Argument Encoding and the Order of Elementary Operations

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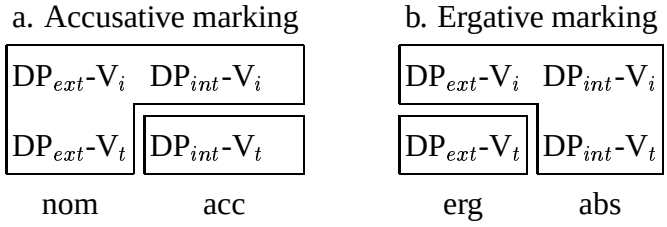
The goal of this paper is to outline the core of a new minimalist analysis of accusative vs. ergative patterns of argument encoding (via case marking or agreement). The central observation is that indeterminacies may arise in the application of the two elementary operations Merge and Agree (see Chomsky (2000, 2001)), given that they both obey an Earliness requirement (see Pesetsky (1989)); and the central claim I would like to put forward is that a principled resolution of one such indeterminacy (on the vP cycle) in one or the other direction yields an accusative or ergative encoding pattern for arguments.

1. Argument Encoding Patterns

There are two basic encoding patterns for external and internal argument DPs (DP_{ext}, DP_{int}) of transitive and intransitive verbs (V_t, V_i) that are not lexically marked. In an accusative pattern, DP_{int} of V_t is encoded by accusative morphology; DP_{ext} of V_t and V_i, and DP_{int} of V_i are encoded by nominative morphology. In contrast, in a (pure) ergative pattern, DP_{ext} of V_t is encoded by ergative morphology; DP_{ext} of V_i, and DP_{int} of V_t and V_i are encoded by absolutive morphology. This is illustrated schematically in (1) (see Plank (1995)).

(1)



Argument encoding can proceed by case-marking on the DP argument ('dependent-marking') or by agreement-marking on the verb ('head-marking'); see Nichols (1986), Baker (1996). I take this issue to be orthogonal to the choice of encoding pattern as such, and will use the terms 'accusative', 'nominative', 'ergative', and 'absolutive' indiscriminately for case- and agreement-marking throughout this paper, with CASE as a cover term

for both.[1] In what follows, I give examples instantiating each of the four language types that result from cross-classifying type (accusative vs. ergative) and and place (case vs. agreement) of argument encoding.

The Icelandic examples in (2) illustrate an accusative case-marking pattern. DP_{int} of V_t is marked by accusative; other primary arguments receive nominative.

(2) a. Sól-Ø=in skín-Ø
sun-SG.NOM=DET.SG.FEM.NOM shine-3.SG
'The sun is shining.' (Kress (1982, 263))

b. Ólaf-ur byrja-ð-i of sein-t
Olaf-SG.NOM begin-PAST-3.SG too late-3.SG.NEUT
'Olaf began too late.'

c. Ólaf-ur las-Ø bók-Ø=ina
Olaf-SG.NOM read.PAST-3.SG book-SG.ACC=DET.SG.FEM.ACC
'Olaf read the book.' (Sigurðsson (2002, 698))

An accusative pattern that relies on agreement-marking can be found in Navajo. An intransitive context is given in (3-a), transitive contexts are shown in (3-bc). Again, DP_{int} of V_t is encoded by one type of morphological marker (accusative), whereas all other primary arguments are encoded by another marker (nominative).[2]

(3) a. (Y)i-sh-cha
Ø-1.SG.NOM-cry
'I am crying.'

b. Ni-sh-ch'id
2.SG.ACC-1.SG.NOM-scratch
'I am scratching you.'

c. Shí-í-ní-ghá́ád
1.SG.ACC-PERF-2.SG.NOM-shake
'You shook me.' (Speas (1990, 209))

[1]This extension of the traditional case terminology to agreement-marking may be more common for ergative systems than for accusative systems; see, e.g., Bickel & Nichols (2001).

[2]Overt argument DPs are usually optional in head-marking languages; I assume that primary arguments are nevertheless present in the syntax here, in the form of empty DP pronouns (see Baker (1996), Bruening (2001) for some of the options that arise under this general view). The Navajo agreement markers are usually called 'subject' and 'object' markers in the literature, and glossed here with the labels NOM and ACC; they are fusional and encode person and number in addition to CASE.

A language that instantiates an ergative case-marking pattern in a relatively pure way is Archi (North-Caucasian, Daghestanian; see Kibrik (1979)). DP_{ext} of V_t is singled out and marked by ergative case; all other primary arguments receive absolutive case. (4-a) provides an intransitive context, (4-b) a transitive one.[3]

(4) a. Dija-Ø w-ir$\bar{x}_\circ$in
father:I-SG.ABS I.SG-work
'Father is working.'

b. Dija-mu $\bar{x}_\circ$alli-Ø b-ar-ši b-i
father:I-SG.ERG bread:III-SG.ABS III.SG-bake-GER III.SG-Aux
'Father is baking the bread.' (Kibrik (1979, 67))

Finally, Sierra Popoluca (Meso-American, Mixe-Zoque; see Elson (1960), Marlett (1986)) exhibits an ergative encoding pattern that relies on agreement-marking. DP_{ext} of V_t is encoded by one type of agreement marker (ergative); all other primary arguments are encoded by another type of agreement marker (absolutive).[4] (5-ab) illustrate intransitive contexts; (5-cd) provide transitive contexts.

(5) a. A-nɨk-pa
1.ABS-go-INC
'I am going.' (Marlett (1986, 364))

b. A-pɨːšiñ
1.ABS-man
'I am a man.'

c. A-Ø-koʔc-pa
1.ABS-3.ERG-hit-INC
'He is hitting me.'

d. Ø-Aŋ-koʔc-pa
3.ABS-1.ERG-hit-INC
'I am hitting him.' (Elson (1960, 208))

These examples may suffice as an illustration of the two basic argument encoding patterns, by case-marking and by agreement-marking. Needless to say, closer scrutiny reveals the actual situation to be more involved in all four languages, with various interfering factors emerging that blur the simple picture arising on the basis of the data presented here. Still,

[3] I, III are noun classes (there are eight); case markers bear number information (Kibrik (2003, 53ff)).

[4] The agreement markers also indicate person, but not number; the latter plays a minor role in Sierra Popoluca morphology (Elson (1960, 209/218)).

the core of the systems of argument encoding in these languages is either (1-a) or (1-b), and these two patterns need to be derived in a simple and general way. What follows is an attempt to do this by resolving an indeterminacy in the application of elementary minimalist operations that can independently be observed.

2. A Case of Indeterminacy on the vP Cycle

Let me begin with some background assumptions (based on Chomsky (2000, 2001)). Assume that syntactic structure is created incrementally, bottom-up, by the elementary operations Merge and Agree, and by Move (which may or may not be a special case of Merge, and which will not play a major role in what follows). For present purposes, the operations Merge and Agree can be understood as in (6) and (7), respectively.

(6) *Merge*:

α is merged with β, forming a projection of α, if α selects β.[5]

(7) *Agree*:

α agrees with β with respect to a feature bundle Γ iff (a), (b), and (c) hold:

a. α bears a probe feature [*F*] in Γ, β bears a matching goal feature [F] in Γ.[6]

b. α m-commands β.[7]

c. There is no δ such that (i) and (ii) hold:

(i) δ is closer to α than β.[8]

(ii) δ bears a feature [F] that has not yet participated in Agree.

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[5] In (6) and in (7), α, β, δ stand for categories. That Merge is restricted to selection contexts is often tacitly presupposed but made explicit here (adverbs may or may not require additional assumptions); not much depends on this in the present context, though.

[6] Starring a feature indicates its probe status, here and in what follows; see Sternefeld (2003).

[7] This permits an Agree relation between a head and its specifier, as seems natural.

[8] δ is closer to α than β if the path from δ to α is shorter than the path from β to α. The path from X to Y is the set of categories Z such that (a) and (b) hold: (a) Z is reflexively dominated by the minimal XP that dominates both X and Y. (b) Z dominates X or Y. (See Müller (1998, 130); also cf. Pesetsky (1982, 289), Collins (1994, 56).) The length of a path is determined by its cardinality. It follows that the specifier and the complement of a head qualify as equally close to the head; and that the specifier of a head is closer to the head than a category that is further embedded in the complement of the head.

Thus, Agree operations are driven by a probe seeking a goal (7-a), require m-command (7-b), and obey minimality (7-c). I assume that Agree needs only identity of probe and goal features to apply, and can thus apply if probe and goal differ in their feature value (i.e., if the feature specifications are different); but if it does so, it is unsuccessful and creates a crash of the derivation.

Suppose further (following Chomsky (2000, 2001)) that the basic clause structure consists of CP, TP, vP, and VP; that lexical items that are to participate in derivations are selected from the lexicon pre-syntactically, and assembled in a numeration N (or lexical array); that DP_{int} is merged in VP, whereas DP_{ext} is merged in vP, as a specifier; and, finally, that T and v are involved in the structural encoding of primary arguments (i.e., DP_{ext} and DP_{int} arguments for which no inherent/lexical CASE is specified), by bearing features that act as probes and thus trigger Agree operations.

More specifically, I will assume that that there is only one structural argument encoding feature, CASE, which can have two values: ext(ernal) and int(ernal) (determined with respect to vP, the predicate domain). The feature specifications [CASE:ext] and [CASE:int] replace the traditional feature specifications [CASE:nom], [CASE:acc], [CASE:abs], [CASE:erg]. [CASE] features figure in Agree relations involving T/v and DP, where T bears a probe [*CASE:ext*] requiring a matching [CASE:ext] goal on DP, and v bears a probe [*CASE:int*] requiring a matching [CASE:int] goal on DP.[9] Case-marking and agreement-marking both depend on an Agree relation between T/v and DP, and thus qualify as two sides of the same coin (see, e.g., Bobaljik & Wurmbrand (2003)): Argument encoding proceeds by case marking if [CASE:α] is morphologically realized on DP; it proceeds by agreement-marking if [*CASE:α*] is morphologically realized on T/v.[10]

[9]This deviates from Chomsky (2001, 6). Still, what follows would in its essentials also be compatible with the assumption that some other features (e.g., Φ-features) on T/v act as probes forcing Agree with DP, and CASE is part of the feature bundle Γ in the sense of (7). However, Chomsky further assumes that CASE is 'not a feature of [...] T, v' (even though 'the value assigned depends on the probe: nominative for T, accusative for v'), which might raise questions concerning agreement-marking under present assumptions.

[10]The two options are not mutually incompatible and often co-exist to some extent in a single language (cf., e.g., nominative encoding via case and agreement in Icelandic); but see Nichols (1986) for some distributional asymmetries. – Morphological agreement marking on T/v requires complex head formation (involving T, v, V), at least in the languages under consideration. I assume that this is accomplished by head

Independently of these specific assumptions about the values of CASE, it is a conspicuous property of the overall system that v (unlike T or V) plays a dual role: It participates in a (first) Merge operation with a DP, and it also participates in an Agree relation with a DP. I will now argue that this dual role has far-reaching consequences for the nature of argument encoding in a language.

Consider first a simple transitive context, with two arguments DP_{int}, DP_{ext}. Suppose that the derivation has reached a stage Σ where v has been merged with a VP containing DP_{int}, with DP_{ext} waiting to be merged with v in the workspace of the derivation.[11] At this point, an indeterminacy in rule application arises: The next operation could be either Agree(v,DP_{int}) or Merge(DP_{ext},v). Based on complexity considerations, Chomsky (2001) proposes an Earliness requirement for syntactic operations (see Pesetsky (1989)).[12] Given Earliness, operations like Merge and Agree must apply as soon as their structural conditions are met, which they both are at stage Σ in the derivation under consideration. Consequently, there is a dilemma: Only one operation can apply first, as required by Earliness. In view of this, one might conclude that an Earliness requirement should be abandoned for either Merge or Agree, so as to resolve the indeterminacy. However, such a step would make it necessary to deny all empirical relevance of Earliness for one of the two operations, and it would also be at variance with the complexity-based motivation.[13] In contrast, I would like to contend that conflicts of this type are real, and must be resolved

movement (and, perhaps, head lowering), followed by post-syntactic insertion of agreement markers into T/v (Halle & Marantz (1993)). See Embick & Noyer (2001), Bobaljik (2002) for discussion of the role of head movement in this; and Müller (2003, 15-18) for an account of the morphology of agreement-marking in Sierra Popoluca along these lines.

[11] The workspace of the derivation comprises items in the numeration and phrases that have been created independently; DP_{ext} belongs to the former if it is a bare lexical item, and to the latter if it has been created via Merge. See, among others, Frampton & Gutman (1999) and Hornstein (2001) for relevant discussion.

[12] See Chomsky (2001, 15): "With the motivation for Procrastinate gone, considerations of efficient computation would lead us to expect something like the opposite: Perform computations as quickly as possible."

[13] Rezac (2003, 158), in discussing stage Σ, tacitly presupposes that Earliness holds only for Agree (even though he envisages Agree(v,DP_{ext}) as a general possibility underlying cases of 'agreement displacement'). However, there is empirical evidence for an Earliness requirement for Merge, and such a requirement has been assumed in practice; cf. the discussion of Merge before Move in Chomsky (1995, 2000, 2001).

in a language by giving one Earliness requirement priority over the other in the case of conflict – in other words, by ranking the two requirements.[14] It turns out that this not only resolves the indeterminacy encountered on the vP cycle; it is in fact all that needs to be assumed to derive the core difference between accusative and ergative encoding patterns.

3. The Order of Elementary Operations

Suppose first that a language gives priority to the Earliness condition on Agree in the case of conflict. Then, an accusative pattern arises (see (8-a)): At stage Σ, Agree(v,DP$_{int}$) applies first (step (i)). Since v is marked [*CASE:int*], this ensures a [CASE:int] specification on DP$_{int}$. (If DP$_{int}$ is specified as [CASE:ext], Agree(v,DP$_{int}$) applies unsuccessfully, and the derivation crashes). DP$_{ext}$ is merged in Specv in the next step (step (ii)). The derivation continues, merging T and vP, and then carrying out Agree(T,DP$_{ext}$), which requires [CASE:ext] on DP$_{ext}$ (step (iii)). The morphological realization of an internal encoding feature [(*)CASE:int(*)] with Agree(v,DP$_{int}$) (by case or agreement) can be called accusative; the morphological realization of an external encoding feature [(*)CASE:ext(*)] with Agree(T,DP$_{ext}$) can be called nominative. This accounts for argument encoding in transitive contexts in languages like Icelandic and Navajo: The internal argument is marked by the internal CASE, the external argument is marked by the external CASE.[15]

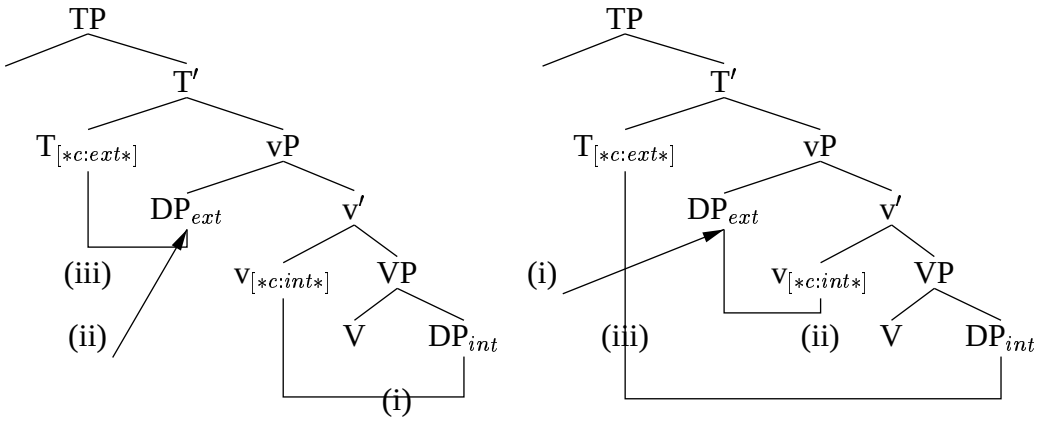
In contrast, suppose now that a language gives priority to the Earliness condition on Merge. Then, an ergative pattern arises (see (8-b)): At stage Σ, Merge(DP$_{ext}$,v) must apply first (step (i)). Crucially, DP$_{ext}$ is now closer to v than DP$_{int}$ (cf. note 8), and given that Agree relations are subject to a minimality requirement and require only m-command by the probe (see (7)), the next operation will have to be Agree(v,DP$_{ext}$), in a specifier/head configuration (step (ii)). This requires [CASE:int] on DP$_{ext}$. Subsequently, T is merged, and Agree(T,DP$_{int}$) is carried out (step (iii)), with [CASE:ext] for

[14] This amounts to an optimization procedure, with minimal violability of the lower-ranked requirement; see Prince & Smolensky (1993). However, the optimization involved here is extremely local (competing candidates are derivational steps), which avoids the complexity problems incurred by standard optimization procedures; see Heck & Müller (2000). Note also that the same kind of local optimization procedure underlies the Merge before Move principle.

[15] In all languages discussed in this paper, Agree triggered by [*CASE:α*] also affects Φ-features.

DP_{int}.[16] The morphological realization of an internal encoding feature [(*)CASE:int(*)] with Agree(v,DP_{ext}) can be called ergative; the morphological realization of an external encoding feature [(*)CASE:ext(*)] with Agree(T,DP_{int}) can be called absolutive. This accounts for argument encoding in transitive contexts in languages like Archi and Sierra Popoluca: The internal argument is marked by the external CASE, the external argument is marked by the internal CASE.[17]

(8) a. *Agree before Merge: accusative* b. *Merge before Agree: ergative*



4. Case Feature Specifications in Numerations

Consider next intransitive contexts. Unchecked probes lead to a crash of the derivation; hence, [*CASE:α*] must be absent on either T or v in the derivation if only one DP is present that provides a matching goal feature specification [CASE:α]. Thus, again, there is an indeterminacy, and again, the problem arises independently of specific assumptions

[16]This Agree operation is just local enough to be in accordance with the liberal version of the Phase Impenetrability Condition (PIC) in Chomsky (2001, 14)). (Also, DP_{ext} does not intervene, given (7-c)).

[17]Some remarks are due on how the present approach is related to other analyses that identify a difference in structural CASE assignment as the source of the two basic argument encoding types (as opposed to differences in projection, as in Marantz (1984), or differences in lexical CASE assignment, as in Nash (1996), Alexiadou (2001), and Woolford (2001)). The analyses in Chomsky (1995, ch.3), Bobaljik (1993), Laka (1993), and Rezac (2003) differ from the one given here in that ergative is identified with nominative, and absolutive with accusative. Bittner & Hale (1996) identify absolutive and nominative but treat ergative and accusative differently. The closest predecessor of the present proposal is the analysis in Murasugi (1992) (also see Jelinek (1993)), where nominative is identified with absolutive, and ergative with accusative.

about CASE feature values.[18] I will suggest that two principled solutions are available.

Consider a derivation that fails to provide a matching goal feature specification for each probe feature specification that it employs. Such a derivation is doomed from the start. It should therefore be excluded in some general way. A place where this can be ensured straightforwardly is the numeration – a component of grammar that does not yet involve structure (outside of individual lexical items) but provides just enough information to formulate constraints that reduce the number of unsuccessful derivations. For concreteness, I assume the following constraint on numerations:[19]

(9) *Feature Balance*:

For every feature specification [*F:α*], there must be a matching feature specification [F:α].

It follows that either [*CASE:ext*] on T or [*CASE:int*] on v must be absent if there is only one D with a CASE feature in the numeration. But which of the two? One possibility is suggested by markedness considerations: [(*)CASE:ext(*)] (nominative/absolutive) is unmarked, [(*)CASE:int(*)] (accusative/ergative) is marked, both from a syntactic and from a morphological point of view. Syntactically, nominative/absolutive is the type of CASE used in default contexts. Morphologically, at least as a robust tendency, nominative and absolutive markers are segmentally less complex (often default or zero, especially the latter); accusative and ergative markers are morphologically more complex (see Comrie (1989, 126) and Dixon (1994, 11), among others). Thus, assume that (9) is respected in intransitive contexts by maintaining the unmarked feature specification. Then, [*CASE:ext*] on T has to be preserved, and [*CASE:int*] cannot be instantiated on v. Consequently, the sole argument of an intransitive predicate (DP_{ext} or D_{int}) is predicted to be encoded by [(*)CASE:ext(*)] (nominative/absolutive), after Agree(T,DP_{ext})

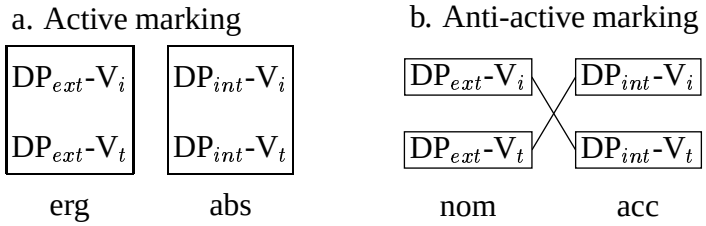
[18] A faithfully updated version of Burzio's generalization ("v can bear [*CASE:int*] iff V takes a DP_{ext}", cf. Burzio (1986, 185)) would still require an auxiliary assumption to derive the patterns in (1) (the problem is to ensure that DP_{ext} of V_i cannot be marked by accusative/ergative).

[19] This constraint may possibly be conceived of as a special case of a more general requirement for numerations, which, e.g., might also ensure the presence of exactly *n* lexical items that can serve as arguments for every *n*-place predicate (essentially, a version of the Θ-Criterion). Also compare Stabler's (1996) discussion of count invariants.

or Agree(T,DP$_{int}$), which captures the situation in the types of language discussed so far.

However, suppose now that there is a second way for a language to respect (9): In the numeration, a CASE feature specification must be matched by the argument type of a D with respect to markedness. (This can be viewed as an iconicity constraint on numerations.) The unmarked situation for an argument of a predicate is to be merged in that predicate's projection; 'externalization' of an argument can be viewed as a special operation in argument structures (see, e.g., Williams (1981)). Consequently, with respect to argument type, DP$_{ext}$ is inherently more marked than a DP$_{int}$. Under this assumption, a marked feature specification ([*CASE:int*] on v) must show up in the numeration in the presence of a V taking an marked argument (DP$_{ext}$), and an unmarked feature specification ([*CASE:ext*] on T) occurs in the presence of a V taking an unmarked argument (DP$_{int}$). A language that chooses this option does not differ from the languages considered thus far in transitive contexts, but it does in intransitive contexts. Suppose that such a language exhibits an ergative marking pattern (by giving priority to Merge over Agree on the vP cycle). Then, DP$_{int}$ undergoes an Agree(T,DP$_{int}$) operation and is encoded by absolutive in intransitive contexts, whereas DP$_{ext}$ participates in Agree(v,DP$_{ext}$) and is encoded by ergative. This way, an 'active' system of split ergativity arises; see (10-a).

(10)



Again restricting attention to the core system, (10-a) is instantiated in languages like Basque (with case) and Guaraní (with agreement); see (11), (12), respectively.

(11) a. Jon-Ø etorri da
Jon-ABS come:PTCP.PRF is:3.SG.INTR
'Jon came.'

b. Jon-ek saltatu du
Jon-ERG jump:PTCP.PRF have:3.SG.TR
'Jon jumped.'

c. Jon-ek ardo-a-Ø ekarri du
Jon-ERG wine-DET-ABS bring:PTCP.PRF have:3.SG.TR
'Jon brought the wine.' (Hualde & Ortiz de Urbina (2003, 364))

(12) a. Še-manuʔa
1.SG.ABS-remember
'I remember.'

b. A-ma.apo
1.SG.ERG-work
'I work.'

c. Ø-Ai-pete
3.SG.ABS-1.SG.ERG-hit
'I hit him.' (Gregores & Suárez (1967))

The present analysis does not per se exclude an 'anti-active' pattern, as in (10-b). Anti-active marking would arise in an accusative system that preserves the CASE feature specification matching the argument type in markedness in intransitive contexts (rather than the CASE feature specification that is unmarked); it differs from the accusative pattern in (1-a) in encoding DP_{ext} of V_i by accusative. This type of encoding pattern does not seem to occur. However, there is an obvious problem with (10-b) (see Bechert (1979)): In an anti-active pattern, there is not a single implicational relation between CASE feature specification and argument type. Consequently, the pattern is extremely dysfunctional and poses severe difficulties for language acquisition.[20]

5. Concluding Remarks

I have suggested two parameters for argument encoding which are active in different components of grammar: Whether a language employs accusative marking or ergative marking is decided in the syntax, by resolving an indeterminacy in the order of the elementary operations Merge and Agree on the vP cycle. Whether a language employs active marking or not is decided in the numeration, i.e., pre-syntactically, by resolving an indeterminacy in the preservation of CASE feature specification in intransitive contexts via markedness (choice of the unmarked feature specification) or iconicity (choice of the feature specification with the same markedness status). To the extent that this approach succeeds in capturing the main argument encoding patterns in a simple way, it has reper-

[20]This may imply that the pattern is in principle available to the language faculty but unusable in practice, or that optimal design restrictions prevent it from being available in the first place (e.g., by requiring unambiguity of argument identification); I will leave this open.

cussions on the theory of parametrization: It suggests that parametric variation cannot exclusively be due to variation in the (functional) lexicon, and that there must be a limited decision space in the application of elementary operations in the syntax and in the numeration. Furthermore, it is worth emphasizing that the present analysis crucially depends on an incremental-derivational approach to syntax; the difference between an accusative and an ergative pattern boils down to whether DP_{ext} is or is not yet part of the structure when the CASE feature of v triggers Agree.

To end this paper, let me stress that what precedes is not intended to be a comprehensive theory of accusative vs. ergative patterns of argument encoding; for this, the analysis would have to be extended in various directions. I will here confine myself to mentioning four of these. First, there are other instances of split ergativity, in addition to an active marking pattern – most notably, aspect-based split ergativitiy, as in Hindi (see Mahajan (1990)); person-based split ergativity, as in Dyirbal (see Dixon (1994)); and clause-type based split ergativity, as in Sierra Popoluca (see Elson (1960)). Second, there are languages in which ergative and accusative can co-occur (see Woolford (1997)). Third, in this paper I have only been concerned with 'morphological ergativity' (i.e., formal argument encoding by case or agreement), and not at all with 'syntactic ergativity' (i.e., cases where DP_{ext} and DP_{int} of V_i, and DP_{int} of V_t are systematically treated on a par in the syntax by processes different from argument encoding); see Comrie (1989), Bobaljik (1993), Dixon (1994), and Bittner & Hale (1996). Fourth, movement to SpecT has been neglected in the preceding discussion; but this operation seems to be related to the nature of argument encoding to some extent. As for the first two issues, I surmise that they can successfully be tackled by invoking language-specific restrictions on (possibly multiple) CASE feature instantiations on v. In contrast, the last two issues essentially reduce to the question of which argument qualifies as most prominent (i.e., acquires 'subject' or 'pivot' properties). Relevant factors here include (a) external CASE and (b) external argument status. With accusative marking patterns, the two properties usually converge (but cf., e.g., Icelandic quirky case subjects); with ergative marking patterns, they usually diverge, and this may plausibly be taken to underlie the substantial variation in promotion to subject status that can be observed here.

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