The Typology of TSL Case Assignment

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Overview

- Yip et al. (1987) analyze case using the syntactic equivalent of an AUTOSEGMENTAL TIER.
- More recently, the TIER-BASED STRICTLY LOCAL (TSL) formal languages have been successfully applied to a wide range of phonological and syntactic phenomena (Graf 2022a)
  - Phonology: long-distance assimilation and dissimilation
  - Syntax: movement, agreement, and case
- This work: a TSL model of case assignment which combines RELATIVIZED DOMINANCE and RELATIVIZED C-COMMAND
  - Both relations independently needed for other syntactic phenomena
  - By combining them, we can handle well-attested phenomena such as dependent case, (split) alignment, and differential argument marking
- *The same formal machinery* can be used for movement, agreement, and case

Contents

1 TSL patterns

A pattern is TSL if it can be described with STRICTLY LOCAL CONSTRAINTS over a TIER OF SALIENT ELEMENTS, treating the rest as invisible (Heinz et al. 2011; Lambert and Rogers 2020).

1.1 Example from phonology

Suppose we have a language with sibilant harmony, blocked by [t], similar to Slovenian (cf. McMullin and Hansson 2016).

(1) Sibilant harmony – example grammar
- Tier contents: all segments in the set {s, ʃ, t}
- Tier constraints: ban substrings {*sʃ, *ʃs}

As a result, harmony is enforced except when [t] intervenes.

(2) Sibilant harmony – example words

	Word	Tier	Licit?
a.	**s**aka**s**a	ss	✓
b.	ʃakaʃa	ʃʃ	✓
c.	sakaʃa	sʃ	✗
d.	**s**ata**ʃ**a	stʃ	✓

Notice: in the blocking case (2d) the sibilants are not adjacent on the tier, so the constraint * sʃ does not apply.

1.2 Relativized locality

- The TSL model of relativized locality: IMMEDIATE PRECEDENCE ON A TIER

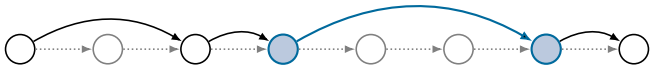


Figure 1: Two adjacent elements on a tier

- This derives the combination of INVISIBILITY and BLOCKING that is characteristic of long-distance linguistic dependencies
- **TSL-2** (TSL with a constraint window of size 2) seems to be a good fit for both phonology and syntax (McMullin and Hansson 2016; Graf 2022b; Hanson 2024)
- **Complication:** for syntax we have multiple relations which can be relativized to a tier

1.3 Constraints on dominance and command

Two key relations in syntax: dominance and c-command[1]

1. Island constraints (Ross 1967) → relativized dominance
   (= immediate dominance on a tier)
2. Relativized minimality (Rizzi 1990, 2001) → relativized c-command
   (= immediate c-command on a tier)

What about case? Consider DEPENDENT CASE rules (Baker 2015):

- e.g. Finite T assigns accusative case to the lower of two unmarked DPs in its domain

If such rules are descriptively accurate for at least some languages, then we need TSL-2 constraints that *simultaneously reference* dominance and command relations on a tier
→ MIXED RELATION TIER-BASED CONSTRAINTS

- e.g. you can have T_{FIN} ($D_{[NOM]}$ $D_{[ACC]}$) but not * T_{FIN} ($D_{[NOM]}$ $D_{[NOM]}$) or * T_{FIN} ($D_{[ACC]}$ $D_{[NOM]}$)
- It is not enough to permit/ban certain dominance configurations (T_{FIN} dominating D_{NOM} or D_{ACC}) or c-command configurations (D_{NOM} commanding D_{ACC}) in isolation
- Once we make this move, several other case phenomena immediately fall into place

[1] Or another command relation; see TODO

2 TSL case assignment

For ease of exposition, we use a Minimalist bare phrase structure (BPS) representation.[2]

Syntactic assumptions:

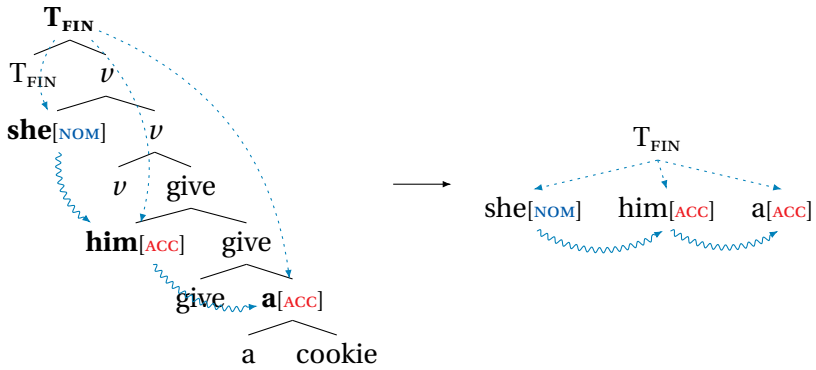
- All projections of a head are in some sense "the same element"
- Only the maximal projection of each head (at the current point in the derivation) is relevant
- Long-distance operations (Move, Agree, etc.) are triggered whenever certain structural configurations are met
- A single head may assign case to several DPs, and may assign different cases to each

Formal assumptions:

- At each point in the derivation, we constrain syntactic operations using:
  1. MG-style diacritics (Stabler 1997, 2011) – indicate that some operation will take place *in the present derivation*[3]
  2. (Mixed relation) TSL-2 grammar – for case, all constraints are 'treelets' with height and width of 2, representing relativized dominance and command
- In general, the tier for a given set of cases includes all case assigners and assignees (but could include blockers, e.g. other case assigners)

A simple example

(3) Tree and tier for *She gave him a cookie* at the point when finite T is merged
(⋯→ = tier-based immed. dominance; ⇝ = tier-based immed. c-command)



(4) Informal rule for English verbal cases (NOM + ACC)
- Tier: all case assigners, all DPs
- Constraints:
  - Highest D under T_{FIN} is NOM
  - Other D's under T_{FIN} are ACC

Notice:

[2] Technically, the TSL constraints apply to the DERIVATION TREE, not the PS tree. For our current focus, there is little practical difference.

[3] This is different from mainstream Minimalism, where features may indicate only the *potential* to undergo some operation.

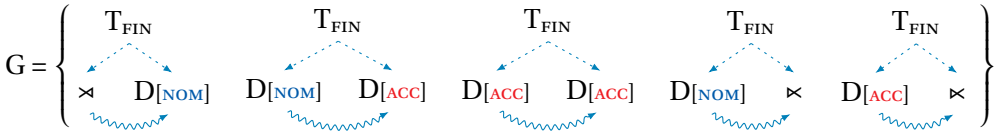
- The case assigner is local to its assignees, and each DP is local to the next higher/lower one
- Even if many functional projections and adjuncts intervened, the tier would be unchanged
- We have abstracted away from the details of *how* case is assigned – valuation/checking, Agree/separate operation, etc.

2.1 The structure of the grammar

The tier contents are the set of salient symbols.

The tier constraints are formalized as a SET OF PERMITTED LOCAL SUBTREES (edge markers ⋊/⋉ indicate that there is nothing to the left/right).

(5) Grammar for English verbal cases
$T = \{T_{FIN}, D\}$



By tiling these subtrees, we can create a variety of case configurations (edge markers included for clarity):

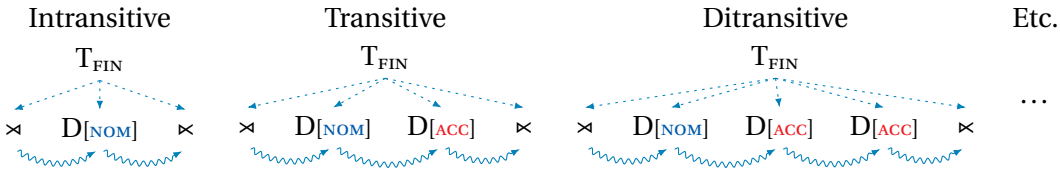


Figure 2: Tiling treelets to make case patterns for different numbers of arguments.

Note: this example includes case spreading, one of the major concerns of Yip et al. (1987).

3 Parameters of variation

With slight modifications to our grammar, we can also handle the (more complex) case systems of other languages. There are **two parameters** available for manipulation:[4]

1. the set of tier elements
2. the tier constraints

For illustration, we consider several classic case phenomena:

- Case spreading
- Structural dative
- Ergative alignment
- Tripartite alignment
- Split alignment
- Differential argument marking

[4] We assume the window size to be fixed at 2 in each direction.

3.1 Case spreading

The English example illustrates spreading of accusative. In some languages, multiple nominatives or genitives occur in certain contexts.

Examples from Japanese:

(6) Stative object

Mary ga eigo ga yoku dekiru.
Mary NOM English NOM well can.do

'Mary can speak English well.' (Hiraiwa 2001)

(7) Possessor raising (subjectification)

Yama ga ki ga kirei desu.
mountain NOM trees NOM pretty are

'The mountains—their trees are pretty.' (Kuno 1973)

(8) Multiple possessors

Taroo no Chomsky no hon
Taroo GEN Chomsky GEN book

'Taroo's book by Chomsky' (Saito et al. 2008)

(9) Nominal subject/object

yabanzin no Rooma no hakai
barbarian GEN Rome GEN destruction

'the barbarians' destruction of Rome' (Saito et al. 2008)

We just need a subtree with **identical daughters** in order to iterate.

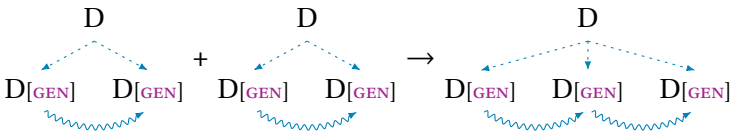
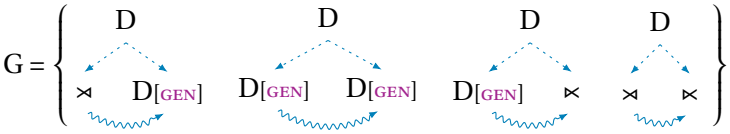


Figure 3: Derivation of multiple genitives.

The full grammar allows zero or more genitive DPs, and no other cases.[5]

(10) Grammar for genitive case in Japanese (adapted from Hanson 2023)

T = {D}



Bonus: The same basic strategy can be used for multiple *wh*-movement (Graf and Kostyszyn 2021).

[5] This is approximately correct for Japanese, though the ga-no (nom-gen) conversion phenomenon apparently allows conversion of only some nominatives to genitives (Maki and Uchibori 2008).

3.2 Structural dative

In certain languages, including Japanese, the indirect object occupies a position between the subject and direct object, and receives dative case. If a ditransitive verb is passivized, this DP becomes nominative, showing that it is not lexically controlled.

(11) **Kuno's Generalization:** Dative is assigned to the middle of three unmarked NPs (Kuno 1973).

a. Intransitive

John ga aruku.
John NOM walks

'John walks.'

b. Transitive

Mary ga hon o yomu.
Mary NOM book ACC reads

'Mary reads books.'

c. Ditransitive

John ga Mary ni okane o yatta.
John NOM Mary DAT money ACC gave

John gave Mary money.

d. Causative of transitive

John ga Mary ni hon o yomaseru.
John NOM Mary DAT book ACC read.CAUS

'John makes/lets Mary read books'

e. Passive-Causative of transitive

Mary ga (John ni) hon o yamaserareru.
Mary NOM John by book ACC read.CAUS.PASS

'Mary is made to read books (by John).'

Structural dative can therefore be seen as **doubly dependent** case. This is impossible in Baker's model (only two DPs can be referenced), but is easily derived with a TSL-2 grammar.

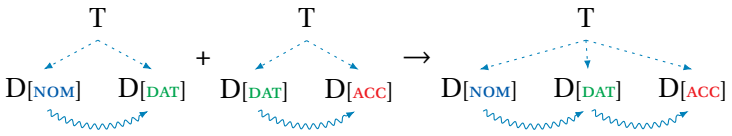


Figure 4: Derivation of structural dative.

What happens if there are more than three arguments? To the extent that this is possible, it seems that you get more datives.

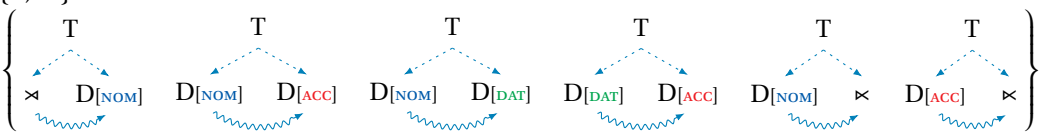
(12) Causative of ditransitive

Ken ga Jin ni Yumi ni hon o agesaseta.
Ken NOM Jin DAT Yumi DAT book ACC gave.CAUS

'Ken made/let Jin give Yumi a book.'

(13) Grammar for verbal cases in Japanese (adapted from Hanson 2023)

T = {T, D}

G = 

Notice: There is no way to end on a dative.

3.3 Ergative case

In many languages, the intransitive subject and transitive object bear the same case (absolutive, =nominative), with a distinct case for the transitive subject (ergative).

(14) Shipibo (Baker 2015)

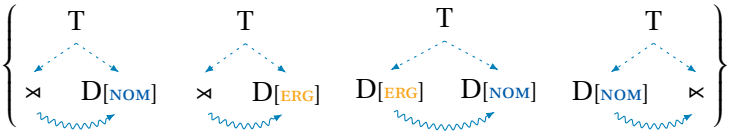
a. Maria-nin-ra ochiti noko-ke.
Maria-ERG-PRT dog find-PRF
'Maria found the dog.'

b. Maria-ra ka-ke.
Maria-PRT go-PRF
'Maria went.'

This is just the **mirror image** of accusative. The 'new' case that appears in transitives comes on the left, rather than the right.

(15) Grammar for ergative alignment

T = {T, D}

G = 

Note: not all supposedly ergative languages work like this.

- In Hindi, there is a tight correlation between ergative case and semantic role, as well as aspect.
- In Basque, both structural (TP-level) and lexical (VP-level) factors exist, while semantic role is a poor predictor.

Since our focus is what can be done with a single tier, we'll cover just aspect-based splits below.

3.4 Other alignments

In descriptive work on case, basic grammatical roles are categorized as:

- S – subject of intransitive
- A – subject ("agent") of transitive
- O – object of transitive

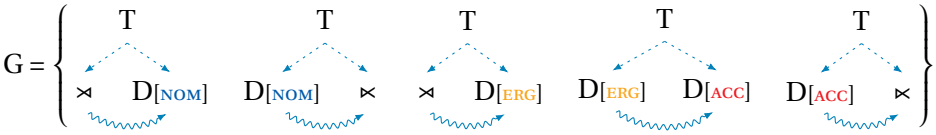
Accusative alignment groups S and A under one case to the exclusion of O, while ergative alignment groups S and O and distinguishes A. Other systems exist as well.

(16) Common case alignments

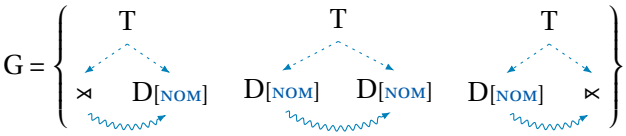
Alignment	Case of S	Case of A	Case of O
Accusative	NOM	NOM	ACC
Ergative	NOM	ERG	NOM
Tripartite	NOM	ERG	ACC
Neutral	NOM	NOM	NOM

Again, there are often structural and/or lexical properties that control alignment. But once we control for these, the various alignments that have been attested are easy to construct in the current system.

(17) Grammar for tripartite alignment

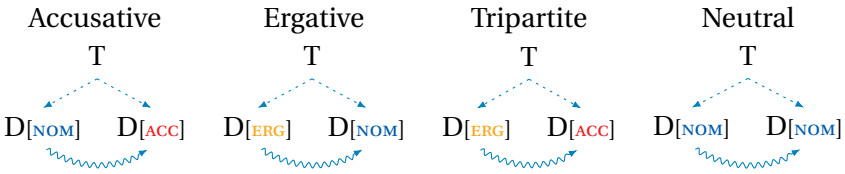


(18) Grammar for neutral alignment



To summarize, all of the possible 'core treelets' are attested.

(19) Core treelet for transitive clauses



What is an impossible alignment, then? Consider the following:

(20) Staircase alignment

- Intransitive clauses have one NOM DP
- Transitives have two ACC DPs
- Ditransitives have three DAT DPs
- Repeat

(21) 2x2 alignment

- The first two DPs are NOM
- The next two DPs are ACC
- Repeat

(22) Anti-local ergative case

- The subject is NOM if there are one or two arguments, and ERG if there are three or more
- Objects are always ACC

(23) Coordinated alignment

- When two clauses are coordinated, one must have accusative alignment and the other ergative, but it doesn't matter which is which

(24) Spiraling alignment

- The main clause is accusative
- A singly embedded clause is ergative
- A doubly embedded clause is accusative
- A triply embedded clause is ergative
- etc.

The reason all of these are impossible is because they require some non-TSL-2 mechanism:

- A window larger than two
- Counting occurrences
- Global boolean logic

There may be some unattested alignments that are TSL-2, but there are far, far more that are not.

3.5 Split alignment

Often, clauses in one tense/aspect show accusative alignment, while others show ergative alignment. In Hindi, aspect controls alignment.

(25) Case-sensitive agreement in Hindi (Mahajan 1990)

a. Imperfective: subject is nominative

Raam roṭii khaataa thaa.
Raam.M.NOM bread.F.NOM eat.IPFV.M be.PST.M

'Raam ate bread (habitually).'

b. Perfective: subject is ergative

Raam-ne roṭii khaayii.
Raam.M-ERG bread.F.NOM eat.PFV.F

'Raam ate bread.'

Wait, why is the object nominative in the imperfective clause? Hindi also has differential object marking (see below). For simplicity, let's ignore this, and also pretend that Hindi has pure (dependent) ergative case. Then, we just let the Asp head control the alignment.

(26) Schematic grammar for split alignment

T = {Asp, D}

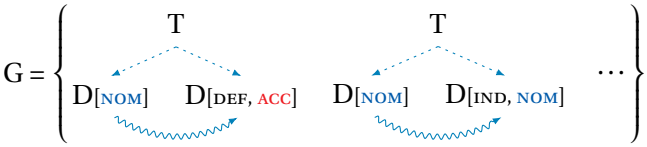
G = { IPFV ⋊ D[NOM] ; IPFV D[NOM] D[ACC] ; IPFV D[NOM] ⋉ ; IPFV D[ACC] ⋉ ; PFV ⋊ D[NOM] ; PFV ⋊ D[ERG] ; PFV D[ERG] D[NOM] ; PFV D[NOM] ⋉ }

Actually, it's likely that accusative and ergative are assigned in different domains (e.g. T and Asp) in a language like Hindi, but this will suffice for illustration.

3.6 Differential argument marking

Structural case may appear only on DPs with a certain semantic/discourse property such as animacy/definiteness. Turkish and Hindi have differential object marking. It is also possible to have differential subject marking, and even for a property of one argument to trigger differential marking of the other (Daniel 2025). **All of this is to be expected** if the two arguments are local on a tier.

(27) Partial grammar for differential object marking



Constructing the other three possibilities is left as an exercise.

3.7 Summary

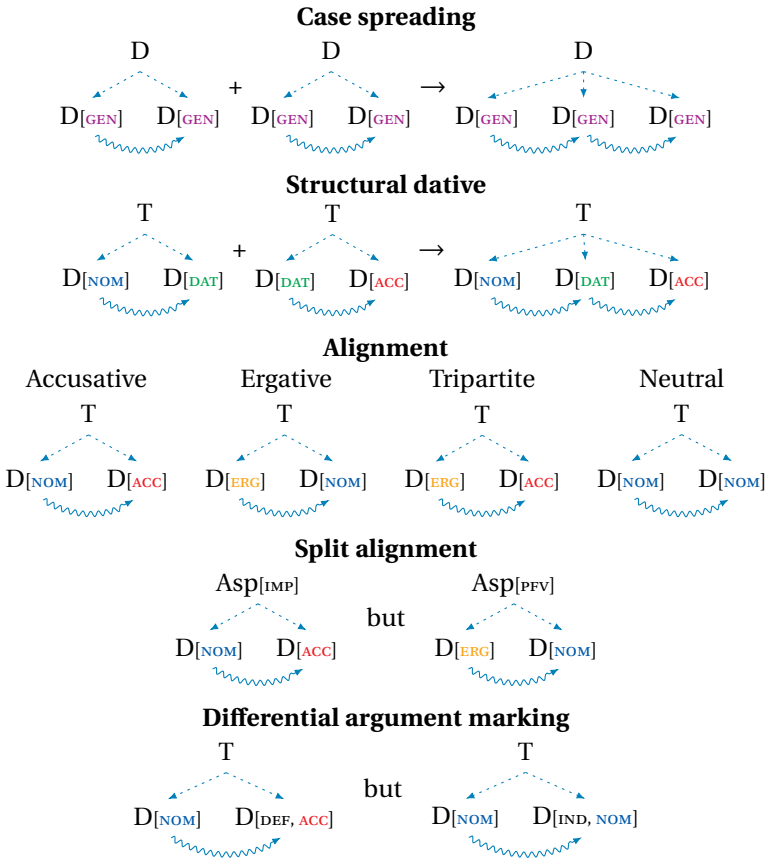


Figure 5: Points of variation predicted by the TSL model.

4 Future directions

For reasons of space, I cannot show examples of successive case assignment throughout the derivation. In the current setup, we would allow some DPs to left underspecified at each step. Also, preliminary investigation suggests that many types of interaction between case and agreement can be handled. TSL-2 over trees thus potentially unifies movement, agreement, and case.

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