Syntax without Syntax

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Abstract

Here I argue that while Minimalism has made important conceptual strides in understanding how the language faculty fits within the biolinguistic context, some leftovers from early formal linguistics make dealing with phonologically-motivated syntactic alternations conceptually difficult or impossible. I argue for an understanding of syntax that, like parralel developments in the field of phonology, is motivated primarily by independently groundable constraints, replacing of the more traditional interpretation of a quasi-linear grammar where a syntax feeds semantic and phonological interfaces. I examine some data problems, difficult or taxing to motivate by traditional assumptions, which I argue to be soluble by assuming a direct and immediate competition of ranked prosodic constraints. These include constituent extraposition, that-trace effects, second-position phenomena and the beginnings of a generalized account of basic word order. I then discuss the interlocking nature of omptimized constraints and what they mean for the acquisition of syntax.

1 The Basic Issues

1.1 The evolutionary problem

The human language faculty is well known to be a kind of evolutionary conundrum. Superficially, language is one of the most complex instruments in the human cognitive repertoire, with a scale of application about as wide as human understanding generally. In formal terms, each instantiation of human language comprises an infinite set of possible utterances, which correspond to an equally infinite and dynamic set of possible semantic interpretations.

But by itself, the complexity of language isn't particularly irregular. Language's true irregularity is the historical instantaneousness of the its development in evolutionary time and the total lack in the animal world of any generative system used for communication equivalent to it.

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Shannon suggests more allusion here to what's to come.

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Unlike other organs, the eye, or the endocrine or auditory system, human language lacks any intermediate forms. While some have endeavored to compare some abilities in the animal world to the syntax of human language, those animals closest to us in descent and history, the other great apes, are curiously unencumbered by any creative and recursive communicative system.

It seems, therefore, that the most complex cognitive apparatus known to us sprung more or less full form without any kind of gradual Darwinian selection. Perhaps for rhetoric's sake, Chomsky himself has been careful not to call the development of language an evolutionary saltation, but this is precisely what we see (albeit perhaps with several small sequential saltations). Within the several millions of years separating man from chimpanzee, we see an immediate unfolding of all linguistic ability.

The Minimalist Program grapples with this conundrum directly. While part of the program is out of sheer theoretical economy, Minimalist approaches to language seek to describe a language faculty as small as conceptually possible, whose more complex traits are not gradually accumulated over a long evolutionary history, but fall out from a complex interaction between external stimuli and a provocatively simple computational system. This element generating the complexity of language is what Chomsky (2005) has termed the "Third Factor."

1.2 Constraints drive alternations

That is to say, the language faculty is a simple one, as is evolutionarily necessary, but the simple mechanism of language interacts with external constraints in such a way to produce languages with enormous superficial complexity and difference. This is no testament to the complexity of the language faculty itself, but to the laws of form that constrain it.

For example, each utterance of human language must be "parseable," in that its speakers must be able to determine what word or morpheme is meant to be interpreted as what (subject, object, agent, patient, adjunct, verb, etc.). Each sentence must also be meaningful, in the sense that the parsed meaning must correspond to something semantically well-formed and relevant. Additionally, each utterance must obey the constraints required by externalization. In the case of spoken language, this means that each utterance must flow in accordance with phonological and prosodic principles that underlie how the actual vocal tract is constructed.

All of these constraints are not added details of language, but impinge quite directly on how languages are constructed.

One important, yet often unnoted corollary of this conception of language is that most of the actually-existing field of linguistics, especially syntax, is *not* a study of the language faculty *per se*, or anything else essentially linguistic. Rather, it is a study of how a simple and unremarkable language faculty (a possible

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Emphasize, expand?

candidate being "Merge" in the ideas of Hauser et al. (2002) and Berwick and Chomksy (2015)) interacts with external factors to yield the actual diversity of human languages. We should be clear that a truly Minimalist account of language is one that exhaustively explains the structure of languages in terms of those non-linguistic contraints that play into it.

The goal of full "consilience" (in the terms of Wilson (1998)) and a unity of scientific fields might be a sisyphean one, but that doesn't make it approaching it less informative. The end of any scientific field is to unify and motivate its principles in external ones, thus leaving the intuitions of the field itself "explained" causally—in the sense that they are understood to be inevitable outcomes of what we know of reality outside of the field. Biology is "complete" when we totally reworded the principles of biology in terms of interacting chemical properties. Economics is "complete" when we can totally reword economic principles in the terms of the psychological and behavioral principles that underpin them. Likewise, linguistics is "complete" when we can totally understand the different alternations and constructions of human languages in terms of the physical and cognitive constraints that interplay to produce them.

This level of "completeness" is likely unreachable in every single case, but it is, no less, the implicit goal of all scientific inquiry.

1.3 Dispensing with Formality

Now, in a way that is sorely unappreciated, there is a fundamental incompatibility between these goals biolinguistic Minimalism and traditional "formal" linguistics, despite the former coming from the wellspring of the latter. The aforementioned imperatives of Minimalism, particularly in evolutionary light, impel us to understand an emergent language faculty, whose individual traits are motivated by external factors. Traditional formal linguistics, on the other hand, models the language faculty as a set of formal syntactic operations, totally autonomous and distinct from external factors.

Chomsky (1953) took it for granted that key to understanding language was to "to determine and state the structure of natural languages *without semantic reference*" [emphasis added], and would soon conclude from the syllogism that syntactic well-formedness needn't imply meaningfulness that "grammar is autonomous and independent of meaning" (Chomsky, 1957).

This all would lead to a formal understanding of human language directly isomorphic to the study of formal languages. The core of "language" came to be understood as a set of idiosyncratic formal operations applicable to the elements in a lexicon. As alluded to, these rules (along with what would later be described as "transformations") would be irrelevant to semantic interpretation, or any kind of external requirements (prosodic well-formedness, parseability). Instead they were understood as *syntax-qua-syntax*, the set of formally

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Lexicon

Syntax/Merge

Sensory-
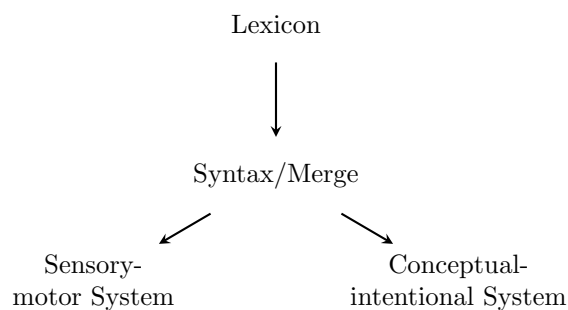motor System

Conceptual-
intentional System

Figure 1: The Modern Y-Model of Grammar

autonomous operations that comprised Universal Grammar.

This quickly led to what has generally been termed the *Y-Model* of grammar (Figure 1). In this model, the formal rules of syntax generated the set of valid utterances for each language, which in turn were sent off to both the phonological and semantic interfaces for interpretation.

Because of the linearity of this model of language, Minimalism has to do some peculiar things to get the right answers. Merge must generate strings which are interpretable by both the sensory-motor system (sound) and the conceptual-intentional system (meaning). But since both are *downstream* from Merge itself, it should not be able to foretell exactly *what* it needs to do to satisfy the constraints of both of those interfaces.

And this is where the real conceptual and empirical problem begins. Firstly, many alternations seem to move lock-step with "downstream" requirements of the phonological system. Richards (2010), for example shows a compelling account of the typological differences in *wh-* movement totally rooted in already establish prosodic constraints. He shows the syntactic "parameter" of *wh-* movement is derivable from two prosodic facts: whether the language has its C to to the right or left of a clause, and whether its syntactic phrases try to match their right or left edges with prosodic phrases.

He argues that all languages, *wh-* moving and *in situ* attempt to minimize prosodic the number of prosodic breaks in between a *wh-* word and the C where it takes scope. Languages like Japanese, which have leftward Cs, yet project to prosodic boundaries on the right can easily compress all prosodic phrases into one single one (illustrated by pitch compression in *wh-* phrases), thus making physically moving the *wh-* word unnecessary.

However English, which has also a leftward C, but tries to map prosodic boundaries on the *left* edge cannot use some kind of prosodic compression to unify the C and *wh-* word, as the *wh-* phrase wants to project a boundary intervening

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between it and the C. This compells English-like languages to move *wh-* words towards the C.

Richards' account works elegantly for the many languages he investigates in depth, but he rightly notices that this so elegant analysis is run aground by the theoretical assumption that we've mentioned here. When the syntax *precedes* the phonology, there's no clear way how it should be able to *happen* to produce strings that the phonology is going to end up accepting. He notes that we would have to have a kind of long-distinance "look-ahead" ability so the syntax can effectively cheat by looking foward to the phonology, and at that point, the point

My suggestion here is that this assumption has to be discarded, and in fact if it is, w

2   Opening the floodgates

2.1   A forestry problem

The most elementary problem of the externalization is that the properties and constituency of semantic structure do not perfectly overlap with the requirements for prosody. While it's well established that languages have an overwhelming desire to map these semantic constituents to prosodic ones (see Selkirk (1984) and the ensuing literature), yet there still remains a fundamental disconnect between the two that makes a perfect 1-to-1 match impossible.

Specifically, we have gradually come to understand that the structure of syntacto-semantics is largely binary: there is an hierarchically invariant base of different meaningful morphemes, adverbs (Cinque, 1999), verbal arguments (see Baker (1988) and ensuing literature) and one of the fundamental points of the recursion of human language is that these structures may be recursive and infinitely deep.

This gives us a syntactic structure like Figure 2, which is at variance with a more optimal prosodic structure in Figure 3. Prosodic structure is not narrow and deep, but bushy and wide. Each *Utterance* is composed of *Intonational Phrases*, which are composed of *Prosodic Phrases* and so on, but recursion to produce the infinite depth in semantic structure is not possible.

Thus each language is tied between these two structures, and in each case, a language must choose how to optimize the constraints of the underlying binary semantic base with the bushy demands of the phonology.

Carnie and Medeiros (2005) note actually precisely the same phenomenon, albeit do not name prosodic constraints as the main causer. They realize that leftward movement in language, particularly the EPP serve to "maximize" syntactic
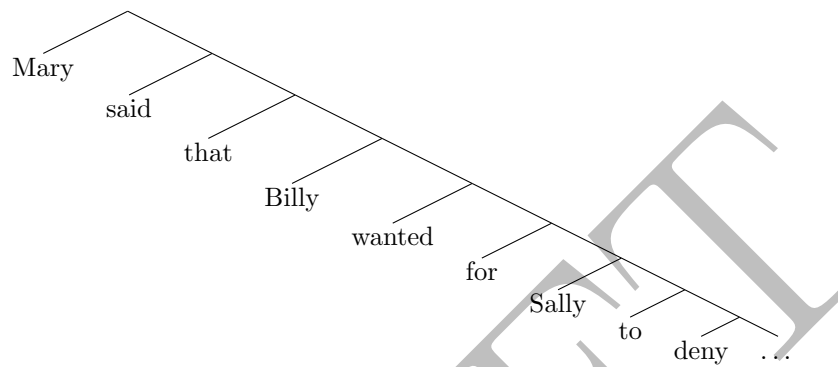
Mary
said
that
Billy
wanted
for
Sally
to
deny ...

Figure 2: Binary structure

U

IP

IP

IP

φ

φ

φ

Mary said that
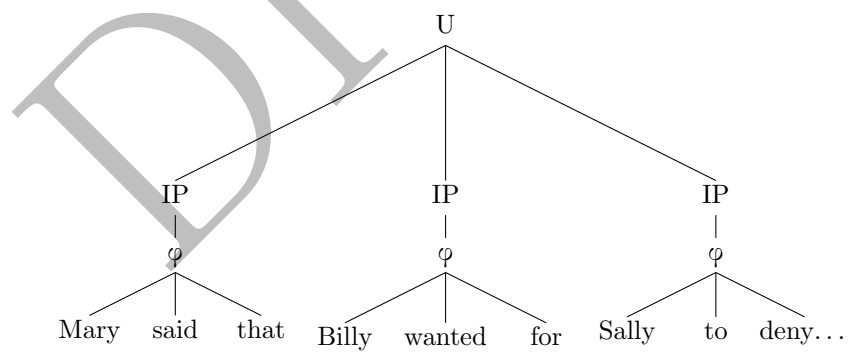
Billy wanted for

Sally to deny...

Figure 3: Prosodic structure

trees or to make them what Medeiros (2012) later also calls "bushy." Medeiros reckons that these movements optimize a structure in that they minimize the C-command relationships, an interpretation he has more recently rejected (personal communication).

Still, the empirical facts hold, and should make more sense in the context of prosodic optimization. Syntactic movement, particularly of a heavy constituent, yields a more bushy, and thus more prosodically accessible sentence.

2.1.1 Extraposition

This no less applies to rightward movement in language. Conventional assumptions of syntax have rendered rightward extraposition a particularly difficult problem to deal with. But the problem evaporates if we understand movement as a kind of optimization scheme for the phonological interface.

Take the common example of CP complement extraposition. It's generally well known that while many languages have SOV order, a significant subset of those languages will show SVO order when objects are particularly heavy, especially when they are CPs. We see this in German, as below.

(1) a. Ich will **es** wissen.
        I   want it to know

        "I want to know it."

    b. Ich will   wissen   **was Liebe ist.**
        I   want to know what love   is

        "I want to know what love is."

    c. * Ich will   **was Liebe ist** wissen.
        I   want what love   is   to know

(1a) shows the normal SOV order of German. Replacing the pronounc *es* with a full CP, *was Liebe ist* without any change in word order is not acceptable, as shown in (1c). These sentences are only utterable if the CP is totally extraposed to the end of the clause, as in (1b).

Let's be clear about what is prosodically suboptimal about (1c). Particular syntactic constituents will want a mapping to particular prosodic constituents (see work in Match Theory (Selkirk, 2011)), in this case, CPs will want to be matched with Intonational Phrases. This is no problem for (1a), as the whole phrase falls under one and only one CP.

But in (1c), where we have an interior CP, it is not clearly possible how to make the subordinated CP to a new IP while totally *inside* the matrix IP. We could awkwardly map *Ich will* to one, the subordinated CP to another, and *wissen* as one word to yet another, yielding three happy IPs under an Utterane, but that
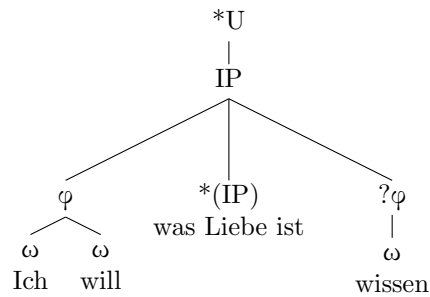
*U

IP

φ   *(IP)   ?φ

ω   ω   was Liebe ist   ω

Ich   will   wissen

Figure 4: The need for CP extraposition

U

IP   IP

φ   φ

ω   ω   ω   ω   ω   ω

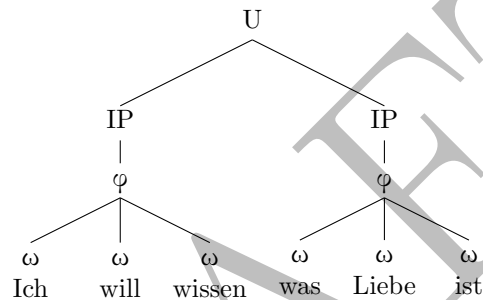Ich   will   wissen   was   Liebe   ist

Figure 5: CP extraposition in German

would require splitting the constituents of the clause, and leaving the verb head to its own IP. There is no clear solution for dealing with (1c)

German solves this mismatch by the extraposition in (1a). The subordinated CP can easily be matched to an IP if it is displaced rightward, as shown structurally in Figure 5. While this sentence violates the canonical German word order, it avoids a violation of the presumedly more important constraint on unmatched CPs. Another way of saying this is that the output tree is more bushy, and thus generally more compatible with phonological constraints.

Note that while this is a common alternation among SOV languages, the reverse does not exist. While many SOV languages will extrapose CP complements for a more optimal SVO structure, no SVO languages will choose to put heavy complements *before* the verb, yeilding SOV order. This typological fact falls out from this kind of movement simply being a prosodic optimization.

We should also be clear that this kind of prosodically-motivated rightward movement is fairly common in languages, and not only in the context of matching CPs to IPs, but also other syntactic constituents. English shows a very robust extraposition pattern in DPs modified by adjectives, like below.

(2)   a.   the excited man

b. * the excited for the party man

c. the man excited for the party

English adjectives usually come before the nouns the modify, as shown in (2a), yet when an adjective is modified by a complement preposition, the canonical word order becomes impossible as in (2b). This badness is easily resolved by extraposing the heavy adjective and complement to the end of the noun phrase, as shown in (2c). We can think of the heavier AP as needing to project to a phrase higher in the prosodic hierarchy and moves for the same reason that German CPs must.

2.2 Stress constraints on syntax

Thus we can move to motivating syntactic alternations by examining what constraints the externalization system, specifically the prosody places on lannguage. This is a fundamental gain in economy, in the sense that we are motivating the traits of language in the terms of independent data.

Now onto the domain of phrasal stress and its resolutionary power in syntax. Selkirk (2011) notes the following constraint in an anlysis of English word stress.

(3) **Strong Start** (Selkirk, 2011)
A prosodic constituent optimally begins with a leftmost daughter constituent which is not lower in the prosodic hierarchy than the constituent that immediately follow:

$$*(\pi_n \ \pi_{n+1}\dots$$

We can generalize this constraint to the domain of phrasal stress and earn some currency in syntactic problems. Note that many languages show "syntactic" constraints sensitive to what is traditionally called Wackernagelian or second-position phenomena. That is, many languages forbid stressless clitics from congregating at the begining of the sentential intonational phrase, instead prosodically inverting clitics to the second position, thus behind some non-clitic element.

In the same vein, Fitzgerald (1994) provides a similar account of the phonologico-syntactic constraints of Tohono O'odham, a language which, despite extremely free word order,

Note that Strong Start is not merely a statement of syllabic stress (i.e. that a word should prefer initial to second-syllable stress), but it implicitly covers every layer of phonological structure. That is to say, for each Utterance, the leftmost IP should be more prominent than the following IP, for each IP, the

leftmost φ should be more prominent than the second, for each φ, the leftmost ω should be most prominent, etc., etc.

(4) **Intonational Phrase Edge Generalization (IPEG)** (An, 2007)
The edge of an I-phrase cannot be empty (where the notion of edge emcompasses the specifier and the head of the relevant syntactic constituent).

An's analysis imputes empty categories as being inputs into the phonological system.

2.2.1 That-trace effects

We can unify a somewhat stipulated aspect of English grammar, that-trace effects in the same stress-related account we've presented here. The classical dichotomy of that-trace effect is presented below. English permits extraction of an initial subordinated subject where there is no overt complementizer, as in (5a), but the existence of a complementizer, as in (5b), produces ungrammaticality.

(5) a. Who do you think gave Billy his black eye?
    b. * Who do you think that t gave Billy his black eye?

Traditionally, there was simply a stipulated that-trace "filter" that weeded sentences like (5b) out, as an extra theoretical pustule on Universal Grammar. A mounting testament of evidence, however, points to the fact that that-trace effects needn't be modeled as a syntactic stipulation, but are phonologically conditioned. Firstly, as Merchant (2001) has noted, ellipsis of the phonological form of a that-trace effect avoids the violation. Thus (6) remains grammatical, despite the fact that the syntax of the elided phrase would have to violate the that-trace effect filter.

(6) John said that someone would write a new textbook, but I can't remember who (*John said that t would write a new textbook).

Thus it seems not to be the extraction iteself, but something about the phonological realization of the subordinated clause which is amiss. At that, that-trace effects are also alleviated by the scrambling of adverbial phrases topicalized in clauses which would otherwise yield violations.

(7) a. Who do you think that after all these months t would still want to go on the trip?
    b. Who did they say that for his whole life t wanted a new puppy?

Importantly Salzmann et al. (2011) realize explicitly that that-trace effects are not merely abstract collocations of *that* and a trace, but on the phonological level, are a linear collocation of *that* and a finite verb. The flexibility of German scrambling can collocate a variety of elements with *dass*, but only the main verb produces the stark unacceptability.

The importance of all of this for our purposes is that the phonological constraints can interact with functional tendencies in language in a systematic way. Crucially, Gundel (1988) recognizes that languages tend to align prosodic and sentential stress to topicalized and focused entities, which occur in cross-linguistically similar locales; these elements are routinely nouns or topical PPs. At that, Bolinger (1954) makes a similar descriptive statement of Spanish, where the surface realization of nominals is often a function of the wider prosodic structure of a sentences; that is, a focused noun will tend to fall where the natural stress of an utterance would otherwise be. In formal literature as well (Rizzi, 1997) (and intuitively), it should be noted that the elements which are focused or topicalized in language are routinely nominals, not verb heads.

Drawing this all together, we can say that that-trace effects actually fall out merely from Strong Start. Assuming that *that* produces a new intonational phrase boundary after it, the following element which begins the IP must be prosodically more prominent than its successor. However main verbs usually have *no* focus or topic quality, they cannot serve this purpose, and thus cannot begin intonational phrases. Thus a language with a high ranking on a Strong Start-like constraint will rule out verb-initial clauses in the same way that languages with productive second-position phenomena (like Tohono O'odham mentioned above) will rule out clitic-initial clauses. Here I will be assuming that Strong Start is a highly ranked constraint for English IPs (while in the canonically VSO languages like Irish, it is ranked lower).

As one should expect, in positions where verb heads happen *to* serve as objects of contrastive focus, that-trace effects are somewhat alleviated as in (8) (Kandybowicz, 2006).

(8)   % Who did you say that WROTE Barriers today?

English CPs prefaced by *that* must project to full IPs, thus potentially paving the way for the violations of Strong Start. On the other hand, English CPs without *that* are enunciated as a single IP phrase, thus the lack of a preverbal element is not prosodically dispreferred.

Interestingly, if a that-trace effect-violating phrase (like 5b)) is read quickly enough as one IP, the violation is alleviated or annulled. A similar fact is noted by Kandybowicz (2006), saying that that-trace effect-violating sequences become acceptable or improved when either the C or following verb is prosodically collapsed onto one another.

I'm going to rewrite a lot of this. I grafted pieces from an earlier iteration of this essay and I don't feel like it melds as well here. The whole that-trace effectsection will get a rewrite, albeit with the same goal in mind.

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(9) a.   Who do you hope *for/%fer to win?

    b. % Who do you suppose that'll leave early?

    c. % The author that the editor predicted that'd be adored...

In examples like (9), we can say that the cliticization nudges the reader to read the sentences as a single, uninterupted IP, thus avoiding violations of Strong Start. These can be compared to the above example of forcing strings like 'the kind to children man' into acceptable English prosody (such that we have 'kind-to-children' realized as one prosodic word).

Additionally, in the same way that complement CPs with *that* project to IPs and CPs without do not, we can see that *restrictive* relative clauses like (10a) do not produce that-trace effects while their near cousins, *non-restrictive* relative clauses, which do have distinct intonational boundaries (comma intonation) do (10b).

(10) a.   the fisherman that *t* liked to play dice

    b.   * the fisherman, that *t* liked to play dice

The required IP boundary in a phrase with a non-restrictive relative clause puts the syntactic clause up to Strong Start on IPs. Again, where there is no IP boundary, like in (10a) or in a complement CP without *that*, Strong Start does not apply.

2.3   Word Order

[Still working on this section. Very incomplete, no real text or explanation as I'm still pounding out the details, but it should be somewhat clear what I'm trying to do. I want to argue that VO or OV word order can fall out from different constraints, particularly whether a phonological phrase in a language takes trochaic (SOV) or iambic (SVO) stress.

Kahnemuyipour (2005) argues, for example, that phonological accounts of sentential stress are in err because they over-generate possible grammars. The classical model of Halle and Vergnaud (1987), for example, produces possible languages with sentential stress on the subject or verb, rather than on the object.

Kahnemuyipour's argument is cogent, given the commonplace assumption that stress is assigned to an already linearized structure provided by the syntax. The prosodic structure of a language can not be created bottom-up by consistent metrical rules applying to the output of a syntax.

But what about the reverse? What if we take as given the prosodic structure of a language and derive from it the linear order of any given language?

This all might not make too much sense out of context. This isn't going to be the beginning of this section.

	TopicFirst	StressArg	Trochaicφ	*φ
a. [Ś] [Ó V]				**
b. [Ś] [V́ O]		*!		**
c. [Ś O V]		*!		*
d. [Ó] [Ś V]	*!			**
e. [Ś] [V Ó]			*!	**
f. [Ś] [Ó] [V́]				**!*

Figure 6: Persian word order driven by constraints.

2.3.1 Justification of Constraints

We can begin to motivate the word order of different languages with only a small set of already well-established and independently motivated constraints.

- **TopicFirst** – asdf

- **StressArg** – Any verbal argument that fails to take phrasal stress will incur a violation.

- **Trochaicφ** – A phonological phrase (φ) must be trochaic.

- **Iambicφ** – A phonological phrase (φ) must be iambic.

- ***φ** – Economize on phonological phrases (φ). Each phonological phrase incurs a violation.

2.3.2 Towards a Typology of Word Orders

3 Thinking about the Theory

3.1 Economy

It's important to be clear about the interlocking nature of constraints in language. As we've said, in our account, what a particular language does for any particular alternations derivable from the interaction of all other "parameters." English's *wh- moving* status falls out from its independent prosodic and ordering constraints; it is *not* an independent parameter in the traditional way of understanding the term. Put another way, if languages do optimize constraints in such a way, a hypothetical language *English′* which is identical to English except it is *wh- in situ* is *not* a possible human grammar, as is a hypothetical *English″* which is identical to English save it is SOV.

In formal terms, each human language is a *Pareto Optimal* ordering of constraints, that is an ordering of constraints whose goodness (in terms of prosodic well-formedness and other interface factors) cannot be improved by changing any one of them. If we visualize constraint-scape visually, we can think of each language as a *local maximum*, where well-formedness on either semantic or prosodic grounds only decreases if we deviate marginally from the peak.

One huge formal (and as we will see, acquisitional) gain is the fact that the set of viable human grammars is drastically constrained by this approach. In a more traditional *Principles and Parameters* theory, the number of possible languages was 2^n where n is the number of binary parameter switches in all of the world's languages. But for us, the set of possible human languages is a much smaller subset of that 2^n; it is a set only including those set of paramaters which are local maxima in terms of optimizing external constraints (prosody/semantics).

3.2 Acquisition

[This section is unwritten, I have a couple drafts of drafts. I intend on talking about how treating syntactic alternations as being prosodically based earns a lot in the acquisition program. If children can converge on a grammar from multiple angles, so to speak (given what I said about each language being Pareto Optimal in some sense), then only a little amount of data is required for language acquisition. Additionally, I want to talk about psycholinguistic evidence, particularlly developmental evidence which nudges us toward thinking that the acquisition of prosodic and syntactic structure are concomittant and that prosodic is necessary for syntactic interpretation. I have some sources, would appreciate more if you have something possibly relevant.]

4 Conclusion

scribendum

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