Hierarchies

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1 Introduction

This work investigates the role that hierarchies play in grammar, specifically the hierarchy of person and animacy. I will use the person/animacy hierarchy in conjunction with other hierarchies to account for instances where person or animacy specifications have an effect in the syntax, for example the case of null subjects in Hebrew, which are only allowed for first and second person arguments, or the complex cliticization patterns of Sesotho, which depend on the animacy of all the arguments in the sentence. The theory developed here is one of markedness, and the crucial observation is that markedness results from the relationship between different hierarchies: a marked configuration emerges when an element ranks high on one scale but low on another.

A hierarchy of person and animacy has been proposed by various authors to account for different grammatical phenomena. For instance, Morolong and Hyman (1977:202) use such a hierarchy to determine the object status of arguments, and Silverstein (1976: 122) uses it in a typology of split ergativity systems. The exact characterization of the hierarchy varies from author to author; the following is the version proposed by Aissen (1998).

(1) Local Person (1st/2nd) > Proper Noun 3rd > Human 3rd > Animate 3rd > Inanimate 3rd

In addition to person/animacy, various other hierarchies have been proposed in the literature. Examples of other hierarchies are thematic role in (2) (this specific formulation taken from Choi 1996), grammatical function in (3) (this specific formulation taken from Aissen 1998), and the reduction scale in (4) (Bresnan 1998).

(2) Agent > Beneficiary > Experiencer/Goal > Instrument > Patient/theme > Locative

(3) Subject > Object

(4) Null > Overt

What ties these different hierarchies together? A suggestion by Maria Bittner (personal communication) is that all of these scales reflect the likelihood of an argument being a topic. Thus, the participants of a conversation are more likely to be the topic of

that conversation than other humans, or animals, or objects. Similarly, agents and subjects are more likely to be topics of discussion than themes or objects. The last scale reflects the tendency to phonologically reduce topics and other anaphoric elements.

The scales in (1)–(4) can be used to impose a markedness measure on syntactic configurations. As noted above, the co-occurrence of an element from the high end of one scale with an element from the low end of another scale is marked. It is not that themes are more marked than agents or that agents are more marked than themes, but it is more marked to have a theme as subject than to have an agent as subject; it is also more marked to have a theme as a subject than to have a theme as object. The markedness relations derived from the abstract hierarchies enable us to incorporate the effects of the hierarchies into the grammar, by excluding marked configurations in favor of less marked ones.

A technical means for capturing the idea that high ends of hierarchies tend to go together with other high ends, and low ends with low ends, has been developed by Prince and Smolensky (1993) in their definition of *alignment*. The domain of their theory is syllable structure, and the two scales are positional prominence within the syllable (peak vs. margin) and sonority prominence. By aligning these two prominence scales Prince and Smolensky derive the result that the least marked syllable is one in which the peak is most sonorous and the margins are least sonorous.

Aissen (1998) applies the alignment technique to hierarchies such as (1)–(4) above, and derives a typology of voice systems. She shows how aligning different scales with the grammatical function scale (3) yields voice systems conditioned by various factors such as person or prominence. I use additional alignments to capture other effects of person and animacy, such as person-conditioned *pro*-drop or restrictions on clitics.

2   Null subjects

The first application of the prominence scales will be an account of person effects on the licensing of null subjects. The markedness measures determined by the prominence scales give a typology of languages, where if a language allows null subjects of a certain type, it must also allow null subjects of any type higher on the scale. As the examples in this section show, this seems to be a correct prediction for natural languages. We start with Hebrew, where it is person specification that licenses null subjects.

2.1   Null subjects and Person

The ability to have a sentence without an overt subject ("*pro*-drop") in Hebrew depends on the person specification of the subject: An overt subject (pronoun or referential NP) is required when the subject is third person, whereas a first or second person subject need not be realized as an overt element in the sentence.

(5)   axalti / axalta / axalt / *axal / *axla / axalnu / axaltem / *axlu   banana
       ate.1s   2ms   2fs   3ms   3fs   1pl   2pl   3pl   banana

The future tense shows clear evidence that it is person specification and not just morphological form that conditions *pro*-drop in Hebrew. Ritter (1995:432) observes that

null subjects are possible with a future second person singular masculine verb but not with third person singular feminine verb, despite the fact that the two forms are homophonous.

(6) ata/*pro* toxal et ha-banana   "you will eat the banana"
     hi/**pro* toxal et ha-banana   "she will eat the banana"

Under the analysis I develop here, the availability of null subjects is tied to the universal person/animacy scale. I thus derive the following implication: if a language has a *pro*-drop system conditioned by person, it must work in the same direction as in Hebrew. The idea works as follows: it is more harmonic, that is less marked, for an element to be on the same side of two prominence scales than for it to be on different sides of the two scales. Thus a null argument which is a first or second person pronoun will be less marked than a null argument which is a third person pronoun, while an overt NP that is first or second person will be more marked than an overt NP that is third person. Consequently, the following implications are derived:

(7) If a language allows null arguments in the third person, it will also allow them in first and second persons;

(8) If a language requires first and second person arguments to be overt, it will also require third person arguments to be overt.

The formal mechanism that derives these implications is alignment of prominence scales. The following definition of alignment (taken from Prince and Smolensky 1993: 136) formalizes the idea that elements on the high end of one prominence sale tend to occur together with elements on the high end of another scale, while elements on the low end of one scale tend to align with the low end of the other.

(9) Suppose given a binary dimension D_1 with a scale $X > Y$ on its elements $\{X, Y\}$, and another dimension D_2 with a scale $a > b > \cdots > z$ on its elements. The *harmonic alignment* of D_1 and D_2 is the pair of Harmony scales:

H_X: $X/a \succ X/b \succ \cdots \succ X/z$
H_Y: $Y/z \succ \cdots \succ Y/b \succ Y/a$

The *constraint alignment* is the pair of constraint hierarchies:

C_X: $*X/z \gg \cdots \gg *X/b \gg *X/a$
C_Y: $*Y/a \gg *Y/b \gg \cdots \gg *Y/z$

The scales that will be aligned in order to derive the *pro*-drop implications are the following.

(10) Prominence scales:
     Reduction: null > overt
     Person: 1,2 > 3

The first of these scales is the reduction scale in (4) above. It means that in general, things on the higher end of hierarchies have more of a tendency to be expressed by null

arguments than things on the lower end. Vieri Samek-Lodovici (personal communication) points out that the preference for null subjects in Italian is limited to topics, and in Hebrew too I feel that null subjects in first and second person are not truly "optional", rather their distribution is dependent on discourse status in a way that is yet to be precisely characterized (in a different Optimality Theory analysis, Bresnan (1998) also ties null pronouns to topichood). So the reduction scale can be thought of as a scale pertaining to topics. The second scale is simply the top two elements of the person/animacy scale in (1)—an extension to the rest of the scale will follow in section 2.3.

We can apply the definition of alignment in (9) to the two prominence scales in (10). The result is the harmony scales in (11) and the constraint rankings in (12).

(11) Harmony scales:
H_{null} : null/1,2 $\succ$ null/3
H_{overt}: overt/3 $\succ$ overt/1,2

(12) Constraint rankings:
C_{null} : *NULL/3 $\gg$ *NULL/1,2
C_{overt}: *OVERT/1,2 $\gg$ *OVERT/3

What has all this bought us? One core assumption of Optimality theory is that constraints can be freely reranked to produce different languages. Free reranking predicts that all permutations of the four constraints in (12) are allowed, that is 24 rankings that yield four possible languages. However, the subhierarchies derived in (12) reduce the number of possible rankings to six. Of these:

(13) One ranking gives a language with *pro*-drop in both first and second persons as well as in third person (e.g. Italian). This happens when C_{overt} dominates C_{null}, so for all persons *OVERT dominates *NULL, resulting in null subjects throughout.

(14) One ranking gives a language with no *pro*-drop in either first and second persons or third person (e.g. English). This happens when C_{null} dominates C_{overt}, so for all persons *NULL dominates *OVERT, resulting in no null subjects whatsoever.

(15) Four rankings give a language with *pro*-drop in first and second persons but not in third person (e.g. Hebrew). This happens when C_{overt} and C_{null} are interleaved, so for first and second persons *OVERT dominates *NULL, while for third person *NULL dominates *OVERT. The result is that first and second person subjects surface as null, while third person subjects are realized overtly. This is demonstrated in the following tableaus:

a.

		*OVERT/1,2	*NULL/1,2
⇒	*pro* axalti		*
	ani axalti	*!	

'I ate'

b.

		*NULL/3	*OVERT/3
	pro axal	*!	
⇒	hu axal		*

'he ate'

What is excluded from the typology is a language with *pro*-drop in third person but not in first or second person. There is just no way to get a ranking where *NULL/1,2 dominates *OVERT/1,2 while *OVERT/3 dominates *NULL/3 that is consistent with the subhierarchies in (12). We can see how the implications in (7)–(8) follow from the subhierarchies:

(16) If *OVERT/3 dominates *NULL/3, then by transitivity we get *OVERT/1,2 dominates *NULL/1,2. This amounts to saying that if a language allows null arguments in the third person it will also allow them in first and second persons (7).

(17) If *NULL/1,2 dominates *OVERT/1,2, then by transitivity we get *NULL/3 dominates *OVERT/3. This amounts to saying that if a language requires first and second person arguments to be overt it will also require third person arguments to be overt (8).

So the prediction that the hierarchies make is that if a language is to make a distinction based on person as to which subjects do not have to be phonetically realized, then it will be the first and second persons that are dropped. In addition to Hebrew, some Italian dialects follow the same pattern: whereas standard Italian allows null subjects for all person specifications, the Trentino dialect (Brandi and Cordin 1989:113) requires overt pronouns for third person subjects while allowing null subjects in the first and second person (with the exception of second person singular). Even in a system like Irish, where the availability of null arguments is not determined by person (see section 2.5), there is a residual effect of person specification. While standard Irish requires that there be no overt subject when the verb is inflected for subject agreement, Doron (1988:216) gives examples from West Munster dialects of Irish, where it is possible to have an overt subject together with an inflected verb, but only in the third person. Once again we see that the prediction of the person hierarchy works in the right direction: if there is an effect of person, then first and second persons are more likely to be dropped.

2.2   Previous analyses

A different analysis for the person effects in the Hebrew *pro*-drop system is given by Ritter (1995). She analyzes these effects as stemming from different licensing conditions on first and second person pronouns as opposed to third person pronouns, the ultimate source being a difference in structure between the two kinds of pronouns (first and second person pronouns are DPs while third person pronouns are NumPs). Ritter gives reference to literature indicating that a difference in the behavior of the two classes of pronouns is attested in various languages. Yet, the particular structures she proposes for the pronouns are specific to Hebrew; it should thus be possible under her account for a language to have opposite structural specifications, and thus show a paradigm opposite to (5) above. Under the analysis I have developed here, the null subject paradigm of Hebrew is one of the options allowed by the universal person/animacy scale; a system opposite to Hebrew is predicted to be impossible.

Another account of *pro*-drop phenomena, couched within Optimality Theory, is given by Grimshaw and Samek-Lodovici (1995). It treats the realization of subject pronouns as a result of the tension between faithfulness to underlying specification and the

tendency to eliminate topics. Thus, a null pronoun in the surface form incurs a violation of the constraint PARSE, while an overt pronoun that is coreferent with the topic violates the constraint DROPTOPIC. The relative ranking of these constraints will determine whether a language allows null subjects (for instance, Italian) or if it requires all subjects to be overt (English). This analysis treats all pronouns alike, regardless of their person specification, and consequently it does not deal with person-conditioned systems like Hebrew.

A possible extension of Grimshaw and Samek-Lodovici's account would be to parameterize the constraint DROPTOPIC: if we assume it to be universally true that DROPTOPIC/1,2 dominates DROPTOPIC/3, then the faithfulness constraint PARSE could appear in three positions with respect to the other two, resulting in three types of languages: Italian (PARSE is dominated by both DROPTOPIC constraints), English (PARSE dominates both constraints), and Hebrew (PARSE appears between the two). Notice the similarity between the proposed universal ranking of DROPTOPIC and the subhierarchy C_{overt} from (12).

(18) DROPTOPIC/1,2 $\gg$ DROPTOPIC/3
      *OVERT/1,2 $\gg$ *OVERT/3

The difference between my analysis and the extension of Grimshaw and Samek-Lodovici's is in how the subhierarchy is derived. I get the subhierarchy from the universal person hierarchy through alignment of scales, so in addition to the constraints governing overt subjects I get a pair of constraints on null subjects; what follows, then, is a theory of surface markedness, and it is not necessary to assume that null arguments fail to parse the input. In contrast, the proposed extension to Grimshaw and Samek-Lodovici's theory will retain the idea that null subjects are a breach of faithfulness, but the reason why the subhierarchy in (18) should be universal remains obscure.

2.3   Null subjects and animacy

The implications in (7)–(8) were derived by aligning the reduction scale (4) with only the top portion of the person/animacy scale (1). If we align the reduction scale with the complete hierarchy we will get additional implications. The typology derived in section 2.1 can be characterized as follows: given the scale 1,2 > 3 that aligns with the reduction scale, a language must choose a point on the scale such that all elements above it are null and all elements below it are overt. This point may be below the whole hierarchy (Italian), above it (English), or in the middle (Hebrew). This generalizes to the alignment of other scales with the reduction scale.

(19) Whenever a hierarchy aligns with the reduction scale, the resulting typology is
      the set of languages with a split such that all the elements above the split are null,
      and those below it are overt.

The split can occur at the bottom of the hierarchy (which means that all the elements are null), at the top (all of them are overt), or between any two elements. The above generalization is guaranteed by the mechanism of alignment; for a formal proof see Appendix A.

If the entire person/animacy hierarchy aligns with the reduction scale, we predict that there should be languages which show a split between null and overt subjects at a point lower on the scale than Hebrew. Polish is such an example: in a grammar of Polish, Brooks (1975) seems to shift between the claim that null subjects are generally allowed (p. 360) and that they are allowed in the first and second persons (p. 363). Maria Bittner (personal communication) points out that null subjects in Polish are fine for human third person referents, but impossible for inanimate ones. Polish thus occupies another slot in the typology predicted by the hierarchies.

2.4   Null expletives

The person-based implications from section 2.1 hold only for thematic subjects, not for expletive ones. While expletive subjects often take the form of a third person pronoun, they are more easily omitted than thematic subjects. In Hebrew, for instance, an expletive (normally the demonstrative pronoun *ze*) may be absent even in places where all thematic subjects (including first and second persons) are required, as in the present tense (where the verb is not inflected for person) or in nominal constructions. Indeed, in a survey of constructions without overt subjects in Hebrew, Berman (1980, fn. 2) makes a distinction between null first and second pronouns, which she considers to be real pronouns, and constructions such as expletives which she considers truly subjectless.

But expletive elements also show behavior similar to what we have seen so far. Travis (1984, ch. 5) suggests that there is a hierarchy of expletives, and shows that if a language allows null expletives on a certain point in the hierarchy, it will also allow null expletives in all the points higher up.

(20) Argumentless Passives and Unaccusatives > Expletives of Displaced NPs > Expletives of Displaced CPs (S′) > Weather Predicates > Referential NPs

Travis's system is exactly what we get if we align the above hierarchy with the reduction scale of (4); this is a further application of the generalization in (19). So given the hierarchy proposed by Travis, the mechanism developed here yields the correct typology.

Travis's hierarchy (20) includes referential NPs as its bottom element. This automatically accounts for the generalization of Jaeggli and Safir (1989:19), that "While every language that permits null thematic subjects also permits null expletive subjects, it is not the case that every language that permits null expletive subjects permits null thematic subjects." We could even go further, and propose that the expletive hierarchy is a continuation of the person/animacy hierarchy in (1). Such an analysis would give us a continuum of languages, from those who only allow certain null expletive subjects to those who allow some null thematic subjects based on a person or animacy distinction and finally to those who allow all subjects to be null. The problem with viewing the expletive hierarchy as a continuation of the person/animacy scale is that person and animacy manifest themselves in various parts of the grammar, while the only evidence so far for the expletive scale comes from Travis's work.

2.5   Morphologically conditioned *pro*-drop

An instance where it is not the hierarchies that determine the availability of null subjects is when null subjects are dependent on the morphology. A token example is Irish: McCloskey and Hale (1984:491) point out that "there is in Irish an absolute complementarity between the appearance of person-number morphology on the verb, and the appearance of an independent phonologically-expressed subject." The existence of agreement morphology on the verb varies with tense and with different person-number specifications, and seems to be the result of morphological accident rather than principled reasons. We seem to be dealing here with a system that is inherently different from that of Hebrew. Also, *pro*-drop in Irish, when possible, is obligatory in all discourse settings, as opposed to the case in Italian or Hebrew where null pronouns are licensed in certain discourse configurations and not in others. The Irish pattern seems to be characteristic of VSO languages: a similar pattern is attested in Classical Arabic; Doron (1988) even draws parallels between Irish and the (relatively marked) postverbal subjects in Hebrew.

Morphology plays a role in Hebrew too, at least in certain constructions. It has already been mentioned that in the present tense and in nominal constructions no null subject are available, and this must be tied to the fact that in these cases there is never any agreement morphology on the predicate. There are morphological effects even in the future tense. In substandard (but very commonplace) colloquial Hebrew, the first person singular form has been suppleted by the third person singular masculine. In this case null subjects are impossible, though they are possible for the standard first person form (Borer 1989; Ritter 1995).

(21)   hu/*pro yoxal et ha-banana   "he will eat the banana"
        Colloquial: ani/*pro yoxal et ha-banana   "I will eat the banana"
        Standard: ani/pro oxal et ha-banana   "I will eat the banana"

This dependence on the morphological form of the verb is in striking contrast to the examples in (6) above, where the availability of null subjects is dependent on the person specification of the verb alone. The explanation for this lies in the fact that the suppletion of the first person singular by the third person form is a relatively new innovation in Hebrew, and is restricted to the more familiar or colloquial registers. On the other hand, the homophony of the future tense second person masculine singular with third person feminine singular is much more established: it appears in all registers, has existed since the earliest stages of the language, and is characteristic of many other Semitic languages. So despite a little deviation which is due to a morphological development that is yet to be stabilized, the availability of null subjects in Hebrew is by and large dependent on person.

2.6   Aligning grammatical relations

I end this section by returning to the alignment operation that we performed in (10)–(12). In these examples it is crucial that we align the person/animacy scale along the reduction scale, and not the other way around. If we aligned reduction along the person scale we would get the following: null first and second person pronouns would be better than overt ones, while overt third person pronouns would be better than null ones.

This is a particular grammar which determines the optimal form for each person specification. However, if alignment should be thought of as universal, then its purpose is to constrain the typology, not to derive a particular grammar. So we are not asking what is the best realization for a specific person, rather the question we are asking is what makes a good null or overt pronoun. This way the grammar imposes a markedness relation on null pronouns and a different markedness relation on overt pronouns, and the various ways of combining these relations yield the set of possible languages.

It seems that in general, then, alignment does not take an element and find the best realization for it, but rather looks at the grammatical realization and determines what elements would fill it best. Previous applications of alignment have also aligned the inherent specification along the grammatical realization: sonority is aligned with syllable position (Prince and Smolensky 1993), and person, thematic role and discourse prominence are aligned with grammatical function (Aissen 1998).

As a further application of alignment, we may look at what happens when we align the reduction scale (4) with the grammatical function scale (3). The following alignment is made using the reduction scale as a base, again following the principle that the base for alignment should be the scale that is more abstract, or that is less tied to the inherent specification.

(22) Prominence scales:
Reduction: null   > overt
Function: subject > object

(23) Harmony scales:
H_{null} : null/subject $\succ$ null/object
H_{overt}: overt/object $\succ$ overt/subject

(24) Constraint rankings:
C_{null} : *NULL/OBJECT $\gg$ *NULL/SUBJECT
C_{overt}: *OVERT/SUBJECT $\gg$ *OVERT/OBJECT

As before, the derived subhierarchies limit the possible ways to arrange the above constraints into a single ranking. This yields the following typological implications, which conform to the generalization made in (19) above.

(25) If a language allows null objects, it also allows null subjects.

(26) If a language requires overt subjects, it also requires overt objects.

As far as I know, these implications hold, at least for null pronominals (traces being a different category).

3 Markedness in Sesotho

In Sesotho, a Bantu language spoken in Lesotho and adjacent areas in South Africa, double object constructions have two arguments (beneficiary and theme) following the verb. In certain instances an argument is realized as a clitic: a passivized argument is realized as a subject clitic, while an object clitic is required when one of the arguments is

		clitic	V	DP	clitic	V	DP
a.	*	BEN.INA		THM.HUM	$\sqrt{}$ THM.HUM		BEN.INA
b.	$\sqrt{}$	BEN.HUM		THM.HUM	$\sqrt{}$ THM.HUM		BEN.HUM
c.	$\sqrt{}$	BEN.HUM		THM.INA	$\sqrt{}$ THM.INA		BEN.HUM
d.	$\sqrt{}$	BEN.INA		THM.INA	$\sqrt{}$ THM.INA		BEN.INA
		beneficiary clitic			theme clitic		

Table 1: One clitic (subject or object)

pronominalized, left dislocated, or is a relative pronoun. However, cliticization is not always possible; the pattern of configurations where cliticization is allowed is rather complex, and depends on the animacy of the arguments, among other things. In this section I show how a natural explanation for the Sesotho paradigms follows from the universal hierarchies and the relations between them.

3.1   Constructions with one clitic

A single argument in a double object construction can be realized as a clitic in all configurations except one:

(27) When the beneficiary is inanimate and the theme is human, the beneficiary argument cannot cliticize.

Table 1 gives a schematic representation of the possible configurations: on the left are the cases with the beneficiary argument as a clitic, and on the right are those with a theme clitic; each column shows the possible combinations of human and inanimate beneficiaries with human and inanimate themes (all the Sesotho data are taken from Morolong and Hyman 1977; for actual examples see Appendix B).

The paradigm in Table 1 is the same for all the grammatical constructions that require a single clitic, so it is natural to see it as a reflection of some structural markedness. The ungrammatical construction in this paradigm is an instance of "the worst of the worst" (or "the opposite of one's expectancies", Morolong and Hyman 1977:204). We want it to follow from our prominence scales that of all the constructions in Table 1, the starred one must be the most marked. The intuition goes as follows: the prominence scales determine that it is more marked for a beneficiary to be inanimate rather than human, and for a theme to be human rather than inanimate. Therefore, the most marked combination is an inanimate beneficiary with a human theme. If the grammar is set in such a way that marked expressions above a certain threshold are excluded from the set of possible outputs, then it must be that the most marked configuration is the one that is most likely to be excluded. Thus, the Sesotho paradigm is not arbitrary, but rather a manifestation of natural markedness relations.

I now show how the above intuition can be derived from the prominence scales. The scales we need are the thematic role scale and the person/animacy scale—in (28) I only show the two relevant elements of each scale (Morolong and Hyman only contrast human arguments with inanimate ones, so I have no information on how non-human

animate arguments pattern; both "human" and "inanimate" are elements of the same scale—the person/animacy scale (1)).

(28) Prominence scales:
  Thematic Role: BEN > THM
  Animacy: HUM > INA

The first step is to show that it is more marked for a beneficiary to be inanimate and for a theme to be animate—this is done through alignment as defined in (9) above. We get two harmony scales, and the corresponding Optimality Theory constraint rankings.

(29) Harmony scales:
  H_{BEN}: BEN-HUM ≻ BEN-INA
  H_{THM}: THM-INA ≻ THM-HUM

(30) Constraint rankings:
  C_{BEN}: *BEN-INA ≫ *BEN-HUM
  C_{THM}: *THM-HUM ≫ *THM-INA

The subhierarchies in (30) only assess the markedness of a single argument. To determine the markedness of configurations with two arguments we need to appeal to two additional principles: the first is *local conjunction* (Smolensky 1995), which captures the intuition that having two marked structures within a single domain can result in a configuration that is more marked than having either of the marked structures alone.

(31) The Local Conjunction of C_1 and C_2 in domain D, C_1 & C_2, is violated when there is some domain of type D in which both C_1 and C_2 are violated. Universally, C_1 & $C_2 ≫ C_1, C_2$.

The second principle is a proposal by Aissen (1998:28) which I will call *ranking preservation*; this principle states that if one structure is more marked then the other, then a complex configuration with the marked structure is more marked then a similar configuration with the less marked structure.

(32) The local conjunction of C_1 with subhierarchy $[C_2 ≫ C_3 ≫ \cdots ≫ C_n]$ yields the subhierarchy $[C_1$ & $C_2 ≫ C_1$ & $C_3 ≫ \cdots ≫ C_1$ & $C_n]$.

Together, the two principles allow us to construct a markedness scale composed of both of the rankings in (30), that is of configurations with both a beneficiary and a theme argument. The general schema for conjoining two subhierarchies is as follows (see also Aissen 1998, fn. 18).

We start with two subhierarchies of constraints:

(33) S_1: A ≫ B
  S_2: C ≫ D

From these we form complex subhierarchies through local conjunction and ranking preservation. Each of the constraints will be conjoined with a subhierarchy, yielding four complex subhierarchies (we assume that local conjunction is symmetric, that is A&B = B&A):
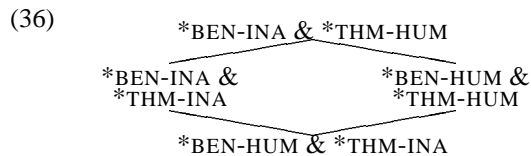
(34) Conjoining A with S_2:   A&C $\gg$ A&D
      Conjoining B with S_2:   B&C $\gg$ B&D
      Conjoining C with S_1:   A&C $\gg$ B&C
      Conjoining D with S_1:   A&D $\gg$ B&D

The rankings above can be collapsed into the following partial ordering:

(35)
```
        A&C
       /   \
    A&D     B&C
       \   /
        B&D
```
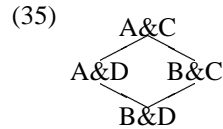
Applying this general schema to the two subhierarchies in (30) (repeated below), we get the following markedness scale.

(30) Constraint rankings:
      C_{BEN}: *BEN-INA $\gg$ *BEN-HUM
      C_{THM}: *THM-HUM $\gg$ *THM-INA

(36)
```
              *BEN-INA & *THM-HUM
             /                    \
    *BEN-INA &            *BEN-HUM &
    *THM-INA             *THM-HUM
             \                    /
              *BEN-HUM & *THM-INA
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We see that indeed the most marked configuration obtains when the beneficiary is inanimate and the theme is human.

The first part of the argument has now been completed—we have shown what the most marked configuration is. Next we need to set up a grammar that accounts for the Sesotho data by excluding the marked configurations. However, not every Sesotho construction with an inanimate beneficiary and a human theme is excluded: such a construction is admissible when both arguments are full NPs; and as the data in Table 1 show, such a construction is also allowed when the theme is a clitic and the beneficiary is a full NP, but is excluded when the beneficiary is a clitic and the theme a full NP. So the markedness scale in (36) has to apply in a different fashion to the various constructions.

Can we use a prominence scale, for instance one that relates clitics and overt NPs, to account for the Sesotho paradigm? The answer is no. Vieri Samek-Lodovici (personal communication) points out that alignment of prominence scales works when the marked configurations arise from an *inverse* relation between the scales, that is when a combination from different ends of two scales results in marked structure. We thus have reason to distinguish between the abstract scales, which do not in themselves signify markedness, and the markedness relations that are reflected in constraint rankings. In the case at hand there is no inverse relation between the type of arguments and the form of the NPs that realize them; the ranking in (36) is a true markedness measure, as it by itself evaluates the relative markedness of syntactic configurations.

What is left to do, then, is to parameterize the ranking in (36) with respect to different NP realizations; we will then get a different version of (36) for every syntactic

structure. I start by examining the structures on the left-hand side of Table 1, where an inanimate beneficiary clitic is not allowed to co-occur with a human theme NP. It is important to specify both that the beneficiary is a clitic and that the theme is a full NP, because constructions where both arguments are clitics are governed by different considerations, as we will see in the following section; in fact it is possible to have an inanimate beneficiary clitic together with a human theme clitic, if the theme is the subject clitic (example a of the two clitic set in Appendix B).

In order to incorporate the NP realizations into the ranking in (36) I will assume two new constraints—one that marks clitics (call it *CL) and another that marks full NPs (*NP). These relate to the specific arguments through local conjunction: while a constraint like *BEN-INA will assign a violation to any inanimate beneficiary, the conjoined constraint *BEN-INA & *CL will assign a violation only to one that is realized as a clitic. We are now interested in beneficiary clitics and NP themes, and these are evaluated by the following subhierarchies (derived from the respective conjunction of *CL with C_{BEN} and of *NP with C_{THM} from (30)).

(37)   *BEN-INA & *CL   ≫ *BEN-HUM & *CL
          *THM-HUM & *NP ≫ *THM-INA & *NP

These follow the general scheme for conjunction of two subhierarchies, so again we get a partial ordering.

(38)   [*BEN-INA&*CL] & [*THM-HUM&*NP]

     [*BEN-INA&*CL] &   [*BEN-HUM&*CL] &
     [*THM-INA&*NP]   [*THM-HUM&*NP]

          [*BEN-HUM&*CL] & [*THM-INA&*NP]

So an inanimate beneficiary with a human theme is also the most marked configuration in the specific case where the beneficiary is a clitic and the theme is a full NP; this is indeed the only configuration in the set of data that is ungrammatical.

We can now proceed to show how an Optimality Theory grammar will exclude the most marked configuration from the set of possible outputs. Let T_B be the topmost constraint in (38), and let F(CL) stand for the set of constraints that force cliticization; *CL will stand for any constraint that works against clitics, aside from T_B. The following ranking will derive the set of data in Table 1.

(39) T_B ≫ F(CL) ≫ *CL

Of course, it is a simplification to treat the constraints that favor cliticization as faithfulness constraints; rather, the grammar as a whole should determine whether or not an argument surfaces as a clitic. But for our present purpose it is sufficient to show that the most marked configuration is ruled out because the constraint that operates against it is ranked higher than any constraint that favors a clitic. Consequently, I will treat the constraints that favor cliticization as faithfulness constraints, and assume that the input contains the specification whether an argument should surface as a clitic or not. In case faithfulness fails, the input will default to something else, for instance a construction with a free standing pronoun instead of a clitic (Sesotho does have free standing pronouns which function like any other NP). The following tableaus illustrate the effect of the above ranking.

(40)

Input: V(THM.HUM, BEN.INA.CL)	T_B	F(CL)	*CL
BEN.INA.CL-V THM.HUM	*!		*
⇒ V THM.HUM BEN.INA		*	

(41)

Input: V(THM.INA.CL, BEN.INA)	T_B	F(CL)	*CL
⇒ THM.INA.CL-V BEN.INA			*
V THM.INA BEN.INA		*!	

Having dealt with cases of beneficiary clitics and theme NPs, we now turn over to constructions with clitic themes and beneficiary NPs (the right hand side of Table 1). We get the relevant modification of (36) by applying the scheme for conjoining sub-hierarchies to those in (42), derived this time from the respective conjunction of *CL with C_{THM} and of *NP with C_{BEN} from (30). The result is the partial ordering in (43).

(42)   *THM-HUM & *CL ≫ *THM-INA & *CL
       *BEN-INA & *NP ≫ *BEN-HUM & *NP

(43)

$$[\text{*BEN-INA}\&\text{*NP}] \& [\text{*THM-HUM}\&\text{*CL}]$$

[*BEN-INA&*NP] &	[*BEN-HUM&*NP] &
[*THM-INA&*CL]	[*THM-HUM&*CL]

$$[\text{*BEN-HUM}\&\text{*NP}] \& [\text{*THM-INA}\&\text{*CL}]$$

Once again we see that the most marked configuration involves an inanimate beneficiary with a human theme. This time, however, the top constraint of (43) must be dominated by some member of F(CL), because a sentence with a human clitic theme and a beneficiary inanimate NP is allowed. Let T_T be the top constraint in the above configuration; the following tableau illustrates the effect of such a ranking.

(44)

Input: V(THM.HUM.CL, BEN.INA)	T_B	F(CL)	T_T
⇒ THM.HUM.CL-V BEN.INA			*
V THM.HUM BEN.INA		*!	

To sum up this section, both the construction with a beneficiary clitic and the one with a theme clitic are consistent with the markedness scale in (36). For beneficiary clitics the topmost configuration is excluded from the language, while for theme clitics all the configurations are legitimate outputs. At the moment we have no principled reason why the top constraint in (38) should assess higher markedness than the one in (43), that is why $T_B \gg T_T$. It seems that generally, a human clitic is better than an inanimate clitic (though it is the opposite for themes).

3.2   Constructions with two clitics

Sesotho also has double object constructions where both the theme and the beneficiary arguments are cliticized; this happens when one argument is passivized and hence realized as a subject clitic, while the other is pronominalized, left dislocated, or is a relative pronoun, and is thus an object clitic (Sesotho does not allow more than one object clitic

		S.clitic	O.clitic	V		S.clitic	O.clitic	V
a.	*	BEN.INA	THM.HUM		√	THM.HUM	BEN.INA	
b.	√	BEN.HUM	THM.HUM		√	THM.HUM	BEN.HUM	
c.	√	BEN.HUM	THM.INA		*	THM.INA	BEN.HUM	
d.	*	BEN.INA	THM.INA		*	THM.INA	BEN.INA	
		beneficiary subject				theme subject		

Table 2: Two clitics (subject-object)

within the verbal complex). Table 2 shows the pattern of grammatical and ungrammatical configurations when one argument is passivized and the other is a relative pronoun (paradigms for the other constructions are slightly different).

The descriptive generalization that emerges from this paradigm is clear:

(45) When one argument is a relative pronoun (and hence realized as an object clitic), the other can passivize only if it is human.

We see that in the case of two clitics, the thematic role of the arguments does not matter, the grammar only cares about the animacy of the subject (the passivized argument). Thus, an inanimate subject clitic together with any object clitic is ungrammatical. In order to derive this result through alignment we have to consider the scales of grammatical function and animacy.

(46) Prominence scales:
    Function: SUBJ > OBJ
    Animacy: HUM > INA

Alignment applies as usual to the two scales and yields the following harmony scales and constraint rankings.

(47) Harmony scales:
    H_{SUBJ}: SUBJ-HUM ≻ SUBJ-INA
    H_{OBJ} : OBJ-INA   ≻ OBJ-HUM

(48) Constraint rankings:
    C_{SUBJ}: *SUBJ-INA ≫ *SUBJ-HUM
    C_{OBJ} : *OBJ-HUM ≫ *OBJ-INA

Finally, the two subhierarchies are conjoined following the general schema, and the result is a new markedness scale on syntactic configurations.

(49)
          [*SUBJ-INA] & [*OBJ-HUM]

    [*SUBJ-INA] &   [*SUBJ-HUM] &
      [*OBJ-INA]   [*OBJ-HUM]

          [*SUBJ-HUM] & [*OBJ-INA]

The hierarchy in (49), much like that of (36) above, has to be parameterized for syntactic constructions. The only place where it actually shows an effect is in constructions

with two clitics. We should therefore look at the conjunction of *CL with the two sub-hierarchies from (48), and at the partial ordering derived from conjoining the two sub-hierarchies.

(50)   *SUBJ-INA & *CL ≫ *SUBJ-HUM & *CL
         *OBJ-HUM & *CL ≫ *OBJ-INA & *CL

(51)   [*SUBJ-INA&*CL] & [*OBJ-HUM&*CL]

      [*SUBJ-INA&*CL] &   [*SUBJ-HUM&*CL] &
        [*OBJ-INA&*CL]   [*OBJ-HUM&*CL]

           [*SUBJ-HUM&*CL] & [*OBJ-INA&*CL]

This time the boundary of tolerated markedness cuts across the middle tier: configurations on the top and the left of the diagram are ungrammatical, while those on the right and on the bottom are fine. Let S_I stand for the two constraints in the hierarchy that include *SUBJ-INA as one component (top and left), and let S_H stand for the two that include *SUBJ-HUM (right and bottom); the constraint ranking in (52) will derive the pattern of Table 2.

(52) S_I ≫ F(CL) ≫ S_H, *CL

(53)

Input: V(SUBJ.INA.CL, OBJ.HUM.CL)	S_I	F(CL)	*CL
SUBJ.INA.CL-OBJ.HUM.CL-V	*		**
⇒ OBJ.HUM.CL-V SUBJ.INA		*	*

(54)

Input: V(SUBJ.HUM.CL, OBJ.HUM.CL)	S_I	F(CL)	S_H:*CL
⇒ SUBJ.HUM.CL-OBJ.HUM.CL-V			* : **
OBJ.HUM.CL-V SUBJ.HUM		*	: *

While the constraint ranking in (52) is consistent with the ranking derived in (51), we have no principled reason for this specific cut across the diagram. Once again it appears that in Sesotho it is less marked to have human clitics than inanimate ones. An opposite cut would mean that two clitics are only allowed when the object clitic (that is, the relative pronoun) is inanimate, something that does not seem to be generally implausible.

4   Split ergativity

There is a relationship between abstract syntactic markedness and morphological marking: syntactically marked elements tend to carry more morphological marking than elements that are syntactically less marked. An example of this generalization is split ergativity systems: Eastern Pomo (California), for instance, has overt Case marking only on arguments that stand in a marked configuration, that is on human objects and non-human subjects (McLendon 1978). In general, the split between ergative and accusative marking in split ergativity systems occurs somewhere along the person/animacy dimension, with arguments high in animacy receiving accusative marking (that is, they are marked for objecthood), while arguments low in animacy receive ergative marking (they are

marked when they are subjects). Silverstein (1976:123) gives a characterization that is reminiscent of alignment when talking about where the break can occur between ergative and accusative marking.

(55) Functional Characterisation of case-marking splits:

      a. Agent hierarchy: $F_{i-n},\ldots+F_i/-F_i,\ldots F_{i+m},\ldots,-NP$
         BELOW [$+F_i$], all NPs have *ergative* case-marking when functioning as transitive agent.

      b. Patient hierarchy: $F_{j-p},\ldots+F_j/-F_j,\ldots,F_{j+q},\ldots,-NP$
         ABOVE [$-F_j$], all NPs have *accusative* case-marking when functioning as transitive patient.

The difference between this and the cases in previous sections is that the marked configurations are not excluded from the possible surface forms, they are just morphologically marked.

    Aissen (1998) proposes an account of the fact that syntactically marked forms carry more morphological marking by appealing to local conjunction of the derived markedness constraints with a constraint that requires morphemes to be realized. A different account emerges from the theory developed in the last section: aligning the scales of person/animacy and grammatical function resulted in the two subhierarchies in (48) (repeated below).

(48) Constraint rankings:
      C_{SUBJ}: *SUBJ-INA $\gg$ *SUBJ-HUM
      C_{OBJ} : *OBJ-HUM $\gg$ *OBJ-INA

In Sesotho we saw that these constraints alone did not mark a construction as to exclude it from the set of possible outputs, it was only the conjunction of these constraints that was too highly marked to be tolerated. But what if a language decided that even the simple constraints were too highly marked? Take the subhierarchy C_{subj}: if both constraints dominate faithfulness then the language cannot have any subjects at all, so while it is theoretically possible it is not particularly useful (much like a language where all words default to a single, least-marked syllable). But if faithfulness lies between the constraints, then the language will allow human subjects while prohibiting inanimate ones. An Optimality Theory grammar will therefore force an inanimate subject to default to something else, and one possibility is that it will be marked as *human*.

    In a similar way, the grammar may force human objects to be marked as inanimate. Now let's call the human marker "ergative" and the inanimate marker "accusative", and what we get is exactly a split ergativity system. By extending the subhierarchies in (48) to the full person/animacy scale we can get the ergative/accusative break anywhere along the scale: arguments low in animacy (below a certain point in the hierarchy) will get morphologically marked when in subject position, and arguments high in animacy (above a certain point in the hierarchy) will get morphologically marked when in object position.

    Furthermore, the break for accusative marking does not have to coincide with the break for ergative marking. Recall that in the analysis of null subjects, a single split in

the system was brought about because the two markedness hierarchies interacted with one another. Here on the other hand each of the two subhierarchies interacts independently with faithfulness, so the upper bound for ergative marking does not have to be identical to the lower bound of accusative marking. The result is a characterization identical to that of Silverstein in (55).

Silverstein points out a puzzle that emerges from his analysis: since the split points for ergative and accusative marking are independent of one another, we expect that there should be languages where arguments in the middle of the person/animacy scale will carry both ergative and accusative marking, and also languages where such arguments carry neither. While languages of the first kind are widely attested, none are found of the latter type. This puzzle is retained in the analysis I have just sketched, as there is no *a priori* reason to have faithfulness ranked in such a way so that for every element in the hierarchy x, faithfulness will be dominated by either *SUBJ-x or *OBJ-x, thus forcing morphological marking on either the subject or the object (or both). Quite the opposite is true: we even expect to find systems where faithfulness dominates all the constraints of the above forms, that is a system where for all person and animacy specifications, neither subject nor object receives morphological marking (a system which Silverstein claims is impossible). So Silverstein's puzzle remains unresolved.

One additional remark should be made with regard to the "ergative marking as animizing and accusative marking as inanimizing" analysis. Ergative and accusative marking are viewed here as changing the animacy value of an argument to the highest and lowest possible values, respectively; the change in value is brought about by the Optimality Theory mechanism, which forces the argument to default to the animacy value which is least marked with respect to its grammatical function. But if an argument already has the least marked value then it has nothing to default to, and in this case morphological marking will be redundant and superfluous. The analysis thus makes the wrong prediction that the arguments ranking highest in person will never get ergative marking (in any language), and those lowest in animacy will never receive accusative marking. A possible way around this is to assume that the person/animacy scale includes two additional values, "highest animacy" and "lowest animacy", which are never carried intrinsically by arguments, but serve as points that animacy can default to when forced to do so by the grammar.

Other instances of morphological marking look similar to the split ergativity cases discussed above: Spanish marks accusative Case only on proper names, and Hebrew marks it on proper names and definites. In both cases an object is marked only if it is on a high position of some scale. Hopper and Thompson (1980:252–3) give ten dimensions which distinguish transitive from intransitive constructions, among them one called "individuation", which includes, among other things, the distinctions proper/common, human/inanimate, and definite/indefinite. While it is not clear to me that all of these dimensions can serve as prominence scales, the intuition behind them is the same—arguments that form (syntactically) marked objects receive morphological marking, and under the interpretation given here this marks a change in some feature, which makes the construction syntactically less marked.

Appendices

A   The typology of alignment

This appendix contains a formal proof for the following theorem (which is the same in essence as the Affinity Cut Theorem from Prince and Smolensky 1993:141).

(56) **Theorem:** If a prominence scale $a_n > \cdots > a_1$ is aligned with the reduction scale Null > Overt (4), then the resulting typology contains all and only the languages where for some integer i, $0 \leqslant i \leqslant n$:

      a. all the instances of a_j such that $j > i$ are realized as null;

      b. all the instances of a_j such that $j \leqslant i$ are realized as overt.

That is, every language will have a cutoff point where elements higher in the hierarchy will be null, while elements lower in the hierarchy will be realized overtly.

    Proof: Alignment as defined in (9) yields the following harmony scales and constraint rankings:

(57) Harmony scales:
$$H_{null} : null/a_n \; \succ \cdots \succ null/a_1$$
$$H_{overt}: overt/a_1 \succ \cdots \succ overt/a_n$$

(58) Constraint rankings:
$$C_{null} : {}^*\text{NULL}/a_1 \; \gg \cdots \gg {}^*\text{NULL}/a_n$$
$$C_{overt}: {}^*\text{OVERT}/a_n \gg \cdots \gg {}^*\text{OVERT}/a_1$$

The subhierarchies in (58) are predicted to be universal; language variation is due to the different ways these subhierarchies can merge into one ranking. What determines if an element a_i is realized as null or overt is the relative ranking of the constraints ${}^*\text{NULL}/a_i$ and ${}^*\text{OVERT}/a_i$. The following observations follow from the transitivity of the dominance relationship $\gg$.

(59) If for an integer i, ${}^*\text{OVERT}/a_i \gg {}^*\text{NULL}/a_i$, then for all integers j, $j > i$, it is the case that ${}^*\text{OVERT}/a_j \gg {}^*\text{NULL}/a_j$.
That is: if a_i is realized as a null element, then all elements *higher* in the hierarchy will also be null.

(60) If for an integer i, ${}^*\text{NULL}/a_i \gg {}^*\text{OVERT}/a_i$, then for all integers j, $j < i$, it is the case that ${}^*\text{NULL}/a_j \gg {}^*\text{OVERT}/a_j$.
That is: if a_i is realized as an overt element, then all elements *lower* in the hierarchy will also be overt.

Since every grammar has all the constraints ranked with respect to one another (a *total ordering*), we know that for every integer $i, 0 \leqslant i \leqslant n$, it must be that either ${}^*\text{NULL}/a_i \gg {}^*\text{OVERT}/a_i$ or ${}^*\text{OVERT}/a_i \gg {}^*\text{NULL}/a_i$. We can now prove that every grammar has exactly one point in the hierarchy, above which elements are realized as null and below which elements are realized as overt.

Let C be a particular grammar, that is a total ordering of the two subhierarchies C_{null} and C_{overt} in (58). Let *i* be the highest integer such that $*\textsc{null}/a_i \gg *\textsc{overt}/a_i$ in C, or zero if there is no such integer. Because of the way *i* was chosen, any element higher in the hierarchy than a_i will be null; any element a_i will be realized overtly, and from (60) it follows that any element lower in the hierarchy will also be realized overtly.

This concludes the proof of the theorem in (56). In the limiting cases, all the elements of the hierarchy will be null, or all will be overt; otherwise, a split will occur, with elements higher on the hierarchy being null, and the lower ones overt.

B   Sesotho data

All the data in this section are taken from Morolong and Hyman (1977).
Glossary: APP—applicative morpheme (allows beneficiary argument)

One clitic (pronominal object)

a.   * *ke-o-bítselítsé*   *baná*
      I-it(feast)-called/APP   children
      ke-ba-bítselítsé   *mokéte*
      I-them-called/APP   feast

b.   *ke-mo-bítselítsé*   *baná*
      I-him-called/APP   children
      ke-ba-bítselítsé   *morena*
      I-them-called/APP   chief

c.   *ke-mó-phehétsé*   *lijó*
      I-him-cooked/APP   food
      ke-lí-phehétsé   *ngoaná*
      I-it-cooked/APP   child

d.   *ke-ó-phehétsé*   *lijó*
      I-it(feast)-cooked/APP   food
      ke-lí-phehétsé   *mokéte*
      I-it(food)-cooked/APP   feast

Two clitics (passive subject, relative object)

a.   * *baná*   *báò*   *mokéte*   *ó-bá-bítselítsoéǹg*
       children   that   feast   it-them-was.called/APP
       mokéte   *óò*   *baná*   *bá-ó-bítselítsoéǹg*
       feast   that   children   they-it-were.called/APP

b.   *baná*   *báò*   *morena*   *á-bá-bítselítsoéǹg*
      children   that   chief   he-them-was.called/APP
      morena   *éò*   *baná*   *bá-mó-bítselítsoéǹg*
      chief   that   children   they-him-were.called/APP

c.	*lijó*	*tséò*	*ngoaná*	*á-lí-phehétsoéǹg*
	food	that	child	he-it-was.cooked/APP
	* ngoaná	*éò*	*lijó*	*lí-mó-phehétsoéǹg*
	child	that	food	it-him-was.cooked/APP
d.	** lijó*	*tséò*	*mokéte*	*ó-lí-phehétsoéǹg*
	food	that	feast	it-it-was.cooked/APP
	* mokéte	*óò*	*lijó*	*lí-ó-phehétsoéǹg*
	feast	that	food	it-it-was.cooked/APP

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