The Syntax-Morphology Relation

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We review and discuss some issues to do with the relation between morphology and syntax which have played a prominent part in generative linguistic research in the past three decades. Focusing on verbal inflection, we first discuss the relation between inflection and verb placement, with special attention given to verb-initial languages. We then discuss the relation between pro-drop and agreement, where we articulate a partly new understanding of Huang’s (1989) generalization that pro-drop is characteristic of languages with rich agreement and languages with no agreement, but not languages that are in-between. We then present and discuss the Mirror Principle, one of the most significant findings in recent linguistic research. We pay special attention to the Mirror Principle as it applies in head-final languages, in the context of a model adopting Kayne’s (1994) Linear Correspondence Axiom. The idea is to show how fairly complex aspects of clausal syntax, including word order and the possibility of phonetically silent arguments of a predicate, may be correlated with readily observable and, in themselves, rather simple properties of verbal inflection, and to show how, given a restrictive theory of Universal Grammar, this follows from the fact that inflections are syntactic categories, albeit realized as parts of word.

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1. Introduction

One of the principal goals of the theory of syntax is to produce an account of the structure of sentences. Words can have internal structure, too, through. Not only that, word structure shares many properties with syntactic structure. First, it makes reference to syntactic categories, e.g. in that a derivational suffix like –y changes a noun into an adjective (word \(\rightarrow\) wordy), and a meaning conveyed by a syntactic phrase in one language can be expressed by a word in another language (e.g. the English phrase the book is expressed by the Swedish word boken, where –en is the definite article). Second, the combinations of meanings are typically compositional in that the meaning of the whole is a function of the meaning of its parts. Just as the meaning of Dog bites man is a function of the way in which the words are combined to form the sentence (notably different from Man bites dog), the meaning of dogs is derived from the combination of “dog” (the meaning of dog) and “plural”, the meaning of –s. Third, although this can only be clearly seen with compounding in many languages, word structure resembles syntactic structure in being recursive, in
that the same operation can be iterated indefinitely to form ever more complex structures:

(1) a. anti-missile missile; anti-anti-missile missile; anti-anti-anti-missile missile, etc.
   b. coffee-maker; coffee-maker-maker; coffee-maker-maker-maker, etc.

Although some of the resulting words are rather silly, there is no doubt that they can be formed, and, most important, there is no doubt as to what they mean (this is partly the source of their perceived silliness in many cases).

So we conclude (i) that words have internal structure, and (ii) that structure is strikingly similar to syntactic structure, i.e. the structure of sentences.

Another very obvious fact about word structure is that it is highly variable across languages. This was noticed in the 19th-century, and led Schlegel (1808) and Schleicher (1862) to postulate one of the earliest ever attempts at language typology, dividing languages into isolating/analytic (those with few or no inflections), inflectional/fusional (those with many inflections, often “fused” together), and agglutinating (those with many inflections in a near one-to-one form-to-meaning mapping). Later a fourth type, polysynthetic, was added (by Sapir 1921): polysynthetic (or incorporating) languages are characterised by the fact that more than a single lexical root may appear interspersed with inflection in a complex word.

The 19th-century morphological typology has often been criticised (see Comrie 1989, Chapter 2, for example), but two things about it are important: First, morphological differences among languages are extremely easy to observe. Second, if we can show that there is a systematic relation between morphological structure and syntactic structure, the morphological differences may reflect more abstract syntactic differences among languages. These points are important not just in the obvious way for linguists interested in cataloguing and understanding the patterns in the world’s languages, but also for language acquisition: The morphological differences are easy to observe not only for linguists but also for children acquiring their first language. Indeed, there is clear evidence from studies of children's language acquisition that they are highly sensitive to morphology, particularly inflectional morphology (Slobin 1982, Wexler 1998, Guasti 2002). If the second idea is right, morphological properties
may be an important cue employed in the acquisition of syntax (see Drescher (1999), Lightfoot (1999) on the notion of cues).

Our main interest in this paper will lie in the nature of verbal inflection. Let us then briefly illustrate the differences that may exist in this aspect of inflectional morphology across languages. A typical regular English verb has four inflected forms: the root (work), the 3sg present (works), the preterit and past participle form (worked) and the present/progressive participle (working). Some irregular verbs distinguish the preterit and past participle (sang vs sung), giving five forms. The verb be, by far the most irregular in the language, additionally and uniquely distinguishes 1sg present (am), plural present (are), and singular vs plural in the preterit (was/were), giving a total of eight forms.

By contrast, in Chinese, an example of a highly analytic language, verb roots are entirely invariant. Information regarding person and number is carried by pronouns; information regarding tense, mood and aspect is carried by separate “particles” of various kinds.

Contrasting in the other direction, take Italian, a standard example of a fusional language. In this language, all six person/number forms (1st, 2nd, 3rd; singular vs plural) are realised distinctively in almost every tense. Hence for the present (indicative of a 1st-conjugation verb) of amare, “to love”, we have:

(3) amo (“I love”) amiamo (“we love”) [Italian]
ami (“you (sg) love”) amate (“you (pl) love”)
amà (“he/she/it loves”) amano (“they love”)

There are five indicative tenses and two subjunctive ones, almost all with six distinct person/number endings, giving 43 finite forms of the verb. In addition, there is the infinitive, the imperative forms, the gerund, and present and past participles. Hence, an Italian verb has around fifty distinct inflectional forms.

Finally, let us compare Finnish, a typical agglutinating language. It has distinct forms in all six persons, it has a present and a past tense and two other finite moods (conditional and potential), giving 24 different verb forms. Each of these can be active or passive, giving 48 forms. There are several aspectual affixes indicating whether an action is done once or is iterated and there are reflexive and causative affixes, each of which can be combined with all tenses and moods, and there is a wide variety of
infinitival and participial forms, some of which can be inflected for six persons and for past and present. All in all this yields several hundred different forms that a verb can take. However, each verb form is constructed with almost perfect regularity, with distinct affixes added in a fixed sequence, each affix making a transparent contribution to the meaning of the verb. For example the verb *maalautuisit* “you would paint yourself” is composed of the following units:

(4) maala-utu -isi -t [Finnish]
    paint-REFLEXIVE-CONDITIONAL-2SG

Each of these affixes can be added to any verb (transitive, in the case of REFL), always contributing the same meaning.

Now, a child acquiring a language does not know in advance whether it is going to have to deal with no inflection like Chinese, poor inflection like English, rich fusional inflection like Italian or rich agglutination like Finnish. Universal Grammar, however construed, can apparently do no more than provide a menu of options. But one result emerges very clearly from the cross-linguistic studies in first-language acquisition: children pay close attention to inflection and are very good at accurately learning complex paradigms. In this light it is not surprising that languages may exhibit radically different systems, some of them extremely complex. An interesting question is whether the variation is also indicative of other, more abstract differences.

In this paper, we will discuss some cases where important aspects of clausal syntax are correlated with the “richness” of verbal inflection. We will also discuss exactly how the internal structure of inflected words is related to phrasal/sentential structure.

2. **Morphology and word order**

An interesting observation, going back to the 1980s, is that there is a correlation between the complexity of verbal inflectional morphology and word order. Consider the following set of data. The examples in (5) are from Early Modern English, those in (6) from Modern English.
Examples like (5) have a slightly familiar “Shakespearean” feel for many speakers of present-day English. Shakespeare lived from 1564 to 1616, and so in his English this kind of word order can be found. Despite this air of familiarity, the word orders in (5) are ungrammatical in present-day English. What is going on here is that the position of the verb (bold) in relation to a sentence-medial adverb or the negation not is regularly different in the two varieties of English: In Early Modern English it precedes adverbs and negation, in Modern English it follows these elements (in Modern English negative clauses there is an extra complication involving the obligatory insertion of an auxiliary, did in (6a)).

The next examples are from Scandinavian; (6a) is from Icelandic, (6b) from Swedish. Note the difference in word order in the bracketed embedded clause:

In Icelandic the verb regularly precedes the negation and any adverbs, while it follows them in Swedish.¹

¹ The difference is visible in embedded clauses only, since all the Scandinavian languages follow the Germanic ‘verb second rule’ according to which the finite verb is always the second constituent of main clauses.
Another verb-related difference between Early Modern and Modern English is that the verb is more richly inflected in Early Modern English. In particular, while the finite (tensed) verb (other than be) in Modern English has a mere three forms in addition to the root (work, works, worked), in Early Modern English (up to about the middle of the 16th century) it had seven forms. Likewise, while the Swedish finite verb has a mere two forms (kallar ‘call/calls’, kallade ‘called’), in Icelandic it has 12-20 forms, depending on the choice of verb. Is there a connection between the two properties, and what might be the rationale of such a connection?

Consider tense: In many languages it is expressed as an inflection on the verb. It is nevertheless clear that, in terms of its meaning, tense is not a property of the verb but of the sentence. Past tense, for example, signals that the event or situation denoted by the entire sentence takes place at some time prior to the time of utterance.\(^2\) It is also common, in many languages, to find tense syntactically dissociated from the verb. In fact, this is the case in (Modern) English in negative sentences and questions.

\[(7)\] a. John does not drink coffee.

b. Did you actually see him?

This suggests that the distinction between Early Modern English and Icelandic on the one hand, and Modern English and Swedish on the other hand, is that the tensed verb (in (4) and (5)) is pronounced in the syntactic position of tense (meaning the position which directly reflects the semantic relation of tense to the rest of the sentence) in Early Modern English and Icelandic, but in the syntactic position of the verb (the position which directly reflects its semantic relation to the rest of the sentence, in particular to its dependent, the object) in the latter set.

Assume the sentence has basically the structure (8), where T = tense, and (Neg) and (Adv) mark the positions of the negation and adverbs (of the relevant kind) and VP is the phrase made up of the verb and its object.

\[(8)\] [Subject T (Neg) (Adv) [VP V Object]]

\(^2\) A rough characterization of the contribution of the verb to the meaning of the sentence is that it denotes a type of activity or state, while the (finite) sentence denotes a particular event or state, located in time (as specified by its tense) and space, involving the type of activity or state denoted by the verb.
The facts above suggest the generalization:

(9) Pronounce the verb in the position of $T$ if $T$ has rich inflection. If not, pronounce the verb in the position of $V$.

Or, in the standard terminology of generative linguistics:

(10) Move $V$ to $T$ if and only if $T$ has rich inflection.

In most of the literature this is not linked to tense inflection directly, but to subject agreement, which, in the case of Middle English and Icelandic contributes significantly to the richness of the verbal inflection (Vikner 1997, Bobaljik & Thrainsson 1998, Rohrbacher 1999, Sundquist 2002). This falls straightforwardly under generalization (10) if subject agreement and tense make up a complex category $T$.³ As shown by Biberauer & Roberts (2010), the focus on subject agreement in earlier accounts of (10) is probably a mistake; the crucial factor is richness of inflection of $T$ more generally, including inflection for future tense and subjunctive or other moods.

Given (10), we expect that in a highly analytic language like Chinese, $V$ will not move, but will occur/be pronounced in the position of $V$, i.e. typically next to its object or other verb complement. This is correct, as discussed by Huang, Li & Li (2009:101f.). Chinese (Mandarin) has a class of aspectual particles which obligatorily precede the verb, shown in (11):

(11) a. Ta zai dasheng chang ge.

he PROG loud sing song

“He was singing loudly.”

b. Wo mei-you qiaqiao de hui jia.

I not-PRF quiet DE return home

“I didn’t go home stealthily”. (Huang, Li & Li (2009:102-3))

³ It is not the case universally that tense and subject agreement make up a morphological unit. For example in Finnish negative sentence subject agreement is realized on the negation while tense is realized on the (moved) verb. (10) can be reformulated to take into account the possibility that the sentential inflections (tense, mood, aspect, agreement) are distinct syntactic heads.
Locating these particles in T, we see the exact order of elements in (8), with the exception that negative mei precedes the particle you in (10b).

Thai is another strictly analytic language. Like Chinese, it has no overt marking of tense, but has a set of aspectual particles, some preverbal some postverbal. The negation is also preverbal. The verb always remains strictly adjacent to its complement, as predicted by (10) (LP = linking particle).

(12) a.  chăn máy đầy pay bān maa  
     I NEG ASP go home ASP
     ‘I didn’t go home.’

b. tɔɔn-ŋii kɔ̂ yaŋ mii panhāa yùu  
     now LP ADV have problem ASP
     ‘There is still a problem even now.’

The validity of (10) is straightforwardly supported by the languages of Europe where the verb regularly precedes the object, as in English and Scandinavian: Except for the Mainland Scandinavian languages and Modern English, they all have relatively rich tense and/or agreement inflection, and they all exhibit V-movement (i.e. the finite verb can occur displaced from the object, in the initial part of the sentence). French is a well-known example. Here we see the order V-Neg-Adv-Obj (if we take pas to be the “true” negator and ne a pleonastic element):

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4 In a model where V moves to T in order to merge with the inflections there (a widely but not universally assumed model; see Chomsky 1993), a complication arises in languages like English and Swedish in that T’s content can attach to V, even though it can be shown that V hasn’t moved. For example, past-tense forms of regular verbs in English bear the –ed affix, but still follow adverbs, as in John soon cooked the dinner. Similarly, the Chinese particle le, follows V but V still follows adverbs (see Huang, Li & Li (2009:103-5) for discussion and examples). The classical analysis (going back to Chomsky 1957) is that a special operation moving T to V takes place in these cases. This operation is cross-linguistically much rarer than its “opposite”, V-to-T movement; see Lasnik (2000).

5 Thanks to Sompho Yaisomanang for examples and discussion. It should be relatively straightforward to investigate whether the correlation between V-movement and richness of verb inflection is truly universal: The prediction is that in languages without any verb inflection the direct object will always be adjacent to the verb, except when the object has moved independently of the verb. This investigation remains to be done. The fact that object movement, of various kinds and for various reasons, is such a common phenomenon is a significant complication, though.

6 Faroese is an interesting test case: The inflectional paradigm of finite verbs is quite drastically reduced compared to the ancestor Old Norse (and Modern Icelandic), made up of five different forms (three in the present tense, two in the past, with no subjunctive). V-to-T movement has virtually disappeared (Heycock & al 2010, 2011). As shown by Heycock & al. (2011) there is nevertheless a subtle difference between Faroese and Danish (which, like Swedish, has only two finite forms and uncontroversially lacks V-to-T).
(12) a. Jean embrasse souvent Marie.
   John kisses often Mary

b. Jean (ne) mange pas de chocolat.
   John (neg) eats not of chocolate.
   *Jean (ne) pas mange de chocolat.

French is fairly typical of the Romance languages in this respect. Interestingly, many French-based creoles have lost most verbal inflection and have the "Modern English" order of elements in relation to negation. The following examples from Haitian Creole illustrate (see deGraff (2005), Roberts (1999:304-7)):

(13) a. Bouki deja pase rad yo.
   Bouki already iron cloth the(ir)
   "Bouki has already ironed the(ir) clothes."

b. Boukinèt pa renmen Bouki.
   Boukinèt NEG love Bouki.
   "Boukinèt does not love Bouki."

So there appears to be a fairly robust correlation between the amount of verbal inflection a language has and the position of the verb in the sentence, whether the verb moves to T or not. This has an interesting diachronic consequence: it is a very well-known fact that inflectional morphology tends to erode and disappear over historical time. We observe this in the loss of noun cases in the development from Latin to the Modern Romance languages, or from Old to Modern English, for example. In itself, this probably has nothing to do with syntax; if anything, the causes are phonetic and phonological. But, given our correlation, we will predict that, as verbal inflection is eroded, then the position of the verb will change over time. This is clearly seen in English: a set of verbal inflections (plural endings in the past and present tense) were lost in the 16th century, and, within at most a hundred years, the position of the verb

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7 This conclusion has been questioned by various researchers recently, notably by Hróarsdóttir, Hrafnbjargarson, Wiklund & Bentzen (2006), Bentzen (2007, 2009) in relation to Germanic languages, and Bailyn (1995) in relation to Russian. These arguments are rebutted by Koeneman & Zeijlstra (2012), in terms of a particular construal of the basic idea being informally presented here.
had changed, i.e. V-to-T movement had been lost. The same can be observed in the
history of Swedish, which moved from an "Icelandic-like" verbal inflection system
with V-to-T movement to its modern system as described above during the Middle
Ages (see Falk 1993). Faroese may be just completing this set of changes (see the
references in Note 4). Finally, the creolisation process that created Haitian Creole
involved the stripping away of nearly all French inflection, and again we see that the
verb does not move to T in the creole.

It may be significant, though, that the loss of rich verbal inflection predates the
loss of V-to-T by several generations, in English as well as in Swedish. Sundquist
(2003), discussing the history of Danish, shows that person agreement on the verb
(argued to be a crucial component of rich verbal inflection in Platzack & Holmberg
(1988), Vikner (1998), Rohrbacher (1999)) disappeared about 250 years before V-to-
T finally disappeared from Danish in the early 18th century. This indicates that the ‘if-
and-only-if version’ of the correlation between rich inflection and V-to-T in (10) is
too strong. Sundquist, following Roberts (1999), Bobaljik (2002), argues for a weaker
version:

(14) Move V to T if T has rich inflection

That is to say, V-to-T does not need rich inflection, but rich inflection needs V-to-T. It
may still be the case that V-to-T needs some degree of T-inflection. Even though
subject agreement inflection eroded and eventually disappeared in, for example,
Danish, the verb was still marked for tense (as it still is, in present day Danish). In any
such language, we assume, V+T can be pronounced in the position of T. However, the
weaker the inflection in T, the less motivation there is for V-to-T, i.e. pronouncing the
verb in the position of T rather than within VP. The prediction is that over time V-to-
T will disappear in such a system.

3. Verb-initial languages

In the previous section, we concentrated on languages whose “basic word order”, i.e.
the relative order of Subject, Object and Verb, is SVO. Testing the validity of (9) is
more complicated in languages where the standard word order is Subject-Object-Verb
(SOV), as in Latin and in subordinate clauses in German. We return to this below.
In this section, we look at languages where the verb is normally the first element in the clause, VSO and VOS languages. Languages with these orders form a minority, but a substantial one, among the world's languages, accounting for about 15% of the world's languages altogether (SOV and SVO each account for about 40% of the world's languages, the other patterns, it can be deduced, are much rarer).

One language family whose members show VSO order is Celtic, illustrated here with Welsh:

(15) a. Fe/mi welais i Megan  
PRT saw I Megan
"I saw Megan."

b. Fe/mi wnes i weld Megan  
PRT did I see Megan
"I saw Megan."

By definition, in VSO order the verb is not adjacent with the direct object. However, in the case of Welsh, there is an alternative way of expressing almost any sentence whose verb is in a simple tense by using a construction involving the auxiliary gwneud ("do") and a non-finite form of the verb (the so-called "verbal noun"), as in (15b). Here the auxiliary precedes the subject, which in turn precedes the verb, which in turn precedes the direct object. So we have the order AuxSVO. Rather as in English, Welsh auxiliaries carry information regarding tense, aspect and mood. We can therefore locate them in T. We can thus assign a structure like (16) to (15b) (the "particle" fe/mi, which marks the clause as declarative, is merged with TP in a higher position):

(16)    fe/mi    [TP T [VP Subject [VP V Object]]]

Here we could say that the subject is merged with the “core” VP containing the verb and the direct object. It has in fact been proposed that this is the case in all languages, and that the pre-T position of the subject we see in many languages, illustrated in the schema in (8), is the result of a further movement operation “raising” the subject out of the VP. If this is correct, then we could posit that Welsh simply lacks this rule.
Examples without auxiliaries and with VSO order involve V-to-T movement, giving (17):

(17) \([\text{TP V+T [VP Subject [VP Object]]]}\]

VSO order thus involves V-movement to T.\(^8\) What distinguishes Welsh from French is a further difference concerning whether the subject appears in VP (Welsh) or in a higher position (French).\(^9\)

Given (10), we now predict that Welsh and other VSO languages should have complex verbal inflection. Both Welsh and Irish certainly fit the bill, in that each has around twenty finite verb forms. Scots Gaelic and Breton may be more impoverished, but still significantly richer in this respect than Modern English or Swedish. The principal VSO Semitic languages (Classical Arabic, Ge’ez and Biblical Hebrew), all have very rich verbal inflection, comparable to, say, Finnish. The same is true, as far as we are aware, of other Afroasiatic VSO languages such as Egyptian and Berber.

What holds for Celtic and Afroasiatic does not hold for all verb-initial languages, however. In her study of VOS and VSO in Niuean, for example, Massam (2000, 2005) argues that there is an operation fronting an apparently verbal constituent, and that this constituent is fronted to a position within TP. She then shows that there is a general operation which fronts non-verbal predicates which are clearly larger constituents than just the verb, e.g. relative clauses. Thirdly, Massam shows that what has been called noun-incorporation in Niuean (e.g. by Baker 1988) cannot be movement of N into V (\textit{pace} Baker) since there are clear cases where a constituent larger than N undergoes this operation. She proposes instead that putative noun-incorporation is really the absence of object-movement to a position outside the “core” VP. In that case, the fact that the apparently incorporated noun moves with the verb shows that what is moved is the whole VP rather than just V. VOS order is thus derived by VP-fronting, and VSO by object-movement to a position outside the core VP combined with “remnant” VP-fronting, as shown in (18) (see Cinque, this issue, for other examples of this type of derivation):

\(^8\) The idea that VSO order is derived by V-movement was first proposed by Emonds (1980).

\(^9\) Extrapolating from (8), we therefore expect to find the order \textit{V Neg Adv Subject Object} in Welsh. In fact this is incorrect: the subject follows the verb but precedes adverbs and negation. It seems, then, that the subject does raise out of VP in Welsh, but to a position to the right of T (the same is true elsewhere in Celtic, with the notable exception of Breton, where the “low-subject” order is found, see Jouitteau (2005)).
A comparison of (18) with (8) shows that the landing-site of VP-fronting corresponds to the subject position in SVO languages. This type of analysis, first put forward by Massam & Smallwood (1997), and developed by Rackowski & Travis (2000) as well as several of the papers in Carnie, Dooley & Harley (2005), has been applied to a number of languages which display both VOS and VSO orders.

Assuming that this general type of analysis is correct for verb-initial languages like Niuean, which exhibit both VSO and VOS orders (unlike rigidly VSO languages such as the Celtic languages, where there is no reason to think that a constituent larger than V moves), we can draw some interesting conclusions in relation to the approach to verb-movement sketched above. In terms of our proposal that verb-movement to T is necessarily connected to richness of verbal inflection, we arrive at the prediction that VOS/VSO languages of the Niuean type will have impoverished verb morphology. If these languages had rich inflection on verbs, then this would have to give rise to V-to-T movement, an option incompatible with the VP-movement containing an unmoved verb that Massam proposes (cf. also Massam 2005: 239).

Indeed Niuean has no agreement inflection on verbs and also lacks tense inflection; tense/aspect information is entirely carried by sentence-initial particles. This is also the case for many other related Oceanic languages: They have V-initial order, and no person or tense-marking on the verb (Samoan, Maori, Rapanui, Tongan; see Dryer (2011), Siewierska (2011), Churchward 1953, Chung & Ladusaw 2004, cited in Chung 2005, see also Otsuka 2005 on Tongan). Also the more distantly related Chamorro, another VSO-VOS language where the V-initial order is argued by Chung (2005) to be derived by VP-movement, lacks tense and agreement inflection. Malagasy, another VSO-VOS language where V-initial order has been argued to be derived by VP-movement rather than V-movement (Pearson 2001, Rackowski & Travis 2000), has a tense prefix but no inflection for agreement (Dryer 2011, Siewierska 2011).10

10 There are reasons to think that prefixes have a different status from suffixes, as will be touched upon in section 5.
So we are led, following Biberauer & Roberts (2010), to the idea that there are two types of VSO languages. Surface VSO order can be derived either by V-movement to T (as in (17)), or by remnant VP-movement as in (18), following a more recent line of analysis instigated by Massam & Smallwood (1997). The structure in (18a) gives rise to VOS order since the object is not moved out of VP prior to VP-movement. The derivation of the general type in (8), leaving open the related question of the position of the subject (SpecTP or lower) is found in Celtic and Semitic (see Adger (1997) on Scots Gaelic, McCloskey (1996) on Irish, Roberts (2005) on Welsh, Jouitteau (2005) on Breton, Newton (2006) on Old Irish, Willis (1998) on Middle Welsh, Shlonsky 1997 on Hebrew and various Arabic dialects, Fassi-Fehri 1993 on Standard Arabic). The derivation in (18) is found in many Austronesian (see Massam & Smallwood 1997, Massam 2000, 2005, Rackowski & Travis 2000, and many of the papers in Carnie, Dooley & Harley 2005). The different derivations correlate with various other properties: VSO languages whose word order is derived as in (8) have rich tense morphology (see Biberauer & Roberts (2010) for more on the connection between V-to-T movement and rich tense morphology), and do not allow VOS alternative orders. On the other hand, V-initial languages derived as in (18) have impoverished tense morphology and allow VOS as an alternative order. We thus see how the different types of V-initial language fit into the generalisation in (10).\textsuperscript{11}

4. Agreement and pro-drop

There is a well-known distinction between languages in which the subject pronoun need not be pronounced, and sometimes even cannot be, and languages where the subject pronoun must be pronounced: null-subject languages vs. non-null-subject languages, or pro-drop languages vs. non-pro-drop languages.\textsuperscript{12} This is traditionally discussed in terms of the ‘null subject parameter’ or ‘pro-drop parameter’; Rizzi (1982, 1986), Chomsky (1982), Huang (1984), the papers in Jaeggli and Safir (1989), Holmberg (2005), Biberauer & al. (2010). There is quite uncontroversially a relation between the presence and richness of subject agreement and the possibility of subject pro-drop, where subject agreement is rich to the extent that it distinguishes between the different persons and numbers and possibly genders that a subject can have. In

\textsuperscript{11} The generalization does not appear to hold straightforwardly for the Mesoamerican languages in which V-initial order is argued to be derived by VP-movement, though (e.g. Lee 2005).

\textsuperscript{12} Pro-drop (i.e. pronoun-drop) does not only apply to subjects. There are many languages where object pronouns can be dropped as well. In this paper we focus on subject pro-drop.
languages with rich subject agreement the inflection on the finite verb or auxiliary makes the subject pronoun redundant, or, more precisely, we claim, in line with most research in generative grammar, it makes pronunciation of the subject pronoun redundant.

(19) a. Ha bevuto il caffè. [Italian]
   Has-3SG drunk-PRT the-M.SG coffee-M.SG
   “S/he has drunk the coffee.”

   b. šerbt l-qehwa [Moroccan Arabic; Harrell & al. 1965: 84]
   drank-3SG.F the coffee
   ‘She drank the coffee.’

There are some well known exceptions to the correlation between rich agreement and pro-drop. In particular, there is a class of so called ‘radical pro-drop languages’, which have no agreement, yet allow pro drop; Huang (1984, 1989), Jayaseelan 1999, Tomioka (2003), Neeleman and Szendrői (2007) (see Haegeman, this issue, for another class of exceptions to the correlation) Huang (1989) put forward an interesting generalization according to which (subject) pro-drop is found in languages which have rich agreement (such as Italian) or no agreement (such as Chinese), but not in languages with poor agreement (such as English). He proposed a theory to explain this generalization. In the following we will articulate a theory of agreement and pro-drop which basically countenances Huang’s generalization, but only in part his explanation of it. It is based on a better understanding of the varieties of pro-drop found among the languages of the world (Biberauer & al, 2010), and also a better understanding of the role of agreement in syntax (see also Baker, this issue, on the syntax of agreement)

We adopt, essentially, the theory of agreement in Chomsky (1995: ch. 4, 2001), according to which what is pronounced as a subject agreement affix on the auxiliary or (finite) verb is, in the syntax, a set of formal, nominal but unvalued features typically represented together with tense in T. The unvalued features receive a value by copying the values of the corresponding features of the subject. (20) represents the situation where the subject is a 3rd person singular feminine pronoun, as in (19b) (uϕ = ‘unvalued formal features’). We continue to assume that the subject starts out as a constituent of the predicate, the VP, although this is not crucial in what follows.
After feature copying/valuation, the feature values of the subject pronoun are represented twice in the sentence. More precisely, the features of the pronoun are a proper subset of the features of T, as T has other features as well, notably tense. We will say, following Roberts (2010a), that the pronoun is incorporated in T. In this situation, only one copy of the feature set needs to be pronounced, for the feature content to be communicated. The one which gets pronounced is the one in T. There is a reason for this: the features in T form a morphological unit together with tense. Thus failing to pronounce them would leave tense unpronounced as well, resulting in unrecoverable loss of information.

As mentioned, the so called radical pro-drop languages are a well known exception to the correlation between rich agreement and pro-drop: they have no agreement, yet allow pro drop. We return to those below. There is also a class of languages which have subject agreement and allow pro drop, but only with non-referential and generic subject pronouns, not personal/definite pronouns.
(21) exemplifies how an impersonal verb such as ‘rain’ is constructed without an overt subject in Finnish, Icelandic, and Brazilian Portuguese. This is pro drop of a non-referential subject. (22a) illustrates the fact that the 3rd person subject pronoun meaning ‘he’ or ‘she’ cannot be dropped. (22b) is nevertheless grammatical, but the interpretation is that the subject is a generic pronoun, a counterpart of English *one*.

(22)  

a. Tässä hän istuu mukavasti.  [Finnish: pro-drop not allowed]  
here he sits comfortably  
‘He’s sitting comfortably here.’

b. Tässä istuu mukavasti.  [generic pro-drop]  
here sits comfortably  
‘One can sit comfortably here.’

The same is true of Icelandic and Brazilian Portuguese (BP).

(23)  

a. Nú má hann fara að dansa.  [Icelandic; pro-drop not allowed]  
now may he begin to dance  
‘He may begin to dance now.’

b. Nú má fara að dansa.  [generic pro-drop]  
now may begin to dance  
‘One may begin to dance now.’

(24)  

a. Ele não pode nadar aqui.  [BP: pro-drop not allowed]  
he not can swim here  
‘He can’t swim here.’

b. Aqui não pode nadar.  [generic pro-drop]  
here not can swim  
‘One can’t swim here.’

The (b)-sentences are not subjectless: The verb ‘sit’ requires an argument, a thing or person doing the sitting, likewise the verbs ‘dance’ and ‘swim’, so they do have a
subject, albeit an unpronounced one. Following Biberauer & al (2010) we will refer to languages such as Finnish, Icelandic, and BP as partial pro-drop languages and languages such as Italian and Moroccan Arabic as consistent pro-drop languages.

Interestingly, there is negative correlation between personal subject pro drop and generic subject pro drop. This can be expressed as in (25) (this is a provisional formulation, to be modified below):

(25) If a language has personal subject pro-drop in active, finite clauses, then it does not have generic subject pro drop in the same context.

Thus, in languages such as Italian and Moroccan Arabic the generic subject must have some overt expression, in active clauses. The (a)-sentences below can only be interpreted as having a personal/definite subject:

(26) a. Può controllare questo macchinario con una mano sola. [Italian]
   Can-3SG control-INF this machine with one hand only
   ‘He can operate this machine with one hand.’

b. Si può controllare questo macchinario con una mano sola.
   SI can-3SG control-INF this machine with one hand only
   ‘One can operate this machine with one hand/this machine can be operated with only one hand.’

(27) a. ka-i-qder i-xaddem had l-makina b-yedd weHda
   PRT-3M-can 3M-operate this machine with-hand one
   ‘He can operate this machine with one hand.’ (Harrell & al. 1965)

b. t-eqder t-xaddem had l-makina b-yedd weHda
   2-can 2-operate this machine with-hand one
   ‘You (one) can operate this machine with one hand’.13

13 Thanks to Abdelkader Fassi Fehri for examples and discussion.
What is the difference between Italian and Moroccan Arabic on the one hand, and Finnish and Icelandic on the other hand? Richness of agreement does not appear to be the (only) difference. True, Brazilian Portuguese has a reduced agreement system when compared with European Portuguese, which is a consistent pro-drop language like Italian (Rodrigues 2002, Holmberg & al. 2009). But Icelandic distinguishes five forms in the active, tensed paradigm (two in the singular, three in the plural); basically the same as Italian. The Finnish agreement paradigm is even richer, distinguishing six forms, three in the singular, three in the plural. Instead, following Holmberg (2005, 2010) and Roberts (2010b), we assume that the difference is that the agreement inflection has a definiteness component in Italian and Moroccan Arabic, formally encoded as a feature \([uD]\), ‘unvalued definiteness’, which is absent in Finnish and Icelandic. Definite pronouns, such as I, you, he, we, etc. are composed of the features \([+D, \phi]\), where \([+D]\) corresponds to the definite article in a lexical noun phrase like the book, and the \(\phi\)–features (person, number, and sometimes gender) correspond to the noun. Hence the pronouns refer to a specific person or group, defined by the \(\phi\)–features. Generic pronouns, for example one in English, do not have D, which is why they do not refer to a specific person or group.

Now consider first the situation in Italian and Moroccan Arabic when the subject is a definite pronoun (here 3SG).

\[(28) \quad [TP \ [T \ Past, uD, u\phi] \ [VP \ [+D, 3SG] \ VP ]] \rightarrow [TP \ [T \ Past, +D, 3SG] \ [VP \ [+D, 3SG] \ VP]]\]

Here \([uD]\) is assigned a + value, and \(u\phi\) the value 3SG by the subject. Only one copy needs to get pronounced (the copy with more features, i.e. the T-copy), indicated by a strike through the subject pronoun. The interpretation is as in (26, 27) above.

Consider the situation in Finnish, Icelandic, and Brazilian Portuguese when the subject is a definite pronoun.

\[(29) \quad [TP \ [T \ Past, u\phi] \ [VP \ [+D, 3SG] \ VP ]] \rightarrow [TP \ [T \ Past, 3SG] \ [VP \ [+D, 3SG] \ VP]]\]
The \([u\phi]\)-features of T get valued by the subject’s \(\phi\)-features, but in the absence of a \([uD]\) feature in T, the value of the subject’s D-feature isn’t copied by T. This means that the subject isn’t a copy of T, so it cannot be deleted, i.e. it must be pronounced.

Consider the situation in Finnish, Icelandic, and BP when the subject is a D-less pronoun.

\[
(30) \quad [TP \ [T \text{Past}, u\phi] \ [VP \text{3SG} \ VP]] \rightarrow \\
[TP \ [T \text{Past}, \text{3SG}] \ [VP \{3SG\} \ VP]]
\]

The \([u\phi]\)-features of T are assigned values by the subject. The subject is therefore, in this case, a copy of T, and can be deleted. This is the derivation of the (b)-examples in (22-24).

Finally, consider the situation Italian and Moroccan Arabic if the subject is a D-less pronoun.

\[
(31) \quad [TP \ [T \text{Past}, uD, u\phi] \ [VP \text{3SG} \ VP]] \rightarrow \\
[TP \ [T \text{Past}, uD, \text{3SG}] \ [VP \{3SG\} \ VP]]
\]

This leaves the D-feature of T without a value, which, by hypothesis is not allowed (Chomsky 1995: 277-282, 2001). Informally speaking, the category, and hence the sentence, cannot be assigned an interpretation unless all features are assigned a value. The generic reading thus cannot be derived in this fashion. Different consistent pro-drop languages resolve this situation in a variety of ways. Some employ an indefinite/quantificational pronoun corresponding to ‘anyone’ in English; they have to be overt since T does not contain any unvalued features corresponding to ‘any’. Others resort to a passive construction, where T does not agree with the understood subject (see Holmberg 2010b). The Italian (more generally Romance) strategy of employing the impersonal/reflexive clitic \(si\) (as in (26b); a strategy also employed by the Slavic languages) can also be characterized as switching to a non-active voice; in fact, in Romance languages the same \(si\) element creates a “mediopassive” construction (see Cinque (1988) on how to distinguish the two kinds of \(si\)). Yet another strategy is relying on the 2SG pronoun ‘you’, used with generic sense, as in (27b) above).
There are languages which do not fall under the generalization (25), repeated here:

(25) If a language has personal subject pro-drop in active, finite clauses, then it does not have generic subject pro-drop in the same context, and vice versa.

Consider the following examples, where (a, b) are from Holmberg & al. (2009) and (c) is from Phimsawat (2011):

(32) a. Ah John waa hai Jinggwok jiu gong Jingman [Cantonese]
   PRT John say in England need speak English
   ‘John says that one/he needs to speak English in England.’

   b. John-wa kono beddo-de-wa yoku nemu-reru-to iu. [Japanese]
   John-TOP this bed-in-TOP well sleep-can-COMP say
   ‘John says that one/he can sleep well in this bed.’

   c. hàak wáicay khon cà cáncay ʔeeŋ [Thai]
   if trust person FUT regret by oneself
   ‘One will regret later if one trusts acquaintances.

How are these languages different from the ones discussed above? Answer: They are so-called radical pro-drop languages, i.e. they have no agreement yet allow pro-drop. This suggests that (25) should be modified as in (33):

(33) If a language has personal subject pro-drop in active, finite clauses, and has subject agreement, then it does not have generic subject pro-drop in the same context, and vice versa.

Why should agreement have this effect? Recall that unvalued features have to be assigned a value, including unvalued \( \phi \)-features and the unvalued D-feature. It follows that languages with agreement in T have to have a subject with \( \phi \)-features and, in the case of consistent pro-drop languages (the ones with a uD feature in T) it has to have a D-feature as well. But if the language has no u\( \phi \)-features or a uD-feature
in T, then the subject need not, on that account, have any $\phi$–features or D-feature. It does have to have some features; enough nominal features to be able to function as a subject. According to Phimsawat (2011), in sentences without an overt subject, the subject pronoun in Thai, a radical pro-drop language, has a general nominal feature [N] and an unvalued [uR] (‘unvalued reference’) feature. The latter property means that it is anaphoric; it does not refer independently, but must receive a referential value from an antecedent in the context. (34) is an example. Here the subject of the embedded clause which, by assumption, has only the features [N, uR], receives the referential index $i$ of the subject of the main clause, as a value of the [uR] feature, which yields the interpretation shown.

(34)  cɔɔn, bɔɔk wàa  [N, i ] pay yìipùn maa [Thai]
     John say that go Japan PERF
    ‘John said that he (John) had been to Japan.’ [Phimsawat 2011]

The alternative, if there is no referential NP antecedent for the pronoun [N, uR], it can receive so called inclusive generic interpretation, that is the interpretation of generic one in English, possible because the inclusive generic reading is the most general and unrestricted reading, as it includes everybody: the speaker, the addressee, and everybody else (see again Cinque 1988 on this interpretation of Romance si). This is the meaning of the null generic pronoun in Thai and other radical pro-drop languages which have a null generic pronoun, exemplified in (27) above.

Sentences with subject agreement do not have the option of employing a subject pronoun without $\phi$–features: Whether the subject has specific or generic reference, subject agreement requires $\phi$–feature values, provided by the subject. The subject pronoun can still be null, if T is sufficiently well provided with $u\phi$-features, and possibly a [uD] feature, to ‘incorporate’ the features of the subject pronoun, in which case the pronoun can be deleted, as a copy of T. In that case, the language has

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14 The Mainland Scandinavian languages Swedish, Danish and Norwegian, as mentioned, don’t have subject-verb agreement. They have other agreement, though: for instance predicative adjectives agree with the subject, and attributive adjectives and determiners agree with the head noun. They are, therefore, not expected to behave like radical pro-drop languages.

15 According to Phimsawat (2011) there is an abstract generic operator with scope over the clause containing the $\phi$–featureless pronoun [N, uR], which for the sentence (31c), for example, yields roughly the reading ‘It is generally true of x that if x trusts acquaintances, x will regret it later’, where x has the unrestricted reference including the speaker, the addressee, and everybody else.
the choice, so to speak, whether to employ the definiteness feature [uD] in T or not. If T contains [uD], the pronoun must have a valued D-feature to value the [uD] feature. If T does not contain [uD] a pronoun with a [D] feature will never be a copy of T.

The agreementless strategy is, in fact, widely employed in other languages, too, in non-finite clauses. The bracketed portions in the English sentences (35a,b) are embedded clauses with a null pronoun as subject, where in (35a) this null subject, traditionally called PRO, is interpreted as identical in reference to the main clause subject, its controller (indicated by the shared index i), while in (b) it has inclusive generic reference. These are the same two interpretations available for null subjects in finite clauses in Thai, Chinese, and other radical pro-drop languages.

(35) a. John is pleased to have been elected teacher of the year.
   a’. Johni is pleased [PROi to have been elected teacher of the year].
   b. It’s nice to be elected teacher of the year.
   b’. It’s nice [PROgen to be elected teacher of the year].

What makes this possible, we claim, is the absence of agreement in these clauses.

To summarize: There are two quite different ways of deriving null subject pronouns: One is with the help of a rich enough $\phi$–feature set in T (with or without [uD]), that is, rich subject-verb agreement. The other way is employed in languages/constructions with no [u$\phi$]-features at all, hence no agreement: a radically null, $\phi$–featureless, anaphoric pronoun which either is controlled by a referential NP in the immediate context, or receives a maximally general, inclusive generic interpretation. It follows that languages which are in between, in that they have some agreement, that is they have [u$\phi$]-features which need valuation, but not rich enough to incorporate a subject pronoun, will have to pronounce their subject pronouns. This is the case in English, for example. As mentioned, this generalization was first put forward by Huang (1989).16

In this section, we have seen how variation in verbal inflection correlates with a further aspect of clausal syntax: the realisation of pronominal subjects. This extends

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16 See Jayaseelan (1999), Tomioka (2003) and Neeleman and Szendrői (2007) for varieties of an approach to radical pro-drop which is quite different from the one in the text. They also rely on morphology, though, but the morphology of DPs, and particularly pronouns, argued to be crucially different in radical pro-drop languages.
and complements the proposal regarding V-positions in the preceding sections. In the
next and final section, we will look first at a further syntax-morphology correlation:
Baker's (1985) Mirror Principle, and then connect this to the analysis of SOV
languages, the one major word-order type we have not yet touched on.

5. The Mirror Principle

Consider the following Finnish sentence, in particular the bracketed part.

(36) Sano minulle [naurattaisinko sinua]. [Finnish]
    ‘Tell me whether I would make you laugh.’

The analysis of this string of two words is as in (37), where the morphemes/word
segments are glossed by their closest English translation.

(37) naura-tta -isi -n-ko sinua
    laugh-make-would-I-whether you

This exemplifies the common phenomenon that a meaning which is expressed by a
string of words in one language can be expressed as a single complex word in another
language. Note, however, how the linear order of the morphemes in the Finnish
complex word is almost the exact mirror image of the linear order of the words in the
corresponding English sentence: the Finnish word is (almost) the English sentence
read backwards. The only exception is that the object sinua ‘you’ is expressed as a
separate word, which follows the complex verb.

    This is far from being an isolated curiosity, but represents a highly regular
    pattern among the languages of the world: there is close correspondence between
    the internal structure of complex words and the structure of phrases and sentences. This
    generalization was first documented and discussed by Baker (1985), who proposed to
    express it formally as the Mirror Principle:
The Mirror Principle (Baker 1985):

Morphological derivations must directly reflect syntactic derivations (and vice versa).

To see how the Mirror Principle works, consider first the structure of the English sentence *whether I would make you laugh*. *Laugh* is an intransitive verb denoting a type of event involving one participant: *[you laugh]*. Like other such verbs it can be ‘transitivized’ by adding the verb *make*, introducing a causer of the event: *[I make [you laugh]]*. This complex event-denoting expression can be combined with the full set of tenses and modalities that the language provides, including the conditional modality expressed by *would*: *[would [I make [you laugh]]]*. As we have seen, the word order rules of English require the subject to precede the finite verb or auxiliary, so the subject is moved to (and pronounced in) pre-modal position: *[I [would [make [you laugh]]]]*. This proposition can now provide the content of a statement or a question, as an independent clause or the embedded one. Combining it with the particle *whether* makes it an indirect question: *[whether [I [would [make [you laugh]]]]]*. This is represented as a tree in (39) (where $t_I$ indicates the position of the subject *I* before movement).

The structure is a consequence of the order of application of the functors to their arguments, i.e. merger of the heads with their complements. In this perspective, the only unpredictable part of the derivation is movement of the subject to pre-modal position, required in English.

The linear, pronounced order of the words can still vary across languages. It is constrained by the structure (the order of application of functors) but there is considerable room for variation. In, for example German the order is as in (40a),
which we can assume has exactly the structure in (39), only the linear order of the
constituents is partly different, as represented in (40b).

(40) a. ob ich dich lachen lassen wurde
  if I you laugh make would

So the fact that the order in the Finnish word is the mirror image of the order in the
English sentence is, in part, an accidental consequence of the fact that English is a
language where heads (almost) consistently precede their complement, when
linearized. However, what the Mirror Principle expresses is the generalization that
the form of a complex word encoding a given set of functors/heads appears to always
reflect, in a direct fashion, the syntactic structure derived by combining these
functors/heads.

Baker (1985, 1988) proposed an articulation of the hypothesis that inflected
words are, or at least can be, the result of head movement in the syntax. Assume that
the structure of the embedded clause in the Finnish sentence (36) has the following
structure, after all the constituents have been merged, as described above (for
explication of the labels, see below).

(41)

The crucial difference between English and Finnish is that the morphemes in the
English version are independent words, but (mainly) affixes in Finnish, more
precisely suffixes. As such, they have to have a host, i.e. they have to be pronounced
as part of a word. This is effected by head-movement: The verb (stem) *naura* moves to the head *Caus* (ative), the morpheme introducing a causer argument in the tree, corresponding to *make* in English (see Marantz, this issue, on the syntax of causation).

(42)

```
NP
  [1SG]  Caus
   np
naura -tta
  sinua

V
```

Following this, the so derived word moves to the next head up, T/M:

(43)

```
T/M
  NP
  naura -tta
  -isi
  [1SG]  Caus
    np
    sinua
  t

V
```

Another difference between English and Finnish is that where we have postulated a head T in English, Finnish has two heads, F (short for finiteness) and T/M (for tense and modality) (see Holmberg & al. 1993, Holmberg & Nikanne 2002). F has the [uφ] features which are valued by the 1st person subject pronoun and pronounced as a suffix *–n*. As a result, there are two copies of the features of the subject in the structure, so the subject pronoun need not be pronounced (see the previous section).

T/M containing the derived verb moves and adjoins to the suffix *–n* under F. Following this, the derived head moves one step further up the tree, adjoining to the question particle labelled Q.
The derived structure is spelled out as shown in (36): *naurattaisinko sinua*.

The derivation of the word by head movement seems to be subject to two conditions: (a) The movement is strictly “upwards” in the tree and therefore leftwards in relation to the string of terminal nodes of the tree, and (b) it is strictly local, as each head moves only to the next head up. In the present example the moved head adjoins every time to the left of the landing site head, i.e. the affixal heads are all suffixes. This, too, is a condition on head-movement, according to Julien (2002), who follows Kayne (1994) in this respect.

Julien (2002) reports a survey of the expression of tense and aspect in 530 languages, sampled so as to cover all the major language families and geographical regions of the world. Tense and aspect are categories both of which concern temporal properties of the event or situation denoted by a sentence. But while tense situates the event in relation to the time of utterance, aspect concerns the temporal structure of the event itself: whether it is punctual or has duration, whether it is temporally bounded or unbounded, etc. Thus, semantically, aspect has a narrower scope than tense, modifying the VP, while tense modifies the sentence. This is reflected in syntactic structure in that, where tense and aspect are encoded as independent words, aspect is below tense, hence closer to the verb. The following example, from Guyanese Creole, is typical in that respect (NONP = non-punctual aspect, corresponding in this case to the progressive in English):

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17 The operation combining T with V in English, Swedish, and Chinese briefly mentioned in Note 3 is an exception to this statement.
(45) Shi na bin a sing. (Guyanese Creole; Todd 1990)
    she not PAST NONP sing
    ‘She wasn’t singing.’

The prediction made by the Mirror Principle is that when tense and aspect are both
affixal, aspect should always be closer to the verb stem than tense. Thus, if both are
suffixes, the order should be (46a), while (46b) should not occur.

(46) a. V-Asp-Tns
    b. *V-Tns-Asp

This is confirmed by Julien’s investigation. This is striking evidence of the Mirror
Principle as a universally valid generalization, and even more specifically, of the
soundness of the theory according to which inflected verbs are derived by successive
head-movement, as depicted above.\(^1\)

Julien (2002) argues that prefixes are not derived by head movement, but are
the result of a sequence of syntactic functional categories and a lexical head being
pronounced as a single word, for example the structurally arranged sequence \[\text{TP Tns}
\text{[Asp Asp [VP V ... ]]}\] would, in some languages, be pronounced as one word (47a).
The prediction is that verbs with the form (47b) should not occur. Again this is
confirmed by Julien’s investigation.

(47) a. Tns-Asp-V
    b. *Asp-Tns-V

Another possibility predicted by the theory is verbs of the form Tns-V-Asp, created
by "partial V-movement", the verb left-adjoining to Asp, with T prefixing to the verb
thus formed. The mirror image Asp-V-Tns is then predicted not to occur. Again the
prediction is basically right.\(^2\)

\(^1\) In fact, Julien allows for another derivation of suffixes, by means of phrasal movement instead of
head movement. This will be discussed in the text below.
\(^2\) Julien (2002: 274-280) discusses a number of potential counterexamples, apparently exhibiting
either Asp-Tns-V or Asp-V-Tns order. For each of them she argues that they have very likely been
Not all inflectional morphology conforms to the Mirror Principle, however. In particular, agreement marking seems to be able to appear in a wide variety of positions in the clause, as a cursory glance at some of the orderings from Julien’s survey of Tense and Aspect markers listed reveals (see note 18). The reason for this is that agreement features (uφ-features; see previous section) do not form autonomous syntactic head positions on their own; this may be because no head can be made up only of uninterpretable/unvalued features (as suggested by Chomsky (1995)). Agreement features are thus in a sense parasitic on other features; to put it another way, uφ features are always associated with a head independently bearing interpretable features. In English and other familiar languages this head is almost always T, but as Julien’s data show, this is very far from being the case universally.

Finally, let us consider how the Mirror Principle (38) might hold in an SOV language. SOV languages typically show general “head-final” properties, in that they are postpositional, auxiliaries follow main verbs, etc. One possibility then is to treat such languages as featuring a general inversion in the ordering of heads and complements at the level of basic phrase structure. Thus, a tree corresponding to (38) might have the inverted order of heads and complements:

(48)

```
I
  \--- whether
    \------ make
    \----- you laugh
```

Assuming that the functional heads are all suffixes, a complex verb like the Finnish *naura-tta-isi-n-ko* could then be derived in a (hypothetical) SOV language either by head movement successively ‘rightwards’, or by pronouncing the sequence as a single word (like prefixes in a head-initial language).

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misanalyzed in the literature. For instance, in several of them the initial aspect marker would not be a prefix but an adverb, a phrasal constituent.
There are very good reasons to think that syntax is not symmetrical in this fashion: head-final order is not the mirror image of head-initial order. Perhaps the most striking asymmetry is that subjects are nearly always found preceding their predicate. More generally, specifiers are nearly always found preceding the head they specify. Thus wh-phrases, in languages where wh-questions are derived by wh-movement, move leftwards, to the initial part of the sentence, rather than rightwards, to the end of the sentence. It is also well known, ever since Ross (1967), that rightwards movement (for example so called Heavy NP Shift) is considerably more constrained than leftwards movement. On this topic, see also Cinque, this issue.

Asymmetries like these are the basis for one of the best known and most controversial ideas in generative linguistics, the Linear Correspondence Axiom (LCA), proposed in Kayne (1994). The following is a somewhat simplified statement.

(50) The LCA: A category \( \alpha \) precedes \( \beta \) if and only if \( \alpha \) asymmetrically c-commands \( \beta \), or if \( \alpha \) is contained in \( \gamma \), where \( \gamma \) asymmetrically c-commands \( \beta \).

The following definition of (asymmetric) c-command is sufficient for our purposes.

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20 The OSV and OVS patterns do exist, but they represent a tiny minority of the world's languages, with 4 and 11 languages respectively (Dryer 2011c). These languages tend to show otherwise mainly "head-final" characteristics (e.g. postpositions, etc). It may be that OVS involves partial roll-up, with the subject left in its "low", predicate-internal position. OVS could be similar but clearly involves a special operation placing either the object or the verb in its observed position. Information in these languages is somewhat scanty, but they clearly merit much closer investigation.

21 A notable exception, the only one on record, as far as we know, is wh-questions in some sign languages; see Cecchetto, Geraci & Zucchi (2009). They propose an analysis where this, too, is a case of leftwards wh-movement, though combined with movement of IP ("the rest of the sentence") to a higher left-peripheral position (an analysis...
a. A category $\alpha$ c-commands its sister category $\beta$ and every category contained in $\beta$.

b. $\alpha$ asymmetrically c-commands $\beta$ if and only if $\alpha$ c-commands $\beta$ and $\beta$ does not c-command $\alpha$.

The LCA explains why subjects precede their predicate: The subject always asymmetrically c-commands the predicate (clearly in the case of finite clauses, where presence of $T$ entails that VP does not c-command the subject; see (8) above, and more generally, if non-finite clauses, too, have a functional head corresponding to $T$ which c-commands the predicate but not the subject). It also explains why wh-movement is always to the left periphery of the sentence: Given that movement is always upwards, the moved constituent will always asymmetrically c-command the position it moved from, hence by the LCA, it will precede the position it moved from. By the same logic, all movement will be leftwards (meaning that the relatively few cases of rightwards movement discussed in the literature need to be reanalyzed; see Kayne 1994: 71-83).

Returning to head-final order, if suffixation of inflections to the verb in sentences with SOV order (and rich verbal inflection) is the result of verb-movement to $T$, it must be the case that the object moves as well, to an even higher position where it asymmetrically c-commands $V+T$. If there is more than one dependent of the verb preceding it, it must be the case that they all move to positions asymmetrically c-commanding $V+T$. An alternative, proposed by Kayne (1994) and developed in a range of works since then (Holmberg 2000, Hróársdottir (2000), Kayne 2000, Koopman & Szabolcsi 2000, Julien 2002, Biberauer 2003, Mahajan 2003, Jayaseelan 2010, Biberauer, Holmberg & Roberts, to appear), is that suffixation of inflections to a head in constructions with head-final order is not derived by head movement but phrasal movement, iterated in a fashion such that the end result is head-final order.

Consider the following example from Lezgian, discussed by Julien (2002), based on Haspelmath (1993):22

(52) Baku.d-a irid itim gülle.di-z aqud-na luhu-da. [Lezgian]

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22 IN = Inessive, ABS = absolutive, DAT = dative, AOR = aorist tense, HAB = habitual aspect.
Baku-IN seven men.ABS bullet-DAT take.out-AOR say-HAB
‘They say that in Baku seven men were shot.’

Assume that the structure is basically (53), where the entire CP complement of the verb meaning ‘say’ is moved to a position higher than that verb, as required by the LCA, given that the complement is spelled out preceding that verb.

(53)  [ [CP Baku.d-a irid itim gülle.di-z aqud-na] [ luhu-da tCP ]] Baku-IN seven men bullet take.out-AOR say-HAB

Now, as discussed by Haspelmath (1993), there is an alternative form of (52), where instead of a full verb ‘say’ taking a quote as complement, there is a hearsay evidential marker suffixed to the verb of the quote.

(54) Baku.d-a irid itim gülle.di-z aqud-na-lda.
    Baku-IN seven men.ABS bullet-DAT take.out-AOR-EVID
    ‘They say that in Baku seven men were shot.’

The hearsay suffix is clearly historically derived from the verb. According to Haspelmath (1993: 148), the source of the marker is still transparent to speakers, and there is some degree of variation between the suffix and the verb. Julien (2002) proposes that the structure is essentially the same as in (53), except that instead of a verb taking a CP complement, there is now an evidential marker, a type of sentential head found in many languages (cf. Cinque 1999), taking a TP complement which undergoes movement to a position where it asymmetrically c-commands the evidential head.23

(55)

23 In fact, Julien proposes that the locative PP ‘in Baku’ occupies a higher Topic-position, c-commanding the IP headed by the evidential suffix; this is irrelevant in the present context.
Note how under this analysis, the verb and the evidential suffix, although pronounced as a word, do not form a constituent in the syntax. The claim is that they systematically end up adjacent to each other, as a result of syntactic movement, and that this is sufficient to allow pronunciation of the two heads as a single word, an inflected verb. Julien (2002) argues (following Kayne 1994 and Holmberg 2000) that this is an alternative derivation of heads with suffixes: In head-initial constructions, suffixation is the result of head-movement, in head-final constructions it is the result of phrasal movement.24

Of course, in the case of (55), the verb and the evidential head end up adjacent only if the dependents of the verb precede the verb. Given the LCA, this means that the dependents are positioned higher than the verb. The verb is also inflected for tense. According to the logic of the LCA-based theory assumed by Julien (2002), following Kayne (1994), the structure of the TP in (55) should be roughly (56): The direct object *irid itim* ‘seven men’ of the verb ‘take-out’ is moved from the position as a sister of the verb to a position where it asymmetrically c-commands both the subject ‘bullet’ and the verb, and the entire VP is moved to a position where it asymmetrically c-commands T. As a consequence, verb and tense end up adjacent (ignoring the silent trace of the moved NP), and tense ends up pronounced as a suffix on the verb.

24 There is another school of thought also emanating from Kayne 1994 according to which suffixal inflection in head-initial phrases, too, is the result of phrasal movement; Hróarsdóttir 2000, Kayne 2000, Koopman & Szabolcsi 2000, Mahajan 2003, Jayaseelan 2010. The difference between head-final and head-initial phrases in this family of theories is, by and large, that in head-initial constructions the dependents of the verb (now taking VP and the sentence as example) first move out of the VP to a position lower than the inflection-head T, before the VP, now containing only the verb, undergoes movement to the specifier position of T. It may be noted that in Jayaseelan (2010), arguably the most elegant of these theories, the reason for VP-movement to the spec of T is still “to bring verbal stems and their inflections together, in all languages that have suffixal inflection on verbs”, which implies that in languages which have no such inflection, there is no such movement.
Plugging this TP in the position of the schematic TP in (55) we can see that this derivation does observe the Mirror Principle: The linear order of suffixes V+T+EVID mirrors the hierarchic relation in the syntax: EVID is higher than T (Cinque 1999), which is higher than V.

Note that if head-final order is derived by roll-up movement (so called because it involves iterated movement of progressively larger constituents) as described, rather than by, say, head-movement rightwards in a tree such as (49), the prediction is that head-final constructions should not have prefixes, only suffixes. This prediction is almost right, as shown by Hawkins & Gilligan (1988). Picking up the observation in Greenberg’s Universal 27 (Greenberg 1963), they observe that25 “[l]anguages with VO and/or Pr+NP word orders in their syntax regularly have prefixes and/or suffixes in their morphology. But in a suggestively large number of cases, languages with OV and/or NP+Po have suffixes only” (p. 219). Hawkins & Gilligan look at a database of 16 morphological categories in approximately 200 languages. The general conclusion shows a clear suffixing preference in general, and a much more marked preference in OV languages as compared to VO languages: “the prefixing/suffixing ratios in VO and Pr+NP languages are 34%/66% and 33%/67% respectively, i.e. roughly 2 to 1 in favor of suffixing; and 13%/87% and 16%/84% in OV and NP+Po languages respectively, i.e. between 5 to 1 and 7 to 1 in favor of suffixing” (p. 230); see Myler (2009:6-7), Roberts (2012), for discussion. The fact that there are any exceptions at all to the generalization means that there are other ways to derive head-final order than roll-up movement. In particular, if in a tree like (51a), the object regularly undergoes movement around the Aspect head, that head could end up as a prefix on the verb.

(51) a. [Asp [VP O V ]]
   b. O [Asp [VP tO V ]]

If object movement is more marked the ‘longer’ it is, the prediction is that functional heads closer to the VP should more often be prefixes to V in OV-languages than more distant categories. Judging by Hawkins & Gilligan (Table 9, p. 234), the prediction is right: aspect and causative prefixes are more common than (almost non-existent) tense and mood prefixes.

25 “Pr” abbreviates “Preposition” and “Po” abbreviates “Postposition.”
6. Conclusion

In the foregoing we have tried to illustrate how fairly complex aspects of clausal syntax, including word order and the possibility of phonetically silent arguments of a predicate, may be correlated with readily observable and, in themselves, rather simple properties of verbal inflection. We have also discussed the relation between the internal structure of words and the structure of sentences. This is essentially a consequence of the fact that inflections are syntactic categories, realized as parts of words. Due to the restricted range of mechanisms made available by Universal Grammar, primarily movement, either head-movement and phrasal movement, both subject to strict locality conditions, the order/structure of complex words closely mirrors the order/structure of phrasal constituents, including sentences.

If, as discussed, the properties of radical pro-drop languages, including quite subtle properties of generic constructions, basically follow from the absence of agreement, then acquisition of these properties is correspondingly simplified. In principle it should suffice to observe the absence of agreement to ‘know’ that the language has the properties of a radical pro-drop language. We also discussed the fact that there are two radically different types of V-initial languages; identical surface order may be the consequence of radically different derivations. Again, insofar as properties of verb inflection are a crucial criterion distinguishing between the two types, we may assume that inflection serves as an important cue for the acquisition of the right grammar. And if the theory sketched in the previous section, based on Kayne (1994) and Julien (2002), is on the right track, then existence of prefixes in a language will be an important cue to abstract structural properties, which we may assume is made use of in language acquisition. Since we know that children pay attention to subtle properties of inflection very early in the process of first language acquisition (Slobin 1982, Wexler 1998, Guasti 2002) this assumption is well motivated.

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