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Periodic Linking
The How, Where and Why of Ergativity and Analogous Phenomena

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A novel linking theory is proposed to account for alignment of arguments with case and grammatical relations (GR). It consists of a series of GR backbones, which hold the arguments, cases and agreement morphemes, and they are laid out as a sine wave. The representation is referred to as a 'pool', where relevant elements can exchange case and agreement morphemes under a strict Universal Linking Convention, plus a Well-formedness Condition. The Pool Theory shows that the ergative and the absolute case are respectively the nominative and the accusative case, and that ergativity, which appears to be an undesirable trait, can only appear if the subject and the object show an asymmetry induced by the missing of the accusative morpheme in an otherwise rich case system. Data from various languages, including Basque, Dyirbal, Hindi-Urdu, Korean, and Warlpiri are thoroughly accounted for under the Pool Theory. It appears that Dyirbal, traditionally considered the archetypal ergative language, in which the case system is split in two interlocked subsystems by a feature mismatch, provides one of the strongest theory-free evidence against the existence of a sui generis ergative and absolute case.

Keywords: agreement, antipassive, argument, case stacking, case, concordance, double Case construction, feature, grammatical relations, harmonization, linearization, linking, passive, psych-verb, scalar, sinusoid, vector.

1. Introduction

Certain languages mark the object of transitive verbs and the subject of intransitive verbs with the same morpheme, while the subject of transitive verbs is singled out with a different marker, which is referred to as the ergative case. Generally in current theories of grammar, the ergative case is a primitive, or a parameter of the language faculty, just like other phenomena such as word order or *wh*-movement. Under this view, there is generally no need to look for a deeper explanation, since it is in the very nature of things that natural languages are either of the accusative or the ergative type.

In this article, I show that there is neither ergative case nor its corollary absolute case, which amounts to say that all languages have nominative and accusative cases instead, if any. The different alignment patterns of case morphemes with grammatical relations, whatever its peculiar aspect, I will show, results from the following conditions, (1), highlighted by the linking theory to be discussed below, but which can be easily checked out descriptively.

(1)   **Conditions for ergativity**

       a.   The language must have overt case morphemes.

       b.   The accusative morpheme is missing or unavailable, unlike the nominative marker.

That is, if the direct object lacks a case morpheme for whatever reasons, while the subject has one, the language is expected to take an ergative alignment. On the other hand, if both the subject and the direct object have or lack a case morpheme, resulting in a perfect symmetry, the accusative alignment takes over. From this perspective, the mechanism that makes a language adopt either an accusative or an ergative alignment is just irrelevant to languages which are devoid of overt case morphology. Those languages are necessarily symmetric, and the accusative alignment is the normal and the default pattern.

(1) pops up from the linking theory to be developed in the next section, and accounts for the 'why' statement mentioned in the subtitle. The 'how' as well will follow from the simple mechanisms of linking, which makes it explicit that ergativity is not a desirable feature to the extent that it violates a fundamental principle of languages: namely the Principle of Harmony, which is essentially an economy condition. Finally the 'where' statement refers to languages with rich case morphology. A few of such languages will be discussed, including Dyirbal (§3), Warlpiri (§4), Basque (§5), Hindi-Urdu (§6), and certain aspects of Korean grammar (§7). Certain of these languages display some complex agreement patterns, which will be handled the same way by our theory.

2. A Theory of Linking

2.1 Preliminary assumptions

As a starting point, I assume that verbs have a complex lexical structure which may resemble what is currently named Predicate-Argument Structure (PAS); see Levin & Rappaport (to appear) for a survey of the literature on that matter. I take the lexical structure of a verb to include at least three layers of information. First, the grammatical relations (GR), which may be two or three in number, according to the verb: the subject, the direct object, and for certain verbs, an indirect object. Second, the number of arguments, which is a variable from one up to three. Finally the case markers, whose number is also variable, even null in many languages.

One of the results that emerge from Desouvrey (2010) is that the case morphemes are in fact

pronouns that carry the thematic roles; they are specified for abstract thematic features, including DATIVE, GOAL, LOCATIVE, INSTRUMENTAL, etc. The nominative and accusative case, traditionally associated to an AGENT/EXPERIENCER and a PATIENT/THEME respectively, are in fact not specified for either. Therefore they can variably interact with one another, as well as with other elements. On the other hand, an indirect object is generally associated with a thematic feature, which the verb supports, and therefore it may be seen as a constant, as opposed to a variable. The type of argument required by a verb is specified as an abstract feature in its feature structure. Without the proper feature, the verb cannot accommodate an argument. For the subject and the direct object, the verb has unspecified thematic nodes in the normal case, while it is variably specified for an indirect object. In certain languages, for instance Warlpiri (see below), the thematic feature that allows the verb to accommodate a dative argument is not abstract; instead a dative-specified morpheme, analogous to a case morpheme, is added to the verb.

In addition, assuming that arguments are more prominent than non-arguments, the subject is defined as the most prominent argument slot of a verb or the earliest element in the wave form. I refer to arguments by their function in the real world, namely Agent/Experiencer, Patient/Theme, Goal, Location, etc., as defined in the lexical structure of the verb. They are descriptive names for activities, particular states, etc., of real word entities. In order to insure that such and such argument appears in a given GR slot, what we need is an animacy hierarchy, or entity hierarchy. Either definition in the following non-exhaustive list is acceptable.[1]

(2)   **Animacy/Entity Hierarchy (A/EH)**

   a.   Animate > Thing

   b.   Active > Non-active

   c.   Actor > Scenery

These definitions are binary, and indeed they only concern the subject and the direct object. The indirect object is constant, predictable and is always specified for an abstract thematic feature, as mentioned above. To complete the scheme, what is needed is the following assumption: the superior element in the A/EH must take the most prominent argument slot, namely the subject. The remaining GR slot is the direct object. It follows that if there is no subject, as is the case of unaccusative verbs, the

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1   In certain instances, there may be no hierarchy, hence whether an argument is the subject is not an objective reality. It
    depends entirely on the intention of the speaker, as is the case with certain psych-verbs (see below).

direct object must become the subject.

2.2 Deriving the accusative and the ergative alignments

Let us suppose that the elements that compose the argument structure of a verb are organized in planes, one for each GR. As a first approximation, the plane are represented as parallel to one another and contain an argument and a default case morpheme, as seen in Figure 1. Conveniently, the subject, the direct and the indirect object (if shown) will appear throughout in the order seen in Fig. 1, which reflects a time line of events (see below).

GR	Subject	Direct Object	Indirect Object
Arguments	Agent	Theme/Patient	Others
Case	Nom(inative)	Acc(usative)	Others

Figure 1. Three-plane structure of predicate-Argument

The subject plane contains the agent and the nominative case, while the object plane, the theme and the accusative case. Likewise, the indirect object plane may include a goal argument and a corresponding case. Although each column, or plane, is independent, I suggest that they make up together a "pool", where in fact they interact with one another. The GRs are universally constant, as they define the plane, but the arguments and their case are variable, i.e their presence depends on certain contingencies like lexical inventory for case and the verb type (transitive or not). Thus in intransitive verbs, one plane lacks an argument, which may give rise to a stranded case, and conversely, a case may be missing in a plane as well. Arguments and cases are not pre-associated in their respective plane, except generally the indirect object. I claim that the association of arguments and cases in the pool obeys the following convention, (3).[2] In addition a Well-formedness condition (WFC), (4), prevents certain types of linking.[3]

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2   The Mapping Theory (MT) discussed in Gerdts (1987) also uses of rules of association. In MT, a level of argument/GRs, strictly ordered, must be linked to actual argument positions, or MAPs. She proposes two types of association rules: an unmarked association, operating vertically, that is in a one-to-one fashion, and a marked type of association, or non-vertical linking, that is the "linking of an 'extra' nominal not lexically subcategorized by the verb (...)" (p.4). In addition, her system includes a Saturation Principle, a Biuniqueness Principle, and a No-Delinking Principle (see her fn 4, p. 16), which have no equivalent in the present system. Moreover in MT, an association does not take place automatically, instead it must be ordered by specific stipulations.

3   WFC is derivable from the Principle of Harmony (see below) by virtue of which the application of grammatical rules or constraints may not be limited by a specific context. If a constraint is destined to rule in a context A, it will apply in

(3)   **Universal Linking Rules**

     a.   An argument must link the case in its own plane, if any.

     b.   An argument must link a stranded case, if any.

(4)   **Well-Formedness Condition**

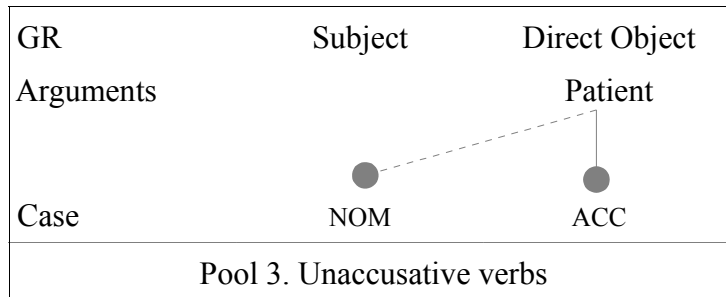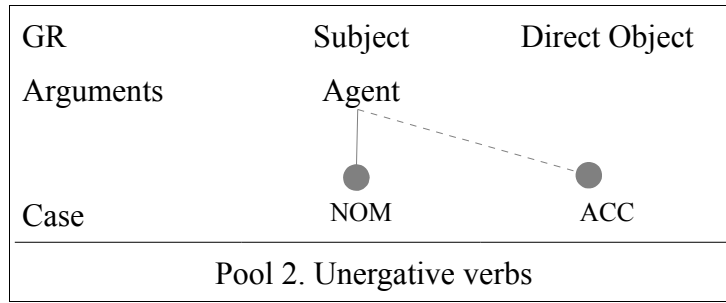   One-to-one linking can only take place between coplanar elements.

Thus in a transitive verb, association of arguments and cases, if any, is one-to-one, as seen in Pool 1.[4] (The indirect object plane is set aside for the time being.) Notice that since a GR define a plane, it links every element in the plane, though this cannot be shown in this representation. GRs are thus the backbone of the system, a point which will become clear under the circular layout.

GR	Subject	Direct Object
Argument	Agent	Theme
	●	●
Case	NOM	ACC
Pool 1. Linking of transitive verbs		

As mentioned above, the arguments are variable, while GRs are constant. In intransitive verbs, the number of arguments is reduced to one, but since other elements are independent, they are not affected, yielding a discrepancy between the number of arguments and case markers. Under such a condition, instead of having a one-to-one association, a one-to-two association (cf. 3b) takes place, as seen in Pools 2 (unergatives) and Pool 3 (unaccusatives).

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other contexts B, C, etc., as well. Thus (3a) is a specific rule for a plane, but its application expands to another plane. Thus, the non-existence of (3a), when the argument has no case in its plane to link to, brings about the cancellation of (3b). In other words, if linking does not take place in a smaller domain, which is its reason d'être, it may not exist for a larger domain. The formulation of WFC is just convenient, for ease of reference.

4   Association lines in the pool are circled, which differentiates them from those in the syntax, which links abstract features to lexical elements.

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GR                    Subject          Direct Object
Arguments             Agent

Case                  NOM                  ACC
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Pool 2. Unergative verbs


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GR                    Subject          Direct Object
Arguments                                 Patient

Case                  NOM                  ACC
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Pool 3. Unaccusative verbs

A pool is a pre-syntactic phenomenon, and as such sends instructions to the syntax where lexical elements are assembled. The instructions sent to the syntax is that one argument must link two different cases according to pools 2 and 3, whereas each argument links exactly one case in Pool 1. According to Pool 1, where association is one-to-one, a simple merger takes place in the syntax, yielding (5). As for Pool 2 and 3, their treatment in the syntax may yield two possible sequences, as seen in (6) and (7). The argument, whether an agent or a patient, is successively merged with both case markers, which appear to be stacked, and then the inner one is deleted because the verb cannot accommodate both of them (cf. Desouvrey 2010).[5]
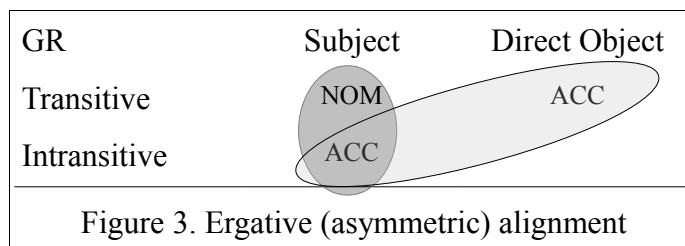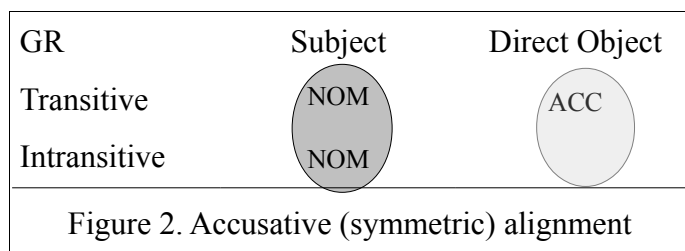
(5)   Agent – NOM Patient – ACC   (transitive verbs)

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5   To understand this point, consider the cyclic computation of three elements A, B, and C, yielding A-B-C. Suppose that the head A can license only one element, A or B. So either A or B has to be deleted. Deletion of C would be a string-vacuous operation since it amounts to assuming that the computation of A-B-C has never taken place. That is, the existence of C can never be inferred. Deletion of B, on the other hand, can be attributed to the presence of C. To translate this in algebra, deleting the last element would be like A+B+C and then A+B+C-C. Such an artifice could be useful in mathematics, but not in a natural linguistic system, which is incompatible with string vacuous operations for reasons of learnability.
    Notice that only the case morpheme, not its feature, is deleted. This can be seen in certain controlled structure involving vectors, as discussed in Desouvrey (2010) with Korean data. In addition, both cases can surface under certain conditions, which will not be discussed in depth here. For instance in Korean, in certain constructions, an NP may bear two different cases, a phenomenon known as case stacking (cf. Gerdts and Youn 1999, Yoon, 2004, Youn 1995, and references therein).

(6)   a.   Agent – ~~NOM~~ – ACC.   (unergative verbs)

       b.   Agent – ~~ACC~~ – NOM

(7)   a.   Patient – ~~NOM~~ – ACC   (unaccusative verbs)

       b.   Patient – ~~ACC~~ – NOM

If the (b)-sequences are chosen, the single argument of intransitive verbs as well as the subject of transitive verbs will be nominative-marked, yielding a symmetric system with one case per plane. On the other hand, the choice of the (a)-sequence must yield what is known as an ergative alignment, where the single argument of an intransitive verb and the subject of a transitive verb take respectively the accusative and the nominative case, hence an asymmetric system with two different cases in one plane. Both types of alignment can be seen in the following Figures.

GR	Subject	Direct Object
Transitive	NOM	ACC
Intransitive	NOM	

Figure 2. Accusative (symmetric) alignment

GR	Subject	Direct Object
Transitive	NOM	ACC
Intransitive	ACC	

Figure 3. Ergative (asymmetric) alignment

In fact whether a language shows an accusative pattern or an ergative one may not be a choice, or parameter. As I will show throughout this paper, the pattern in Figure 3 in which the accusative case spans two grammatical relations is an anomaly to the extent that it runs counter a fundamental building principle of natural languages, namely the Principle of Harmony. The Principle of Harmony, which is an economy principle, disallows constraints of the type if-then. As a result, a constraint applies even where it need not, unless it comes to challenge another constraint (recall footnote (3) and all of my past researches). Specifically applied in the present context, it may be formulated as follows:

(8)   **Principle of Harmony (PH)**

      a.   The same linearization type must hold for all intransitive verbs

            in a given language.

      b.   Each grammatical relation must be uniformly case-marked for all types of verb.

It should be clear that (8) insures the uniformity of marking for all verbs, transitives and intransitives, by disallowing different types of linearization for unaccusative and unergative verbs. That is, if unergative verbs and cases are linearized as in (6b), where accusative is stacked first, (7b) has to be used for unaccusatives as well, and vice versa. Moreover, the result in (6b) and (7b), according to which all instransitives are marked with nominative case, unlike (6a) and (7a), is the best because it is consistent with the subject of transitive verbs. As a result, the nominative-stacked-first linearization, which is the cause of ergativity (see below), is ruled out, cf. (6a) and (7a), and in the normal case will never be an option.

The abstract system just described is that of a language which has a case morpheme for each grammatical relation, that is a language with no morpheme gap, cf. (1). The Principle of Harmony forcefully prevents such languages from being ergative.

2.3 Anatomy of the ergative system of case-marking

In asymmetric languages, those of the type consistent with (1), the application of PH is compromised, which may result in various types of anomaly (or ergativity). Let us illustrate this with a simple paradigm in which either the nominative or the accusative is missing. Consider first the case where the nominative is missing. For a simple transitive verb, one has the following Pool. Each argument links the case in its plane, if any. Therefore, one obtains a bare Agent (subject) and an accusative-marked Patient (direct object) in the syntax.

GR	Subject	Direct Object
Arguments	Agent	Patient
		●
Case	--	ACC

Pool 4.   Agent   Patient-ACC

Now, consider the behavior of intransitive verbs in the context of a missing nominative case. In an unergative pool, the agent can never link the accusative case, since only coplanar elements can be in a one-to-one linking (cf. 4); see Pool 5. On the other hand, the single patient argument of an unaccusative verb can normally link the accusative case in its plane, as shown in Pool 6. Both types of intransitive verbs would bear a different case, which would yield an ergative system. However, I claim that PH harmonizes unaccusatives with ergatives so that the former will always surface without case in a nominative-gapped system. In effect, since no-linking can occur with unergatives, linking normally takes place, but the linked case is deleted in the syntax. It is important to note that the harmonization cannot be done the other way around, since the Agent in Pool 5 cannot link the accusative case by virtue of WFC on linking. The whole picture is shown in Table 1, which displays a perfect symmetry.

GR	Subject	Direct Object
Arguments	Agent	--
Case	--	ACC

Pool 5.   Agent   (unergative)

GR	Subject	Direct Object
Arguments	--	Patient
Case	--	accusative

Pool 6. *Patient-ACC (unaccusative)
Patient-ACC (by harmonization)

GR	Subject	Direct Object
Transitive	--	ACC
Unergative	--	
Unaccusative	--	

Table 1. Type of accusative alignment

If the accusative morpheme is missing instead of the nominative one, a whole new ball game obtains, however. I show that PH cannot align both types of intransitive verbs with the transitive scheme shown in Pool 7.

GR	Subject	Direct Object
Arguments	Agent	Patient
Case	NOM	--

Pool 7. Agent-NOM Patient (transitive)

In an unaccusative pool no linking is possible by virtue of (4). Therefore, the single patient argument come to align with the direct object of transitive verbs, as shown in Pool 8, which parallels Pool 5.

GR	Subject	Direct Object
Arguments	--	Patient
Case	NOM	--

Pool 8. Patient (unaccusative)

As for unergative verbs in this type of case system, the Agent can link the nominative case in its plane, as shown in Pool 9. The single argument of unergatives is thus normally aligned with the subject of transitive verbs, yielding an inherently asymmetric alignment. PH may intervene to align them with unaccusatives so as to uniformize case-marking in all intransitive verbs, as shown in Pool 9. Just as in the case discussed above, the harmonization cannot be based on Pool 8 by virtue of WFC.

GR	Subject	Direct Object
Arguments	Agent	--
Case	NOM	--

Pool 9. Agent-NOM (unergative)

Patient-~~NOM~~ (by harmonization)

Ergativity is therefore inescapable with this type of case system, and may take two different aspects, according to whether case marking in intransitive verbs is harmonized (cf. Table 3) or not (Table 2). It turns out that ergativity has to be split; it cannot be perfect, for in a perfect case system where there is no gap, ergativity will never arise. Therefore ergativity is an anomaly, and it is likely to cause instability in affected languages to the extent that PH will try different ways in the syntax to harmonize the system (see below).

GR	Subject	Direct Object
Transitive	NOM	--
Unergative	NOM	
Unaccusative	--	

Table 2. Unharmonized alignment

GR	Subject	Direct Object
Transitive	NOM	--
Unergative	--	
Unaccusative	--	

Table 3. Harmonized alignment

It is clear now, from the present perspective, that there is neither ergative nor absolutive case in natural language grammar.[6] (For ease of reference I will continue to use these terms, though it would be

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6   Yip et al. (1987) reach a similar conclusion from a different perspective. Under the assumption that a sentence comprises a sequence of cases (N A in this order) making up an autonomous tier, the accusative alignment is derived by the

more appropriate to refer to ergative languages as asymmetric languages, or even accusative languages, since accusative case is the fault line that runs across two planes.) An argument for the existence of the ergative case is traditionally the fact, in passive constructions, that no arguments ever become ergative, quite the contrary of an accusative language where the patient acquires nominative case under passivization. The Pool Theory correctly predicts this fact. Passivization is the addition to a transitive verb of some special morphology so that the Agent is no longer a variable in the pool. Therefore, in an ergative system, a passive verb must be treated as an unaccusative verb (cf. Pool 8). We know, by virtue of (4), that the Patient can never link the nominative case in such a context. The antipassive construction will be shown to be equivalent to a passive.

The exposition so far is based on the simplex case systems where only nominative and accusative are considered. Nevertheless, it is strong enough to allow us to navigate through various language-specific complexities. Along the way, it will be shown what may cause a morpheme to be missing in a case system. In the rest of this article, I will analyze data from Dyirbal, Warlpiri, Basque, Hindi-Urdu, and Korean. The reader who gets the gist of this section can immediately start to verify the predictions of this first approximation of our theory of linking with whatever case system she/he knows of.

3. The rise of ergativity in Dyirbal

3.1 Dyirbal has only one case system

Dyirbal, apparently a nearly extinct language of Australia, is usually presented as an archetypal ergative language. It shows a rare, perhaps unique, split in its case system. NPs and third person pronouns follow an ergative alignment, while first and second person pronouns use an accusative alignment, a fact that puzzles Yip et al. (1987) (cf. their first footnote).

In Levin (1983:227), one finds that Dyirbal has two separate case systems for nouns and pronouns. As she describes it, absolutive and ergative are found with lexical nouns, while nominative and accusative are used with pronouns (first and second persons). This is shown in Table 4.

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association of cases with NPs from left to right, whereas the ergative alignment arises from a right-to-left association. Crucially in intransitive verbs, extra case is ignored. In the Case Tier Theory, the alignment type is a parameter, and therefore there is no explanation as to why a language would chose a direction of association instead of the other. However, in the Case Tiers Theory and the Pool Theory, accusative and nominative case are supplied by the representations (tier and pool), unlike other hard-linked cases, which are pre-associated to NPs (lexical case, in their terminology).

Nouns		Pronouns	
Absolutive	--	Nominative	--
Ergative	-ngku	Accusative	-nya
Genitive	-(ng)u	Genitive	-(ng)u
Dative	-ku	Dative	-ku

Table 4. Dyirbal double case system (cf. Levin 1983)

Let us take a closer look at Table 4 in order to find out the differences between both case systems. First the genitive and the dative case are the same for nouns and pronouns, and therefore they can be set aside. Second, the remaining cases can be rearranged so that Absolutive faces Accusative, while Ergative and Nominative face each other, as seen in Table 5, since we now know that absolutive is accusative, and ergative is nominative. It is thus easy to see that both case systems make up an interlocked pattern. Indeed, Absolutive interlocks with Accusative, so do Ergative and Nominative. Clearly, the absolutive and the accusative in one hand, and the ergative and the nominative cases on the other are in complementarity distribution, which is generally the blueprint of environment-sensitive elements. This analysis of Dyirbal case-system is theory independent.

Nouns		Pronouns	
Absolutive	--	nya	Accusative
Ergative	ngku	--	Nominative

Table 5. Dyirbal case equivalence

Therefore, instead of the double paradigm shown in Table 4, a single case system can handle both nouns and pronouns, as seen in Table 6. The rightmost column lists the relevant features in the paradigm, essentially Φ and Ω (to be discussed below). Clearly, it appears that the case system of Dyirbal is perfect as it contains no gap. However, there are two irregularities that must be found out: (a) why pronouns are incompatible with nominative case, and (b) why nouns are incompatible with accusative case. Once both (a) and (b) are understood, one can turn to the linking theory to account for the different patterning of nouns and pronouns with respect to grammatical relations.

Ergative	Nominative	-ngku	Ω
Absolutive	Accusative	-nya	Φ
Genitive	Genitive	-(ng)u	--
Dative	Dative	-ku	--

Table 6. Dyirbal unified case system

The questions (a) and (b) are at the heart of the natural language structure building, which in my view consists of a series of binary mergers (cf. Desouvrey 2000, etc.). Generally, if two elements are expected to merge but fail to do so, the reason is to be found in their feature specification. Compatible elements can merge, unlike elements with different feature specifications. Two elements are compatible if they are both specified for the same feature or at least one of them (the complement) is underspecified (neutral). Thus in Dyirbal, nouns and third person pronouns, as opposed to first and second person pronouns, must be specified for some features, while the case markers are specified for a different type of feature. One feature that comes to mind is OMEGA, which determines whether an element is a vector, as opposed to a scalar, which most syntactic elements tend to be (cf. Desouvrey 2007). OMEGA, as well as its opposite PHI, is usually the only feature that do not generally have a morphological manifestation, and which may cross-linguistically be found in any type of elements, including wh-elements, negation (most likely its 'homeland'), inflected verbs, pronouns, etc.[7]

3.2 Deriving the split alignment

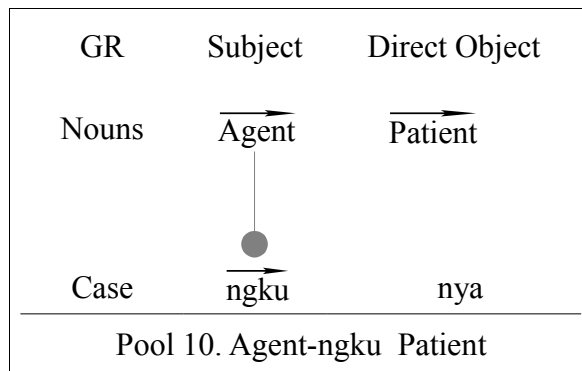Suppose, indeed, that in Dyirbal all nouns and their referring pronouns are Ω-specified (vector). Suppose also that the nominative marker is specified the same, while other personal pronouns and the accusative marker are Φ-specified (scalar). With this in mind, let us derive the alignment pattern of the transitive sentence in (9).[8] Since both arguments are NPs, an ergative-absolutive pattern is traditionally assumed (the second gloss), which I replace with a nominative-accusative pattern, where the accusative marker is absent for reasons to be discussed shortly. The linking Pool 10 shows a one-to-one alignment:

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7   For instance in English inflected verbs, including modals are Ω-specified (vectors), just as negation and *wh*-elements. In Spanish infinitive verbs and pronominal clitics are Ω-specified. The omega feature has important consequences in Haitian Creole, European Portuguese and Korean (cf. Desouvrey 2000, 2008a, 2008b, 2009, 2010).

8   The Dyirbal, Warlpiri, and Basque data are all found in Levin (1983). The number in parenthesis next to the gloss indicates both the chapter and the example number in her work; (9) above is Levin's example 2, chapter 5. She gives credit to Dixon (1978) (Dyirbal) and Hale (1982) (Warlpiri), which are not accessible to me.
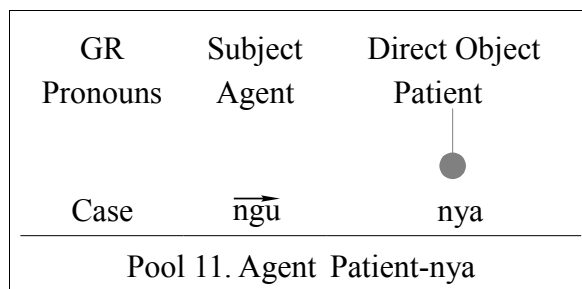
the agent takes the nominative marker, but since the patient is also a vector, it cannot link the accusative scalar, which is hence ignored. Thus Pool 10 is equivalent to Pool 7.

(9)   palan jukumpil pangkul   yarangku palkan

             there woman   there-NOM man-NOM hit-NFUT

             there-ABS woman-ABS there-ERG man-ERG hit-NFUT

             'The man is hitting the woman.' (5.2)

GR	Subject	Direct Object
Nouns	Agent →	Patient →
Case	ngku →	nya

Pool 10. Agent-ngku Patient

With pronominal arguments, as in (10), the mismatch is reversed since pronouns, unlike nouns, are scalar. As a result, the nominative marker never shows up with pronominal argument, which does not entail they take the same case as object nominals, as suggested in the literature. As shown in Pool 11, in the subject plane, the scalar Agent cannot link the vector nominative.

(10)   ngaja nginuna palkan

             I you-ACC hit-NFUT

             'I am hitting you.' (5.11)

GR	Subject	Direct Object
Pronouns	Agent	Patient
Case	ngu →	nya

Pool 11. Agent Patient-nya

The same relations are expected to be found in verbs with mixed arguments. If the subject is an NP

while the object is a pronoun, there is no mismatch in the system, and therefore a perfect nominative-accusative sentence obtained, as seen in (11). However, if the subject is a pronoun and the object, a noun, both arguments mismatch with their case-marker and therefore no linking occurs: the arguments remain caseless, as shown in (12).

(11)   ngaykuna pangkul yarangku palkan

            I-ACC there-NOM man-NOM hit-NFUT

            'Man is hitting me' (5.12/33)

(12)   ngaja payi yara palkan

            I- there man hit-NFUT

            'I am hitting man' (5.13/32)

   Let us consider now single argument verbs. The discrepancy between case number and argument number concomitantly with the feature mismatch will explain the different alignment of nouns and pronouns. According to PT, a single argument must link with the unlinked case of a missing argument; but it is able to do so only if it can link the case in is own plane (cf. 4). Thus in unaccusative verbs with a noun argument, there is no linking at all, since in the DO plane the omega argument and the scalar case-marker mismatch. Therefore the noun will surface without case-marker, which traditional analyzes interpret as absolutive (unmarked case). In unergative verbs, there is no mismatch in the subject plane and one would expect a linking, yielding an argument with nominative case (ergative). However in order to harmonize both types of intransitive verbs, PH prevents the linking of unergative from taking place, generalizing the pattern of unaccusatives. As a result the argument surfaces with no case marker. This is shown in Pools 12 (unaccusative verbs) and 13 (unergative verbs).

GR	Subject	Direct Object
NP		$\overrightarrow{\text{Patient}}$
Θ-pronoun	$\overrightarrow{\text{ngku}}$	nya
Pool 12. Patient		

GR	Subject	Direct Object
NP	$\overrightarrow{\text{Agent}}$	
Θ-pronoun	$\overrightarrow{\text{ngku}}$	nya

Pool 13. Agent (by harmonization)

With pronominal arguments (scalar), the agent cannot link the nominative marker (a vector) of an unergative verbs, and therefore PH prevents the linking of unaccusative verbs as well, or if it does link, deletion has to take place in the syntax. The data provided by Levin confirm this analysis. The argument of an intransitive verb, whether a noun or a pronoun, never takes case morphology, as shown in (13).

(13)   a.   Payi yara paninyu

there man come-nfut

there-ABS man-ABS come-NFUT (5.1)

b.   Ngaja paninyu

I come-NFUT

I-NOM come-NFUT

I am coming (5.10)

It is clear that the feature mismatch amounts to a gap. With pronouns the gap is the nominative case, while with NPs it is the accusative case, which yields the ergative pattern. PT correctly predicts different alignments for both systems. Indeed, the nominal system, including third person pronouns, follows an ergative alignment, since those elements cannot take the accusative morpheme, unlike first and second person pronouns. This succinctly summarized in (14) and (15), showing NPs and pronouns respectively.

(14)   a.   Agent-nom Patient   (transitives)   (NPs)

b.   Patient   (unaccusatives)

c.   *Agent-nom   (unergatives)

(15)   a.   Agent Patient-acc   (transitives)   (Pronouns)

b.   ***Patient-acc**   (unaccusatives)

c.   Agent   (unergatives)

To strengthen this analysis, we need to provide evidence that Ω- and Φ-features are the disruptive factor in Dyirbal case system. To this effect, I will consider two types of structures, relative clauses and the topic-chain. Both are expected to show some vector effects, consistent with the theory of vector (cf. Desouvrey 2008a).

3.3 Vector effects in Dyirbal

Having shown that the hypothesis on feature specification makes the correct prediction, let us see now what type of evidence can be adduced to support it. When vectors are involved in a system, one must expect to find some vector effects. With respect to controlled clauses, on which I have a limited set of data, the following vector effect is expected to be found:

(16)   a.   A vector referring element cannot acquire its antecedent across another
               intervening vector.

        b.   A vector cannot be the antecedent of another vector

In Dyirbal NPs are vectors, so is the nominative marker, while the accusative marker is a scalar. In a transitive sentence, the agent argument perfectly merges with the nominative marker, unlike the patient argument, as discussed above. When two vectors are merged, they cancel each other, yielding a neutral element. That is, the nominative marker is acting as a switch to the agent argument. On the other hand, a bare NP argument (patient) is not switched off as a vector. Let us assume that verbs have to be enhanced with relevant features to accommodate their variously specified arguments.

3.3.1 The syntax of relative clauses

With this in mind, consider relative clauses. In Dyirbal, there are no relative pronouns. To derive a relative clause, the verb takes a non-finite form to which the particle *ngu* (also used to mark genitive noun phrases, as Levin points out) is affixed, and then the case-marker of the head noun in the main clause is added to the verb plus *ngu* base. In addition, the argument coreferent with the head noun in the main clause (i.e. the relativized NP) is deleted in the relative clause. This is descriptively the making of Dyirbal relative clauses, as reported in Levin (1983). This is illustrated with (18), which is
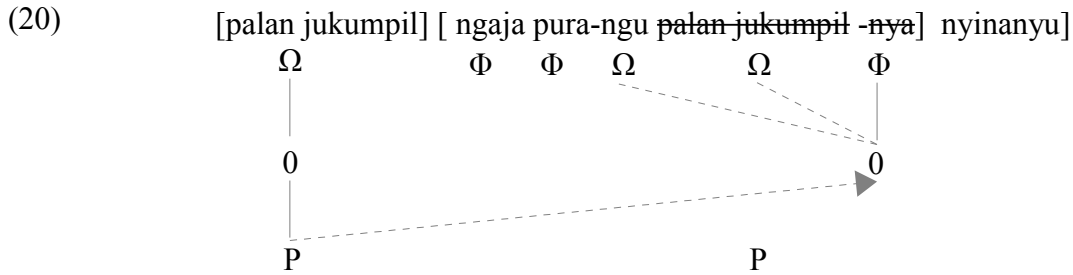
made of the sentences in (17).

(17)   a.   palan   jukumpil   nyinanyu
               there-(ACC) woman-(ACC) sit-NFUT
               there-ABS woman-ABS sit-NFUT
               'woman is sitting down' (5.91a)

       b.   ngaja   palan   jukumpil   puran
               I-(NOM) there-(ACC) woman-(ACC) see-NFUT
               I-(NOM) there-ABS woman-ABS see-NFUT
               'I am watching woman' (5.91b)

(18)   [palan   jukumpil   [ngaja   purangu]   nyinanyu]
                there-(ACC) woman-(ACC) I-(NOM) see-GEN-(ACC) sit-NFUT
               'the woman whom I am watching is sitting down' (5.92)

With respect to this state of affairs, the first order of business is to consider the following questions:

(19)   a.   What is the implication of the verb being uninflected in the relative clause?

       b.   What is the marker *ngu* needed for?

       c.   Why is the case-marker of the head noun added to the relative verb?

The answers to these questions will become clear under the following analysis. Let assume with Levin and others that a relative clause in Dyirbal is a nominalized clause, which is obvious since the verb may not be uninflected. I claim that the uninflected verb takes the genitive case (*ngu*) so as to become a noun complement to the relativized NP. The latter, which is declined at the same case as its intended antecedent in the main clause, is deleted, leaving stranded its case marker. The head noun then supplies a reference feature to the stranded case marker, and as a result the latter technically functions as a relative pronoun. Under this analysis, the structure of the relative clause (18) is as seen in (20).[9]

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9   For the treatment of coreference in this framework, see Desouvrey (2003), (2006), (2007) (2008a) 2008b), etc. In the present nonlinear system, coreference is not as a huge beast as Binding Theory. A maximally specified referring element (an NP) has a root node, Φ- or Ω-specified, which develops into a thematic node holding a terminal, or referential feature, noted with capital letter, P, Q, etc. A pronoun has no terminal feature while an anaphor just has a root node. Coreference is obtained by spreading: an NP spread its terminal feature to a pronoun thematic node, while an anaphor can receive a thematic node from a pronoun or an NP.

(20)   [palan jukumpil] [ngaja pura-ngu ~~palan jukumpil~~ ~~-nya~~] nyinanyu]
                    Ω   Φ   Φ   Ω   Ω   Φ

                    0   0

                    P   P

Notice that I assume that the accusative case marker (a scalar) is reintroduced for the purpose of relativization, and is deleted, without its features, since it comes to mismatch with the Ω-specified noun. The genitive case is universally an anaphor, and hence does not have a thematic feature node of its own (cf. Desouvrey 2010). It gets the thematic feature from the case attached to the deleted head noun, namely a 0-specified one (i.e. underspecified). The bare head noun, *palan jukumpil* 'woman' is a vector, as is the case of NPs in Dyirbal.

Under this analysis, a relative clause in Dyirbal is expected to have certain restrictions. First, since the relative noun phrase must have the same case as its head in the main clause, it might be that relativization is impossible if another NP already bears the desired case (that of the head noun) in the relative clause. If the relative verb is intransitive, relativization should be always possible since the relative noun phrase can match any case borne by the head noun without competing with another argument. However, if the relative clause contains a two-argument verb, the relativized NP would not take the case of a co-argument in order to match the case of its head. This point cannot be checked, due to lack of data. Second, since NPs are Ω-specified, a bare accusative NP is an active vector, unlike a nominative-marked NP. In effect, since the nominative marker is Ω-specified as well, it functions as a switch to the NP. As a result both the NP and the case marker lose their vector properties.

Levin provides a few examples which confirms the proposed analysis. Thus in (20) above, the head noun can be the antecedent of the case marker in the relative clause, since the intervening argument, a pronoun, is a scalar (i.e. Φ-specified). Now consider the sentences in (21). The relativization of *pangkul yarangku* 'the man' is not possible since the relative clause would come to contain an intervening vector, *payi yuri* 'the kangaroo', as seen in (22) whose representation is (23).

(21)   a.   payi yara panakanyu

                there-ABS man-ABS return-NFUT

                'man is returning' (5.93)
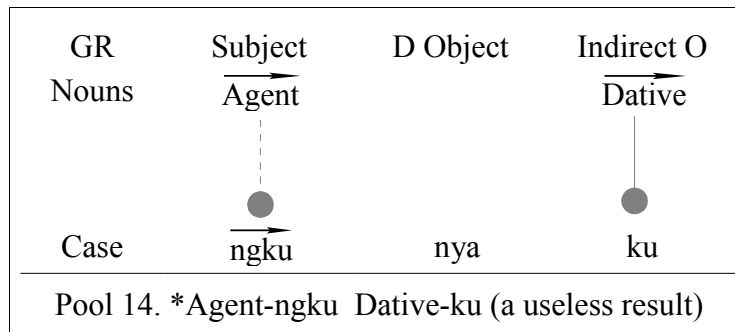
b.   payi   yuri   pangkul yarangku pakan

there-ABS kangaroo-ABS there-ERG man-ERG   spear-NFUT

'man speared kangaroo' (5.94)

(22)   * payi   yara [payi   yuri   pakan-gu-~~nya~~]   panakanyu

there-ACC man-ACC there-ACC kangaroo-ACC pakan-GEN-ACC panakanyu-NFUT

'Man who speared kangaroo is returning.'

(23)   *[payi yara] [payi yuri paka-ngu ~~pangkul yarangku-nya~~] panakanyu]

Ω Ω Ω Ω Ω Φ

0   0   0

P   Q   P

To derive a well-formed relative clause, (25), the vector *payi yuri* 'the kangaroo' has to be eliminated from the representation. Dyirbal can transform an Agent-Patient verb into an Patient-Goal verb; the Patient of the original verb becomes the Goal, and the Agent, the Patient in the new structure. Such a transformation takes place in the pool. The new linking pool includes an indirect object plane in which the dative argument is hard-linked, that is pre-associated, as is generally the case with indirect objects.[10] If the agent appears in the subject plane, while there is no argument in the direct object plane, the association will be one-to-one, hence useless, as the nominative marker is still in the structure, as shown in Pool 14. In effect, the Agent being a vector, it cannot link the accusative case, as discussed above.

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10 The pre-association of the indirect object in Dyirbal is further enforced by the over dative marker *ngay* that appears on the verb. In other languages, like Korean (see below), the verb bears an abstract dative feature, which make the dative argument more likely to interact in the Pool.

GR	Subject	D Object	Indirect O
Nouns	Agent		Dative
Case	ngku	nya	ku

Pool 14. *Agent-ngku Dative-ku (a useless result)

If instead the agent appears in the direct object plane, it cannot link either case-marker by virtue of the WFC on linking (cf. 4), resulting in a bare agent, which is exactly the needed result, as seen in Pool 15.

GR	Subject	D Object	Indirect O
Nouns		Agent	Dative
Case	ngku	nya	ku

Pool 15. Agent Dative-ku
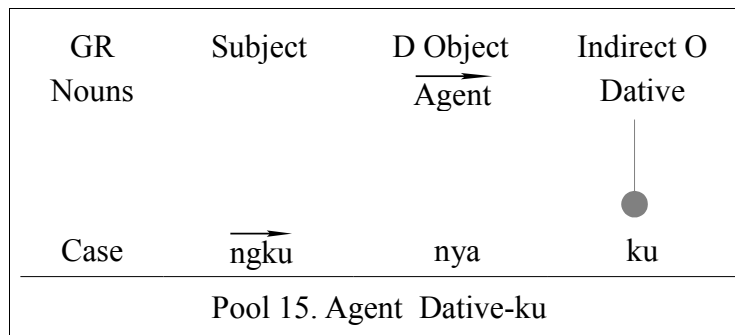
As a result, the patient becomes the subject, as seen in (24), and therefore relativization can take place, (25).

(24)   a.   payi   yara   pakalnganyu   pakul   yuriku
            there-abs man-abs spear-ngay-nfut there-dat kangaroo-dat
            'man speared kangaroo' (5.94)

(25)   b.   payi yara   [pakalngangu   pakul yuriku]   panakanyu
            there-(a) man-(a) spear-ngay-gen-(a) there-dat kangaroo-dat return-nfut
            'Man who speared kangaroo is returning' (5.95)

The head of the relative clause can be in nominative or any other cases, as Levin points out. For instance, in (27), which is made of the sentences in (26), the only argument can be freely relativized and it takes the nominative case of the head. Relative clauses in Dyirbal do not hinge on its ergative alignment; what seems to be crucial is the notion of vector.

(26)   a.   payi   yara   pangkun jukumpiru puran

there-ABS man-ABS there-ERG woman-ERG see-NFUT

'woman saw man' (5.88)

       b.   palan   jukumpil   waynyjin

there-ABS woman-ABS go uphill-NFUT

'woman went uphill' (5.89)

(27)   [payi yara   pangkun jukumpiru   puran] [waynyjingurru]

there-(ACC) man-(ACC) there-NOM woman-NOM see-NFUT go uphill-NGU-NOM

'As woman were going uphill, she saw man.' (5.90)

3.3.2 The syntax of the topic-chain construction

Dyirbal has a construction, named "topic chain", which is derived from any two sentences with a common topic. Levin suggests that this construction resembles conjunction, but it makes use of the same features found in relative clauses. From the sentences in (28), two topic-chain constructions may be derived, as shown in (29). In each of them the argument in the second clause may be deleted in whole or in part under coreference with an argument in the first clause.

(28)   a.   payi yara paninyu

there man come-nfut

there-ABS man-ABS come-NFUT

man came here (5.14)

       b.   payi yara pangkun   jukumpiru   palkan

there man there-NOM woman-NOM hit-NFUT

there-ABS man-ABS there-ERG woman-ERG hit-NFUT

woman hit man (5.15)

(29)   a.   [payi yara paninyu] [~~payi yara~~ pangkun jukumpiru palkan]

man came here and was hit by woman (516 / 418)

       b.   [payi yara pangkun jukumpiru palkan] [~~payi yara~~ paninyu]

man was hit by woman and came here (5.17 / 419)

The topic in each clause is the bare accusative argument, a live vector. Therefore, the topic chain can be seen as a vector chain defining a series of scopal domains. A scalar element has no active scope, hence cannot enter in this sort of construction. Indeed, if both topics are not in the bare accusative form, they have to be transformed via the *ngay* construction, just as in certain relative clauses. This is illustrated with the sentences in (30) and (31), which are first transformed as in (32) in order to make the chain in (33)

(30)   pala yuku pangkul   yarangku nutin
              there tree   there-NOM man-NOM cut-NFUT
              there-ABS tree-ABS there-ERG man-ERG cut-NFUT
              'man cut tree' (5.82/)

(31)   payi nyalngka pangkul   yarangku punjun
              there boy   there-nom man-nom spank-nfut
              there-ABS boy-ABS there-ERG man-ERG spank-NFUT
              'man spanked boy' (5.83)

(32)   a.   payi   yara   paku   yukuku nutilnganyu
              there   man   there-DAT tree-DAT cut-NGAY-NFUT
              there-ABS man-ABS there-DAT tree-DAT cut-**NGAY**-NFUT
              'man cut tree'

        b.   payi yara   pakul   nyalngkaku punjulnganyu
              there man   there-DAT boy-DAT   pank-NGAY-NFUT
              there-ABS man-ABS there-DAT boy-DAT pank-**NGAY**-NFUT
              'man spanked boy'

(33)   [payi yara paku yukuku nutilnganyu] [----- pakul nyalngkaku punjulnganyu]
              'man cut tree and spanked boy' (5.84/)

To conclude, both topics must be a live vector so that they can enter in a long distance relation. Only scopal elements, namely the bare accusative argument can take part in this construction. The vector subject is switched off by the case marker, and therefore, it has to be transformed via the *ngay* construction in order to make a topic chain.

It turns out that Dyirbal relative clauses and the topic chain construction have nothing to do with the notion of ergativity in the traditional sense. In fact, this language provides strong empirical evidence against this notion. What is peculiar to Dyirbal, and unlikely to be a widely spread property in world languages, is the fact that elements of the biggest class, namely NPs, are vectors. The Dyirbal language might have been a steep learning curve for an infant in a bilingual environment dominated by English.

3.4 Antipassive

Many languages have a passive construction in which the subject-agent is dismissed and replaced by the object-patient. This is generally done by means of some special morphology on the verb. There is then a change in the valence of the verb, although the dismissed Agent may reappear as a kind of adjunct. Since the dismissed Agent is no longer an argument, passives must be treated as unaccusatives.

In an ergative language, unaccusatives cannot link in the pool by virtue of WFC (cf. (4)), and therefore the patient can never take nominative case. Nevertheless, an alternative construction exists, the antipassive, which seems to do the same job as a passive in accusative language. In effect, the gist of both constructions is less the dismissed of the agent than the appearance of the patient in a marked GR so as to become more prominent. Thus, (34a) is a normal nominative-accusative (or ergative-absolutive) sentence; in its antipassive (34b), the object-absolutive becomes a dative, while the subject-ergative appears in the absolutive form.

(34)   a.   Payi   parrkan   pangkul   yarangku   jurrkanyu
                there-ABS   wallaby-ABS   there-ERG   man-ERG   spear-NFUT
                'Man is spearing wallaby.'

        b.   payi   yarra   pakul   parrkanku   jurrkananyu
                there-ABS   man-ABS   there-DAT   wallaby-DAT   spear-APASS-NFUT
                'Man is spearing wallaby.' (3.23)

It turns out that the agent enters the pool in the direct object plane, while the patient takes the indirect object plane with a constant dative case, and as a result a bare agent and dative-marked patient obtains as seen in Pool 16.

GR Nouns	Subject	D Object $\overrightarrow{\text{Agent}}$	Indirect O $\overrightarrow{\text{Patient}}$
Case	$\overrightarrow{\text{ngku}}$	nya	$\overrightarrow{\text{ku}}$

Pool 16. Agent Patient-ku
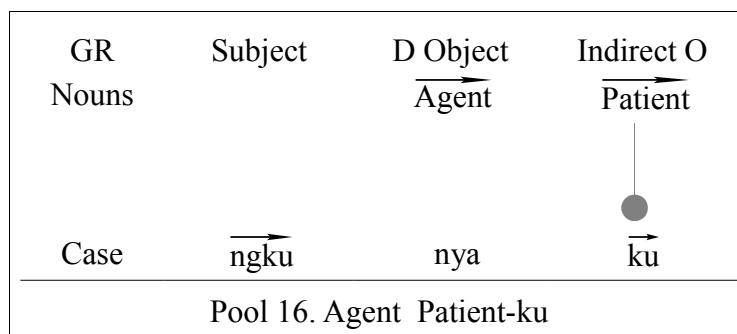
The antipassive, like the passive construction in accusative languages, is intended to give more prominence to the patient argument by allowing it to have an unusual GR. So if instead the subject enters the pool in the indirect object plane, the patient would not be affected, i.e it would not benefit the stranded nominative case, consistent with the WFC on linking. Thus, all the processes would be pointless.

To conclude, Dyirbal has one perfect, gapless case system. The apparent split on an argument-type line is caused by a highly marked Φ/Ω-specification which thwarts the Principle of Harmony.

4. Why Basque is an ergative language

4.1 Deriving the main verb classes

Basque possesses a great deal of case markers, an overview of which as well as some basic descriptions can be found in Levin (1983).

The table below shows the main cases in the paradigm, nominative and accusative with their declension according to number and definiteness; the last column shows their names in Basque traditional grammar, which I conveniently use as placeholders instead of real morphemes, just as in Warlpiri (see below).[11] As can be seen, the non-definite accusative (NOR) is blank, which means that the paradigm has a morpheme gap. I argue that this gap is precisely what causes Basque to be an ergative language.

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11 Levin adopts the traditional Basque name of the case marker in her description in order to avoid theoretical bias about their nature, as she puts it.

Case	Non-Definite	Singular Definite	Plural Definite	
Nominative	Ek/k	ak	ek	(NORK)
Accusative		ak	ek	(NOR)

Table 7. Basque Case Paradigm (adapted from Levin (1983))

Levin reports that Basque has two main verb classes: the NOR class, which apparently only includes patient single argument verbs, and the larger NOR-NORK class of transitive verbs. The NOR class is illustrated with example (35), showing an unaccusative verb. As we now know, the single argument of this type of verbs in an accusative-gapped language cannot link a case marker, as shown in Pool 17.

(35)   Ni etorri naiz

              I come 1s-IZAN

              I-NOR come 1sNOR-izan

              I came. (6.9)

GR Argument	Subject	Direct Object Ni
Case	NORK	--
Pool 17: Ni		

Example (36) illustrates the NOR-NORK class of transitive verbs. As can be seen in Pool 18, the subject links the case marker in its plane, unlike the object which remains unmarked.

(36)   Mirenek ni ikusi nau

              Miren-NORK I-NOR see 1sNOR-UKAN-3sNORK

              Miren saw me. (6.10)

GR	Subject	Direct Object
Argument	Miren	Ni
Case	NORK	--

Pool 18: Miren-nork ni

It is clear that unaccusative verbs are not case-marked, just like the object of transitive verbs (recall the unmarked argument, or absolutive, is referred to as the NOR argument). Unergative verbs could either align with the subject of transitive verbs or with the only argument of unaccusative verbs. Apparently Basque rejects the second possibility, since as Levin was keen to demonstrate, the NOR class includes only verbs whose single argument is a patient (unaccusative). Basque does have agent intransitive verbs, but it uses a specific constructions to deal with them, namely the *N-Egin* compound. It consists of the verb *egin* 'to do' plus a noun in the non-definite declension. Thus this construction makes it possible to convert unergative verbs in transitive verbs without altering the meaning, hence circumventing any harmonization with unaccusative verbs. This is illustrated in (37).

(37)   Nik   lan   egin dut.
              I-NOM work-NDF do   3sNOR-ukan-1sNORK
              I-NORK work-NDF do 3sNOR-ukan-1sNORK
              I worked. (6.15)

To conclude, the two main classes of verbs in Basque are accounted for. However, there is a small class of NORK verbs which at this point does not fit in the entire picture, a point to be discussed in the next section.

4.2 The quest for symmetry

Ergativity is much more complex in Basque than in other languages such as Dyirbal and Warlpiri. I will show that this is due to the three layers of declension of its case system, which aggravates the asymmetry problem.

To understand the effect of the declension, one must consider for each type of intransitive verbs two

different pools according to whether one argument is in the accusative non-definite form (the gap). Consider again unaccusatives. Let us envisage a case where the accusative is definite. As seen in Pool 19, two types of linearization are possible, depending on which case is stacked first. Since the non-definite Pool 17 yields a bare accusative (NOR case), PH must enforce the NORK/nominative-stacked-first linearization (NFL), as opposed to NOR/accusative-stacked-first linearization (AFL). NFL returns a NOR case. Thus in both types of pool the same rule applies, though in one case the argument is not marked.

Pool 19: *Patient-~~NOR~~-NORK (AFL)
           Patient-~~NORK~~-NOR (NFL)
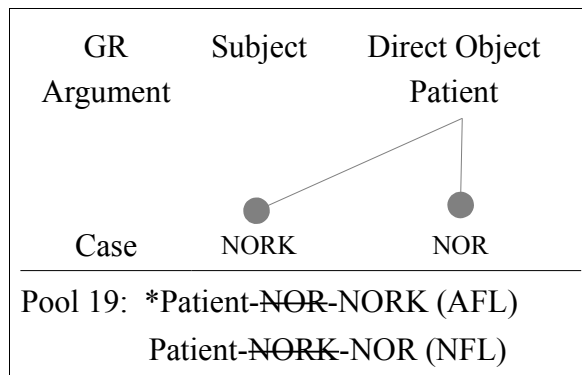
Let us turn now to unergative verbs. In the non-definite case, association of argument and case is one-to-one, which yields a nominative-marked argument (NORK), as shown in Pool 20.

Pool 20: Agent-NORK
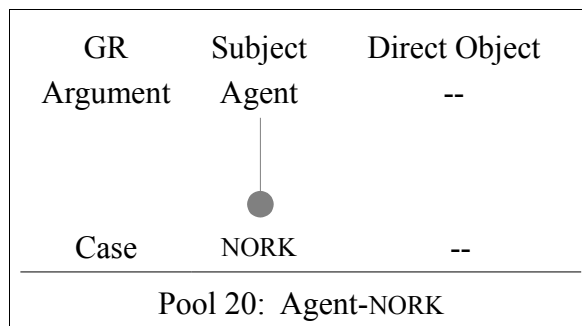
If the direct object plane is conceived in a definite form, linking is one-to-two and therefore two possibilities of linearization must be considered; see Pool 21. In such a case, PH rules out NFL in order to unify the marking of all unergative verbs, whenever the *N-Egin* construction is not used. That is, Pool 21 is harmonized with Pool 20.

Pool 21: Patient-~~NOR~~-NORK (AFL)

             *Patient-~~NORK~~-NOR (NFL)
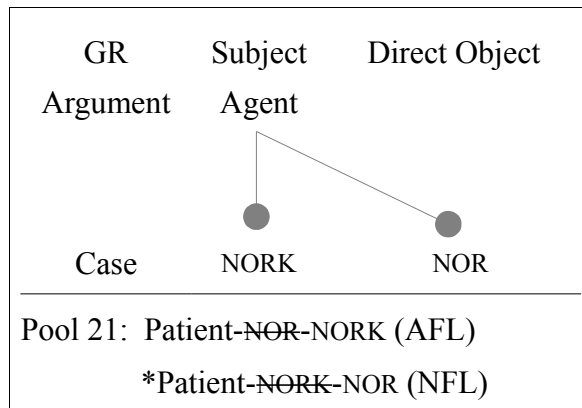
It turns out that two different linearization rules are running in the system, which is contrary to a fundamental economy principle in the grammar. In unaccusative verbs, NFL ensures a very local unification to the extent that all unaccusative verbs are unmarked (NOR/absolutive). Conversely unergative verbs are ruled by AFL, which unifies the unergative verbs.

Pools 20 and 21 accounts for the existence of the NORK class, which turns out to be much smaller than the NOR class. Levin (1983) notes that there are only a few such verbs. Why is it like so? From a symmetry perspective, the grammar must normally apply two rules, namely NFL and AFL, in order to deal with two class of intransitive verbs. In an ideal system, such as an accusative language, just one rule, AFL, is needed. Thus the *N-Egin* construction makes it possible to supersede AFL altogether, in an attempt to achieve a greater harmony; see Figure 5, which accounts for the split in the alignment.

Figure 4. Current split
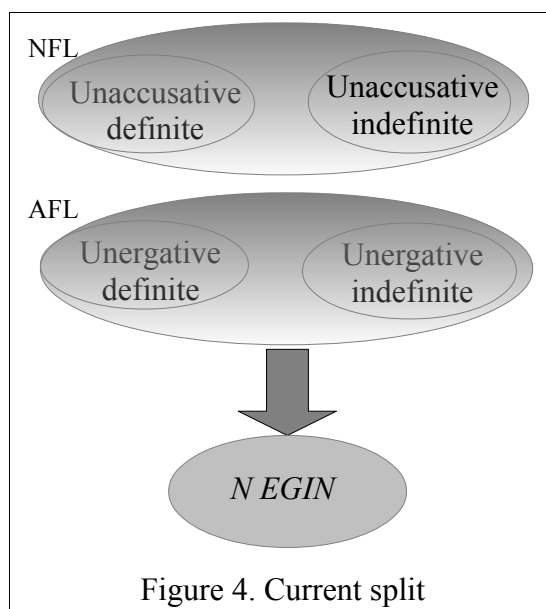
The system shows a few exceptions. For instance, an unergative verb like *mintzatu* 'to speak' belongs to the NOR class (accusative) and an unaccusative verb, *irakin* 'to boil', patterns with unergative verbs (nominative). The existence of such exceptions suggests that other harmonization schemes have been tried in the history of the language. Since the verb *mintzatu*, despite being unergative, requires its argument to take the accusative marker, it must be the case that it adopts the NFL, which yields a different case pattern for the definite and the non-definite, (38). In order to harmonize the argument, the linking of the Agent to the nominative marker has to be canceled in the non-definite, given that the lack of case on the non-definite Agent amounts to a bare accusative case. On this view, the split is readily eliminated in the linking system. However, speakers may have realized that this decision might not be optimal, given the complexity of the case system. In a system of four elements, namely definite and indefinite unaccusatives, and definite and indefinite unergatives, the best harmony is to have all them under the same rule. Since the latter is frankly not possible in a gapped-paradigm, (cf Figure 5), the system has to be symmetric in some way; it must be equally divided in two systems, as it is already, each of which is ruled by a local principle. To put it in number, the ideal symmetry is 2:2, not 3:1, which is downright asymmetric. This is illustrated in Figure 6. Unaccusatives and definite unergatives are unified, while non-definite unergatives still require AFL.

(38)   a.   Agent-~~NOM~~-ACC   (definite)
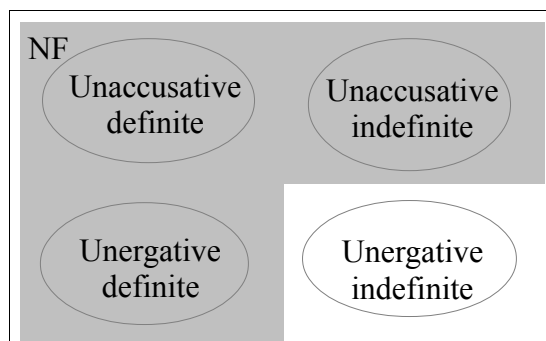
        b.   !Agent-NOM / Agent (non-definite)

Figure 5. Failed unification under NFL

Similarly, the verb *irakin* may be a survival of another failed unification under AFL (Patient-~~Acc~~-Nom). In such a scheme, all intransitive arguments but non-definite unaccusatives would surface with nominative case. There is a gain but at the expense of a more basic local harmonization: unaccusative

class is split according to definiteness. This is shown in Figure 7.

Figure 6. Failed unification under AFL
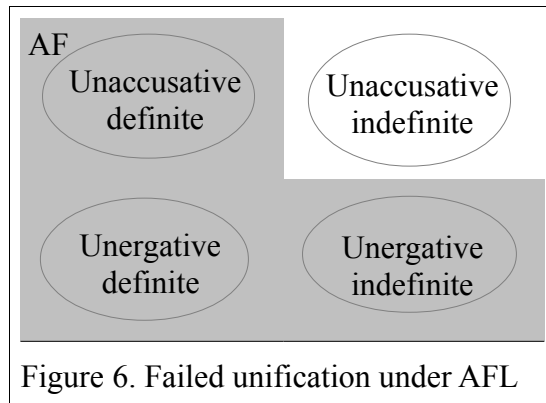
Why are such exceptions still in use? It seems that they are needed to ensure the stability of the system. Without the persistence of these exceptions, new speakers would probably start over endlessly those vain attempts to harmonize the grammar, generating even more instability.[12]

To conclude, PT predicts the ergativity of Basque. Additional complexities are shown to be induced by the declension of the case system according to number and definiteness.

5. Warlpiri

Warlpiri is also an interesting language to look at, not so much for its trivial ergativity which the present theory thoroughly predicts, but for its system of agreement which follows an accusative alignment. For the purpose of illustration, I shall take a look at both the case and the agreement systems. The latter will lead us to refine the representation.

5.1 The case system

As reported in Levin (1983)[13], arguments in Warlpiri may be inflected for three cases, ergative (*ngku*), absolutive (unmarked), and dative (*ki*/*ku*). Since in my perspective, ergative is equated to nominative and absolutive to accusative, the case system has to be recast, as shown in Table 8.

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12 According to the data accessible to me, it seems that ergative languages show more dialectal variation than accusative languages. While variation in accusative languages is mostly observed in the lexicon and the phonology, in ergative it is apparently deeper as it affects various syntactic processes.

13 Levin mostly relies on Hale's *The Essential Features of Warlpiri Main Clauses* (Hale 1982), which I have not seen. In addition, notice the following code: PRES (present), NPST non past, 1/2s first /second person singular, M1 subject agreement, M2 object agreement.

Nominative (ergative)	Accusative (absolutive)	Dative
-ngku	--	-ki
-rlu		-ku
Table 8. Warlpiri case system		

We know that the absence of accusative case, for whatever reason, in an otherwise case-rich language, yields an insuperable asymmetric system, or ergative. Indeed, in Warlpiri intransitive verbs mostly align with objects of transitive verbs with respect to case, as illustrated in (39) and (40). Notice that every sentence in Warlpiri includes an auxiliary which agrees with first and second person arguments, whether subject or object.

(39)   a.   Marlu-ngku   ka   ngarrka nya-nyi

kangaroo-NOM PRES man   see-NPST

kangaroo-ERG PRES man see-NPST

The kangaroo sees the man. (4.5)

b.   Ngarrka-ngku ka   marlu   panti-rni

man-NOM   PRES kangaroo spear-NPST

man-ERG   PRES kangaroo spear-NPST

The man is spearing the kangaroo. (4.9)

(40)   a.   Ngaju ka-rna   wangka-mi

I   PRES-1sM1 speak-NPST

I am speaking. (4.14)

b.   Ngaju ka-rna   parnka-mi

I   PRES-1sM1 run-NPST

I am running.(4.1)

The examples in (39) illustrates the largest class of transitive verb in Warlpiri, namely the so-called ergative-absolutive array. The subject (agent) takes the nominative case while the object appears with the null accusative case. (40), however, exemplifies the absolutive array, which includes most single argument verbs (whether agent or patient).

In transitive verbs, linking of arguments and case markers is one-to-one, that is each argument aligns with the case markers (if any) in its own plane, just as discussed above. For instance, the alignment of (39a) is as shown in Pool 22.

GR	Subject	Direct Object
Argument	marlu	ngarrka
	●	
Case	ngku	--
Pool 22. Marlu-ngku ngarrka		

However, in unergative verbs, no linking is expected to take place, as seen in Pool 23, which accounts for the sentences in (40). I have no example of unaccusative verbs in Warlpiri, but from Pool 24 (cf. Pool 8) we know that such verbs do not allow linking, which is thus canceled for all intransitive verbs, by virtue of PH.[14]

GR	Subject	Direct Object
Argument	ngaju	--
Case	ngku	--
Pool 23. ngaju		

GR	Subject	Direct Object
Argument		NP
Case	ngku	--
Pool 24. NP		

In addition to the absolute and ergative-absolutive arrays, Warlpiri possesses three other verb classes, namely the ergative-absolutive-dative class, (41), the ergative-dative class, (42), and the

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14 It is likely that the gap in the case paradigm is due to some feature mismatch, just as in Dyirbal. If so, the nominative and the dative are most likely neutral (or 0-specified), while the accusative morpheme is omega-specified, which would make it compatible only with similarly specified heads, for instance *wh*-elements. To verify this point, it suffices to check whether *wh*-arguments and other scopal elements appear with some special case-markers in the relevant grammatical function. This found case marker would be the missing accusative in the above table.

absolutive-dative class, (43).[15] The former can be considered to be special transitive verbs; indeed, the ergative-absolutive-dative class corresponds to three-argument verbs in other languages (NOM-ACC-DAT verbs), while the ergative-dative class (NOM-DAT verbs) may or may not exist in certain languages, and might be a member to the unergative class.[16] As for the absolutive-dative verbs, one can treat them as unaccusatives with double object. If this view is correct, one object hard-links the dative marker, since both the verb and the NP bear relevant morphology, while the other fails to associate with any marker, just as in the case of simple absolutive verbs seen above; see Pool 25.

(41)   Ngarrka-ngku ka-rla kurdu-ku japujapu kiji-mi
             man-ERG PRES-rla child-DAT ball throw-NPST
             The man is throwing the child the ball. (4.29)

(42)   Ngarrka-ngku ka-rla   karli-ki   warri-mi
             man-ERG   pres-rla boomerang-DAT seek-NPST
             The man is looking for a boomerang. (4.43)

(43)   Kudu ka-rla   ngarrka-ku parda-rni
             child PRES-rla man-DAT   wait-NPST
             The child is waiting for the man. (4.33)

GR	Subject	DO	IO
Arguments	--	kurdu	Ngarrka
			●
Case	ngku	--	ku

Pool 25. kurdu ngarrka-ku

15 The marker *rla* is referred to as the dative registration morpheme, which in my opinion is similar to Dyirbal *ngay*. They are just visible feature. Korean has instead abstract feature in the verb tree-structure, which I interpret as the reason why the indirect object in this language is not hard-linked, and even does not have its own plane, allowing more combinations in the pool (see below).

16 Apparently this is similar to Blake (1977) who claims that the dative in Australian languages is the indirect object of intransitive verbs (cf Levin 1983:154).

5.2 The agreement system

The agreement system of Warlpiri is special in that it does not follow the same alignment pattern as case. From a case perspective the language is ergative-absolutive, but its agreement shows a nominative-accusative alignment: the same agreement marker is used with transitive and intransitive verbs. In my view, the question is whether this state of affair has to be taken for granted, as in the traditional view, or is predictable and derivable from morpheme inventory or feature specification, as seen above.

I show that the Pool Theory just applies to both case and agreement systems. To begin with, let us take a look at the inventory of agreement marker in Warlpiri. A survey of the data discussed in Levin results in the markers shown in Table 9. Non-existing morphemes are indicated by a dash, while an interrogation mark represents possible existing morphemes for which no data are found. Even though the data are incomplete, we have enough information to tackle the observed accusative pattern. It is likely that both singular and plural are symmetric, and hence follow the same alignment pattern, even though there are two gaps in the third person singular. In fact, PT tells us that ergativity is not possible in a perfectly symmetric system. If the indirect object, which is not a central relation in the linking pool, is set aside, a complete picture for third person markers in the paradigm is obtained. It turns out that for each person both the subject and the direct object have its own morpheme or lack them altogether.

	Subject	D. Object	I. Obj.
1 sing.	-rna	-ju	-ju
2 sing.	-npa	-ngu	-ngu
3 sing.	-	-	-rla
1 pl-inclusive	-rlipa	?	?
2 pl.	?	?	?
3 pl.	-lu	-jarna	?
3 dual	-pala	-palangu	?

Table 9. Warlpiri agreement system

In Warlpiri the auxiliary agrees in person and number with the subject and the direct object by means of distinct markers. Intransitive verbs use the same markers as subject of transitive verbs. Now

the question is: how does the Pool accommodate the agreeing auxiliary? For the time being, let us suppose that agreement and case operate in different but complementary pools. The agreement pool would include a GR for each plane, an agreeing element (Aux), subject and object agreement morphemes, SA and OA respectively, as shown below.

GR	Subject	Direct Object
Argument	Aux	Aux
Agreement	SA	OA

Figure 7. Agreement Pool structure

With this in mind, the argument pattern in the transitive sentence (44) (ergative-absolutive) can be derived from Pool (26). A one-to-one association yields *ka-rna ka-ngku*; since the auxiliary is identical, one must assume that one occurrence is deleted: ka-rna ~~ka~~ -ngku.[17]

(44)   Ngajulu-rlu ka-rna-ngu   nyuntu nya-nyi
              I-erg   pres-1sM1-2sM2 you   see-npst
              'I see you.' (4.17)

GR	Subject	Direct Object
Argument	Ka	Ka
Agreement	rna	ngku

Pool 26. Ergative-absolutive verbs (cf.44)

Let us turn now to intransitive verbs. Above we have seen that when one argument is missing, the stranded case may be linked by another argument, consistent with the rules of association and the Well-formedness Condition. In an agreement pool, however, one cannot infer the features (person, gender, number) of a non-existing argument of unaccusatives or unergatives. I suggest that the agreement markers shown in Table 8 above do not show up directly in the pool. Instead a variable, or placeholder,

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17 At this point, I set aside the question of the ordering of the auxiliary and the agreement markers. It might result from the harmonization with the order of arguments at the input, i.e the first stage of a syntactic derivation.

is used for each grammatical relation, and it replaces only existing markers. Let us refer to them as SA (subject agreement), DA (direct object agreement), and IA (for the indirect object). They are replaced with actual agreement markers once they enter the syntactic level. The following pools represent an ergative and an unaccusative verb. In both cases, a misalignment is avoided by the appropriate linearization, namely the stacking of the direct object marker prior to the subject marker.

GR	Subject	Direct Object
Argument	Ka	
	●	●
Agreement	SA	DA

Pool 27. ka-DA-SA (unergatives)

GR	Subject	Direct Object
Argument		Ka
	●	●
Agreement	SA	DA

Pool 28. Ka-DA-SA (unaccusatives)
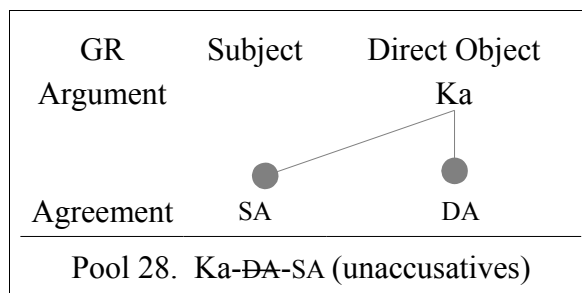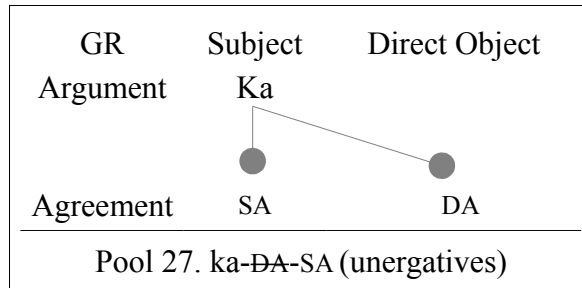
If a marker does not exist, it may not have a placeholder. For instance the pool for the sentence in (45) shows no subject marker, since there is none for third person.

(45)   marlu-ngku   ka-ju   ngaju nya-nyi
             Kangaroo-erg pres-1sM2 I   see-npst
             The kangaroo sees me. (4.20)

| GR	Subject	Direct Object
Argument	Ka	Ka
		●
Agreement	--	DA

Pool 29. Ka-DA (cf.41)
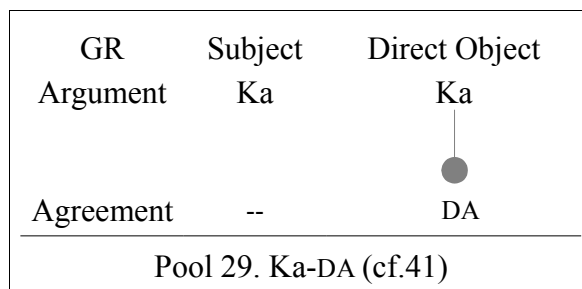
To conclude this section, the Warlpiri data show that alignment of case morpheme and agreement morpheme follows the same principle. Ergativity arises when the accusative marker is missing, yielding an asymmetry with an existing nominative morpheme. It is the same for agreement markers; they follow an accusative alignment because there is no gap causing an asymmetry in the paradigm.

5.3 The agreement-case cycle

It is clear that the pool correctly accounts for both case and agreement patterning. However it is unlikely that a grammar uses two different pools to deal with such similar elements. In addition, the agreeing element, AUX, appears twice in the pool, which casts doubts on this type of representation. What is needed is a new structure that would hold the case pool and the agreement pool, while eliminating the double appearance of AUX. Suppose that each plane, besides case and argument, includes a verb/auxiliary, and agreement markers, all of them being aligned along a GR backbone, as shown in Figure 8.


Figure 8. Case-agreement planes
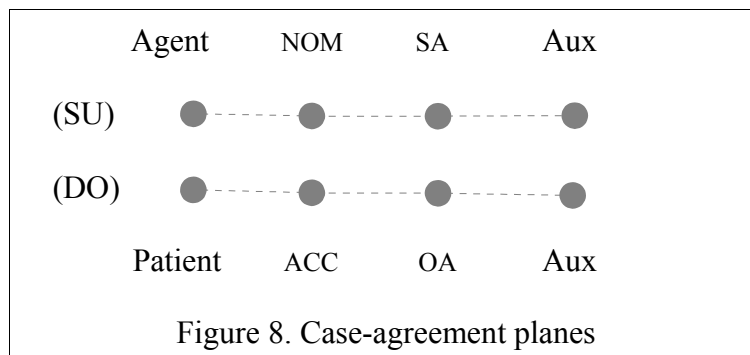
Since Aux appears on each plane, it is natural to suppose that it is the point where the planes meet. In addition, since the agent and the patient can exchange case, I am lead to suppose that both planes are aligned such that they roughly make up a single circular plane, which can be best represented as a sine wave, as illustrated in Figures 9 and 10 respectively. This representation makes it clear that both planes are independent and complementary, as each element in the upper strand is opposed to a similar one in the lower strand.

Figure 9. Circular layout of a pool

Figure 10. Sinusoid layout of a pool
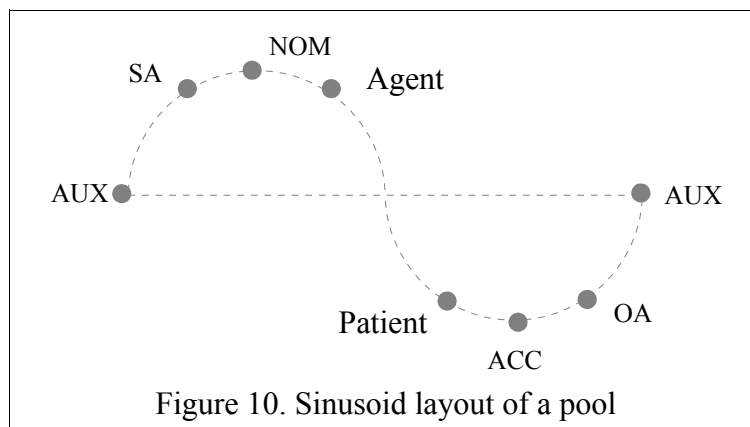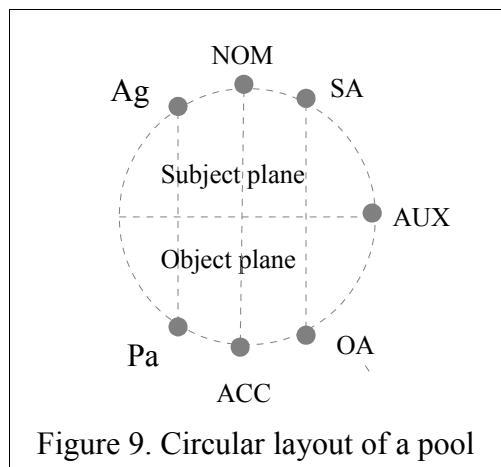
This new representation does not affect the linking rules and WFC. Interacting elements will be linked with a solid line, which looks like a chord due to the technical impossibility to run a solid segment on the backbone; and non-existing elements will have no slot on the backbone. For instance, the case and the agreement pattern of (43) can be represented in a single wave pool, as seen below.

Pool 30: Sinusoid layout of (43)
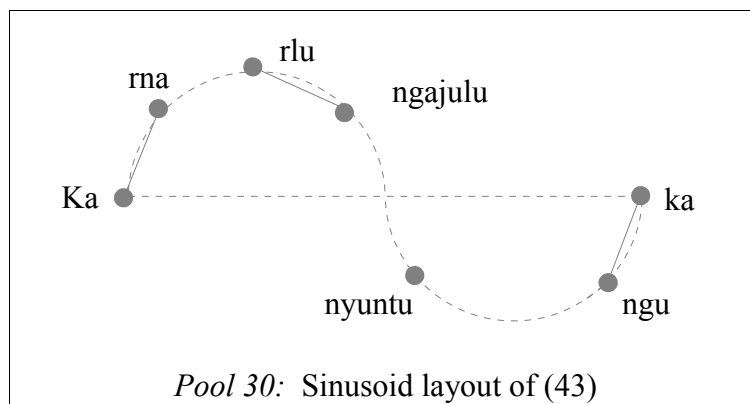
Similarly, Pool 31 illustrates the agreement and case patterns of the unergative verbs in (39) (prior to harmonization by deletion of the nominative in the syntax). Incidentally, this representation shows that unergatives in an ergative language have only one strand. auxiliary, duplicated in the representation, links the the subject agreement and the object agreement. As for the single patient argument, it cannot link the nominative case in the upper strand, consistent with WFC.

Pool 31: Sine wave layout of (39)
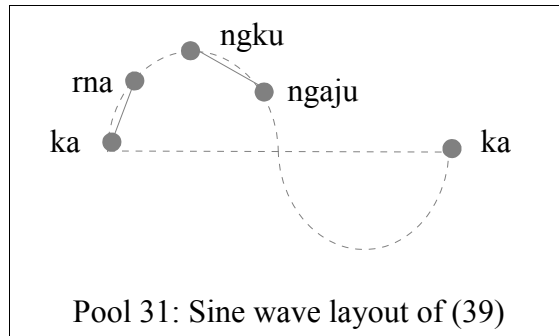
It turns out that agreement and case appear in the same pool, where both planes are complementary and making up a sine wave defined by a GR backbone. It will be shown that further cycles can be added to accommodate an indirect object as well as noun complements to the arguments, which lead us to take the sine wave layout to be more adequate than the wheel layout.

6. The case of Hindi-Urdu

Ergativity in Hindi-Urdu shows some tricky features not found in the case systems seen above: the interesting fact is that case markers carry special semantics that override the principle of harmony, which otherwise forces linking of arguments and morphemes to apply uniformly and mechanically. Once the of alignment type is unraveled, I turn to the agreement system.

6.1 Ergativity diagnostics

In the literature on grammatical relations, Hindi is classified as a split ergative language; cf. Butt (2005), Finley (2010), Keine (2007), Montaut (2006), Woolford (1999), etc., and references therein. The system is split on an aspect line; ergativity only affects perfective verbs, whose subject shows up with the marker *ne*, (46); the subject of intransitive verbs takes either an unmarked case (unaccusative), also referred to as nominative, (47), or the *ne* case (unergative), (48).

(46)   a.   raam-NE ravii-KO piitaa

    Ram-ERG Ravi-ACC beat.PERF

    'Ram beat Ravi.'

   b.   raam ravii-KO piitaa hai

    Ram.NOM Ravi-ACC beat.IMPERF be.PR

    'Ram beats Ravi.'   (Mohanan 1994:70; in Keine 2007)

(47)   a.   raam giraa

    Ram.NOM fall.PERF

   b.   *raam-NE giraa

    Ram-ERG fall.PERF

    'Ram fell hard.'   (Mohanan 1994:71; in Keine 2007)

(48)   a.   raam-NE nahaayaa

    Ram-ERG bathe.PERF

   b.   *raam nahaayaa

    Ram.NOM bathe.PERF

    ' Ram bathed.'   (Mohanan 1994:71; in Keine 2007)

The object of transitive verbs may take a marked case, *ko*, which can be either an accusative or a dative marker. In addition to case, *ko* indicates that an NP is either specific or human, as seen in (49).

(49)   a.   ilaa-ne ek bacce-ko / *baccaa ut^{h}aayaa

    Ila-ERG one child-ACC / child.NOM lift/carry.PERF

    'Ila lifted a child'   (Mohanan 1994:79; in Keine 2007)

   b.   nadya-ne gaṛi-ko / gaṛi cɑla-yi hɛ

    Nadya.F.SG-ERG car.F.SG-ACC drive-PERF.F.SG be.PRES.3SG

    'Nadya has driven the car / a car.'   (Butt and King 2004; in Keine 2007)

In ditransitive verbs, only one occurrence of *ko* is allowed, and it obligatorily appears on the indirect object (dative):

(50)   a.   Ilaa-ne mãã-ko yah haar / is haar-ko diyaa

    Ilaa-ERG mother-DAT this.NOM neckace.NOM this.NOM necklace-ACC give.PERF

    'Ila gave this necklace to mother.'   (Mohanan 1994:79; cf.. Keine 2007)

b.   Ilaa-ne mãã-ko baccaa / bacce-ko diyaa

          Ila-ERG mother-DAT child-NOM child-ACC give-PERF

          'Ila gave the child to the mother.'

The question that arises is the following. Is it the case that *ko* represents two different but syncretic case markers or is there a single morpheme *ko* that is used for both cases? The data shows that *ko* can be used with human or non human arguments, and in the latter case it indicates specificity. Thus, if there were two different case markers under the same morpheme, one would expect two occurrences of *ko* in ditransitive verbs. With such verbs, however, only the dative is mandatorily *ko*-marked, the accusative cannot be, whether it is human or not. Therefore, I conclude that there is a single morpheme *ko*, pending some mechanism to account for its distribution. The relevant part of the case system is shown in Table 10, where the standard traditional view appears in parentheses. Secondary cases like genitive, instrumental, etc. are set aside, since in general they play no significant role in the alignment process.

Nominative (ergative)	Accusative (absolutive)	Dative
-ne	--	-ko

Table 10. Hindi-Urdu Partial Case System

Because of the lack of accusative marker, an asymmetry exists between subjects and objects, which accounts for the ergative pattern, just as in the other languages seen above. Now, the next step is to account for the fact that ergativity is restricted to verbs in the perfective aspect. Hindi-Urdu presents certain similarities with Dyirbal. Recall that in Dyirbal the case system is split on an NP-pronoun line because of the effect of Φ- and Ω-features. Suppose that the case marker *ne* and perfective verbs are Ω-specified, unlike non-perfective verbs. On this view, the paradigm seen in Table10 has to be split in two, according to verb aspects. This is shown in Tables 11 and 12. As can be seen in table 12, the morpheme asymmetry disappears in imperfective verbs, since they are incompatible with Ω-specified *ne*, and therefore there is no ergativity in this aspect, as predicted by PT. Table 11 is of course identical to Table 10, since perfective verbs in general are always compatible with morpheme *ne*.
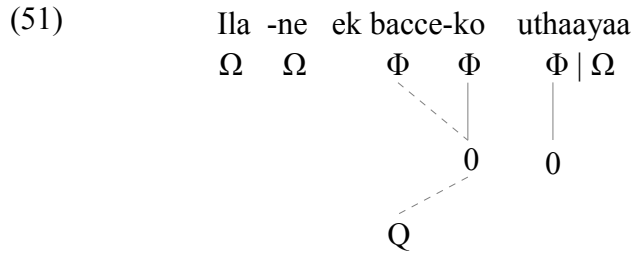
Nominative (ergative)	Accusative (absolutive)	Dative
-ne	--	-ko

Table 11. Case System – perfective verbs

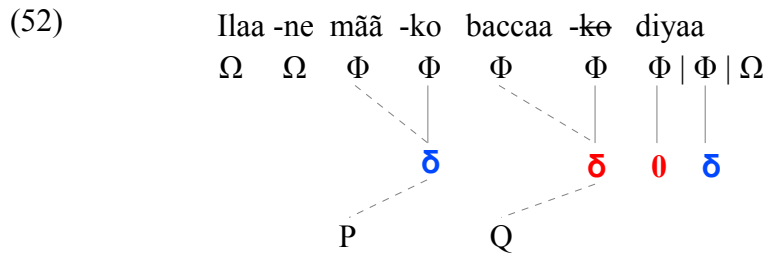| Nominative (ergative)	Accusative (absolutive)	Dative
--	--	-ko

Table 12. Case System – imperfective verbs

We have now the rationale for both the general ergativity and its split along an aspect line. In the next subsections, I turn to evidence for the few assumptions made above.

6.2 The features of *ko*

Consider first the object case marker *ko*. As noted above, it can be used either as an accusative (direct object) or a dative (indirect object), and in addition in ditransitive verbs, only the dative argument is ko-marked. I suggest that there is just one morpheme *ko*; it is specified for phi (Φ), hence it is a scalar. I take its accusative use to be warranted by its unspecified thematic node, as is normally the case with accusative markers. And minimally it must be specified for definiteness and a human related feature, perhaps [animate] or simply [human]. This is illustrated with (51), which is the partial representation of (49a). The perfective verb bears Φ- and Ω-features, which accommodates respectively the direct object and the subject, assuming that, unlike Dyirbal, Hindi leaves NPs unspecified which allow them to get either a Φ- or Ω-feature in the symbiosis process, much like Korean (cf. Desouvrey 2010). In addition, the '0' node is the unspecified thematic role of the marker (normally a theme), which the verb accommodates as well. As for the terminal feature Q, it is the referential feature of the NP *bacce* 'child'; that of the subject is not shown.

(51)   Ila -ne ek bacce-ko   uthaayaa
          Ω   Ω   Φ   Φ   Φ | Ω
                           | |
                           0   0

                           Q

As for its use as an indirect object, I suggest that it is enhanced with the dative feature prior to its insertion in the syntactic structure. This type of enhancement rule may not be peculiar to this language; for instance *se,* the predicative pronoun in Haitian Creole (cf. Desouvrey 2009), undergoes a similar enhancement process. Thus with a dative verb, *ko* is no longer unspecified for thematic feature, and therefore, if it marks the direct object, it cannot pair up with the relevant node of the verb (0). On the other hand, the dative argument with the enhanced *ko* is fully supported by the verb. This is illustrated in (52), which is the representation of (50b).

(52)   Ilaa -ne mãã -ko baccaa -ko diyaa
          Ω   Ω   Φ   Φ   Φ   Φ   Φ | Φ | Ω
                                                 | |
                     δ   δ   0   δ

                     P   Q

Under the present theory of feature-driven syntax, a dative verb is specified for dative case (δ) in the relevant Agr, while the Patient and the Agent argument have no feature attached to their Φ- or Ω-node. When the verb and its arguments are merged together, the general rules of agreement take place: identical features of the verb and its arguments pair up, and making up a tier. Thus in (52), the dative argument pairs up with the relevant node of the verb, while the direct object argument fails to do so, since the verb does not have the dative feature under the relevant node, resulting in its deletion, or most likely the crash of such a structure.[18]

Note that if there were two distinct but syncretic morphemes, one could not explain why they cannot cooccur. This analysis is the simplest one and does not depend to any further mechanism, although other analyzes may do the same job. For example, an impoverishment rule along the line of Keine

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18 I.e, a derivation with both arguments *ko-marked* may in fact never have taken place. A 0-marked verb is unlikely to require its argument to merge first with an affix, and then triggers its deletion.

(2007), which removes the dative from the direct object in the relevant contexts, would work but at the cost of simplicity.

6.3 Vector effect

If marker *ne* is a vector, one must expect a *ne*-marked subject to have some special behavior with respect to scope, at the opposite of other arguments.[19] To show this, I take a brief look at two phenomena, negation and negative polarity items, which seem to be very important in research on Hindi-Urdu.

Before proceeding, a remark on scope is in order. In this theory of feature-based syntax, it is admitted that certain elements have scope, but scopal elements may or may not be specified for omega, which is the scope feature. In a sequence of unspecified scopal elements, say A...B, two readings are possible: either A > B or B > A (where > is wide scope), a fact that is traditionally translated in first order logic. Also, the initial linear order of those elements may be altered by a movement operation without modifying the readings. On the other hand, if one of the elements in the sequence is a vector, that is an Ω-specified element, it must take wide scope independently of its actual position; if both elements are omega-specified, their respective scope depends rigidly on their relative position; the leftmost element has wide scope and their relative linear ordering cannot be altered by a movement operation.

Anand and Nevins (2006) discuss a case of scope freezing in Hindi, (53). In the imperfective aspect, any of the two quantifiers can have wide scope, as shown in (53b). In the perfective aspect, however, the universal quantifier cannot take wide scope, (53a). It seems that the existential quantifier, which takes the ergative marker *ne*, prevents the universal quantifier to take wide scope, consistently with my view of scope in grammar (cf. Desouvrey 2000, 2008a/b, 2009, 2010). This fact supports the Ω-specification of *ne*, which causes the language to be an ergative, just like Dyirbal.

(53)   a.   Kisii šaayer-ne har ghazal lik^{h}ii.

            some poet-ERG every song-NOM write.F-PERF

            'Some poet wrote every song.'   ($\exists > \forall$, *$\forall > \exists$)

---

19 I take particle *ne* to be a case-marker with additional features, which seems to be the standard assumption in the literature. However, Finley (2010) argue that this marker is the sum of a noun *n-* meaning action, and an oblique case *-e* which marks locative case, hence his adoption of the transcription *n-e*. As he puts it, "[...] the subject form *raamdaas n-e* must be read as 'located in the Action of Ramdas', and the locative gerundive form *khaa-n-e* as 'located in the Action of eating'. " (p.106).

b.   koi šaayer har ghazal likʰtaa hai.

some poet-NOM every song-ACC write.M-IMPF be-PRES

'Some poet writes every song.'   (∃ > ∀, ∀ > ∃)

A second case of scope effect can be found in data discussed in Vasishth (2003). In Hindi, the complex verb and negation are normally not separable by intervening elements, though word order is generally free. Sentence (54) may at least have five other variants in which the subject and the object are freely distributed around the complex Verb-Neg-Aux or Neg-Verb-Aux. Vasishth points out that each such variant is a case of sentential negation.

(54)   raam roti nahii khaataa   thaa

Ram bread NEG eat-IMP-PART-MASC be-PAST-MASC

'Ram did not (use to) eat bread.'

In the case of constituent negation, Vasishth notes that "the negated constituent can have the negation to its immediate right, apparently violating the constraint regarding Verb-Neg contiguity." (p.110) In my view, it is likely that negation is attracted to vector *ne*, a property precisely exploited by the grammar to realize constituent negation. The movement of negation to the subject is not cost free; it breaks the initial adjacency (OCP effect) of two vectors, and perhaps it is forced to adjoin (or incorporate) to the subject, an operation which is usually impossible with negation, unless the negation morpheme is not π-specified.[20] As a result, the structure must be rescued with a strong pitch accent on the offending element (cf. Desouvrey 2000, etc.).

(55)   a. $\overleftarrow{\text{Siitaa}-\text{ne}}$ kitaab $\overrightarrow{\text{nahii}}$ $\overrightarrow{\text{khariidii}}$

Sita-ERG book NEG bought

'Sita didn't buy a/the book.'

b. $\overrightarrow{\text{SIITAA}-\text{ne}}$ $\overrightarrow{\text{nahii}}$ kitaab $\overrightarrow{\text{khariidii}}$ (kisii-aur-ne khariidii)

Sita-ERG NEG book bought (someone-else-ERG bought)

'SITA didn't buy a/the book (someone else did).'

---

20 Certain elements cannot adjoin to another element, rather they have to move to an edge of their clause. For instance, *wh*-words frequently have this property. In the present theory, adjunction is incorporation, and by adjunction an element is put in a secondary timing tier. The π-feature protect an element from changing tier (cf. Desouvrey 2000, 2007, 2008a,b).

It should be noted that this analysis of (55) is a tentative one, for I do not have a full control over the data. What is the expression of constituent negation with non-perfective verbs, which are incompatible with marker *ne*? What is the clause structure of Hindi so that it allows such a variety of word order by scrambling? Does negation in Hindi really lack the π-feature, which prevents incorporation? These questions fall way beyond the scope of this paper. Therefore this analysis may err in the detail. The general idea of vector effects induced by *ne* is basically correct, however.

6.4 Types of sentences

Having shown that the gap in the case system is induced by the fact that marker *ne* and perfective verbs are vector, consider now the linking of arguments with case markers in the pool.[21] In the case of ditransitive verbs, a one-to-one association obtains, as shown in Pool 32.

Su	DO	IO
Ag	Pa	Goal
●		●
Ne	-	ko

Pool 32. Hindi ditransitive linking
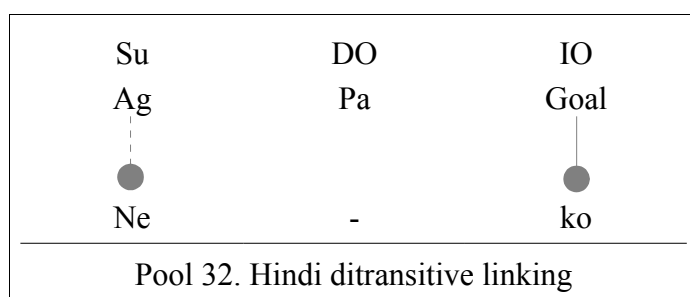
Similarly in simple transitive verbs, each argument is associated with the case of its plane, as seen in Pool 33. In Hindi, unlike the other languages discussed above, the case markers bear semantic force, so the presence of the *ko* marker in the pool depends on whether the argument is human or intended to be specific. Similarly, marker *ne* may not figure in the pool if the event described by the verb is not volitional (see below).

Pool 33. Hindi simple transitive linking
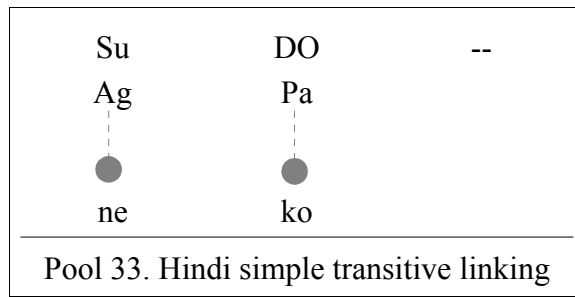
Consider now intransitive verbs. PH will seek the unification of both types of intransitive verbs under a single type of linearization. In unergative verbs, the linking rule must insure that the subject carries the volitional semantic marker. This can only be realized by applying AFL, which results in the systematic deletion of marker *ko*, as shown in Pool 34. Even if the pool was conceived without marker *ko*, the result would be the same: the agent would normally link marker *ne* consistent with the linking convention. Notice that stacking the accusative first normally occurs when a language can avoid ergativity; so this move is unusual for a system that lacks the accusative case.

Pool 34. Agent-~~ko~~-ne
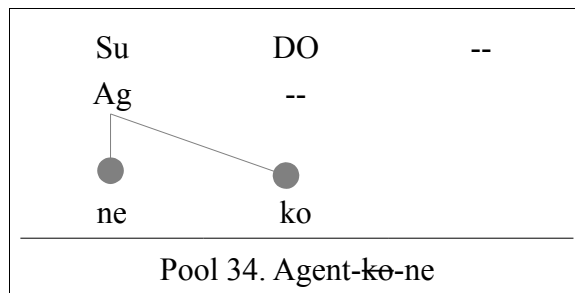
Let us turn now to unaccusative verbs. Two cases must be considered. First, marker *ko* is absent, which means that the intended argument is neither human nor definite, as shown in Pool 35. Consistent with the WFC on linking, a one-to-one association is impossible, which yields a bare Patient argument. On the other hand, if the Patient is human or definite, marker *ko* must be present, as seen in Pool 36. The grammar must normally apply the same rule of linearization to both unergative and unaccusative verbs, which yields an unwanted result, since a Patient is by definition incompatible with overt volitional semantics. The alternative is to either stack nominative first or to let the harmonization to take place in the syntax by deletion of marker *ne* on non-volitional subjects. The first possibility would complicate further the grammar by eliminating any type of symmetry; in effect it would yield two types of unaccusatives, *ko*-marked and bare unaccusative verbs, thus a three-way expression of intransitives,

since unergatives have to surface with *ne* anyway. Instead, the second alternative is chosen, allowing the deletion of *ne* in the syntax, whenever it appears on non-volitional contexts. As a result all unaccusatives in the perfective aspect surface the same, without case marking.

Su	DO	--
--	Pa	
ne	--	

Pool 35. Patient

Su	DO	--
--	Pa	
●	●	
ne	ko	

Pool 36. Patient-~~ko~~-~~ne~~
*Patient-~~ne~~-ko

Keine points out that there are a few verbs that depart from the general pattern. A few perfective verbs do not accept *ne*, even in volitional contexts, while a few others reject *ko*-marking independently of the humanness / specificity. It is unlikely that the existence of such exceptions are purely accidental. It seems that they are needed to insure the learnability of the system, as seen above in Basque. In other known languages with overt case morphology, the case morphemes are just that: redundant formal elements showing the relation of verbs with arguments. They thus indistinctly link any argument in the pool consistently with the linking convention, unless they clash with NPs, as in Dyirbal. Suppose that there are no exceptions. The deletion of both case markers is unusual, and it would be difficult to learn. Most likely, the absence of volitional semantic with the single patient argument would be reanalyzed as seen in (56), which would break the symmetry by reintroducing a different type of linearization (cf. Pool 34). I suggest that in order to strengthen (56b) so that new speakers are aware of it, the deletion of *ne* must arbitrary apply elsewhere; the grammar chooses a few perfectly transitive verbs and delete their volitional marker. As a result, single patient verbs come to be member of the same class with other verbs whose volitional semantics is obviously deleted. A similar reasoning should account for the

exceptions with *ko.*

(56)   a.   *Patient-~~ne~~-ko

       b.   Patient-~~ko~~-~~ne~~

6.5 Agreement by proximity (concordance)

I show that the present theory of linking can account for the complicated pattern of agreement in Hindi-Urdu. To perform the analysis, one must keep in mind one very fact: in this language verbs agree in gender, number and person with their arguments, unlike Warlpiri in which verbs agree in person and number with their arguments. In addition, verbs do not agree with an element bearing a case, either nominative (i.e ergative), dative or accusative. This is succinctly presented in (57) (intransitives) and (59) (transitives) (adapted from Woolford (1999, (7), (9)). In both schemes, the verb agrees with the underlined argument, otherwise it takes third person masculine singular as default agreement, as the data show. (The data are also from Woolford (1999), who credits Mahajan, as indicated.)

(57)   a.   subject-NOM   verb-default

       b.   <u>subject</u> verb-AGR

       c.   subject-DAT verb-default

(58)   a.   khuttoN-ne bhoNkaa

                  dogs-NOM barked.MASC.SING

                  'The dogs barked.'   (Mahajan 1990:74)

       b.   siitaa aayii

                  Sita.FEM arrived.FEM

                  'Sita arrived.'   (Mahajan 1990:74)

(59)   a.   subject-NOM <u>object</u> verb-AGR

       b.   subject-DAT   <u>object</u>   verb-AGR

       c.   subject-NOM object-DAT verb-default

       d.   <u>subject</u> object verb-AGR

(60)   a.   Raam-ne   roTii   khaayii   thii.

                  Ram-NOM bread.FEM eat.PERF.FEM be.PAST.FEM

'Ram had eaten bread.'   (Mahajan 1990:73)

b.   siitaa   kelaa   khaatii   thii

      Sita.FEM banana.MASC eat.IMP.FEM be.PAST.FEM

      'Sita (habitually) ate bananas.'   (Mahajan 1990:72)

c.   siitaa-ko la.rke pasand the.

      Sita-DAT boys.NOM like be.PAST.MASC.PL

      Sita likes the boys.   (Mahajan 1991:7)

d.   siitaa-ne laRkii-ko dekhaa

   Sita.FEM-ERG girl-DAT see.PERF.3SG.MASC.

      Sita saw the girl.   (Mahajan 1990:87)

In fact, what it is being called agreement must be further qualified. Hindi-Urdu is different from Warlpiri in that there are no agreement affixes attached to verbs. The latter possess instead an array of conjugation according to tense, masculine, feminine, singular, plural and person. Similarly nouns are inflected for gender and number. Conjugation and noun inflection cannot be altered in the pool, since there are no discrete morphemes to trade. The process that actually takes place is that the verb form concords with that of its arguments, if both are adjacent, as I will show.[22]

The verb-argument concordance that occurs in Hindi-Urdu can be straightforwardly accounted for, given the circular shape of the pool. Consider (60d). This transitive sentence has a pool with two arguments, an agreeing element, the verb, and two cases nominative (ergative) and dative, as seen below. Association of arguments and cases is one-to-one, assuming that this verb selects for a dative and a nominative argument. The verb and the argument being not adjacent in the GR backbone, concordance is not possible, and therefore the verb takes the default singular masculine form.

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22 It seems that this language has a mixed system in that cases are much like what is typologically referred to as agglutinating morphemes. Agglutinating morphemes are easily identifiable from the noun selecting them, just as in Korean or Japanese.

Pool 37: Case-agreement process for (60d)
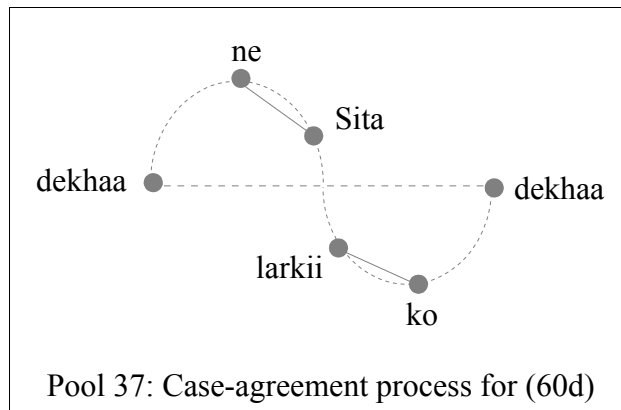
In (60a), however, the direct object argument is adjacent to the verb, unlike the subject. Therefore, the concordance of the verb with that argument is required, as shown below.

Pool 38: Case agreement pattern for (60a)
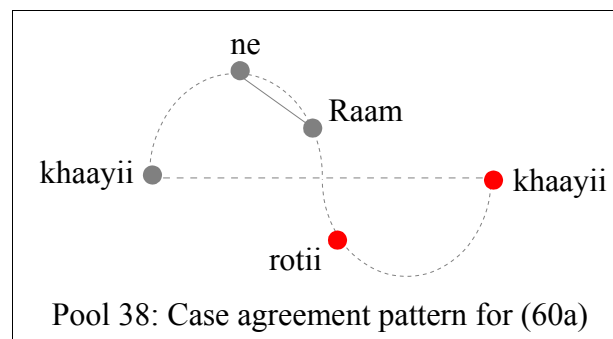
In sentence (60b), there are no case nodes in either strands, and therefore the fact that the verb agrees only with the subject must be accounted for; see Pool 39. Each verb in Hindi-Urdu has a conjugation for each feature value, for instance, third feminine plural, third feminine singular, and so on, which parallels nominal declension. However, it seems that there are no pieces of conjugation that would corresponds to a pair of NPs. So we can ask rather why the verb concords with the subject instead of the object. I argue that concordance with the object would be too costly for the grammar in that the latter would have to check whether the argument is caseless or not. Indeed in imperfective verbs, the subject never takes nominative case (ergative), quite the contrary to the object which may or may not be case-marked with *ko*, depending on whether it is a human or intended to be specific. Therefore, since concordance with the subject (imperfective verbs) is always possible, unlike the object, which is contingent on case, the grammar chooses the former, the more general. This is obviously an effect of PH and the lack of constraints of the if-then types. To put it differently, when a

process is compatible with either of two diffrent environments, it must choose the one which is always context free.

Pool 39: Agreement pattern for (60a)
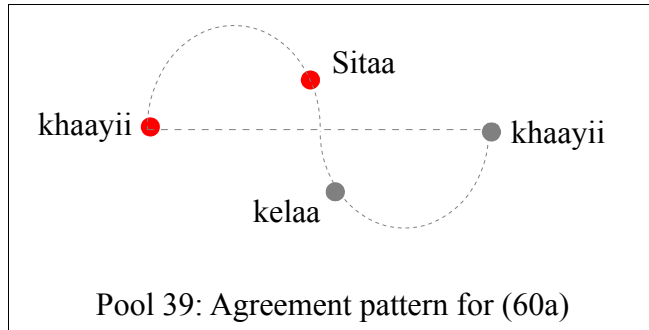
The extension of the Pool Theory to include agreement system is a further important gain. The pool and inventory are sufficient to account for various types of agreement and concordance, as defined above. Thus, subject-verb agreement in English and Romance, for instance, turn out to be a concordance with the verb and the subject, since such a phenomenon is not mediated by any agreement affixes. Specifically the fact that, in French, verbs concord as to person and number with subjects follows from the pool and the lack of gender morphology in the conjugation system. Concordance with the subject, and not with the object, is due to the fact that the latter may or may not be adjacent to the verb in the relevant sense. In effect, in these languages, including English, the object may be marked with a thematic preposition, unlike the subject; cf. *Mary likes John/ Mary is thinking *(to) John.*

7. Why Korean is an accusative language

7.1 A perfect case system

As is well known, Korean has a wealth of case markers, including nominative, accusative, dative, genitive, etc. (cf. Table 13). Interestingly there is no gap in the system, or any critical feature mismatch which may induce a gap. Therefore, such a language is expected to exhibit the normal accusative alignment, which is indeed the case.[23]

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23 Most of the data accessible to me are in Yale Romanization. This table is compiled from various sources; see for instance Youn 1995, Min-Jo Kim 2004, Jhang 1994, Yoon 2005, Gerdts (1993), etc. Notice that two cases in a cell are phonological allomorphs. In addition, the other abbreviations are: PST (past), DCL (declarative), PL (plural).

Topic /top	(TOP)	un / nun
Nominative	(NOM)	i / ka
Accusative	(ACC)	ul / lul
Dative	(DAT)	Eykey/ey
Genitive	(GEN)	uy

Table 13: Korean case system (partial)

As can be seen in (61)-(63) (cf. Kang 1996: 118), the subject of transitive and intransitive verbs are uniformly case-marked with the nominative, which means that the accusative marker is systematically stacked first and deleted in the inner position of the string (cf. Agent- / Patient-~~ACC~~-NOM).

(61)   John-i nwun-ul noki-ess-ta
            J.-NOM snow-ACC melt-PST-DCL
            'John melted snow.'

(62)   Nwun-i nok-ass-ta
            snow-NOM melt-PST-DCL
            'Snow melted.'

(63)   saram-tul-i ttwi-ess-ta
            people-PL-NOM ran-PST-DCL
            'People ran.'

However, Korean grammar possesses a property of the highest interest for any linking theory. In certain constructions, it allows more than one argument with the nominative (or the accusative case). In the next subsection, I turn to the double nominative construction (DNC), showing that it can be best explained by the periodic representation of the pool.

7.2 Periodic Effect

Young Kook Kim (1995), following Suh (1993), generalizes that multiple nominative constructions occurs only with unaccusative verbs. He argues further that true locative verbs are unergatives while

locative existentials are unaccusatives. I will show that the available evidence fall under the realm of the Pool Theory. I consider in turn each of this in the light of the sinusoid layout of the Pool Theory.

7.2.1 Typical intransitive verbs

Consider the sentences in (64). In (64a), *cwuke* 'die', an unaccusative verb, is compatible with DNC; indeed, the inner NP normally takes nominative case, while the first one can take either nominative or genitive. On the other hand with the unergative verb *takyeka* 'to run' in (64b), the first NP is compatible only with the genitive marker, excluding the possibility of DNC. I show that both sentences can be explained in a principled way under PT.

(64)   a.   John-uy/i hyeng-i cwuke-ss-ta

               J.-GEN/NOM brother-NOM die-PST-DEC

               'John's brother died.'

        b.   John-uy/*i hyeng-i talyeka-ss-ta

               J.-GEN/*NOM brother-NOM run-PST-DEC

               'John's brother ran.'   (cf. Kim 1995:302, and credited references therein)

It is clear that in the normal case, nominative Case occurs on the head noun, while the noun complement is inflected for genitive Case. This state of affairs can be adequately explained by using the periodic property of the pool. In the sinusoid layout, two strands define a period, or cycle. An unaccusative verb must have a nominative Case in the upper strand, and the patient argument as well as the accusative Case in the lower one. Nominative and accusative are anyway the default case in the pool. I take the NP complement to the patient head to be in a further cycle so that both NPs and both the accusative and the genitive Case have the same period, i.e. they are in phase, as shown below. In the first cycle, the patient argument links both the accusative and the nominative case, and at the linearization, the accusative must be stacked first, then deleted, in order to avoid ergativity. Genitive being not a pool case, unlike nominative and accusative, it is pre-linked to the second NP (in red for clarity), hence it supersedes the default accusative of the pool. Moreover, since the genitive is hard-linked to John, the latter may not link the nominative case in the second cycle, which is ignored.

Pool 40: hyeng – ~~ul~~ – i John – uy (64a)
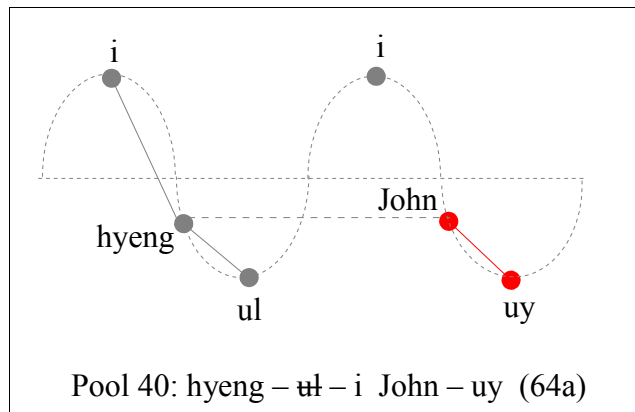
Now in a system where case-stacking and subsequent deletion of the first stacked case is frequent, it is likely that speakers come to process the genitive the same way as the default cases, by an effect of PH. Thus alternatively, if the genitive case is not conceived as hard-linked, the noun complement first link it, and then it links the nominative case as well. Then at the linearization, genitive is stacked first, and is deleted, yielding a DNC, as seen in Pool 41. It is important to note that genitive has to be stacked first, since it is in phase with the head noun, which has its own case stacked-first. In other words, the noun complement must follow the same linearization pattern as the head noun.

Pool 41: hyeng-~~ul~~-i John-~~uy~~-i (64a)
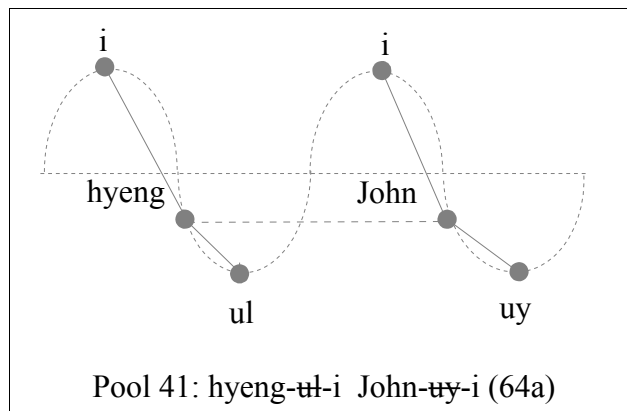
Let us turn now to the unergative sentence exemplified in (64b). The only argument, the Agent, is in the subject strand, where there is also the default nominative Case. A default accusative case appears in the lower strand. Just as in the case discussed above, the noun complement and the genitive Case occupy another strand, but they are in phase with the Agent and the nominative respectively, as shown in Pool 42. Linking normally takes place; in the first cycle, the accusative is stacked first and is deleted as usual, since Korean may not be an ergative language. In the second cycle, whether or not the NP

complement is pre-linked with genitive, the result is the same, since accusative must be stacked first anyway, parallel with the head noun, and consistent with PH. DNC is therefore not possible.


Pool 42: hyeng-~~ul~~-i John-uy (64b)
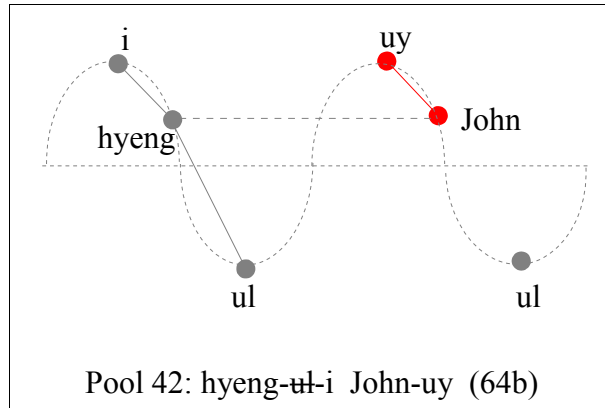
7.2.2 Locative verbs

Kim distinguishes two types of locative verbs: existential locatives and true locatives, and then affirms that the former are unaccusative, while the latter are unergative. Both types are shown in (65). As can be seen, the existential locative in (65a) allows a case alternation which may result in a DNC, but not the true locative in (65b).

(65)   a.   Mikwuk-ey/i cicin-i na-ss-ta

America-LOC/NOM earthquake-NOM occur-PST-DEC

'An earthquake occurred in America.'

b.   Mikwuk-ey/*i Tom-i san-ta

America-LOC/NOM Tom-NOM live-DEC

'Tom lives in America.'   (Kim 1995:303)

If Kim is correct, (65a) must be made up of a head noun, *cicin* 'earthquake', and a locative complement, *Mikwuk* 'America'. It is thus parallel to (64a) above. Just as in the latter, the NP complement may or may not be pre-linked in the pool. If it is pre-linked, as in Pool 43 it surfaces with locative case, while the running nominative in the upper strand is ignored.

Pool 43: cicin – u̶l̶ – i Mikwuk – ey (65a)
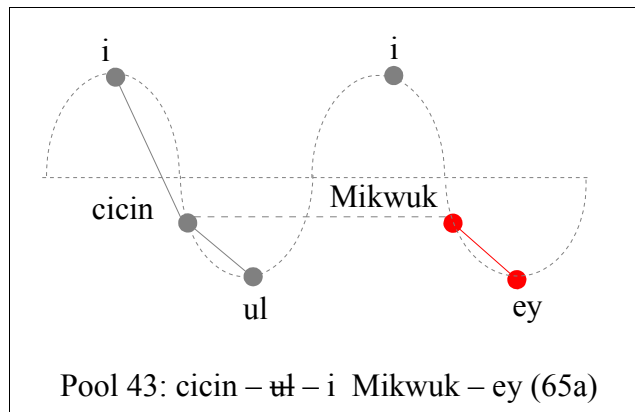
If instead the locative case is not pre-linked, the locative complement must link it as well as the default nominative case in the upper strand. So the locative case is stacked first, just as the accusative case in the first cycle, and is deleted. As a result, a DNC obtains, as shown below.

Pool 44: cicin-u̶l̶-i Mikwuk-e̶y̶-i (65a)
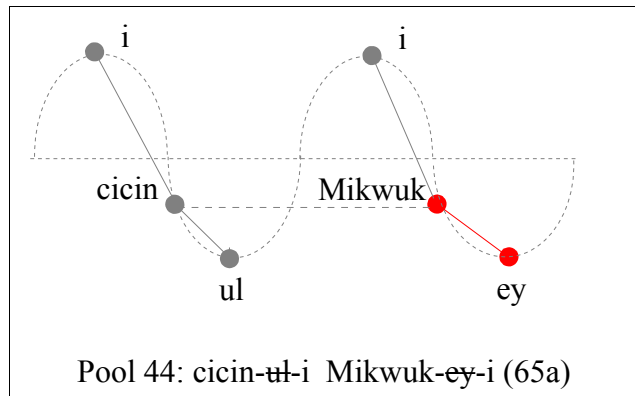
As for (65b), Kim treats it as unergative. If so, the locative NP can be treated as a complement to the subject, and must appear in phase with the latter in the next cycle, as shown in Pool 45. On this view, the locative complement, whether or not its case is conceived as pre-linked, will always surface with locative case, since accusative has to be staked first under PH. Notice, however, that the result would be the same under an analysis that treats this verb as transitive, but with a specified locative complement. In such a case, the subject and the locative object would be in a single cycle, and linking of arguments and case would be one-to-one, as shown in Pool 46.

Pool 45: Tom-u̶l-i Mikwuk-u̶l-ey (65b)


Pool 46: Alternative representation of (65b)
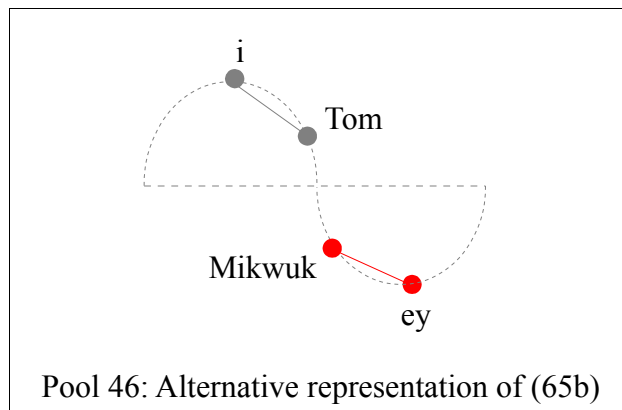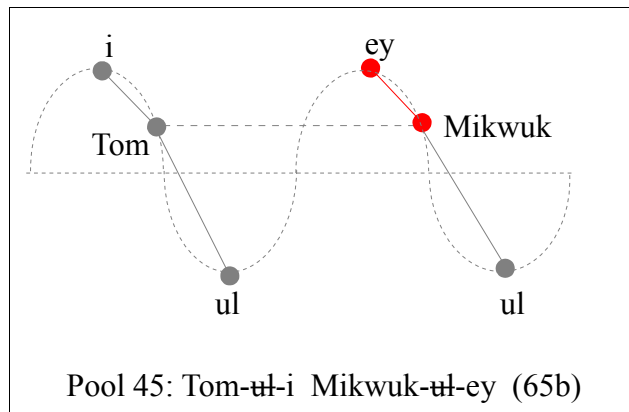
7.2.3 Psych-Verbs

Psych-verbs in Korean illustrates an interesting case of DNC. According to the data discussed by Kim, they belong to two types; one type, illustrated in (66a), shows a dative nominative alternation, on the subject, hence an optional DNC, while a second one, (66b), always requires both arguments to bear nominative case. In the present theory, case alternation occurs only when there are more cases than argument in a cycle. Therefore, on can assume that psych-verbs are intransitive verbs, broadly speaking. Moreover, since the subject of such verbs may not be seen as agentive, it must be the case that they are unaccusative verbs. Further, it is reasonable to assume that these verbs belong to different subclasses: *kurip* 'to miss' takes two internal arguments, one of which is hard-linked with dative, while *joh* 'like' takes two internal arguments, none of which bears a case.[24]

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24 Conveniently, I am assuming that the dative case is stipulated in the lexical structure of this verb. However, if Ilkyu Kim (2008) is correct, this experiencer dative is predictable from its semantic properties.

(66) a. Mary-eke/-ka kohyang-i   kurip-ta

DAT/NOM   hometown-NOM miss(ergative verb)-DEC

'Mary misses her hometown.'

b. Tom-i Mary-ka joh-ta.

NOM   NOM   like(ergative) DEC

'Tom likes Mary.'   (Kim 1995:298)

Consider (66a), which allows a DNC. Each NP occupies its own strand, but the first strand may not have an argument. In addition, the lower strand in the first cycle includes a dative case, which supersedes the normal accusative case. Since the dative case is hard linked to Mary, the latter may not link the nominative case, resulting in a dative marked subject; in the second cycle, the accusative case is stacked first, as is normally the case in an accusative language, and therefore it is deleted, as seen in Pool (47). If instead the dative is reanalyzed as a pool case, both cases are stacked and the inner one, the dative, is deleted, as seen in Pool (48).

Pool 47: Mary-eke kohyang-~~ul~~-i

Pool 48: Mary-~~eke~~-ka kohyang-~~ul~~-i
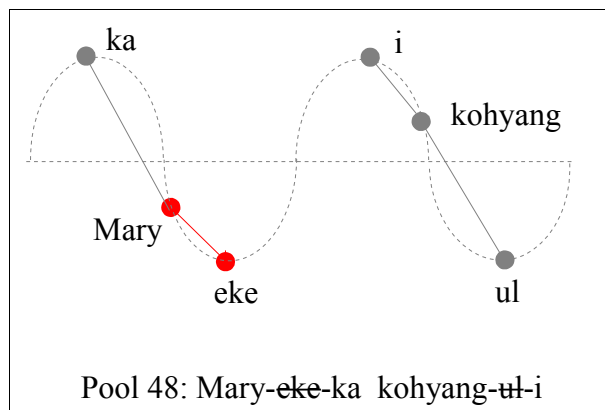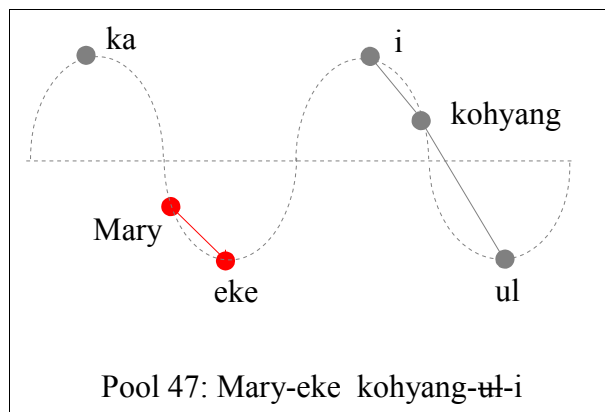
Consider now (66b), which always requires two nominative arguments. There is nothing more to say about it. The accusative and the nominative, as pool case, are never hard linked; so each NP must trade with the nominative case, which results in the systematic deletion of the mandatory stacked-first accusative, as seen in Pool 49.[25]

Pool 49: Tom-~~ul~~-i Mary-~~ul~~-i
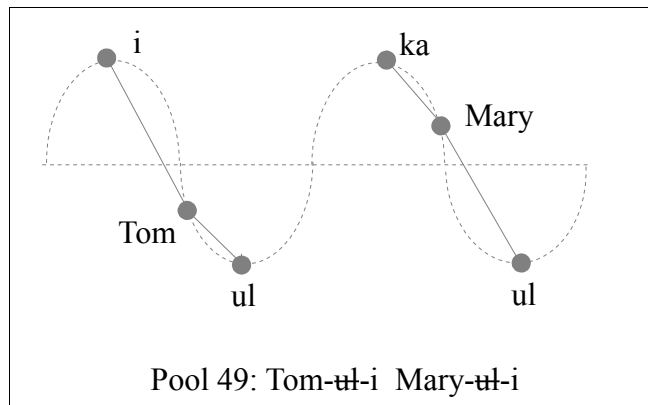
7.3 Other double case constructions

Certain constructions in Korean show instead more than one occurrence of the accusative case. I take a look at one of them, the so-called applicative construction discussed in Gerdts (1993). I show that PT allows to account for it in a principled way.

Consider the following sentence. The agent is nominative-marked, the theme, accusative-marked, but the goal may be either accusative- or dative-marked. Each of this case needs to be accounted for.

(67)   Chelswu-ka Swuni-eykey/lul chayk-ul   cwu-ess-ta

              C.-nom   S. DAT/ACC   book-ACC give-PST-IND (i.e. DCL)

              'Chelsoo gave Sooni a book.'   (after Gerdts 1993, (8))

It is clear that this type of verbs, in all natural languages, take three arguments, a subject, a direct object and an indirect object. One can thus assume that the dative case is the normal case of the indirect object, and normally it is hard-linked to its argument. In the circular layout, however, one can explain why the case alternation involves the accusative instead of the nominative, as seen above. Indeed, given that there is no dependency between the objects, each must have its own half cycle and therefore the arguments are not in phase, unlike the case of the noun complement discussed above. So, as usual,

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25 Notice that if both NPs were in phase, which means one is the complement of the other, the result would be the same.

the first strand included the nominative case and the subject, while the theme and the accusative case appears in the next complementary strand; as for the indirect object, it appears on the next cycle with its dative case. At this point, there is no further argument, and the accusative case repeats itself in the half cycle, as shown below. In the first cycle, linking is one-to-one, and therefore no case alternation is possible. In the second cycle, there is one argument for two cases. In the normal case, the dative is hard -linked, and therefore the running accusative case is ignored. As in the case seen above, by a reanalysis process triggered by PH, the indirect object may link both the dative and the running accusative case. Then the dative is stacked first and is deleted, yielding an indirect object with accusative case.

Pool 50: Chelswu-ka chayk-ul Sooni- eykey

Chelswu-ka chayk-ul Sooni- ~~eykey~~ -lul
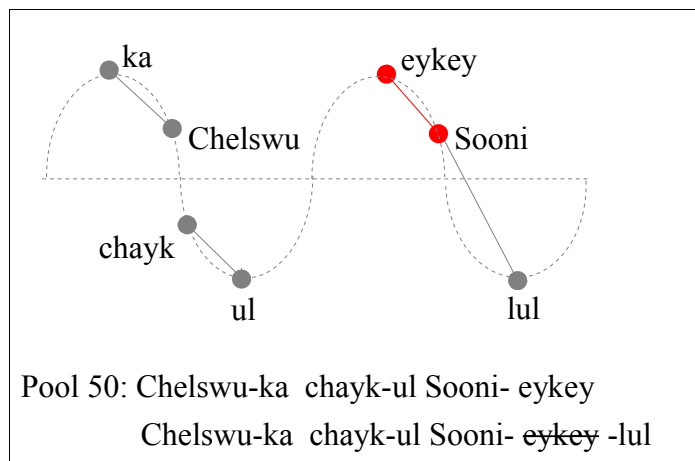
   With this representation, a case alternation affects elements in the same cycle. There may be no alternation between dative and nominative case, which belong to different cycles. In addition, we may note that this theory is further supported by the fact that both stacked cases may appear in the output, as illustrated in (68).[26] Interestingly, in such a case, the hard-linked case, is always stacked first, which supports its reanalysis as a pool case.

(68)   Chelswu-ka Swuni-**eykey**-lul chayk-ul   cwu-ess-ta

              C.-nom   S. DAT-ACC   book-ACC give-PST-IND (i.e. DCL)

              'Chelsoo gave Sooni a book.'

---

26 This possibility of surface stacking is mentioned in Lee (1997). Incidentally, notice that double accusative constructions, and more generally any double case constructions, may not always apply mechanically; they are rather driven by specific semantic needs of the grammar. A language may exploit any syntactic process in order to convey some specific meaning. A semantic analysis of the facts discussed here falls beyond the scope of this paper.

9. Concluding remarks

The linking theory argued for in this paper, the Pool Theory, makes it possible to account for a variety of phenomena from grammatical alignment types to agreement pattens to multiple case in Korean in a simple, elegant and highly principled way. It uses simple pieces, namely grammatical relations, case, and argument, making up a pool, where case and agreement morphemes are exchanged under strict rules of association. The keystone of PT, which springs from a previous study of Korean syntax (cf. Desouvrey 2010), is the stacking of extra-case, which yields the various observed alternations in many languages under two possible types of linear ordering: accusative stacked first (nominative languages) and nominative stacked first (ergative languages).

The pool consists of a series of backbones, or strands, defined by each grammatical relation, and laid out in a sine wave. The pool cases, or default cases, namely nominative and accusative, appear successively in crest and troughs, unless an NP enters the pool with its own hard-linked case, which supersedes the relevant pool case, generally the accusative case. Agreeing elements, verbs or auxiliaries, may appear at each end of a cycle, i.e. a series of two consecutive backbones, while agreement morphemes, if any, lay out between the ends and the cases. Elements in the same cycle, can interact, yielding a case alternation whenever the number of argument is less than the number of case. The sinusoidal wave can reproduce itself any number of times in order to accommodate further elements, for instance an indirect object and nouns complements. The latter must be at the same period as their head noun, ensuring that their hard-linked case supersedes that of their head noun. In addtion, the sinusoidal wave obviously describes a timely event. The subject is normally in the first strand with the nominative case, but in unaccusative verbs it is missing and the argument in the lower strand surfaces as subject. Therefore, it turns out that the subject is the earliest argument in a cycle, independently of its case. The indirect object is always the latest argument, and it is not in the same cycle as the subject.

PT correctly predicts that ergativity can only occur in languages displaying an asymmetry between the subject and the object with respect to case marking. If the asymmetry is due to the missing of the accusative marker, ergativity cannot be avoided. Conversely, if the accusative markers is present, unlike the nominative marker, ergativity can, and must be avoided. There may be no other types of ergativity. Thus Nez Perce, which exhibits the so-called tripartite alignment because the subject of intransitive verbs is neither nominative (ergative) nor accusative (absolutive) (cf. Deal 2010), should

not be considered an ergative language.[27] According to preliminary observations of Deal's data, the nominative case is most likely deleted as subject of intransitive verbs. It may be that in some languages, a different case, neither nominative nor accusative, is used as subject of intransitive verbs to avoid a mismatch. In any event, the task therefore is to find out the cause of the deletion or the use of the third marker as well as its absence in transitive verbs.

PT, as a lexical theory, is compatible with other grammatical theories, although the facts discussed here can only be best accounted for under the feature-based theory of syntax advocated in Desouvrey (2000) and subsequent work. The demonstration that the ergative is the nominative case, and the absolutive is nothing but the accusative case, may interest linguists of whatever obedience.

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27 A summary of various types of alignment can be found at: http://en.wikipedia.org/wiki/Morphosyntactic_alignment. A recent paper by Deal contains a summary of various types of handling of ergativity in the Generative literature (cf. Deal 2012). The Nez Perce case and other three-way alignments will be addressed in future research.

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