The Language Design

The Biolinguistics Network

Abstracts

The Language Design

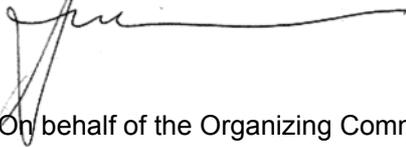## Design

The Biolinguistics Network

Abstracts

Montreal, May 27, 2010

Dear participant,

The Organizing Committee of The Language Design Conference is pleased to welcome you and wishes you a pleasant stay in Montreal.

We thank you for your active participation to the Conference, which, we hope, will further advance our understanding of the factors entering into the human language design.

Regards,

On behalf of the Organizing Committee

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INVITED PAPERS

How the language organ self-organizes

Cedric Boeckx
Universitat Autònoma de Barcelona

The focus of the talk is the challenge posed by interdisciplinarity: How could we integrate the findings of theoretical linguistics about language design with the rest of cognitive science and indeed with biology, or the natural sciences at large. Although generative grammarians have always advocated a cognitive science/biolinguistics perspective, in practice few concrete attempts have been made at genuine collaboration. Like many, theoretical linguists have given way to "isolationist" tendencies, by emphasizing modular (i.e., non-interface-based) explanations. This is most clearly the case in the realm of syntax, where features (which are nothing more than small modules) play a central role.

In this talk I would like to find out how many properties of the language faculty can be captured by appealing to a very minimal set of features. Most syntacticians (not only within minimalism, but also in other frameworks such as HPSG, or LFG) would say that this enterprise is doomed from the start. I will try to show that they would be wrong to say this. Quite a bit can be captured without features, and in fact, quite a bit can be explained better without features.

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Where do coercion effects come from?

Roberto G. de Almeida
Concordia University

Sentences such as 'John began the book' are often said to license an interpretation that includes a predicate such as 'reading', which is 'interpolated' in semantic representation, thus yielding 'John began reading the book'. Several psycholinguistic and neurolinguistic experiments have shown that sentences with aspectual verbs such as 'begin' engender longer reading times. I will discuss some of these experiments and present an fMRI study suggesting that, if anything, coercion effects are the products of pragmatic inferences. I will defend a view of semantic interpretation guided by structural properties of token sentences, with structural markers operating as pragmatic triggers for inferences that occur largely outside the linguistic domain.

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Asymmetry in language design, a biolinguistic perspective

Anna Maria Di Sciullo
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In this talk, I explore the role of asymmetry in the factors entering into language design. I discuss instances of asymmetry in biology, the contribution of asymmetry to our understanding of language variation and change, and its incidence, if any, in external factors reducing complexity. First, I relate morphogenetic dynamism to the asymmetry of Merge, and discuss some differences between complementation and adjunction. Second, I compare symmetry

breaking in evolutionary developmental biology, to symmetry breaking in language, and discuss one case of symmetry breaking in language evolution and change. Third, I distinguish the information-theoretic notion of complexity, from what I call I-complexity, viz., the complexity brought about by the growth of linguistic form. I suggest that external factors reducing complexity are (a)symmetry-related principles. From a biolinguistic perspective, then, asymmetry has a pervasive role in the language design. This might be due to the stability it brings about to the language faculty.

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Computation with doubling constituents: Pronouns and antecedents in Phase Theory

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We develop a computational implementation of (syntactic) Binding theory compatible with basic assumptions from the Minimalist Program. We take as our starting point the basic Merge/Move operations plus the probe-goal Case agreement system of Chomsky (2000; 2001) together with Kayne's 2002 (see also Zwarts 2002) proposal that pronoun-antecedent coreference relations originate with a base-generated pronominal/r-expression "doubling constituent", e.g. as shown in (1a). Similarly, we propose that anaphors have the structure shown in (1b).

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(1) a. [D [D] [N [N him][D John]]]
    b. [D [D self][N [N him][D John]]]
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In either case, under standard assumptions about locality and Phase theory, the r-expression half of the doubling constituent must separate from the pronominal component in a timely fashion and undergo movement to be licensed independently (i.e. receive its own theta role and have its Case feature valued). We differentiate between (1a) and (1b) by requiring that the DP in (1b) be a (strong) Phase - thus causing a shift in the timing of movement. From this difference, we show how the computational implementation can derive the classic asymmetry in distribution between pronouns and anaphors for mono- and bi-clausal sentences, ECM, picture NPs and other constructions. We also discuss outstanding problems with the proposed machinery for experiencer verbs (backwards binding) and wh-constructions.

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The dialect design: Socio-syntax of development and the grammar of Cypriot Greek

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Studying the syntax of first language development is to pay close attention to a child's acquisition of the (morpho)syntactic properties of the mother-tongue — in the present case the Cypriot variety of Modern Greek (henceforth, Cypriot Greek). This raises an additional difficulty: How to investigate a non-codified linguistic system? This talk addresses some fundamental issues relating to Cypriot Greek. The core will deal with the socio-syntax of development, that is, sociolinguistic factors influencing the first language (morpho)syntactic acquisition process of the native variety. The guiding line is familiar from generative grammar: Dialects are languages, or rather: Since a language is a system of abstract rules that govern a speaker's I(nternalized)-language, then if the I-language is something that is called a 'dialect', so be it. On the sociolinguistic side, some of the perennial problems burdening formal investigations of dialects

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will be sketched (e.g., the 'low' status of Cypriot Greek as opposed to the 'high' variety of Modern Greek, of which no Greek Cypriot is a native speaker). On the morphosyntactic side, some interesting properties of Cypriot Grammar will be presented (e.g., clitic placement, wh-question formation, and case issues). Despite all (political) efforts, Greek Cypriot children typically grow up acquiring their native variety, and it is only at the onset of formal schooling, around the ages 5 to 6, that the 'proper' language is being used, largely through instruction. The developmental part of this talk presents some systematic research carried out by the Cyprus Acquisition Team with a special emphasis on the socio-syntax of development hypothesis applied to the acquisition of clitic placement drawing from experimental data with typically developing children aged 2 to 7 and children with (specific) language impairment.

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Pronominal perspectives

James Higginbotham
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The content of perceptual memory, imagination, and dreams may be organized in different ways with respect to the role played by a given participant. Assuming as in Higginbotham (2003) and (2009) that the content is a property $^\wedge \lambda e\ \phi(e,\alpha)$ of events e with respect to participant α, α may be realized *internally* or *externally*, so that (1), for example, is ambiguous as between whether I imagine myself as I would be seen from the outside, or rather as I would feel it happening to me, the "what it's like" of experience:

    (1) I imagined [myself walking down the street]

That the ambiguity is genuine is shown (as Zeno Vendler in effect observed) by replacing the reflexive with PRO, which allows only the internal, what-it's-like, perspective, as in (2):

    (2) I imagined [PRO walking down the street]

I will argue that the external perspective reflects anaphora between formatives, whereas the internal arises from anaphora between thematic roles or stereotypes. The internal/external distinction criss-crosses with a distinction between the *first-personal* interpretation of the participant α (it is really happening to me), and the *impersonal* interpretation, which retains the internal perspective, but assigns it to no subject (as in Bernard Williams's (1966) famous example of imagining being Napoleon). This second distinction is manifest in the ambiguity between controlled PRO and PRO(arb) in the two interpretations of (3):

    (3) I imagined [PRO being afraid of myself]

That is: (i) I imagined what it would be like for a person to be afraid of me (where PRO is internal/impersonal, and the reflexive is external/first-personal); and (ii) I imagined my being afraid of what I myself might do (where PRO and the reflexive are both internal/first personal). Finally, there is a further distinction between a participant α that is *in the frame*, or capable of acting within the situation dreamt of or imagined, and one that is *out of the frame*, merely an observer as one is of the action of a play or in a movie, or as one's great-grandmother is when watching one from heaven.

The distinctions above all have a role to play in anaphoric classification, in English and other languages (I will illustrate chiefly with reference to Italian and Romanian). They also should serve as a corrective to the idea that the *de se* and the like involve any peculiarity such as "context-shifting," as in Schlenker; rather, the phenomena appear to fall into place once it is recognized that there is room in language design for a variety of referential and anaphoric properties available to pronouns and PRO.

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Parts and wholes in syntax

Wolfram Hinzen
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An important task in the biolinguistic movement is to scrutinize the foundations of semantics as a discipline and to account for the origins of a systematic form of meaning, including the fact that it appears to take a truth-theoretic format. In recent years I have proposed that particular forms of semantic evaluation are an inherent part of the syntactic computations themselves, and in Arsenijevic and Hinzen (2009) we claim that all syntactic recursions are mediated by forms of semantic access. This view is incompatible with a 'modular' view of the language faculty, on which syntax is an autonomous system. Here I argue it is incompatible with a traditional 'compositional' view of semantics as well, as understood in the tradition of Montague (1970) as well as recent minimalist inquiries. In the latter field it is widely assumed that the interpretation of complex syntactic objects at the interfaces depends on the interpretations of their parts (e.g. Chomsky, 2008). While stated as such this seems true enough, what exactly does it mean? Usually the view is held against a background of a Merge-based syntax, which implicitly defines the notion of 'part' used, namely in set-theoretical terms. I argue that this is the wrong notion of part, and that the meaning of a complex whole is not composed from the meanings of its set-theoretic parts. That in turn may throw doubts on the adequacy of a set-theoretic analysis of Merge.

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Language design and the syntax-phonology interface

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Asymmetries abound in natural languages. For example, the stream of speech is unidirectional and is rendered unintelligible when played in reverse. We likewise observe in syntax that pronouns typically follow their antecedents and binding relations are stated in terms of asymmetric c-command. In this talk we seek to outline a program for the explanation for the occurrence of such asymmetries through the analysis of oscillators in two subsystems of language: phonology and syntax. Our starting point is that phonology is characterized by repeating patterns in the linear sequence of sounds. Such patterns can be identified by autocorrelation analysis and modeled with finite-state automata. Syntax is instead characterized by repeating patterns in the hierarchical structures, which implement recursion. This abstract oscillation is not nearly as straight-forward to detect, but can still be modeled with push-down automata. Drawing on experiments conducted by Doug Saddy and colleagues we suggest an auto-correlation method for distinguishing classes of Lindenmayer systems with an autocorrelation method. The overall goals are: (1) to review and critically examine asymmetry phenomena in syntax and phonology, (2) to relate asymmetries to underlying oscillations and characterize the nature of the oscillatory systems in terms of their characteristic automata (finite-state automata for phonology, push-down automata for syntax), (3) to develop a learning theory for oscillatory systems in linguistics based on autocorrelation methods and analysis-by-synthesis.

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An exercise in syntactic (de)composition

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Much of the previous work on clause types that falls within the generative tradition argues that clauses contain a Force feature that can be valued as a declarative, interrogative, exclamative, or imperative (Baker 1970, Cheng 1991, Rivero and Terzi 1995, Rizzi 1997, 1999, Han 1998, 2001, etc.). However, an examination of the way in which particular phonological material (various so-called clause type particles) maps onto a particular semantic interpretation suggests that the situation is more complex. The Quebec French particle tu for instance can occur in interrogatives and exclamatives, but not in declaratives or imperatives. This suggests that there is some more primitive feature that interrogatives and exclamatives share and hence that it makes sense to trace the 'type' of a clause to a plurality of features, rather than to a unique Force feature. In this talk I will pursue the hypothesis that Force is not encoded in the syntax as an atomic syntactic feature, but is instead a derivative notion which results from the semantic composition of more primitive components, which are in turn in a one-to-one correspondence with syntactic features. This approach will make possible the unification of apparently disparate phenomena, such as Clause typing, Focalization and Topicalization, by potentially revealing primitive features that various clauses share with Topic and Focus, that have been shown to be 'composite' in a similar way (Lambrecht 1994, Choi 1996, Cormack and Smith 2000, Ward and Birner 1998, 2001). At the same time, an analysis along these lines will have consequences for the theoretical choice between the assumption that each morphosyntactic feature corresponds to an independent syntactic head, and the assumption that multiple syntactic features syncretically coexist on one syntactic node.

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Emergence of complexity in design: the case of symmetry

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Chomsky (2005) noted that the design of language can be profitably viewed from the three perspectives of 1) genetic endowment, 2) experience and 3) "principles not specific to the faculty of language." The principles in 3) might be non-domain specific (e.g., principles of computational efficiency and even non-organism-specific (e.g., minimization of wiring in neural circuits).

We suggest that a plausible candidate for such a "third factor" might be principles of symmetry. In the first place numerous cases of (a)symmetry have been documented for language (Di Sciullo and Boeckx, in press). In the second place principles of symmetry both non-domain-specific and non-organism-specific occur throughout physics, chemistry and biology. A common theme in all these cases is that the symmetric solution is not always the most stable one in Nature. In those cases symmetry breaking operates and a less symmetric solution is chosen. In his influential paper, *More is Different*, Anderson (1972) argues that symmetry breaking can result in a macroscopic system in which the whole is more than the sum of the parts – emergent properties then result (see also discussion in Jenkins 2000).

Restricting ourselves to biology we find numerous examples of symmetry breaking in molecular and cellular biology; e.g., cell division, polarization, motility, etc. (Li and Bowerman, 2010). At the level of the nervous system, there are many cases of asymmetry of brain anatomy and function. The theory of gauge symmetry plays an elegant role in the explanation of how a falling cat rights itself to land on its legs. Stewart (2000) has shown how one might use symmetry concepts to reverse engineer the neural circuits underlying animal locomotion.

Trevisan and Cooper (2007) demonstrate how symmetry breaking may help account for variations in birdsong. And Niyogi (2006) has shown how symmetry breaking principles (bifurcation and phase transitions) might shed light on models of language change and evolution.

We must concur with Li and Bowerman's assessment that "…asymmetry in biology is as rich and diverse as it is in the inorganic universe. As such, the study of symmetry breaking will remain a fundamental and exciting area of research for many years to come."

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A surprising consequence of single cycle syntax

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Since the 1970's, especially triggered by May (1977), the ambiguity of sentences with raised quantifiers such as (1) has been a major research concern.

    (1) Some student is likely to solve the problem

There have been many different approaches to the phenomenon of <lowered' readings of quantifiers. One that is particularly interesting in light of recent developments in Minimalism is that of Sloan and Uriagereka (1988), who propose, roughly in the spirit of Lasnik (1972), that quantifier scope is determined cyclically, but as part of the syntactic cycle, not as part of a later LF cycle. This is an obvious precursor of the multiple spell-out of Uriagereka (1999), which is itself an immediate precursor of single-cycle syntax. However, it has long been known that 'lowered' readings are often unavailable. For example, Partee (1971) already pointed out that (2) cannot be paraphrased by (3)

    (2) Nobody is (absolutely) certain to pass the test
    (3) It is (absolutely) certain that nobody will pass the test

The constraint is not limited to negatives. Lasnik (1999) gives examples roughly like (4), whose truth conditions differ to some extent from those of (5).

    (4) Every student is quite likely to pass the test
    (5) It is quite likely that every student will pass the test

In fact, lowering only seems to occur with indefinites. In this talk, I will present a new account of lack of lowering, attributing it, ironically, to single cycle syntax, in particular the interaction of single cycle syntax with QR and the ban on 'improper movement'. The apparent lowered readings of indefinites will then be argued to follow from the fact that indefinites can be assigned their scopes via existential closure, as in Reinhart (1997), hence without QR.

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How to probe history with grammar

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A radically new method of language comparison, based on the advancements prompted by the formal biolinguistic framework, will be presented, aiming at the goal of making modern cognitive theories relevant to historical investigation and to population sciences. Such a

method uses purely grammatical (syntactic parameters) characters, overcoming most shortcomings of traditional historical taxonomic procedures, and allows for reconstruction of plausible long-range phylogenies by reliable mathematical and computational tools. It supports the analysis of actual language variation in terms of grammatical parameters from an unexpected viewpoint, and provides for the first systematic comparisons of lexical and grammatical evolution and of linguistic and biological variability among different populations.

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Culture in the Zebrafinch as a multigenerational phenotype

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Culture is typically viewed as consisting of traits inherited epigenetically, through social learning. However, cultural diversity has species-typical constraints, presumably of genetic origin. Oscine songbirds exhibit song learning and provide biologically tractable models of culture: members of a species show individual variation in song and geographically separated groups have local song dialects. Different species exhibit distinct song cultures, suggestive of genetic constraints. Zebra finch isolates, unexposed to singing males during development, produce song with characteristics that differ from the question, whether a population of isolates would evolve a song culture over multiple generations, and if so whether the resulting culture would bear a resemblance to the wild type song culture. The experimental answer to this question is positive: songs evolved towards the wild-type in three to four generations. Thus, species-typical song culture can appear de novo. Our study has parallels with language change and evolution. In analogy to models in quantitative genetics, we model song culture as a multigenerational phenotype partly encoded genetically in an isolate founding population, influenced by environmental variables and taking multiple generations to emerge.

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Learning, developmental plasticity and the evolution of
morphological asymmetries in animals

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Evolution by natural selection requires three steps. New variants of organisms: must arise, must have an impact on fitness (survival or fecundity), and must (ultimately) be heritable. The first step – how new variants arise - remains controversial. Traditionally, new phenotypes are attributed to novel genotypes (mutants or recombinants). But developmental plasticity may be a more important source of new variants than generally recognized.

The absence of heritable variation for direction of asymmetry in species that show a random mixture of asymmetric forms (i.e., equal numbers of right- and left-handed forms), identifies a unique phenotype - "direction of asymmetry" - for which there is no genotype. A wide-ranging survey of asymmetry variation within and among species of animals and plants offers some of the strongest evidence to date for a 'phenotype-leads' mode of evolution. In addition, the tendency of many animals to learn (e.g., handed behavior) may facilitate both the origin and the amplification of right-left morphological differences via developmental plasticity. Such an

interplay between learning and developmental plasticity might greatly enhance the rate of morphological evolution.

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Language design and evolution in a new perspective

Massimo Piattelli-Palmarini
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Having, at long last, ruled out the canonical neo-Darwinian adaptationist reconstruction of the evolution of language, we have to indicate new approaches to the origins of language design. There are some lessons we can derive from some recent developments in evolutionary studies:
The lesson from master genes and "coordination": traits do not evolve one at a time, they evolve as coordinated structures. It may well be that the appearance of language has been "driven" by some totally different function (one candidate seems to be renal filtering, coordinated with the bipedal station). The Otx1 master gene has under its control: the kidneys, cranio-facial structures, guts, gonads, larynx, inner ear and the cerebral cortex (segmentation and corticogenesis). The last three are directly and obviously linked to language.
The lesson from the genome project: probably many, many genes of low penetration are involved, with highly complex interactions.
The lesson from transposons: insertion of genetic material into pre-existing structures (NS as a viral infection, dealing with the interfaces).
The lesson from morpho-spaces and from non-genomic nativism: only a very limited number of possibilities, allowed by the "physics" of language (Is Narrow Syntax indeed optimal?)**.**
The lesson from epigenetics: same genes, different phenotypes (principles-and-parameters as a minimax solution?).
The lesson from modularity and Evo-Devo: "Distant" species (songbirds) can sometimes tell us as much as, or even more than, "close" species (chimps and gorillas), just like the genetics and development of the eye in distant species (the box jellyfish) tell us a lot about the development of the vertebrate eye. It appears that, once activated, a developmental module tends to go "all the way up", regardless of utility to the species (provided, of course, that it's compatible with survival and reproduction).
Finally, though module 1 all the way up is not, by itself, enough to develop a complex new function, nor is module 2 all the way up by itself, possibly the activation of *both* all the way up is what can "do the trick".

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I-Languages and conceptual reanalysis

Paul Pietroski
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When Frege invented modern logic, he viewed his Begriffsschrift as a tool for introducing concepts that have certain formal properties, and not merely as a vehicle for expressing concepts perspicuously. I think that natural languages are also used to introduce formally new concepts, and that this is where the real cognitive utility of the human faculty of language (HFL) lies. But Frege could introduce logically interesting concepts, of a sort that let him explore the foundations of arithmetic, because his invented language was governed by a sophisticated

composition operation: saturation, often characterized as function-application. Many current theories assume that natural languages are similar in this respect. By contrast, I think HFL lets us introduce logically boring but psychologically useful concepts that can be combined by means of simple (neo-Davidsonian) operations: restricted forms of conjunction, existential closure, and appeals to a few thematic concepts. I'll discuss a range of facts which suggest that lexicalization is a formally creative process in which available concepts of various sorts are used to introduce concepts that are monadic and number-neutral. Such concepts are "bleached" with regard to adicity and singular/plural distinctions.

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Phonology is as recursive as syntax

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In the Minimalist Program (e.g. Hauser, Chomsky & Fitch, 2002) recursion is seen as a (or the) defining property of syntax. Merge is potentially the sole operation of syntax, in a narrow sense, and it is recursive, since it applies to its own output. A derivation involves reapplying Merge to its own output until the numeration is exhausted, terminating the recursion. With this move, Chomsky is pursuing what he defines as the "natural approach" to linguistic theory:

> "to abstract from the welter of descriptive complexity certain general principles governing computation that would allow the rules of a particular language to be given in very simple forms, with restricted variety" Chomsky (2000:122).

In this paper, we argue that a parallel to Merge-based syntax is possible in (rule-based) derivational phonology. The traditional phonological rules of a language can be treated as functions on a stack, ordered with the first rule at the top of the stack and the last at the bottom. A universal operation Phon, parallel to the Merge of syntax, applies the top function of the stack to the current representation (whose initial value is the UR) then pops that function/rule off the stack. Phon reapplies to the current representation (using the function currently at the top of the stack) until the stack is empty (that's the base case that terminates recursion). Just as Merge abstracts away from the selectional properties of the items in the numeration, Phon abstracts away from the details of particular rules and reduces the phonology to recursive function application. This treatment of phonology allows us to assimilate it to syntax, and incorporate it into the FLN, the narrow language faculty, proposed by Hauser, Chomsky & Fitch. Each module is reducible to a single recursive function. We will show that in some sense, this position is a return to the view of Classical Generative Phonology.

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Innate grammar and efficient acquisition

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We will argue that the concept of interfaces increases the necessity of innate restrictions. While one reading of interface theory is that less of grammar is innate, another suggests that the information explosion is magnified if semantic and pragmatic factors introduce new forms of potential variation. In the classic learnability framework, what we will call strict innate interfaces

serve to limit potential variation severely and therefore make acquisition efficient. Richards (2008) argues that Chomsky's 3 factor division provides no place in grammar for variation and therefore it is entirely a property of the phonology. In contrast, we will argue that there are three forms of Multiple Grammars each of which is needed in a constrained theory: Compatible Grammars (including dialects like AAE), Structural extensions (including language specific forms of infrequent recursion), and Competition models (which captures traditional parameters). We provide a number of empirical examples to illustrate these distinctions. Thus variation falls within grammatical theory but not as a single coherent object.

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The minimal structure of the left periphery
Peggy Speas
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Research on clausal architecture in the left periphery has tended to deal either with Topic, Focus and Tense (eg. Rizzi 2004) or with Mode, Mood and Force (eg. Cinque 1999). The usual assumption is that the heads that Cinque posits above Tense are an expansion of IP, while Rizzi's heads are an expansion of CP. In this paper I argue that this assumption cannot be correct. I examine three types of data: 1. The relative scope of epistemic modals and quantifiers; 2. The relative scope of focus and evidential markers; and 3. The relative scope of topics and evaluatives, evidentials and epistemic modals. Instead, I argue that information structure (Topic/Comment, Focus/Presupposition) involves internal Merge and mood/mode involves external merge, within a minimal split CP structure that is parallel to the structure of VP.

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Human language and molecular biology: metaphor or more?
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Over the last decades we have attained deep insights into how life functions at the molecular level. This includes the storage of information, the expression of this information in complex molecular structures and networks of regulation, and the capacity to evolve. Molecular systems are commonly found to be hierarchically organized: basic building blocks collaborate in modules, which are themselves grouped into higher-order systems on many levels. Overall, we observe a (practically) unlimited potential to respond to the demands of function. At its most basic level, function is realized through the self-organized spatial arrangement we observe in protein structure. Remarkably, even though proteins can consist of tens of thousands of atoms, their structure is not arbitrary but contains identifiable regularities and recurring patterns. I will present results from our work on pattern discovery in the 3D-structure of proteins and outline similarities to aspects of human language. The question arises whether these shared features are coincidental, or whether they arise from shared fundamental constraints, such as limits to the diversity of building blocks and robustness under perturbations, which underlie such systems.

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Linguistic design and development
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MIT

Since the beginning of the modern study of language acquisition, there have been large numbers of attempts to explain the order of linguistic development in children as stemming from the nature of adult language, of UG. These attempts have uniformly failed. Why? What is the relation between language design and development? Is there any logical relation at all? Or does the order of development result from independent principles? Biological principles? Interface principles? What is the relation between Minimalist considerations in linguistic theory and developmental considerations? In this paper I'll try to make some sense of the issues, motivating discussion with evidence about linguistic development from such phenomena as the slow development of particular properties of checking relations (the *Unique Checking Constraint* and its ramifications), the even slower development of non-phasal projections that "should be" phasal (the *Universal Phase Requirement)* and possibly the late development of semantic properties such as maximality. We might ask about the relation between ontogeny and phylogeny in the study of language.

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PAPERS

Non-native acquisition from a biolinguistic perspective
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Penfield and Roberts (1959) and Lenneberg (1967) suggested that there is a limited period in ontogeny during which it is possible to acquire a natural language to native-like levels of proficiency, and after which it is virtually impossible to attain a native-like command of the given language. As noted by Lenneberg, this hypothesis, known as the Critical Period Hypothesis (CPH), is quite consistent with the facts that a human can learn a second language at age 40, given that "we may assume that the cerebral organization for language learning as such has taken place during childhood, and since natural languages tend to resemble one another in many fundamental aspects, the matrix for language skills is present." (p. 176). The CPH has fallen under attack in the field of non-native acquisition, where researchers have found poverty-of-stimulus arguments, that is, they have found that sometimes L2 speakers' knowledge of the L2 cannot be attributed to their knowledge of the L1 (because the L2 and the L1 are typologically very different), and neither can the knowledge be attributed to the nature of the input of the L2 (see White 2003, Belikova and White 2009), the implication being that non-native acquisition must be constrained by UG without the mediation of the L1, contra the CPH. Knowledge of the effect of the Overt Pronoun Constraint (OPC) in an L2, by speakers whose L1 lack overt pronouns, has been argued to constitute one such argument (see Kano 1997). In this paper I will show that the OPC is the result of a principle of efficient computation induced

as a side effect by the same principle responsible for the WCO effect. Since such third-factor principles are language independent (Chomsky 2005), knowledge of their effect cannot be used to prove access to UG in non-native acquisition. I will further argue that in an architecture of the language faculty in which parametric variation is restricted to certain aspects of the lexicon, it is quite possible to defend the Lenneberg's version of the CPH, once we factor out the effect of language independent principles in constraining knowledge of an L2.

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Function without content. Evidence from Greek subjunctive *na*
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Empirical problem. Subjunctive *na* in Greek is used in a variety of seemingly distinct environments. i) clauses embedded under future oriented predicates (*hope, want*) (1), ii) clauses embedded under aspectual predicates (*start)* (2), *how to* clauses (3), realis conditionals (4), counterfactual conditionals (5). Since all these clauses are dependent, the subjunctive is often characterized as marking a dependent clause-type (Quer 2009, Giannakidou 2009). However, subjunctive *na* may also be used in main clauses which are used as requests, orders, wishes or desires (6). The goal of this paper is to develop a unified analysis of *na*.

Theoretical background. Ritter & Wiltschko 2010 argue that INFL functions as universal anchoring category which may but need not be associated with temporal content. In particular, they assume that INFL is intrinsically associated with an unvalued coincidence feature [ucoin] which must be valued in the course of the derivation. In indicative root clauses the event situation in VP is anchored relative to an abstract utterance argument in SpecIP (cf. Demirdache & Uribe-Etxebarria 1997). In English, present values INFL as [+coin] (**ia**) while past values INFL as [-coin] (**ib**). Valuation via the substantive content of morpho-syntactic features (henceforth m-valuation) is however only one strategy made available by UG. In the absence of m-valuation, INFL may be valued by the embedding predicate (henceforth predicate valuation). In this context, the event situation is anchored relative to the event situation denoted by the embedding predicate: aspectual predicates value INFL as [+coin] (**iia**) resulting in a simultaneous interpretation, while future oriented predicates value INFL as [-coin] (**iib**) resulting in a future irrealis interpretation. The second strategy for INFL valuation is via the embedding functor, namely C (henceforth C-valuation). The directive force of Imperatives values INFL as [+coin] (**iiia**) anchoring the event-situation to an abstract plan set in SpecCP (cf. Han 2002) whereas counterfactuality values INFL as [-coin] (**iiib**) anchoring the event situation to an evaluation world (cf. Mezhevich 2009).

```
i)    a.  m-valuation [IP [+coin] [VP Ev-sit Vpres]
      b.  [IP [- coin] [VP Ev-sit Vpast]
ii)   a.  predicate valuation [VP Ev-sit [Vasp [IP [+coin] [VP Ev-sit V]
      b.  [VP Ev-sit [Vfut [IP [- coin] [VP Ev-sit V]
iii)  a.  C-valuation [CP Plan set [Cdir [IP [+coin] [VP Ev-sit V]
      b.  [CP Eval-world [Ccfct [IP [+coin] [VP Ev-sit V]
```

Towards a unified analysis of *na*. We argue in this paper that *na* spells out [ucoin] in INFL. The spell out of [ucoin] is only possible in the absence of m-valuation from below. The dependent character of subjunctive *na* derives from INFL's requirement to be valued. Since [ucoin] must be valued, it requires external valuation. But there is no restriction on the category or content of the embedding predicate. And it is compatible with a positive or negative value of [coin].This is responsible for the seemingly distinct interpretations associated with *na*.

Conclusion. The distribution of *na* provides evidence for the dissociation of function from substantive content. While INFL consistently functions as an anchoring category via its intrinsic coincidence feature, its substantive content varies across constructions. Time permitting we will also discuss supporting evidence from individuals diagnosed with Down syndrome.

```
(1) Elpiz-o na aɣoras-e to vivl-io.
hope-IMPF-PRES-1SG SUBJ buy-PRF-PAST-3SG the-NEU-SG-ACC book-NEU-SG-ACC
'I am hoping that s/he bought the book.'
(2) Arxis-e na mu ares-i o KanaD-as.
start-PRF-PAST-3SG  SUBJ  1-GEN-SG  like-PRF-DEP-3SG  the-MASC-SG-NOM
Canada-MASC-SG-NOM
'I'm starting to like Canada.'
(3) O ɣiorɣ-os kser-i (pos)
the-MASC-SG-NOM George-MASC-SG-NOM know-IMPF-PRES-3SG how
na se kan-i kala.
SUBJ 2-ACC-SG make-PRF-DEP-3SG good
'George knows how to make you feel better.'
(4) Na su to aɣoras-o afto,
SUBJ 2-GEN-SG 3-ACC-SG buy-PRF-DEP-3SG 3(DEM)-ACC-SG
an iposxeT-is na diavas-is
if/COND promise-PRF-DEP-2SG SUBJ study-PRF-DEP-2SG
'I am agreeing to buy you this if you promise to study.'
(5) An/as kerdiz-es to lax-io
if/COND win-IMPF-PAST-2SG the-NEU-SG-ACC lottery-NEU-SG-ACC
na anakeniz-es to spiti-i.
SUBJ make-PRF-DEP-2SG the-NEU-SG-ACC house-NEU-PL-ACC
'If you had won the lottery, you would have been able to re-decorate
the house.'
(6) a. Na fiɣ-is (tora).
SUBJ leave-PRF-DEP-2SG (now)
'Leave (now).'
    b. Na to p-is
 SUBJ 3-ACC-SG say-PRF-DEP-2SG subj it.say.pnp.2sg
'You may say it.'
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Compositionality and complexity in a framework with cycles

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1. GOAL: In this paper we argue for a system where the relevant syntax-interface mappings (Chomsky's phases/cycles) are determined by uninterpretable morphology, and not interface criteria (propositionality, predication, etc.) or quantity-based complexity.
2. BACKGROUND: Within the minimalist literature the main motivation to incorporate cycles was related to computational complexity by Chomsky (1995, 2000). In particular, Chomsky alluded to the type of complexity that arises when comparing different (converging) derivations, and introduced the notion of 'reference set' / 'lexical array' in order to differentiate lexical items in a local relevant domain (e.g., two occurrences of "Obama" in (1) as opposed to the two tokens of "Obama" in (2)). For reasons that ultimately concern when a given lexical item (within a 'reference set' / 'lexical array') is selected (e.g., when the expletive there is merged in structures such as (3) and (4)), Chomsky (2000) further claimed that arrays are not accessed as a whole as derivations unfolds: only a subpart - a phase - is.

3. CYCLIC SPELL-OUT AND MORPHOLOGY: Over the years Chomsky has emphasized the hypothesis that the Spell-Out points - the cycles/phases - should correspond with the heads that determine agreement and structural Case. This is welcome, not only because of the relevance of the Theory of (abstract) Case within generative grammar, but also because it allows us to dispense with interface-based characterizations of cyclic nodes, like those invoking "propositionality", "truth", or "convergence", which are admittedly murky (as emphasized by Hinzen's 2006 and Pietroski's 2005 work). Pursuing this route, Chomsky (2000 et seq.) has argued that phases are CP and v*P because these are headed by C and v*, which contain the φ-features.

4. COMPOSITIONALITY AND MERGE-BASED CYCLES: It is interesting to point out that, at first glance, Chomsky's view of phases departs from a strict (semantic) compositionality scenario, where every syntactic rule (that is, every application of Merge) would be paired with a corresponding semantic or phonological rule. Under such a view (which one can refer to as 'every-phrase-is-a-phase'; cf. Epstein & Seely 2002) after Merge (α, β) applies, yielding $\{\alpha, \beta\}$, the system could transfer β, as shown in (5). A version of this idea is supported by Boeckx (2009), who argues for two types of phases, intransitive and transitive, which can be seen in (5) and (6) respectively. Notice that these approaches to cycles presuppose that the system is somehow quantity-sensitive. Although that is in and of itself consistent with the idea that complexity measures the 'order' (= number of steps) of an algorithm, it is nonetheless true that the way in which elements are combined must be taken into account too (say, nesting dependencies impose less computational burden than crossing ones). The most pressing problem of these approaches, though concerns their lack of a local determination: if we were to argue that cycles emerge every time Merge applies, then we would have to provide an answer to the questions in (7): (7a) tacitly assumes that the system has a counter, or else that it can forsee what kind of unit the interfaces want ('look-ahead'). As for (7b), there is no agreed-upon solution, as the answer will depend on how much fine-grained (cartographic) structures are (cf. Cinque 1999, Starke 2009, and references therein).

5. AN ALTERNATIVE: The alternative I would like to defend is the one that takes uninterpretable morphology to signal the applications of Spell-Out. There is robust empirical evidence that C and v* are the loci of φ-features (cf. Boeckx 2008, Chomsky 1995), which need to be deleted as part of the cyclic transfer process. Notice that this approach predicts that Spell-Out points are always asymmetric, involving a Probe-Goal pattern, for Spell-Out is part of Agree/feature-valuation. This is a welcome conclusion, since it fits with the idea that the interfaces can only 'digest' asymmetric units (argument-predicate, binder-bindee, linear order, etc.; cf. Kayne 1994, Di Sciullo 2005, Moro 2000), a claim that is pushed to the syntax by Narita (2009). More generally, the approach is also interesting inasmuch as it provides a rationale for uninterpretable morphology to exist: they trigger Spell-Out.

6. CONCLUSIONS: This paper has argued that the complexity argument for cycles (also known as 'lexical arrays') provided by Chomsky (1995) cannot depend on Merge-based metrics, the main reason being that it fails to provide a local determination. Such a determination is available if we entertain the idea that cycles/phases are contingent on φ-feature valuation, which in turn implies a inherent asymmetry, rooted in the nature of the Probe-Goal framework (cf. Chomsky 2000; 2001).

    (1) $\langle$Obama$_1\rangle$ was elected $\langle$Obama$_1\rangle$
    (2)   Obama$_1$ voted for Obama$_2$.
    (3)   There is likely to be a proof discovered.
    (4)   There is a possibility that the proofs will be discovered
    (5) $\{\alpha, \beta\} \rightarrow \{\alpha, \cancel{\beta}\}$
    (6) $\{\gamma, \{\alpha, \beta\}\} \rightarrow \{\gamma, \{\cancel{\alpha, \beta}\}\}$
    (7)   a. Why does Spell-Out take place after every application of Merge?
           b. What are the units that Merge manipulates?

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On the labeling algorithm and its alleged exceptions

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Labeling Algorithm Chomsky (2008:145) argues "the label of SO must be identifiable with minimal search, by some simple algorithm" (where SO is a syntactic object), and he suggests the following proposals:

```
(1) a. In {H, α}, H an LI, H is the label.
    b. If α is internally merged to β, forming {α, β},
       then the label of β is the label of {α, β}.
```

This algorithm makes the following three predictions: (i) if External Merge (EM) merges H and XP (forming {H, XP}), then H will be the label of its outcome; (ii) if Internal Merge (IM) merges XP and YP (forming {XP, YP}), then the probe (finding a goal for IM) will be the label of its outcome; and (iii) if EM merges XP and YP (forming {XP, YP}), then the label of its outcome will not be determined. Thus, it is a consequence of this algorithm that EM cannot merge XP and YP (if the label of SO must be identifiable with minimal search), but an alleged exception is, of course, "EM of external argument DP to vP."

3-Place Predicate In addition to "EM of external argument DP to vP," there is a problem for the labeling algorithm, thus far not discussed in minimalist literature. Consider the following example with a 3-place predicate: ***the boy put the book on the table*** (cf. Larson 1988, Chomsky 1995). This example poses a problem for the labeling algorithm as well as the Case-theoretic analysis of feature-inheritance (developed by Richards 2007 and Chomsky 2007, 2008). Consider the following VP structure, prior to the merger of v: ***[[the book] [put [on the table]]]***. This is the type of {XP, YP}, formed by EM. So, this is a potential problem for the labeling algorithm. But in addition, it poses a serious problem for the valuation of Case by **V(*put*)** that inherits unvalued phi from v. That is, after inheriting unvalued phi from v, **V(*put*)** is supposed to value Case on ***[the book]*** (for the derivation to converge). But ***[the book]*** occupying Spec-V is "too high," meaning ***[the book]*** is not in the search domain of **V(*put*)**. Thus, if **V(*put*)** remains in situ and its search domain continues to exclude ***[the book]***, then the narrow syntax (NS) cannot value Case on ***[the book]*** and phi on **V(*put*)**, contrary to fact.

Last Resort Strategy To circumvent these two related problems, I would like to suggest the following last resort strategy:

```
(2) If K is a label-less syntactic object SO, then IM takes a label
    L that was accessed to form K, and merges L to K, forming a new
    SO={L, K}.
```

Suppose this last-resort operation kicks in if and only if EM forms a label-less SO. Then, IM can merge **V(*put*)** to ***[[the book] [put [on the table]]]***, forming ***[put [[the book] [put [on the table]]]]***. The outcome of this operation is a SO with its label **V(*put*)**, thereby overcoming the problem of label-less SO. Subsequently, EM merges v to ***[put [[the book] [put [on the table]]]]***, forming ***[v [put [[the book] [put [on the table]]]]]***. In this structure, ***[the book]*** is arguably in the search domain of **V(*put*)**. Thus, after **V(*put*)** inherits unvalued phi from v, NS can (in principle) value Case on ***[the book]*** and phi on **V(*put*)**.

External Argument Revisited The present analysis also solves the problem imposed by "EM of external argument DP to vP. Consider the continuation of the derivation in question. EM merges an external argument ***[the boy]*** to ***[v [put [[the book] [put [on the table]]]]]***, forming ***[[the boy] [v [put [[the book] [put [on the table]]]]]]***. This is the type of {XP, YP}, formed by EM, a label-less SO. Thus, the last resort strategy, formulated in (2), kicks in, and IM can merge v to ***[[the boy] [v [put [[the book] [put [on the table]]]]]]***, forming ***[v [[the boy] [v [put [[the book] [put [on the table]]]]]]]***. As demonstrated here, thanks to the last resort strategy (2), which is independently motivated on the Case-theoretic ground, both "EM of external

argument DP to *v*P" and "EM of internal argument DP to VP" do not yield a label-less SO as their final outcome; they are no longer exceptions to the labeling algorithm.

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Binary branching
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Isolating inflection provides a one-to-one correlation between word forms and grammatical properties. The precedence relations of these word forms are naturally represented in binary-branching syntactic structures. *Agglutinating inflection* also offers a one-to-one correspondence between forms and properties, but these forms are affixes, rather than words. These precedence relations can be represented in binary-branching morphological structures, and the reversal of precedence relations that is found in the comparison of isolating and agglutinating constructions may be understood as the consequence of head movement or the morphological operation of FLIP (cf. Di Sciullo 2005). These constructions are exemplified in the data of Amharic in (1a, b).

At first glance, *Fusional inflection* seems to be quite different. It presents a one-to-many correspondence between forms and grammatical properties and there are no obvious precedence relations or binary-branching structures involved. I will argue, however, that fusional inflection is not so singular. The distribution of forms in the paradigms of fusional inflection displays systematic patterns of syncretism, as shown in the Old English declensions in (2) and (6). These syncretic patterns will be shown to follow from a binary branching structure that provides the interface between the forms and the grammatical properties of these paradigms. Thus, it is argued that the syntactic, morphological and lexical derivations of inflection are essentially parallel.

I follow Jakobson (1935/1984) in decomposing the traditional Case labels (Nominative, Accusative, etc.) into three case properties as shown in (3). Since the binary character of these properties will be attributed to a binary-branching structure, they are represented here as privative features. In the Old English declensions, some of these case properties are not manifested explicitly because of the extensive syncretism of forms. Thus, the forms that are traditionally labeled as "Genitive" also appear in Ablative contexts, for example, and many paradigms neutralize the contrast between Dative and Instrumental, and so on.

Assuming that grammatical properties constitute a procedural knowledge system, I argue that the grammatical properties of Old English declensions are best represented in a hierarchy of tiers, as shown in (4). Each declension is represented in a specific derivational path that intersects these tiers. The phonological forms of inflection are linked to specific positions on the tiers, except for the "default" form, which is linked to the derivational path itself. Forms that are linked to more than one tier by "tier connectors" are specified for more than one grammatical property.

The derivations may be understood as follows. The speaker's perception of a given referent stimulates the appropriate grammatical tiers. Only these tiers and the tier connectors that relate these tiers can participate in this derivation. For example, the derivation of the Nominative Feminine Plural illustrated in (5) involves only the PLURAL, the FEMININE and the SOURCE tiers. Only the rightmost forms on these tiers are potential candidates for lexical insertion. The form that is inserted is the candidate on the tier that nearest to the point of insertion. In the derivation illustrated in (5), the form /e/ is inserted because it is separated from the point of insertion by only one derivational step. The form /u/ is two steps away, and the default form /Ø/ is four steps away. In any given derivation, the intersection of the derivational path and the grammatical tiers constitutes a binary-branching structure that defines the distribution of the forms of inflection.

This account also explains why so many forms of inflection appear in several different

declensions. The Genitive singular Masc./Neut. form of the Strong noun declension continues in the Strong Adjective declension, but not in the Weak adjective declension, for example, while the Genitive plural form is identical in the two adjective declensions, etc. In this account, the same grammatical tiers and the same phonological forms are implicated in every derivation. Each declension is unique only because it has a unique derivational path that intersects the tiers in a unique trajectory. Since only one of these paths is stimulated in a given derivation, some phonological forms may be candidates for insertion in more than one declension.

(**1**)   AMHARIC: ISOLATING AND AGGLUTINATING INFLECTION

a. ***kä   and   bet*** "from a house (ablative)"   b.   ***bet   -u   -n***   "the house (accusative)"
   ABL. INDEF. house   house-DEF.-ACC.

(**2**)   OLD ENGLISH: (**3**) JAKOBSON'S CASE FEATURES &
          a. STRONG NOUN DECLENSION   OLD ENGLISH CASE NAMES

	SINGULAR			PLURAL		
	MAS	NEU	FEM	MAS	NEU	FEM
NOM	-Ø	-Ø	-u	-as	-u	-e
ACC	-Ø	-Ø	-e	-as	-u	-e
GEN	-es	-es	-e	-a	-a	-a
DAT	-e	-e	-e	-um	-um	-um
INST	-e	-e	-e	-um	-um	-um

	MARGINAL	QUANTATIVE	SOURCE
NOM			√
ACC			
INST	√		(√)
DAT	√		
GEN		√	(√)
GEN		√	
GEN	(√)	√	(√)
GEN	(√)	√	
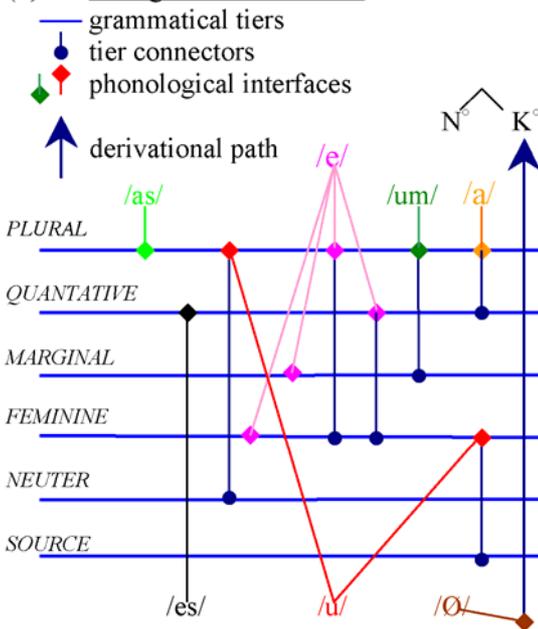
(**4**)   Strong Noun Declension   (**5**) Derivation
                                                    Nominative Feminine Plural

— grammatical tiers
● tier connectors
▼♦ phonological interfaces
⬆ derivational path
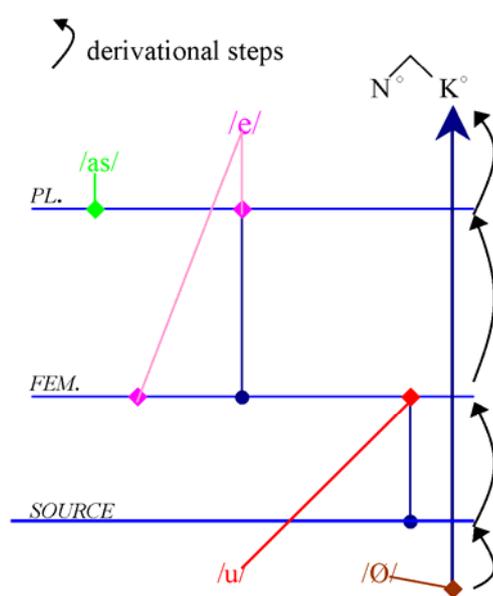
(**6**) a.   STRONG ADJECTIVE DECLENSION

	SINGULAR			PLURAL		
	MAS	NEU	FEM	MAS	NEU	FEM
NOM	Ø	Ø	-u	-e	-u	-a
ACC	ne	Ø	-e	-e	-u	-a
GEN	-es	-es	-re	-ra	-ra	-ra
DAT	-um	-um	-re	-um	-um	-um
INST	-e	-e	-re	-um	-um	-um

b.   WEAK ADJECTIVE DECLENSION

	SINGULAR			PLURAL		
	MAS	NEU	FEM	MAS	NEU	FEM
NOM	-a	-e	-e	-an	-an	-an
ACC	-an	-e	-an	-an	-an	-an
GEN	-an	-an	-an	-ra	-ra	-ra
DAT	-an	-an	-an	-um	-um	-um
INST	-an	-an	-an	-um	-um	-um

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Experimental evidence from sign languages for a phonology-syntax-semantics interface

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Sign languages (SLs) as linguistic interfaces of perceptual and non-speech motor behaviors can provide unique insights into neurobiology of language. This study presents experimental evidence for a phonology-syntax-semantics interface in sign languages. In sign language linguistics, articulator movement is considered to be the core of a syllable, comparable to vowels in spoken language. In Brentari (1998) phonological model of sign language, sign movements are dynamic prosodic units with autosegmental status similar to tones in contrastive tonal languages. From this perspective, syllables in American Sign Language contain distinctive features which are accessed by phonological rule only in terms of their tiers and syllabic positions (syllable initial, final) without further subdivision or organization. The segments in the syllable are timing slots (x1, x2) onto which phonological features are mapped. Wilbur (2003) made the linguistic observation that ASL lexical verbs could be analyzed as telic (denoting a change of state, such as *throw, fall*) or atelic (denoting homogenous activities, such as *swim, walk*) based on their phonological form: telic verbs appeared to have a sharper ending movement to a stop, reflecting the semantic end-state of the affected argument. The observation that semantic verb classes are characterized by certain movement profiles was formulated as the Event Visibility Hypothesis (EVH). We present motion capture data on sign production in two unrelated sign languages ASL and Croatian sign language, HZJ), demonstrating that the x2 part of syllables in predicate signs denoting bounded (*telic*) events is marked by a rapid deceleration at the end of the sign, made even more prominent by higher peak velocity, as compared to verb signs denoting unbounded (*atelic*) events (Figure 1). These distinctions of syllable structure denoting event type are robust to Phrase Final Lengthening (Figure 2). We suggest that these overt phonological distinctions map onto a complex representation of event structure at the syntax-semantics interface for sign languages (Wilbur, 2008). Motion capture data supports the view that more complex kinematic profiles of telic verbs correspond to a more complex phonological representation, as compared to that of atelic verb signs. We also present fMRI data on brain activations in native ASL signers (N=13) during comprehension of telic and atelic verb signs from the motion capture study. Telic verb signs elicited stronger activation in the areas processing syllabic complexity and event segmentation, as compared to atelic ones. Additionally, in comparison to non- meaningful gesture, ASL verb signs elicited activation in the canonical language processing areas, but not motion-sensitive areas. The above experiments demonstrate that sign languages utilize physical properties of movement to represent event structure at the syntax-semantics-phonology interface, as evident from verb sign production and neural activity during comprehension. The study further demonstrates that it is possible to investigate neurobiological underpinnings of the linguistic phenomena previously relegated to the level of conceptual representation (in spoken languages) or iconicity in sign languages.

Figure 1.   Peak velocity in ASL and HZJ, demonstrating that the distinctive velocity profile of telic predicates is unaffected by Phrase Final Lengthening in either language.
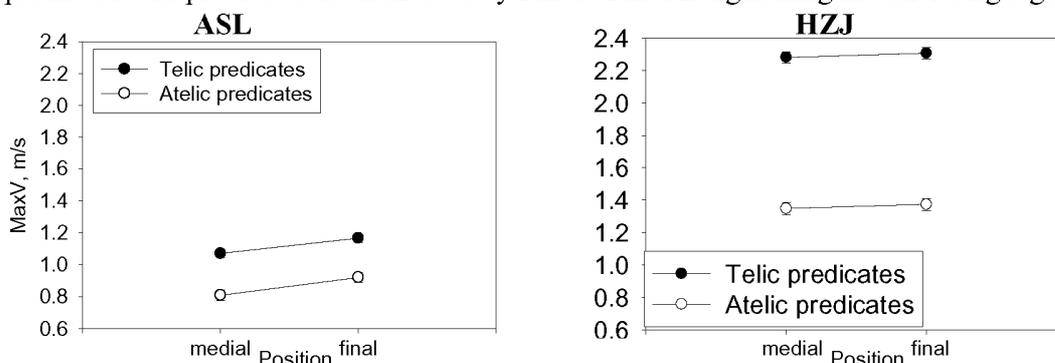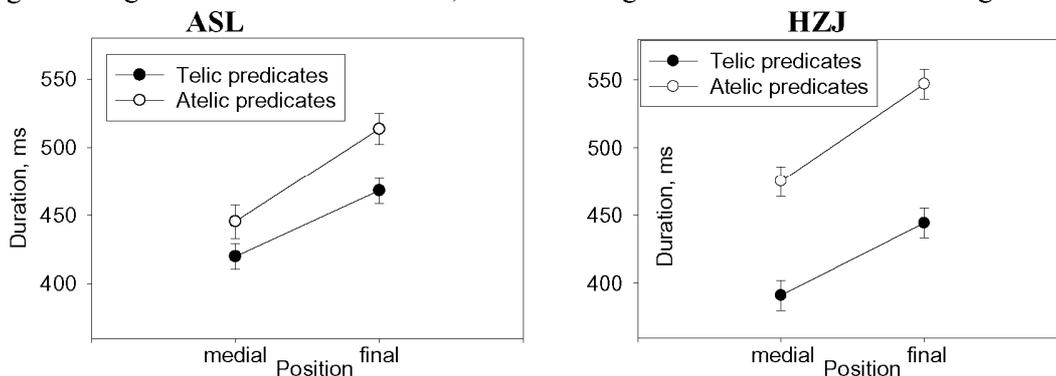
Figure 2. Sign duration in ASL and HZJ, demonstrating the effect of Phrase Final lengthening.

POSTERS

Fossils of language: What if we were looking in the wrong places?

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The traditional approach of mainstream Evolutionary Linguistics (EL) rests on the assumption that any successful attempt at explaining the origins of language must pay special attention to communication. Thus, many works in this area may be characterized on the basis of how they tackle what is taken to be one of the main issues in EL, namely, the alleged discontinuity between human language qua communication system and the other systems of animal communication (Chomsky, 1968; Bickerton, 1990). Accordingly, research on the linguistic capabilities of our ancestors, for example, has concentrated on the analysis of those anatomical structures which are most directly connected with communication, such as the organs of speech and hearing. It is our contention in this paper that all these assumptions are misguided and that research on the evolutionary origins of our linguistic capabilities will benefit from a radical shift of focus. Something along these lines was already attempted by Hauser, Chomsky and Fitch (Hauser *et al.*, 2002), but, in our opinion, this paper failed to drop communication from the evolutionary equation.

We propose here a reassessment of the existing 'fossils' more or less directly associated with language by putting special emphasis on computational aspects rather that on communicative ones. We will deal with three kinds of evidence. **(i)** Fossil evidence of conceptual systems. Evidence in this area is hardly compatible with the existence of language in other hominids, even in *H. neanderthalensis*. This not only concerns conventional archaeological evidence of symbolic behaviour (complex symbolic practices seem impossible in the absence of a complex language), but also the technological record, which suggests that only prehistorical techno-complexes related to modern humans (i.e *Homo sapiens*) are non-static. **(ii)** Other (i.e. not usually analysed) fossil evidence concerning computational capacities at the core of the FL, such as knot tying (Piatelli-Palmarini and Uriagereka, 2005; Camps and Uriagereka, 2006), also wanting in species other than *H. sapiens*. **(iii)** Paleoneurological evidence. The increase in brain size during human evolution, traditionally regarded as secondary, appears to be more conclusive in this respect than it was previously assumed.

We contend that, form the standpoint of the Chomsky Hierarchy (Chomsky 1956; 1959), fossil evidence of the second group suggests the presence of context sensitive computational

regimes (type 1). As such regimes demand more computational power than types 2 or 3, fossil evidence in this group, but also in groups i and iii, can plausibly be interpreted as indicative of the evolution of the sophisticated working memory required by such systems (Uriagereka, 2008). We argue that such an enhanced working memory component is a recent evolutionary innovation that emerged at a critical point in the process of cortical growth observed in the evolution of humans (Balari and Lorenzo, 2008; 2009a). Furthermore, as brains tend to auto-organize as a result of variation in size (Striedter, 2005), the mutual invasion of areas and nuclei of activity as these acquired larger proportions (Deacon, 1990) gave place to new internal communication pathways between sensorimotor specialized areas and those areas devoted to conceptualization and intention fixation (Balari and Lorenzo, 2008; 2009a; 2009b).

We will support this hypothesis by considering available evolutionary information on different genes involved in the regulation of neuronal proliferation (but also neuronal differentiation, migration and interconnection) which have been positively selected in the human clade. We will hypothesize that such mutations could have given rise to the aforementioned increase in brain size, but also contributed to a reconfiguration of certain circuits (plausibly those connecting the basal ganglia with different regions of the cortex), which have made possible the emergence of language (along with the reorganizational processes which accompanied brain growth). As a corollary we will also conclude that any productive analysis of the evolution of the (biological substrate of the) FL should be crucially grounded on deep homology analyses, since the different components of the FL (although not some of their individual evolutionary developments and their interconnections) can exhaustively be traced in different species (not always closely related to human beings and in unexpected domains of behaviour).

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"Language genes": they exist and we have them, but what do we really use them for?

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This poster will try to critically reassess the actual significance (and relevance) that genes currently identified from different conditions in which language impairment is a prominent (or purportedly exclusive) symptom have for a biological characterization of the nature and the development of the Faculty of Language (henceforth, FL).

With this purpose, the poster will examine the following key topics: (i) technical concerns (and shortcomings) regarding the way in which these genes are routinely identified and characterised, including a) the precise nature of the phenotypes these analyses (should) start from (discussing, in particular, if only specific language impairments should be considered at this stage, but even if such disorders actually exist), and b) the real scope of the molecular tools conventionally used for achieving such enterprise (discussing, in particular, the genuine compass of cloning strategies, functional analyses of cloned genes, and animal models of the disorders); (ii) main structural and functional properties of genes currently related to language, which will be tentatively characterised (and classified) attending to (a) the biochemical nature (both structural and functional) of the products they encode; and (b) the physiological role played by these products; and (iii) noteworthy (and apparently paradoxical) conclusions derived from the analysis of the genotype-phenotype correlations established to date in people affected by different (specific) language impairments and disorders, which on the whole seem to exclude an univocal (and causal) link between particular mutations and particular phenotypes.

The poster will progress by further characterising the genuine contribution of genes to the ontogenetic development of the "language organ", which will be summarised as follows: (i) genes do not determine language per se, but just allow the synthesis of particular biochemical products which contribute to certain physiological functions; (ii) ordinarily, each gene plays different roles in diverse moments and places during ontogeny (pleiotropy); (iii) many genes

contribute (each to a different extent) to the development and functioning of the neural substrate of the FL (polygenism); (iv) the relevance of the particular roles played by each of the involved genes is clearly surpassed by the effect due to the precise balance kept, in a particular moment and place, by the different biochemical products these genes encode; (v) gene activity (and the activity of the products encoded by them) is necessarily and decisively conditioned by the molecular and the ontogenetic contexts, by all the elements and factors that conform the remaining levels of biological complexity that characterize the FL (molecules, organelles, cells, tissues, and brain circuits, areas, structures and macrostructures), and also by the (linguistic) environment in which development takes place; and (vi) the final phenotype (functional, afunctional or dysfunctional) always arises as the result of a nonlineal interaction among the diverse (genetic, epigenetic, ontogenetic, maternal, environmental) factors involved. A major conclusion of the poster will be that characterising (and understanding) language in genetic terms fundamentally means precisely to dissect the particular ways in which the involved genes interact thus contributing to regulate the development (and to some extent, the functioning) of certain neural structures in order to allow them to compute the tasks implicated in language processing. Hence, this endeavour cannot properly be equated anymore to the finding of genes exclusively related to linguistic competence (though maybe there are some). In fact, the circumstance that most of these "language genes" are substantially shared with other cognitive capacities (and even with other species) is entirely compatible with the biological idiosyncrasy and the functional specificity of the FL.

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On the so-called post-syntactic compounds in Japanese

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Shibatani and Kageyama (1988) and different individual works of theirs (namely Kageyama1982, 2009 and Shibatani 1990 among others) claim that there are three different types of compounds in Japanese (1-3) formed in three different domains. We will critically evaluate whether this tripartite modular approach to morphology is an absolute need for grammar. Shibatani and Kageyama (1988) (hereinafter SK) points out a couple of peculiarities of P(ostsyntactic) C(ompound) but none in our view undoubtedly justifies their claim that PCs must be formed in phonology after all syntactic operations are over. For example SK argues that PCs (459) "exhibit a completely different pitch pattern, with the inherent pitch patterns of the individual members kept intact and a slight pause put after the first member." and that (460) "their pitch patterns are exactly the same as those of their corresponding phrasal counterparts from which they derive." In our view, the phonology of a language imposes certain limits on how many syllables (or moras) one pitch unit can contain in that language. If any linguistic construct, be a phrase or a word, exceeds that limit in number of syllables (or moras), one or several slight pauses are introduced automatically in the prosody of that construct. SK also claims that unlike other compounds PCs (4) can bypass the Anaphoric Island Constraint. However, examples like (5) point to the fact that this constraint is randomly violated. On the other hand, there are also PCs (6) which cannot violate the constraint. We claim, following Ford et al. (1997), that PCs can be handled in morphology with W(ord) F(ormation) S(trategies). Each WFS (7) is licensed by a set of pairs of words based on i) the same formal contrast, ii) semantic relatedness and iii) categorical affiliation. For example, if a lexicon of Japanese contains nouns that end in go*ryokoo* and also nouns that lack that sequence they will form pairs and these pairs may license (7). The noun *Yooroppagoryokoo* 'travel by an honorable person in Europe' can be obtained by mapping another noun Yoroppa onto this WFS. The sequence go*ryokoo* in these words is isophonic with the regular word go*ryoko* 'honorable travel' but such isophonicity is generally lost during grammaticalization. In some other models, go*ryoko* can be considered as a (becoming) suffix,

and as we know, affixes generally originate from full words. Constructions that SK describes as PCs exist also in other languages. For example, the Bengali word *Amerikabhromonkalin* 'during the America-tour' has a structure which is quite similar to PCs and such words can be formed with (8). According to Downing (1977:824) any attempt to characterize compounds as derived from a limited set syntactic structures "can only be misguided. A paraphrase relationship need not imply a derivational one." Fradin (2005:178) too convincingly argues, on semantic grounds, why mere combining of lexemes "does not result in a syntactic structure". The particular status that SK attributes to PCs is hard to justify and we claim that any word in any language can be satisfactorily handled in morphology (which can be a sub-module of syntax). This implies that SK's tripartite modular view of word formation is not indispensable. We also note that the kind of morphology Ford et al. (1997) proposes does not need to be part of some 'innate grammar' if by this term we mean, as Singh (2001:364) puts it, "knowledge constructed with the help of principles unique to language-faculty." In his view, "General cognition seems sufficient to extract whatever morphology can be justifiably extracted from given lexica."

1. **Lexical compounds:** *yama-nobori* (mountain-climbing) 'mountain-climbing', *denki-kaisha* (electric-company) 'electric company'
2. **Syntactic Compounds:** *yomi-hazimeru* (read-begin) 'begin to read', *yom-aseru* (read-causative) 'cause to read', *yom-areru* (read-passive) 'to be read'
3. **Postsyntactic Compounds:** *Yooroppa:ryokoo-tyuu* (Europe-tour-middle) 'in the middle of the tour in Europe', *zikken:syuuryoo-go* (experiment-finish-after) 'after finishing the exam'
4. Taroo wa senzitu [tyuukosya$_i$:hanbai] no sai ni sorera$_i$ no itidai o kowasite simatta
(Taro-Top-the other day-used car$_i$-sell-Gen-occasion-on-them$_i$-Gen-one car-Acc-damage-ended up)
"the other day, on the occasion of selling used cars, Taro ended up damaging one of them."
5. [Bush$_i$ supporters] still believe that he$_i$ was a brilliant guy.
6. *Ueda-sensei ga [Yooroppa$_i$:ryokoo] tyuu sore$_i$ wa samukatta
(Ueda-Professor-Nom-Europe$_i$-travel-middle-that$_i$-Top-cold Past)
'During Professor Ueda's Europe visit, it was cold in that continent'
7. /X/$_{N, place}$ ↔ /Xgoryokoo/$_N$ 'travel by an honorable person in /X/'
Pari 'Paris' ↔ Parigoryokoo 'travel by an honorable person in Paris'
Amerika 'USA' ↔ Amerikagoryooko 'travel by an honorable person in America'
8. /X/$_N$ ↔ /Xkalin/$_N$ 'during /X/'
Iorop-bhromon 'Europe-trip' ↔ Iorop-bhromon-kalin 'during the Europe-tour'
bas-bhromon 'journey by bus' ↔ bas-bhromon-kalin 'during the journey by bus'

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Constraints on sideward movement
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Minimalist considerations favor a conception of Move as the compound operation Copy+Merge. Given this conception, the existence of sideward movement – movement between separate derivational workspaces – follows immediately unless some stipulation is made to the contrary.

Sideward movement has been exploited in analyses of control, head movement, parasitic gaps, and several other constructions (Nunes 1995; Bobaljik & Brown 1997; Uriagereka 1998; Hornstein 2001, 2009); but despite its evident utility, there is concern that sideward movement may lead to massive overgeneration. In response to these concerns, I will argue that a particular formulation of Merge Over Move ("MOM", Chomsky 2001) acts as an effective constraint. Certain auxiliary assumptions are required. Amongst these: (i) that the syntax is blind to selectional restrictions; and (ii) that competition amongst derivations is predicated solely on identity of starting numeration. (1a) exemplifies the kind of overgeneration that must be prevented. On the face of it, there may appear to be a licit derivation of (1a): the one shown in (1b). However, stage 2 of (1b) violates MOM, since gamblers moves to become the object of meet even though people remains in the numeration and could be merged instead. Thus, the derivation in (1b) is blocked because the derivation in (2b) is licit. In such cases, it is crucial that there be a convergent MOM-consistent alternative derivation. MOM is a defeasible economy condition, and may be violated if it is otherwise impossible to converge from a given numeration. To show that a derivation such as (1b) is blocked by MOM, it is therefore necessary to exhibit a convergent derivation consistent with MOM from the same numeration. Crucially – as is clear from a comparison of (1) and (2) – this convergent derivation may have a different interpretation (assumption (ii) above). I argue, based on the further investigation of pairs such as (1) and (2), that MOM derives an "almost-c-command" requirement on movement. Thus, somewhat counterintuitively, the combination of sideward movement and MOM yields a constraint on movement nearly as strict as the proper binding condition. The derivation of almost-c-command is an encouraging result, since while it is well known that almost-c-command is in some respects a more empirically adequate constraint than c-command (e.g. for variable binding, see (3)), no principled derivation of this constraint has previously been given. A "chicken or egg" question now arises: does the syntax conspire to enforce an almost-c-command constraint in order to meet an interface output condition, or is the interface sensitive to this relation because it happens to be one of those the provided by the syntax? I argue for the first option: there is an antecedently present notion of scope at LF that constrains the output of the syntax. This is supported by the existence of seemingly scopal phenomena which, though regulated by almost-c-command, presumably cannot involve movement (see e.g. (4), from Bolinger (1967), and the NPI data in (5)). It seems that MOM derives almost-c-command only if selectional restrictions are not enforced in the narrow syntax. Otherwise, the ungrammatical (6a) could not be blocked by (6b) under MOM, since (6b) would be ungrammatical (as opposed to merely unacceptable/semantically deviant) and hence could not compete with (6a) for the purposes of MOM. By investigating further examples of this sort, I attempt to determine the precise distribution of labor between the narrow syntax and the interfaces that is necessary to derive the almost c-command condition on movement. In this way, the problem of constraining sideward movement is tied to the broader problem of delimiting the narrow syntax and the interfaces.

(1a)   *[People who meet gamblers$_1$] want t_1 to win.
(1b)   Stage 1:   [want gamblers to win] *Workspace 1*
        Stage 2:   [want ~~gamblers~~ to win] *Workspace 1*
                    [meet gamblers] *Workspace 2*
        Stage 3:   [want ~~gamblers~~ to win] *Workspace 1*
                    [people who meet gamblers] *Workspace 2*
        Stage 4:   [[people who meet gamblers] want ~~gamblers~~ to win]
(2a)   [Gamblers who meet people]1 want $t1$ to win.
(2b)   Stage 1:   [want gamblers to win] *Workspace 1*
        Stage 2:   [want gamblers to win] *Workspace 1*
                    [meet people] *Workspace 2*
        Stage 3:   [want ~~gamblers~~ to win] *Workspace 1*
                    [gamblers [who meet people]] *Workspace 2*
        Stage 4:   [[[gamblers [who meet people]] want ~~gamblers~~ to win]
(3a)   No-one$_1$'s mother loves him$_1$.

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(3b)   *The mother of no-one$_1$ loves him$_1$.
        (Antecedent too deeply embedded; binding impossible.)
(4a)   An occasional sailor danced. *(Has a reading: "Occasionally, a sailor danced.")*
(4b)   A friend of an occasional sailor danced. *("*Occasionally, a friend of a sailor danced.")*
(5a)   No-one's mother has any time for John.
        ("Almost-c-command" obtains; NPI licensing possible.)
(5b)   *The mother of no-one has any time for John.
        (Licenser too deeply embedded; NPI licensing impossible.)
(6a)   *[The man that dispersed [the swarm of bees]$_1$]$_2$ wants t_1 to leave.
(6b)   [The swarm of bees that dispersed [the man]$_1$]$_2$ wants t_2 to leave.

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The patterns of associating sounds with meanings: the case of telicity
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This study concerns with how in the grammar, three types of linguistic atoms, phonological contents (π), syntactic categories (κ), and semantic contents (Σ), are associated with each other. THE EMPIRICAL CLAIM: I start by focusing on how a semantic content, telicity which denotes an inherent endpoint of an eventuality, empirically associates with phonological contents of the verb. I claim that languages vary in either (i) that there are phonological contents dedicated for telicity or (ii) that there are no phonological contents dedicated for telicity. Slavic and Germanic fall into pattern (i), as shown in (1) and (2). In these languages, the morphology of verb formation is simplex while the phonological contents of the verb are a string of segments. Hebrew and Japanese fall into pattern (ii), as shown in (3) and (4). In these languages, the phonological content for telicity is the quality of vowel while the consonantal part behaves as the verbal root. Thus, the morphology of verb formation is complex. In particular, the quality of vowel combines with the consonantal part in a non-concatenative way and they derive the verb stem with a string of segments. The properties of these two patterns are summarized in (5).

THE ANALYTICAL CLAIM: Based on the properties, I provide a syntactic analysis for the two patterns above, within a single engine model of the grammar in which word formation rules and phrase structure rules are all implemented in syntax (e.g. Chomsky 1995). I claim that how π associates with κ and Σ generates the two patterns. (i) A phonological content associates with multiple syntactic categories and their semantic contents (i.e., one-to-many association of π with κ and Σ). This is represented in (6a). One-to-many association of π with κ and Σ requires a string of segments for π of the verb stem. This is because the number of the linguistic atoms is restricted (e.g. the number of segments in a language) while the number of combinations of multiple syntactic categories and their semantic contents is large. (ii) A phonological content associates with a syntactic category and its semantic content (i.e., one-to-one association of π with κ and Σ). This is temporarily represented in (6b). One-to-one association of π with κ and Σ does not require a string of segments for π of telicity, given that the number of semantic contents of a syntactic category is restricted. Assume that the syntactic categories of the verbal domain contain V, Aspect which is the category for telicity, and v which introduces Cause, as in (7). Then, the original Japanese data further support the claim. First, the one-to-one association of π with κ and Σ holds not only in transitive verb stems but also in unaccusative intransitive verb stems which lack v (cf. Miyagawa 1989). Second, if the quality of vowel does not associate with Aspect, the telicity value is vague. This is demonstrated in denominal verbs in
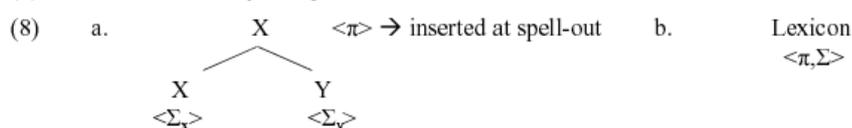
which the quality of vowel is part of the noun (cf. Muraki 1991). If the present claim is correct, the claim sheds light on the assumption that below v, the association of π with κ and Σ is universally in a one-to-many manner (i.e., opaque) due to an independent constraint (cf. Ramchand 2008).

CONCLUSION: I conclude with further inquiry into what governs the two patterns. I claim that the two patterns are attributed to the locus of the association of π with κ and Σ in the grammar. The one-to-many association of π with κ and Σ takes place after spell-out (i.e., late association <<κ,Σ>,π>), as represented in (8a). The late association <<κ,Σ>,π> is inevitable for the one-to-many association of π with κ and Σ, given the single engine model (cf. (6a)). Meanwhile, the one-to-one association of π with κ and Σ takes place before syntactic processing (contra Halle & Marantz 1993). In particular, π associates with Σ in the lexicon before associating with κ (i.e., early association <<π,Σ>,κ>), as in (8b). The early π-Σ association predicts that the π-Σ association is used across syntactic categories. This prediction looks promising in Japanese. First, the quality of vowel associates with syntactic categories and their semantic contents both in the verbal domain and in the nominal domain, as shown in (9). Second, the vowel /a/ specifies the default semantic value of each category while the rest of the vowels specify the marked values.

(1) SLAVIC (Russian)

[TELIC] verb	Gloss	[ATELIC] verb	Gloss
dat'	'give'	znat'	'know'
kupit'	'buy'	pisat'	'write'
sest'	'sit down'	kričat'	'shout' (Smith 1991)

(2) GERMANIC (English)

[TELIC] verb		[ATELIC] verb	
recognize	paint	know	run
lose	draw	desire	push
research	build	understand	drive (Rothstein 2004)

(3) SEMITIC (Arabic)

[TELIC] verb	Gloss	[ATELIC] verb	Gloss
ḍaraba	'hit'	karuma	'be noble'
ʔakala	'eat'	kasuda	'be stagnant'
kataba	'write'	fahima	'understand'
qaraʔa	'read'	kariha	'hate' (Bahloul 1994)

(4) JAPANESE

Syllable structure	[TELIC] verb	Gloss	[ATELIC] verb	Gloss
V	e-ta	'get'	i-ta	'exist (animate)'
VC	ut-ta	'hit'	ot-ta	'chase'
CVC	ket-ta	'kick'	kit-ta	'cut'
CVC	kut-ta	'eat'	kot-ta	'be stiff'

(5)	π encodes telicity	π of telicity	Morphology of the verb stem	π of the verb stem
Pattern (i)	no	n/a	simplex	a string of segments
Pattern (ii)	yes	quality of vowel	complex (non-concatenative)	a string of segments

(6) a.
```
            X
          /   \
        X       Y
      <Σx>     <Σy>
          <π>
```
b.
```
            X
          /   \
        X       Y
    <πx,Σx>   <πy,Σy>
```

(7) ....vP[Cause AspP[Aspect vP[V]]]

(8) a.
```
        X      <π> → inserted at spell-out
      /   \
    X       Y
  <Σx>     <Σy>
```
b.   Lexicon
          <π,Σ>

(9) VOWEL	ASPECT	v (CAUSE)	TENSE	(MODAL)	DEMONSTRATIVE
/e/	TELIC	CAUSATIVE		IMPERATIVE	
/u/	TELIC		NONPAST	ATTRIBUTIVE	
/i/	ATELIC			ADVERBIAL	
/o/	ATELIC			COHORTATIVE	APPROXIMATE
/a/	TELIC/ ATELIC	DECAUSATIVE	cf. /ta/-PAST	IRRIALIS	DISTAL

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Concealed reference-set computation or how syntax escapes the parser's clutches

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Aim A core assumption of the biolinguistic program is that all properties of language beyond recursion can be motivated by requirements imposed by other cognitive modules (Chomsky, 2005, Hauser, Chomsky and Fitch, 2002). One component in this setup is the parser, which is thought to give rise to a preference for computational parsimony. I provide a mathematical result on reference-set computation (Fox, 2000, Heim, 1998, Jacobson, 1997, Reinhart, 2006, Shoichi and Fox, 2005), an (allegedly) non-parsimonious piece of machinery, that challenges this assumption and suggests that syntax can sometimes "trick" the parser in order to escape its demands. This gives rise to a reconceptualization of language in which syntax, somewhat paradoxically, does not necessarily have to obey interface requirements yet must not violate them, either.

Formal Result I demonstrate that Fewest Steps, a transderivational constraint (TC) introduced in Chomsky (1995), can be faithfully modeled by *rational relations* (the relational counterpart of regular languages; see Comon et al, 2008, Gécseg and Steinby, 1984, Hopcroft and Ullman 1979) in a very natural way using *finite-state optimality systems* (OSs; Frank and Satta, 1998), which can be viewed as a considerably weaker version of OT grammars. The interest in rational relations stems from the fact that these relations, when applied to a language L generated by a Minimalist grammar (MG), yield an output language of the same complexity as L (Kepser and Mönnich, 2006, Wartena, 2000]. That is to say, for every MG G_i using only TCs that can be modelled by rational relations, there is an MG G_j without any TCs that derives the same language as G_i. Notably, G_j preserves the non-transderivational part of G_i without changes.

Fewest Steps can be defined by a rational relation if the corresponding OS satisfies three properties: 1. GE N is a rational relation. 2. All constraints are rational relations. 3. The OS is *globally optimal* (Jäger, 2002). As noted in Sternefeld, 1996, most TCs, including Fewest Steps, rely on identity of numerations or identity at LF as conditions for computing the reference-sets. As a consequence, reference-sets do not overlap and GE N is an equivalence relation. A short proof by contradiction suffices to show that in this special case, an OS is globally optimal if the set of optimal outputs is the same for all trees in the same RS, which clearly holds for Fewest Steps. Condition 2 is also easily verified by exhibiting a rational relation that will derive all suboptimal outputs from the optimal outputs (i.e. produce trees with additional traces from the tree containing the fewest number of traces). Ensuring that GE N is well-behaved in the relevant way is slightly more involved, due to the lack of precise definitions of the identity condition on numerations and LFs. We examine several conceivable interpretations and conclude that at least some of them can be implemented by rational relations.

Consequences Due to its global nature, Fewest Steps is usually deemed too complex an operation to be in accord with the demands of the parser. While this may be true, it no longer implies that Fewest Steps cannot form an integral part of syntax, thanks to the result described above: if it is possible to find for every MG G_i employing this constraint an equivalent MG G_j without reference-set computation, then syntax may happily use G_i while the parser operates on G_j . Thus, this kind of *concealed reference-set computation* is allowed to persist in syntax despite opposing interface requirements. More complex transderivational constraints, however, are still ruled out due to the lack of non-transderivational alternatives. Therefore, interface requirements maintain a tight grip on syntax after all, but it may not be as tight as commonly conjectured. I speculate that this change in perspective could be used to devise new explanations for empirical phenomena like crosslinguistic variation in Principle B delay (Baauw, 2000, Baauw and Cuetos, 2003, Di Sciullo and Aguero-Bautista, 2008]. Under the Rule I

account of Grodzinsky and Reinhart (1993), the acquisition of Principle B depends purely on cognitive maturation and thus is expected to be uniform across all languages. The difficulty of finding a non-transderivational equivalent of Rule I, on the other hand, may vary depending on the grammar that is supplemented by Rule I. Thus, if Principle B is mastered by finding a correspondent of Rule I rather than gathering all the cognitive resources required for reference-set computation, differences in acquisition speed are unsurprising. Independent results from the cognitive modelling literature might lend further support to this conjecture (Hendriks, van Rijn and Valkenier, 2007). Pursuing this line of analysis, we might eventually be able to provide an answer to the most basic question about concealed reference-set computation: Why should it be a part of syntax to begin with?

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Syntactic effects of conjunctivist interpretation
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In this paper I will review the "Conjunctivist" version of neo-Davidsonian semantics (Pietroski, 2005) and show that some of the distinctive syntactic properties of maximal projections and adjuncts can be derived from it. The crucial property of Conjunctivism is the fact that the smallest unit of interpretation containing any head will necessarily also include all of its arguments, because the arguments' *relative* positions are semantically significant; this imposes constraints on the ways in which interpretation can occur throughout the derivation, i.e. the points at which a spellout operation can apply. When this constrained incremental interpretation is expressed in a variant of the formalism in Stabler (2006), some otherwise unexplained distinctions between intermediate and maximal projections, and between arguments and adjuncts, emerge naturally.

The puzzle I begin with is that while the clefting operation in (2), for example, appears to apply only to maximal projections of V, when an adjunct is added it can be either included or not included in the targeted constituent (while lower projections of V remain inaccessible), as shown in (3). Adjuncts seem to "maintain the maximality" of the constituent they adjoin to. This was encoded as in (4) in early versions of X′ theory; but capturing this under Bare Phrase Structure, where bar-levels are purely relational notions, is extremely problematic.

These facts are made to follow from the distinct semantic properties of arguments and adjuncts on neo-Davidsonian theories. The Conjunctivist view emphasises that the choice of which thematic relation is used to connect an argument's referent to the event depends on the *structural* relation that the argument bears to the verb: 'Arthur' denotes the agent precisely because it is the *external* argument, and 'the rabbit' denotes the theme precisely because it is the *internal* argument. The standard neo-Davidsonian predicate in (5) can be re-expressed as in (6) to better convey the spirit of the Conjunctivist proposal, with the emphasis on structural relations and the idea that they trigger a kind of type-shifting of entities like `a` into conjoinable predicates of events like `ext(a)`.

It is this significance of structural relations that constrains the points in the derivation at which spellout can be applied. Whereas incremental interpretation at *every* intermediate point in a bottom-up derivation achieves the desired result on a more standard function-application based approach, such frequent interpretation gives the wrong result if the Conjunctivist theory is adopted. Since the object to interpret immediately after combining 'Arthur' has exactly the same structure as the one immediately after combining 'the rabbit', 'Arthur' appears to be the *internal* argument of the atomic object with semantic value `killing & int(r)`. In order for 'Arthur' to be understood as the *external* argument, we need to avoid interpretation at the intermediate point, delaying it instead until both arguments have been added. Once 'killed' has

combined with all its arguments, we *can* interpret what we have and discard all existing structure; i.e. phases are all and only maximal projections. In this respect maximal projections form a natural unit of interpretation on the Conjunctivist theory — we must wait until maximal projections are complete in order for the syntactic structure to establish the asymmetries between arguments that lexical semantic values do not express — and in the formalism we adapt from Stabler (2006) it follows from this that maximal projections, and not intermediate projections, should be targets for movement. No such asymmetries are necessary, however, for the correct neo-Davidsonian interpretation of adjuncts, so the points at which spellout can apply are less restricted in the case of adjuncts; this predicts a wider range of possible targets for movement when adjuncts are present. This prediction is borne out by the facts in (3): greater freedom in the choice of where to apply spellout gives rise to greater freedom in the choice of what can be treated as a maximal projection of V. Thus the particular way in which Conjunctivist semantics fails to be (in general) "directly compositional" (Barker and Jacobson, 2007) turns out to be a virtue.

(1)   Arthur killed the rabbit yesterday.
(2)a. What Arthur did was [$_{VP}$ kill the rabbit].
   b. *What Arthur did the rabbit was [$_V$ kill].
(3)a. What Arthur did yesterday was [$_{VP}$ kill the rabbit].
   b. What Arthur did was [$_{VP}$ kill the rabbit yesterday].
   c. *What Arthur did the rabbit yesterday was [$_V$ kill].
(4)   [$_{VP}$ [$_{VP}$ kill the rabbit] yesterday]
(5)   λe:killing(*e*) ∧ Agent(*e*; a) ∧ Theme(*e*; r) ∧ yesterday(*e*)
(6)   killing & ext(a) & int(r) & yesterday

(7)

(8)

(9)

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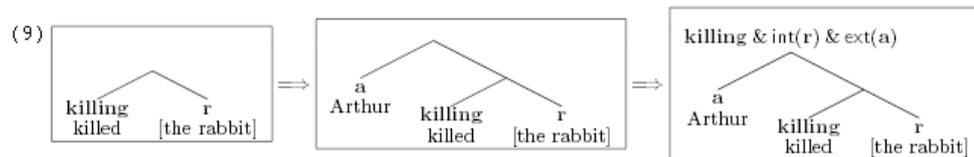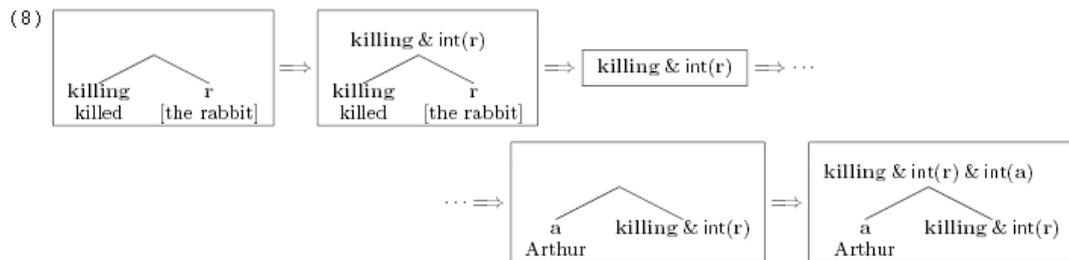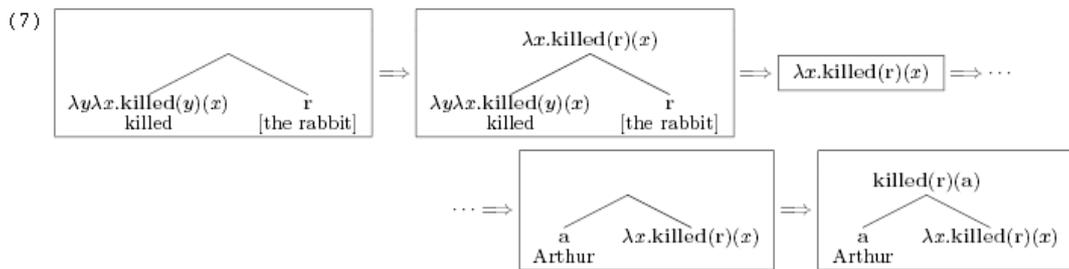
Explaining variation in resultative secondary predicates

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Introduction. Resultative secondary predicates (RES-SP) are a well-known locus of cross-linguistic variation. For example, many (families of) languages lack RES-SP of the English type italicized in (1), where the RES-SP is predicated of the internal argument *the metal*.

> (1) ENGLISH RESULTATIVE SECONDARY PREDICATE
> John pounded the metal *flat*. (John pounded the metal until it became flat)

On the other hand, languages like Chinese are more permissible than English in that they allow RES-SP which can be hosted by external arguments:

> (2) CHINESE RESULTATIVE SECONDARY PREDICATE
> Zhangsan pao-le de henlei.
> Zhangsan laugh-PRF. RES. (= get) tired.
> 'Zhangsan laughed tired.' (Zhangsan laughed till he got tired)

An explicit account of how these empirical facts are to be explaine still proves hard to formulate (Kratzer 2006, Zubizaretta & Oh 2008, Mateu & Rigau 2002, Folli 2001, a.o.) By examining first a less studied construction with resultative-like semantics in Romanian (Romance), and secondly, the Chinese and the English pattern, this paper argues for a new typology of RES-SP. They are analyzed as forming complex predicates which assign a thematic role compositionally, and in which the two sub-eventualities (V + ADJ/N) are combined via the contribution of functional projections (PATH+IN, or IN). What makes the distinction cross-linguistically is, first, the position where these functional projections attach (similarly to Di Sciullo & Williams 1987, Pylkkänen 2008). Following Marantz (1997), it is also assumed that verbal categories are composed of a root (√) which combines with a verbalizing functional projection (*v*). This paper will provide evidence that there are resultatives which attach to the root. The complications are seen with resultatives attached higher than the root, at *v* level, and at a level higher than *v*, called here *v*EXT, a position where information about external arguments can be computed. The hypothesis is that in some languages, among which Romance, the *v* head is ore complex (following and developing on Talmy 1985). Besides introducing the verbalizing semantics, it might also contain, "bundled" (Pylkkänen 2008, Iatridou 1990) or "via conflation" (Mateu & Rigau 2002), the information of the PATH functional projection. Languages select out of the inventory of functional projections either the conflated or the non-conflated variant. Another claim made is that those Chinese RES-SPs , which are possible with unergative verbs, are construed by the merger of the resultative functional projection at the v_{EXT} level.

1. Resultatives in Romanian (Romance). Although adjectival resultatives of the type illustrated in (1) are not robust/possible in Romance, it is not the case that RES semantics is completely absent from these languages. The attention is focused in this paper on a less studied RES-SP construction, illustrated here with the examples in (3) from Romanian (Romance). In these examples the idiomatic resultative semantics is obtained by the addition of a noun in its default form, characterized by the absence of the gender and number (en/pro)clitic inflection:

> (3) ROMANIAN RESULTATIVE SECONDARY PREDICATES: NOUNS
> a). a   bate măr.   b). a   răci   cobză
>   to beat apple   to   catch cold violin
>   LIT.'to beat apple'   LIT. 'to catch a cold violin'
>   (till it becomes   (to catch a cold till the voice
>   an apple , i.e. soft)   becomes like a violin)

The puzzling constructions in (3) have not been the object of intense research. Semantically, they might appear to be similar to "degree words" or "intensifiers"; but what drastically distinguishes them from the latter is syntax: they can appear only post-verbally (like other SPs,

ex. depictives), them from the latter is syntax: they can appear only post-verbally (like other SPs, ex. depictives), while "degree words" are possible only pre-verbally in Romanian:

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(4) ROMANIAN: DEGREE WORDS VS. NOUN RESULTATIVES
a). DEGREE WORDS              b). NOUN RESULTATIVES
    a   mai   munci (*mai)       a(*lună) curăţa lună.
    to  more  work              to              clean      moon.
('spotless')
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In this paper the examples in (3) are analyzed as resultatives added to the root, having the structure in (5). The further evidence for this assumption is that such noun RES-SP are preserved cross-categorically (6). That is, as long as they do not take any type of (enclitic) inflection (7), they are possible with eventive nouns or adjectives. As resultatives express a change of state (see Rothstein 1985, Tenny 1994), they are impossible with purely stative elements (like the stative nominalization of *get cold*, in 6).

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(5) NOUN RESULTATIVES ADDED TO THE ROOT
[…. √ [FP PATH FPATH [FP IN FIN NP]]]
(6) NOUN RESULTATIVES ATTACHED TO EVENTIVE NOUNS/ADJECTIVES
curăţenie                 lună/bătut măr/   *răceală
cobză
the  action  of cleaning.-N.F.SG.   moon/beaten-ADJ.M.SG.   apple/ *cold-F.SG.STAT.
violin
(7) NOUN RESULTATIVES: ONLY THE DEFAULT FORM IS POSSIBLE
a bate măr/*a bate mărul/*a bate un măr/*a bate mere/*a bate merele
to beat apple/*to beat apple-THE.M.SG./*to beat an apple/*to beat apple-PL./*to beat apple-
PL.THE
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2. Explaining variation. Similar types of resultatives are seen in other "non-resultative" languages. Crucially, the observation that such resultatives are possible only in the default form does not necessarily provide support to analyses in which resultative semantics results from a process of "serialization", which blocks the presence of inflectional morphology on the secondary predicate (Kratzer 2006). According to such analyses, Romance adjectives require overt rich inflection, and therefore are not possible candidates for "serialization". The fact that adjectival inflection is not what blocks the formation of resultatives is demonstrated by languages like Icelandic, where adjectival resultatives of the type in (1) are possible, but always require overt inflectional morphology (as seen on *flat*, inflected for gender, number and Case):

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(8) ICELANDIC RESULTATIVES (Whelpton 2006)
Járnsmiðurinn      hamraði        málminn              flatan.
Blacksmith-the     hammer-PST.    metal- M.ACC.SG.     flat- M.ACC.SG.
'The blacksmith hammered the metal flat'.
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In order to explain the fact that Romance resultatives cannot attach higher than the root, it is assumed here that *v* heads can contain, besides the verbalizing information, the semantics of various motion-related functional projections, like the PATH (direction) component. Languages like Romance select for this complex *v* type (*v* + PATH), while English and Icelandic have "simple" *v* heads. This type of account is strengthened by typological investigations, like Talmy (1985). Interestingly, there are also languages like Chinese, where resultatives can be combined with unergatives, yielding examples like *He laughed tired* (He laughed till he got tired), which are impossible in English. In this paper, such resultatives are analyzed as resulting from the merger of the functional projections to a level higher than *v*, but still inside VP (Andrews 1982, a.o.). This projection is labeled here v_{EXT}, and it is assumed that in the construction of complex predicates, this is the level where information about external arguments can be computed in some languages (among which, Chinese).

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The acquisition of scalar implicatures

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This paper describes a modified replication study of Noveck's experiment (2001) on the scalar terms *must* and *might*. Noveck (2001) conducted an experiment on the acquisition of the scalar terms *must* and *might* as well as the quantifier *some*. He found that children use the semantic interpretation of the modal *might* more frequently than adults and accept *might* in situations where *must* would also be true. More recent studies on scalar terms such as numbers and the scales *some - all*, *finish - start* and *at least - at most* have been conducted (see Papafragou & Musolino, 2003; Chierchia et al., 2005; Noveck, 2005; Noveck et al., 2007a; Noveck & Sperber, 2007b). These papers also suggest that children interpret weak scalar terms differently than adults and apply scalar strengthening. To account for this behaviour, several hypotheses such as the Pragmatic Delay Hypothesis, the Reference-Set Hypothesis and the Innateness Hypothesis have been developed and discussed (for details see Noveck, 2001; Chierchia, 2005; Crain & Khlentzos, 2008). My study was conducted with 22 German speaking subjects between the age of five and ten. The children were confronted with a covered box as well as with two open ones and were told that the content of the covered box was the same as the one of either box I (content: A+B) or box II (content: B only). The subjects were then asked to evaluate several utterances concerning the content of the covered box. In general the results of this study are similar to Noveck's. However, I can prove (by analyzing the results in more detail) that even five-year-old children are able to calculate scalar implicatures (SI). These early SIs, which I call child-implicatures, are based on the fact that children understand the uttered statements as exhaustive descriptions. For example, younger children reject the statement *There must be A in the box* and accept the statement *There might be A in the box* more often than the older subjects not because they are unable to calculate SIs but because they consider the utterances as exhaustive descriptions of the content of the box. My data also provide evidence that even children at the very young age of five stick to the Conversational Principles. However, younger and older participants consider scalar strengthening at different points. Therefore my interpretation of these findings is that children exploit the Q-Principle before they are fully aware of the R-Principle (Horn, 1996). My general conclusion is that even five-year-old children are under certain circumstances able to calculate the expected adult-SI. However, they calculate child-implicatures more frequently than the kind of SI adults normally compute. Therefore, one cannot claim that implicatures are in general acquired late. It is important to differentiate between early and late implicatures.

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Phonological forms: from ferrets to fingers

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Recently, the biolinguistic research agenda has been characterized by increased emphasis on 'Third Factor' principles (Chomsky 2005), properties of "good design" that are not unique to language but pertain more generally to computational efficiency and learnability. This complements the dichotomy posed by Hauser, Chomsky, & Fitch's (2003) between the Faculty of Language, Narrow Sense (FLN) and the Faculty of Language, Broad Sense (FLB). The focus in recent work in this vein is largely on syntax; phonological representations and processes have been largely overlooked, a fact for which Hauser, Chomsky, & Fitch have been criticized (see Pinker & Jackendoff 2005). The purpose of my talk is, to situate phonology within this emerging picture of the language faculty, and specifically to investigate how much of

phonological operations/representations can be explained by properties of general cognition and the Sensory-Motor system. I refute Pinker & Jackendoff's (2005: 212) claim that "major characteristics of phonology are specific to language (or to language & music), [and] uniquely human," and their conclusion that "phonology represents a major counterexample to the recursion-only hypothesis."

My approach comes from two different angles: from behavioral and physiological studies on animal cognition, and from sign language phonology. I use these lines of evidence to converge on a conception of phonology as a highly abstract, modality independent computational system consisting of a few primitive operations, namely searching, copying, and concatenation, that are shared with narrow syntax and other cognitive domains.

The major focus of the talk will be on the origins of phonological objects, namely features and the larger units into which they are organized, on the evolutionary level as well as in the child language acquirer. Here I bring evidence from a review of animal studies (including analyses of birdsong structure, cortical recordings in ferrets, and) as well as multiple modalities of human language to bear on the issue of whether features, segments, and syllables are innate or emergent, and whether they are unique to human language. This investigation resolves two tension found in the current literature. First, according to Carstairs-McCarthy (1999), X'-structure is taken to have evolved from an onset-rime syllable structure, yet sign language and birdsong syllables (if they can truly be considered as such) show no such internal organization. Second, Mielke (2008) suggests that features are abstracted by infants from groups of segments that pattern together phonologically, while at the same time there is ample behavioral and growing physiological evidence that the mammalian auditory system has particular sensitivities that correspond to features (Kuhl & Miller 1975, Mesgarani et al. 2008, and many others). Taking these seemingly conflicting views into account reveals a core set of representations that are neither species-, domain-, nor modality-specific and can be manipulated by operations of the same description.

I conclude by bringing together sign language and animal data in another way, connecting the findings of Fehér et al. (2009), who found that zebra finch isolates—birds who were deprived of the proper tutoring from adults during development—evolved wild-type song over the course of 3-4 generations in an isolated community. Such rapid self-organization of structure in vocalizations suggests that a similar process could be operative in creating human phonological systems. I argue that this is exactly what is currently underway in Al-Sayyid Bedouin Sign Language (Aronoff et al. 2008).

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The syntax and semantics of compound sentences
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The way we generate/understand a sentence may be top down or bottom up. We see it in complement clauses and adverbial clauses in English and Japanese. A clause may yield a structural asymmetry. As pointed out by Hooper & Thompson (H&T 1973), complement clauses in (1) accept Root Transformation (RT), such as Left Dislocation (LD), and those in (2) reject it. The same can be true in Japanese. The MP explains these in the compositional manner, the clauses are composed from bottom to top, and those in (2) lack a higher projection which hosts LD (Emonds 2004, Haegeman 2004, 2006, Sawada and Larson 2004). However, the bottom up approach may not explain how: first, two LDs are not acceptable in English and Japanese; second, two 'defective' clauses can form a sentence. First, 2 LDs and 2 NP-*nara*s are blocked in English (in (3)) and Japanese (in (4)). NP-*nara* may be equivalent to LD in English, which introduces 'aboutness'. Second, H&T (1973) point out that the availability of RT

is associated with the interpretation: a clause interpreted as assertion accepts RT whereas it interpreted as presupposition rejects it (hence defective). According to H&T (1973), there are 4 combinations. A sentence is over all assertion, that is, when two presupposition clauses are combined, the clausal relation is assertion. Hence: **A**. [ASST **[MainPrep]**[SubPrep]], **B**. [ASST **[MAsst]**[SPrep]], **C**. [ASST **[MPrep]**[SAsst]], **D**. [ASST **[MAsst]**[SAsst]]. LD is possible in one of assertion clauses. In **A.** two defective (presupposition) clauses become assertion. To explain the combination, we could use the bottom up approach, Merge, however, **A**. violates the inclusiveness condition. Moreover, Merge cannot explain **C**: suppose the main is 'head', and when it is presupposition, it does not project as the label. Head should project as the label, but it fails in **C.** Alternatively, we could employ a structure in semantics, suggested by Partee (1991). Top-down /bottom-up is also an issue in semantics, as in the Projection Problem ((1a) and (2a)). The interpretation of complement clauses is determined, either in the compositional manner (Heim 1983, Partee 1995, etc.), or the anaphoric (binding) manner (Sandt 1992). Compositionality faces problems (Schiffer 1987, Higginbotham 2003, etc). The anaphoric approach also faces a problem, since all presuppositions are not anaphoric, as in (2a). To take the middle, we could employ Partee's (1991) tripartite structure: a complex sentence is divided into Operator, Restrictor (Res), and Nuclear Scope (NS). It does not represent the surface word order, nor c-command, among the three. The highest node (which determines the sentence property as a whole) dominates the three. The structure represents the interpretation of a sentence. Presupposition falls into Res, and assertion, into NS. The availability of LD can be inherited from the highest node to one clause in NS. This top down approach is not impossible in the MP, as in the feature inheritance in C-T (Chomsky 2004, 2007, 2008). As we have seen, we may need a non-configurational, but top down device, to explain the unavailability of 2 LDs, and compounding two defective clauses. Merge fails to explain compounding clauses in which the main clause is interpreted as presupposition.

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Merge as a minimax solution to the optimization problem of generativity

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The Strong Minimalist Thesis SMT maintains that the language faculty FL emerged as an optimal solution to legibility conditions at the interfaces with the conceptual-intentional C-I and sensory motor S-M systems (perhaps with primacy at C-I (Chomsky 2005)): "providing legible representations at the interface levels [...] is the minimal condition FL must satisfy to be usable at all" (Chomsky 2000: 94). This formulation, however, is trivially inadequate, for obviously FL could not be usable if, prior to satisfying interface conditions ICs, it did not first satisfy a Generativity Condition GC: Generate the maximal number of structured expressions SE with the minimal function (hereinafter the "minimax" function). On the simplest assumptions, the maximal number is aleph zero; a generative function f is minimal iff it is unrestricted (i.e., a free magma operation) or, if restricted, restricted such that the properties of f constitute a proper subset of the properties of any equally productive generative function $g \neq f$. The recursively defined strongly-generative function of the computational system for human language CHL— call it "Merge"—can be formulated as the minimax function. Minimax Merge is unary at minimum (for set formation) and binary at maximum (for combinatoriality and dimensionality). In computational terms, Merge = shift + push-down/reduce. So formulated, Merge can be proven to entail a principled solution to linearization of terminals at first-merger and principled explanations of endocentricity, projection, and labels. GC is assumed to obtain of any generative system by virtual conceptual necessity. The minimal function prong is merely a metaphysical interpretation of epistemological parsimony; the maximal number prong is a

truism: to be usable at all, FL must generate SEs that can be used; to limit the number of SEs that can be generated would be an unsightly stipulation. Once assumed, GC derives (hence explains) the principles of computational efficiency with which ICs are satisfied: i.e., a computational implementation of the minimax function satisfies conditions maximally with minimal operations. The strongest minimalist thesis would thus maintain that FL emerged as an optimal solution first and foremost to GC and secondarily to ICs. Incidentally, this thesis is consistent with the free application of syntactic operations on edge features (Chomsky 2004, 2007, 2008) rather than application as a Last Resort (Chomsky 1995, 2000, 2001).

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