isn't the plural {s} inflection on the noun [[car]s] redundant since we already know that the determiner 'two' is plural? Such redundancy would seem to come at a cost for any evolutionary theory of language. Likewise, what is the essential difference between the morphological/Inflectional Case between I and Me? In fact, most native English speakers get this subtle and redundant distinction wrong every time, whenever they say 'keep it between you and I' (where the Case on the pronoun should be *accusative* 'me', not *nominative* 'I'). No matter: we carry on because it has no effect on communication. What are these functional words and inflections really doing? This seems to be a quirky-feature development—one which has arisen without the typical underlying (bottom-up) biological pressures (*pace* a Darwinian theory). Rather, lexical words such as Nouns, Verbs, Adjectives, Prepositions would be less expensive since they give back every pound's worth of money. Such words can't be easily deleted without communication breaking down. For an example of an exclusive lexical language (one which functionalist would claim as a universal language, devoid of byzantine ornamentation, and one compatible with a Darwinian-based theory of language evolution, one only need look at so-called Pidgin languages (see the *late* Derek Bickerton's book *Language & Species*, Chapter 5 on 'Pidgin Languages'. For further review see Oxford link).[15]

Some example of a lexical-based Pidgin language.

Him go eat. What the man doing? Money no can carry.

Too much children, many children, small children, house money pay.

e.g., = (I have a lot of small children and need to pay the rent)

Here below is a favorite example I once heard in an open market:

> *'Hello, me sell you four pound tomato for two dollar, very good price, yeh? You buy? Me no come tomorrow. Me friend come but him no good! Him want too much money. Me better price. Me sell you four pound tomato for two dollar. Yeh, you buy?'*

5.4. Diary Drop

The notion of diary drop is quite simple: image you are simply writing to yourself (as in a diary). In this environmental context, so many things can be omitted since you know who the writer is, along with the background context of the descriptive writing. In this environment, many

[15] https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199935345.001.0001/oxfordhb-9780199935345-e-13

aspects of language (functional language/words, correct grammatical constructs) are rather relaxed and can simply go missing. Diary-drop is said to be very similar to lexical (stage-1) child language given that many of the same features of language get omitted. See example below:

'Saw John hospital today. Doesn't look good... bad shape. Might not make it thru night.'

5.5. Gapping

We'll end with perhaps the most interesting and syntactically complex examples of so-called *Gapping*. Gapping is a form of ellipsis (a removal of certainly words)—such ellipses work since the omitted word or utterance can be reconstructed based on understood contexts and prior utterances (via pragmatics: a Darwinian pursuit). Such omissions of words typically come in the form of conjuncts in coordinate structures in order to avoid repetition. Examples include: 'John bought an apple, and Mary _ an orange' (where the second verb 'bought' is deleted and forms a gap between 'Mary' and 'orange'.

There are interesting constraints on such gapping. The most obvious is that the element deleted must be part of a coordinate structure. If not, gapping is illicit: e.g., John drove to the market and *Mary ~~walked~~ home. In this example, the two verbs 'drive' and 'walk' can't be linked with a coordinative conjunction since the two don't coordinate. One must rather spell out that 'John <u>drove</u> to the market and Mary <u>walked</u> home' (two different predicates). Also note that there may be subtle constraints between coordinating with or without prepositions. It seems the utterance: 'John drove to the market, and Mary _ home' seems not to work (at least for me). This doesn't seem to be as fluid as our first example with proper syntactic coordination 'bought an apple…an orange' shown above. Here, 'home' doesn't require a Preposition {to}. But if we change the preposition to have the same coordination, the syntactic constraint seems to be relaxed: e.g., 'John [VP <u>drove</u> [PP to the market]] and Mary [VP _ [PP to the library]]'.

5.6. Word segmentation (Word boundaries) / Word Change

One final interesting note is to examine where actual 'gaps' might be between words, so-called word boundaries (the IPA word-boundary symbol is #). So, in spontaneously spoken speech (unlike with written text), one may not know precisely where to cut words from other words—namely, where the word boundaries lie. This is a considerable problem, a so-called 'learnability problem' for developmental theories of child language acquisition and has forced developmental linguistics to posit very complex innate structures that children must have and bring to the table in confronting word segmentation. Of course, historically, errors undoubtedly have arisen, giving examples of *word change* over time. As our final piece of data, let's have fun with such one-time errors (which are now wholly accepted as part of our English language). Note how the 'n' has been displaced forming an historically erroneous word boundary:

(i) A # norange → An # orange.
('Orange' via Latin has the recognizable cognate 'Norange')

(ii) A # Napron → An # apron.
(The Latin 'napkin' comes from Napron (*nape*): an 'apron' is a 'napkin').

6. Conclusion

The aim of this accumulative lecture on 'form & function' helps to serve as a springboard to other analyses and research topics for linguistics students. Examining structure/phonology/syntax in L1 and/or L2 settings, these data, I hope, have provided some insight not only into Chomsky's claim for an innate Faculty of Language (FL), earlier described in his work as 'Universal Grammar', but also leads to other insights and implications dealing with early school-age education as well as bilingual educational settings. The philosophical history as well as the history leading up to evolutionary theories are rich with the scatterings of this debate, which continues even as I write.

Final notes: for specific research proposals per class, **please see §7 below**. The following ideas, data, topics are simply proposals, to get students to think about research topics which may come in the way of a midterm or final. My personal classes usually are engaged in research at their appropriate levels— using at least one outside source as a reference while also utilizing their texts and lecture notes as an inside source. Original data, samples etc. are always encouraged but are not necessary. Usually, a 'Summary' and/or 'Literature Review' serves as a good platform for exams. In terms of style and formatting, I prefer single-space with a works-cited page, MLA or APA are accepted. Good luck!

J, 3-19-2020

CSUN

7. For my own students.

Specifically, for my own students, please consider the following as topics for research/final exam projects. For example, if Phonology is the topic of research, I'd suggest looking at the phonology material to serve as a springboard for research topics for papers, exams.

Linguistics 100, 200, 250 and English 301, 302, 303 would fall as 'introductory courses'.

Linguistics 329, 339, 417 are more advanced courses.

*(While this paper does not apply to graduate seminars, some material here could be reviewed and help serve as a springboard for research).

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Staying on the topic of **Phonology** (typical of a final exam topic), specific class suggestions might look like the following (from introductory class to advance senior-level classes):

·**Ling 100/200/250**. For a final exam/research topic, consider speech as found in the community. This could include samples of data which show child language speech development, speech errors, and/or second language (L2) bilingual speech (see section below). Another topic might be to provide a **brief summary of the history of spelling**. For example, the letter 'A' was once reversed to show the shape of an Ox (which triggered the sound 'A' should make, /a/ (for ox).

For some fun, here's a NY post article on it:

https://nypost.com/2015/02/08/the-stories-behind-the-letters-of-our-alphabet/

Likewise, there are notions that the shape of mouth came to represent the letter (Letters are called 'Graphemes' in linguistics). Consider below:

(i) /θ/ where 0 = lips/mouth, and – is teeth between lips yielding /θ/.
(ii) The letter g is of historical interest: for Greek the /g/ sound was gamma Γ. This in turn took on a 'C'-shape by the Romans by extending the bottom tail of Γ = C with the added feature that it now took on a – voice (voiceless) quality. /k/ (as in criss, Christ).
(iii) But now the romans had no /g/, it being replaced by /k/ now represented by C.
(iv) Hence, the origin of C (voiced) by crossing the lower curve, yielding 'G'. Hence, the letter G was the result of sound and grapheme (or error) change from Greek to Roman.
(v) Don't forget how technology, SMS can affect spelling over time.

But don't forget for Ling 100,200,250, a proper **phonology topic** is appropriate for such courses:

For example:

(i) see child speech (§3.1).
(ii) see L1-transfer (§3.2).

For more detailed per class suggestions, see below.

For topics on grammar, see:

(i) Child Grammar (§4)
(ii) Pidgin Grammar (§5.3)

⇨ **Engl 301, 302, 303 (Language Introduction and English Grammar).**
For my English Linguistics, final exam topics concern Grammar/syntax (where 'tree' diagrams are involved). One possibility would be to focus on child grammars and the lack of certain grammatical features which come at certain stages of development, employing a lexical stage-1 vs a functional categories stage-2. One specific example would be the development of Tense ({ed}, present tense {s}, Possessive {'s}, Auxiliary verbs (do, be, have), Determiners {The}, etc.

(i) See Radford & Galasso on Possessive.
(ii) See Galasso 'Min of English Grammar (Chapter 11) for some data and analyses.
(iii) Topics could also include theoretical debates (Skinner v Chomsky), Brain processing (The Dual Mechanism Model, see Pinker 'Words & Rules' book cited herein), as well as ASL (language in the deaf community), as well as language of special populations (language impairment, autism, SLI, etc. topics found in Min. of English Grammar' text.

*Tree diagrams would be required.

⇨ **Ling 100, 200, 250**
Topics of phonology are appropriate here. L1 transfer, vernaculars and bilingualisms such as Black Vernacular English, Ebonics, Spanglish, (See Ling 417 material below).
For black vernacular data, see the great link below:

https://www.rehabmed.ualberta.ca/spa/phonology/features.htm

(There are also great web-pages devoted to Spanglish).

Also, L1-transfer as found with Japanese to English can provide some nice phonemic/syllabic interferences, sometimes called 'phonological repair'.

Link below presents English words borrowed in Japanese, examples of L1 -transfer, English to-Japanese.

file:///C:/Users/csunl/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/Phonological%20Changes%20when%20English%20Words%20are%20Borrowed%20into%20Japanese%20(3).pdf

Recall (§3.2) our example of Japanese of how 'love story' often gets produced as 'loba sutori'.

⇨ **Ling 417 (CSUN) / Ling 329-339 (CSULB) (Language Development courses).** A focus on any of these topics can make its way as a discussion point with the special aim and scope of 'language in the early school years settings'. The topic of Phonology is well placed in the research literature here.

Specific topics for research as cited within this paper include:

(i) The baseball-glove analogy in term of language evolution.
   a. Animal communication vs human language.
   b. The pongid v. hominid split (6 mya) (million years ago).

(ii) Has language evolved like all other Darwinian properties, or is Language special?
   a. See Chomsky vs Pinker/Bloom here, etc.
   b. Fodor, Wexler vs Tomasello (Lenneberg's Dream).

(iii) The analysis and development of structure (See my 'Ben paper' enclosed).

(iv) The development of:
   a. Grammar (See telegraphic speech, Radford (1990)
   b. Radford & Galasso (1998) (link enclosed)
   c. Phonology (see below).

7.1 First Language (L1) Child Language Acquisition (Phonology).

For Ling 417/329, see readings in the Hoff text dealing with child phonology (chapter on phonology). Topics include:

<u>Phonemic Development</u>

(i) Stage-1 Phonemic Development:
   a. Plosives /b, p/, /d, t/, /g, k/, → stage-1
   b. Fricative /f/, /v/
   c. Nasals /m/, /n/
   d. Glides /w/

(ii) Stage-2 Phonemic Development: → stage-2
   a. Fricatives /z, s/
   b. Liquids /r/, /l/
   c. Glide /y/

(iii) Stage-3 Phonemic Development: → stage-3
   a. Fricative (interdental): /θ, δ/
   b. Fricative (palatal) /ž, š/
   c. Affricate (palatal) /ǰ, č/

As an exercise, theorize on the types of utterances a young child might be able to pronounce given these phonemic stages: e.g., /wowo/ 'roller', /də/ for 'the'.

Syllabic Development

Stage-1: V, CV, CV:CV (gemination (e.g., wowo, baba, kaka, or kiki/ for kitty (/kIti/)
Theorize as why a young child might say /kiki kæ/ for /kIti kæt/). Note that gemination as well as the /t/ to /k/ substitution, and the final/t/ deletion in cat / kæ/. Note which syllabic stages the child would be in given such data.

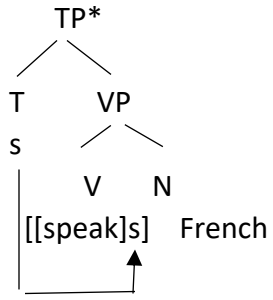
Stage -2: CVC (referred to as the CVC-proto word template).

At this stage now the child can say /kæt/ (CVC). Once CVC emerges, the child then enters into the so-called 'vocabulary spurt' since most words either conform to or can be readily reduced to a CVC format. Note though what would happen to the word skate /sket/ if the child only had access to CVC (e.g., /ket/). Question, why would the /s/ delete and not the /k/? (See phonetic stages above).

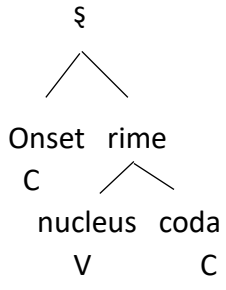
Stage-3: CCVC, CCVCC, etc. now Skate can be produced /sket/ (a CCVC syllabic structure). See my chapter on phonology (chapter 13) of 'Minimum of English Grammar' (link enclosed).

Recall how CVC form-template structures resemble each other and give rise to recursion:

'She [[speak]s] French' (showing INFL)



CVC template e.g., /kæt/ (cat) (See fn 13).



*(See footnote 13 with link for discussion of how both structures have recursive properties. For syllabic tree, see link to paper ex. [27], ex. [31] which show 'sister-to-sister' *assimilation* and *constraints* on assimilation having to do with 'mother-daughter' relations). This is a very interesting theoretical observation. For so-called 'tapping experiments' see Hoff's chapter dealing with 'The Early School Years'.

7.2 Second Language:

Theory

· First Language (L1) transfer (See Bley-Vroman's 'Fundamental Difference Hypothesis').

· L1-interference (e.g., Spanish substitution of /č/ for /š/ (e.g., 'chower' for 'shower'). (See my link to IPA for proper phonological /IPA/ notation (found in 'Minimum of English Grammar', Chapter 13).

·Reading strategies which take the phoneme as the basic unit of a sound-to-print relation (the so-called *decoding* question). See the 'Reading Wars' which pin *Phonics*-based (Bottom-up) methods of decoding written text vs. (Top-down) *Whole-language* approaches.

See Krashen's theory for L2 learning:
https://apps.esc1.net/ProfessionalDevelopment/uploads/WKDocs/58121/2.%20Stephen%20Krashen.pdf

Teaching Methodologies: See works by:

· Vivian Cook:
https://scholar.google.com/citations?user=YPoCwdcAAAAJ&hl=en&oi=ao
https://books.google.com/books?hl=en&lr=&id=b06gIjWiCZIC&oi=fnd&pg=PT333&dq=vivian+cook&ots=Po7zwkN0iq&sig=WY1YYQsylrrRA6xlM9zdvfcAbQY#v=onepage&q=vivian%20cook&f=false

https://books.google.com/books?hl=en&lr=&id=Ma0uAgAAQBAJ&oi=fnd&pg=PP1&dq=vivian+cook&ots=uYlsrKGSo8&sig=oIpzUDADqOkOQ2XLQgmcp-GmyUM#v=onepage&q=vivian%20cook&f=false

https://books.google.com/books?hl=en&lr=&id=TZMEemWIlyEC&oi=fnd&pg=PR7&dq=vivian+cook&ots=-5NT25edTA&sig=0w-EUV5kAMDdFqrzrIpLqgYmiQk#v=onepage&q=vivian%20cook&f=false

·Steven Krashen:
https://apps.esc1.net/ProfessionalDevelopment/uploads/WKDocs/58121/2.%20Stephen%20Krashen.pdf

First Language Acquisition (L1) of Syntax/Grammar

(i) For acquisition of **Possessive**, see link to Radford & Galasso enclosed in this paper.

(ii) See 'Minimum of English Grammar' text (chapter on Child Grammar (Chapter 11)), link enclosed in this paper.

(iii) Hoff text chapter 5 on Development of Syntax where much data can be found: see boxes (§5.1, 5.2, 5.3, etc.).

⇨ **Ling 302/303 (Grammar courses)**

(i) For acquisition of **Possessive**, see link to Radford & Galasso enclosed in this paper.

(ii) See 'Minimum of English Grammar' text (chapter on Child Grammar (Chapter 11)), link enclosed in this paper.

(iii) Tree diagrams as found throughout the text 'Min. of English Grammar' (See chapters 4-6).

⇨ **Ling 100/200/250 (Introduction to Linguistics courses)**

For all introductory course, some interesting topics for research include:

(i) The Skinner vs Chomsky debate as well as its implications:
   a. Berko's 'wugs test' (for L1)
   b. Sally Experiment (for L2) (Galasso)

(ii) Speech and Accents of non-native speakers (Spanish L1 => English L2)

(iii) Spellings: evolution and change
   a. See 'Word segmentation/Word boundaries' in section (§5.3.4)
   b. The history of spelling could also be examined: see link below: https://www.researchgate.net/publication/283664530_English_Spelling_and_its_Difficult_Nature

   c. See §5.1 Abbreviations and Initialisms (as evolved via text SMS).
   d. Language and Technology (how technology may shape language—which would indeed be an environmental 'Function defines Form' analysis).

      See Minimum of English Grammar, vol 1. Chapter 13 (§13.1D) on 'The Great Vowel Shift'.

(iv) All topics of Phonology are open for research at this level:
   a. phonological development in children (provide based examples of child speech)
   b. Speech of bilinguals (bilingualism and accent, speech perception).

8. Further Readings

Christiansen, M. & Chater, N. (2008). Language as shaped by the brain. *Behavior and Brain Sciences* (Target article). 31: 489-558.

Fisher, S.E., & G. F. Marcus. (2006). The eloquent ape: genes, brains and the evolution of language. *Nature Reviews Genetics*, Vol. 7 issue no. 1

Fitch, T. (2010). Three meanings of 'recursion': Key distinctions for biolinguists (chapter 4) in Larson, R., Déprez, V., Yamakido, H. (eds). *The Evolution of Language*

Fitch, T., Hauser, M., Chomsky, N. (2005). The Evolution of the Language Faculty: Clarifications and Implications *Cognition* 97, 179-210.

Fodor, J. (2000). *The mind doesn't work that way: scope and limits of computational psychology*. MA. MIT Press.

Galasso, J. (2019). Note on Artificial Intelligence and the critical recursive implementation.

https://www.academia.edu/39578937/Note_4_A_Note_on_Artificial_Intelligence_and_the_critical_recursive_implementation_The_lagging_problem_of_background_knowledge_1

For a note on how recursive structures show up in phonology (via assimilation), see 'Recursive Syntax' monograph (2019), link below (ex. [31]:

https://www.academia.edu/42204248/Working_Paper_no._4_Reflections_on_Syntax_From_Merge_items_to_Sets_categories_Move_Movement-based_Theoretical_Applications_Morphology_down_to_Phonology

Gould, S.J. (2017). *Punctuated Equilibrium*. Harvard University Press.

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Lightfoot, D. (2006). *How new languages emerge*. Cambridge University Press.

Pinker, S. (1999). *Words & Rules*. NY: Basic Books.

Pinker, S. & P. Bloom (1990). Natural language and natural selection. *Behavior and Brain Sciences, 13*. (4): 707-784.

Tomasello, M. (2000). Do young children have adult syntactic competence? *Cognition,* 74. pp. 209-304.

Tomasello, M. & J. Call (1997). *Primate Cognition*. Oxford Press.

Wexler, K. (2003). Lenneberg's Dream. (Chapter 1, pp.11-61) in Levy, Y. & J. Schaeffer (eds). *Language Competence across Populations*. Mahwah, Erlbaum.

See debates between:

(i) Pinker vs. Chomsky (cf. Pinker & Bloom vs. Chomsky (Fitch et al). on the possibilities of adaptive' measures leading to language evolution. Chomsky suggests that only top-down, non-Darwinian dynamics can explain recursive structures required for language. (See my Ben' paper for review on recursion: https://www.academia.edu/15151583/Some_notes_on_what_makes_language_interesting_For_Ben._Opening_Remarks_for_Ling_417_Child_Language_Acquisition_Spring_2014.

(ii) Fodor vs Pinker (cf. 'The mind doesn't work that way').

(iii) Works of S.J. Gould regarding 'evolution and mind' https://melaniemitchell.me/EssaysContent/ep-essay.pdf/

(iv) Dawkins vs Gould https://en.wikipedia.org/wiki/Dawkins_vs._Gould

(i) *Sterelny, K. (2007). Dawkins Vs Gould: Survival of the Fittest. Cambridge, U.K.: Icon Books. ISBN 1-84046-780-0.* Also ISBN 978-1-84046-780-2

(ii) Dawkins, Richard (2004). *The Ancestor's Tale: A Pilgrimage To the Dawn of Life*. London: Weidenfeld & Nicolson. p. 503. ISBN 0-297-82503-8

(iii) Gould, Stephen Jay (1996). *Full House: The Spread of Excellence from Plato to Darwin*. New York: Harmony Books. ISBN 0-517-70394-7.

Some popular readings:

(1) Dennett, D. (1995). *Darwin's Dangerous Idea.* Touchstone Book.

(2) Diamond, J. (1993) *The Third Chimpanzee*. Harper.

(3) Gould, S.J. (2003). *The Hedgehog, the Fox, and the Magister's Pox*. Three Rivers Press.

_____(1997). *Life's Grandeur*. Vintage.

_____(1996). *The Mismeasure of Man*. W.W. Norton.

(4) Penrose, R. (1994). *Shadows of the Mind*. Oxford Press.

(5) Pinker, S. (1997). *How the Mind Works*. Penguin Press. *(See counter argument found in Fodor's The mind doesn't work that way. (See references for citation)).*

____ *Language Instinct (1994)*

____ *The stuff of language (2007)*

(6) Searle, J. (2004). *Mind.* Oxford University Press.

And there are many, many other books, articles, summaries (that can be found on the web)—topics related to the debate over whether or not language (in a narrow scope as it relates to syntax/recursiveness) can have emerged via adaptive/Darwinian biological pressures. Chomsky comes out the strongest against this point, as expressed in the Pinker/Bloom vs Chomsky debates.

For an overview of 'Language and Artificial Intelligence' , see my paper
https://www.academia.edu/39578937/Note_4_A_Note_on_Artificial_Intelligence_and_the_critical_recursive_implementation_The_lagging_problem_of_background_knowledge_1.

Appendix

Over many years, Chomsky has, in one mode or another, constantly referred to some form of an innate/mental 'Linguistic Apparatus' – to quote Descartes, a 'Faculty of Thinking' –as taking on a biological dimension, lodged in the human brain, which serves to function as some 'intervening process' between input & output. This linguistic apparatus is what we refer to hear in this lecture as 'Form'.

This appendix presents a brief chronological overview the form has taken over the span of several decades pertaining to the 'Generative Grammar' Enterprise. (GGE)

A1. 'Grammatical Transformations' / 'Phrase-structure' Rules).

***Aspects of the Theory of Syntax* (Chomsky 1965).** In this early treatment, the notions of 'Surface vs Deep' structures enters the GGE literature showing that some intervening process in the way of *Transformational/Phrase structure* rules decodes what one hears in the surface phonology (input) and manipulates it to map onto deep-structure logic. The most famous examples are:

(i) I *expected* John (to leave)
(ii) I *persuaded* John (to leave)

Where, while on the surface/phonological level, the two sentences may seem to have identical structure, the deep structure bears very different meaning: in (ii), The underlying deep structure must show that *John* is the direct object of the verb *persuade*, while in (i) *John* doesn't take on direct object status: consider the difference, I *persuaded* John (of the fact…) is grammatically fine while * I *expected* John of the fact (is illogical). The same aspects deal with **Active vs Passive** constructs where is was assumed under behaviorist theories that they were two separate sentences, while in GGE, they take on the same deep-structure logical form while only having two different surface-structure phonological processes.

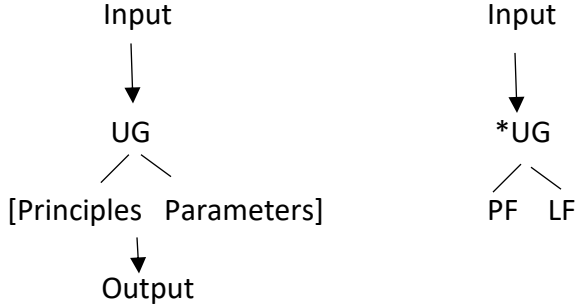
(i) John kissed Mary [John does the kissing]
(ii) Mary was kissed by John [John does the kissing].

A2. '**Universal Grammar '(1976).** Stated by Chomsky as the innate 'system of principles, conditions and rules that are elements or properties of all human language'. (Chomsky 1976, p.29). UG, in this sense, is a system of knowledge, not of behavior: It regards an internal mental form not exclusively pegged to external behavior. UG becomes instantiated as a species-specific language organ situated in the human brain which guides *internal* processing to create *external* linguistic behavior.

A3. 'Principles and Parameters' Framework (P&P) (1981). Part and parcel of the Government and Binding framework of the early 1980's, we find UG becoming a platform for P&P (whereby principles are those common elements and properties that all human-natural language shares, and parameters those variant 'peripheral features' which make language appear somewhat different (at least on the surface level).

(i) Input →[P&P] →output

(ii) With P&P innate structure as [lexical principles [functional parameters]]



*(Phonological Form (PF) breaks down into (i) *syllabic* and (ii) *phonemic* form representations, while Logical Form (LF) has to do with (i) semantics and (ii) theta-marking).

This dual process found in UG then led to two stages of child language acquisition, based on a lexical stage-1 vs. a functional stage -2 (where stage-1 principles map onto lexical categories (N, V, Adj, Prep) and where stage-2 parameters map onto functional categories (Determiner, Aux-verb, Tense, Agreement, Case). This model was then articulated as the **Language Acquisition Device (LAD)** which helped to account for the two classic stages of child language acquisition.

A4. The Dual Mechanism Model (DMM) (1990's). The coming together of these two various aspects of language in the brain. A Brain-to-Language corollary becomes established in the literature to account for not only child language acquisition, but aphasia as well: (Broca's area as it relates to parameters/movement vs. Wernicke's areas as it relates to principles). (See Pinker).

A5. 'Faculty of Language' (FL) (2000). This term proceeds from out of Hauser, Chomsky, Fitch (2002) whereby the authors articulate a clear distinction between (i) **broad-scope** cognitive/general problem-solving skills associated with language learning (which all higher-order primates share) and (ii) **narrow-scope** 'recursive properties of syntax' (which is human-species specific). Out of FL comes the phonological form (PF) (typically what is found at the surface level) and Logical Form (LF) which had since replaced the notion of deep structure.

Input => [LF [broad [narrow]] as it maps onto [UG [principles [parameters]]

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List of Terms (informal)

Adaption (vs. Exaptation): terms which distinguish Darwinian 'adaption' via natural selection vs S.J. Gould's hitchhike 'exaptation' (as a free rider).

Aristotle (see his debates with Plato over empirical v rationalism).

Assimilation (phonological): a rule-based phonological process whereby 'distinctive features' move and affect neighboring phonemes. (e.g., the voiceless /s/ in 'cars' => becomes voiced /z/, due to the adjacent voiced /r/: /karz/).

Constraints on (mother-daughter relation) (see fn. 13 link, Galasso 2019) 'Movement-based theoretical applications'

Sister-sister relation (assimilation is allowed due to adjacency)

Case (morphology/INFLection) e.g*., I vs Me, She vs her*, etc. Nominative case vs Accusative case.

Categorical representation (phonemic, syntactic), Similar to Plato's argument of a pure/ideal form. (See Meno's problem, the Republic). That we don't rely on the environment to obtain category representation. 'One step removed from the environment'.

Child language (First Language, L1). (See Radford, Radford & Galasso cited herein).

Chomsky, Noam (See Skinner vs Chomsky debate, 1959. His review of Skinner's 1957 book 'Verbal Behavior). See Berko's 'Wugs test'. Roger Brown's children (Adam, Eve, Sarah, Christopher): First child language studies (Harvard).

Darwin (founder of the science of evolution: adaptive measures).

Descartes (17th century Enlightenment, Rationalism).

Dual Mechanism Model (see Pinker, 'Words & Rules' theory/book. Galasso 2006).

Form defines Function (innate category/design which has an effect on how humans perceive and process speech and language—e.g., the idea that 'two people can hear the same sound different'.

Frequency (effects) (Behaviorism) Where the role of repetition secures strength of processing.

Functional (stage-2) (Language acquisition)

Functional words

Auxiliary verbs (*Do, Be, Have*) sometimes called 'helping verbs'. Elements which introduce a Verb (e.g, *do* speak*, is* cooking, *have* seen).

Determiners (*a, the, this that, my, each, every, all,* etc.), elements which introduce a Noun.

(Functional words along with INFLections go missing at early stages of child language acquisition).

Functionalism (that language evolved out of a niche to communicate, different from functional stage-2)

Galileo (See Chomsky's book 'On Nature and Language', Chapter 2).

Gapping (e.g. 'John bought apples and Mary __ oranges': there is a silent gap __ (= bought) between 'Mary' and __'oranges' which is recovered via the context/prior utterance. There are interesting syntactic constrains imposed on Gapping.

'Ghost in the machine' (Descartes). Newton exorcised the machine and left the ghost intact. His inability to explain action at a distance (e.g., gravity). The departure of the classical 'mechanical world'.

INFLectional (morphology) affixes such as {s}, {ed}, {'s}, {ing} which involve movement.

L1-Interference (L1-Transfer) The influence of L1 affecting a second language (See Fundamental Difference Hypothesis, Bley-Vroman).

Language Faculty (Chomsky's notion calling for an innate and mental design for language).

Language & Technology (emoji, SMS, texting, initialism)

Lexical (stage-1) (Language acquisition)

Locke (see the 'Blank Slate' theory, Tabula Rasa). (17th century British Enlightenment, vs Descartes).

Newton (Though who sees absurd the notion of 'action at a distance', nonetheless, must accept paving the way of the dismantling of classical mechanics). (See Ghost in the Machine).

Phonemic (development): stages of phonemic representation.

(e.g., Plosives>Fricatives>Palatal>Interdental). Three stages of phonemic develop leading to child speech errors. (See 'Form defines Function' in this respect).

Phonology (L1, L2)

Pidgin Language (see D. Bickerton).

Plato (see debate between Plato vs (his student) Aristotle). Much of the dialogues come to us via Socrates.

Punctuated equilibrium (S.J. Gould) That 'Gradualism' may not explain certain aspects of evolution.

Recursive syntax (See Galasso 2019's book 'Recursive Syntax'. The ability to have recursive/embedded structures within language design).

Second language (L2) 'Non-native' language. See L1 interference, The 'Fundamental Difference Hypothesis' (Bley-Vroman).

Skinner, B.F. (See Skinner vs Chomsky debate). The belief that language learning is just another form of general problem-solving skill). That language is a 'learned behavior' based on Stimulus & Response conditioning. (See Radical Behaviorism of the 1950's *pace* Chomsky).

Speech is Special (Philip Lieberman)

Syllabic Template (CVC)

CC-clusters (e.g., 'skate' CCVC, /sket/ (initial CC-cluster).

Syllabic stages (CV /ka/, CV:CV /ka:ka/ gemination, CCVC /skul/ (school) with CC-cluster).

Telegraphic Speech. Reduction of functional words and inflectional morphology (only lexical communicative **content** words are generated (in early child syntax)—like sending a word-reduced telegraph (at minimum cost).

Child lexical stage-1 (See Radford's 1990 book). (See Radford & Galasso 1998 for lack of INFLection/Possessives).

Tense (Tense Phrase, TP). [TP Mary [T {s} [VP speak-s French]]].

'Wanna' contraction (= 'want to') e.g., 'Who do you 'wanna' help?' as opposed to the illicit *'Who do you wanna help you?'

Constraints on (See constraints on 'wanna' contraction).

Word segmentation (word boundaries #)

e.g., 'The teacher sits'

has the word boundaries:

/ðə # tičər # sIts/

/ðət # ičərs # Its/ (but image wrong placement of boundaries. Children don't seem to make such egregious errors: why?

So, how do very young children know where to place the word boundaries before they have acquired the language? This poses a so-called 'learnability problem'. There are indeed innate factors which guide children here:

Innate Constraints help guide the child—e.g.,

(i) CVC can't hold a nucleus which is an unstressed schwa /ə/,
ruling out any possible */ðət/ (CVC) since schwa is unstressed, and CVC proto-word templates much have a stressed vowel (its only vowel). The word 'the' is allowed since it is only a CV (not a proto-word template).

(ii) Assimilation is violated with # ičərs since /r/ is voiced and /s/ is voiceless.