

# Chapter 7

## Case

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This chapter surveys work on case within LFG, beginning with some of the earliest studies in Bresnan (1982). The chapter then moves on to cover the interaction of Mapping Theory with case marking, Optimality Theoretic approaches to case and the ideas articulated by Constructive Case. It closes with an outlook on more recent analyses. While these recent analyses are couched within current LFG and are applicable to a wider range of phenomena, they echo the basic insights of some of the earliest approaches to case in that they essentially take a lexical semantic view of case, but go beyond the lexicon and use LFG's projection architecture to chart the complex interaction between lexical, structural and semantic/pragmatic factors exhibited by case markers crosslinguistically, including core case markers. Examples in this chapter are drawn mainly from Australian, Scandinavian, and South Asian languages.

### 1 Introduction

In LFG there is no one theory of case and so this chapter goes through a variety of approaches. While the approaches differ formally and focus on a diverse set of phenomena, they are unified by the same underlying sense of how case should be analyzed. Case marking is seen as being closely connected to the identification of grammatical relations (henceforth grammatical functions or GFs), but also to the realization of lexical semantic information, such as experiencer or causer/causee semantics, instruments, goals, locations, etc. Like any piece of morphological or syntactic information, case is seen as contributing to the overall morphosyntactic and semantic analysis of a clause. That is, case marking is taken to provide important information about GF status (e.g., SUBJ vs. OBJ vs. OBJ<sub>θ</sub> or OBL<sub>θ</sub>) and about the lexical semantics of the arguments of a predicate. This can go so far as

taking the form of ‘Constructive Case’ whereby the case marking is responsible for the ‘creation’ or introduction of a particular GF into the syntax (Section 4). For example, the ergative might come with the information that a SUBJ must exist in the clause and thus contribute a SUBJ feature to the f-structure analysis.

The chapter begins with a look at the earliest treatments of case in LFG in Section 2, which developed the basic insights informing later work. Case marking is modeled as a combination of syntactic and lexical semantic information and plays a role in the mapping from semantic arguments to GFs. This is discussed in Section 3, with Section 6 laying out the effects of case at the clausal semantic level, i.e. in terms of telicity or partitivity and modality. Case also appears to have pragmatic impact in that it can express information structural meaning and can be governed by information structural concerns.

With the rise of Optimality Theory (Prince & Smolensky 1993), influential work by Aissen as well as Woolford sought to account for Differential Case Marking (DCM) and other distributions of case via an Optimality Theory (OT) approach (Aissen 1999, 2003; Woolford 2001). LFG took an early interest in the possibilities of OT (Bresnan 2000) and as discussed in Section 5, this included experimenting with OT for analyses of case.

Some of the material in this chapter has already been presented in Butt (2006) and Butt (2008), particularly the description of Constructive Case and the mapping between semantic arguments and GFs. However, this contribution provides a deeper look at case in early LFG and at case within approaches inspired by OT. It also updates the discussion with respect to new proposals for mapping/linking and ties the various facets of case marking together in a sketch for an overall comprehensive approach in Section 7. Section 8 summarizes.

## **2 Early LFG**

Some of the earliest LFG work included papers that were specifically devoted to case. This section discusses the contributions by Neidle (1982); Andrews (1982) and Mohanan (1982) on a diverse range of languages, namely Russian, Icelandic and Malayalam, respectively.

### **2.1 Russian**

Neidle (1982) looked at patterns of case agreement in Russian complements and secondary predicates. In essence, Neidle’s overall approach to case did not differ much from what would have been standard assumptions at the time in that

Neidle divides case into two broad categories: 1) *structurally predictable* case; 2) *lexically required* case and exceptions. This bipartite distinction still underlies most of the assumptions and theorizing on case in standard GB/Minimalist approaches, e.g., see Butt (2006); Bobaljik & Wurmbrand (2008) for overviews, and is currently framed as an opposition between dependent vs. inherent case, e.g., Baker & Bobaljik (2017).

A special feature of Neidle's approach is the adoption of Jakobson's feature decompositional approach to case (Jakobson 1936). Neidle also briefly touches on the issue of genitive objects in Russian, which are introduced structurally in the presence of negation and more generally when the object is non-quantized. In the latter case, the genitive may be part of a Differential Case Marking (DCM) pattern by which the genitive is used for non-quantized objects and the accusative for quantized objects, e.g., in verbs such as 'demand' (Neidle 1982: 400). Genitive case is sometimes also required by the inherent lexical semantics of the verb (e.g., 'wish').

Neidle does not quite integrate the quantizedness semantics into her account and instead opts for a simple distinction between structural and inherent case. Structural case is assigned via f(unctional)-structure annotations on c(onstituent)-structure rules. For example, the annotations on an object OBJ and an indirect object (termed OBJ2 in early LFG) might look as in (1), where the Jakobsonian-inspired featural decomposition (–, –, +) corresponds to accusative whereas the (+, –, +) corresponds to a dative.

$$(1) \quad \text{VP} \longrightarrow \text{V} \quad \text{NP} \quad \text{NP}$$

$$\quad \quad \quad \uparrow=\downarrow \quad (\uparrow \text{OBJ})=\downarrow \quad (\uparrow \text{OBJ2})=\downarrow$$

$$\quad \quad \quad (\downarrow \text{CASE})=(-, -, +) \quad (\downarrow \text{CASE})=(+, -, +)$$

The structural case assignment is matched up with the functional information gleaned from the morphological case marking on nouns, pronouns, adjectives, etc. That is, if a phrase structure rule as in (1) calls for an accusative object, then whatever noun or pronoun this NP is instantiated by needs to have accusative morphology. Given this approach to structural case, the lexical entries for verbs generally contain no information about case: as shown in (2), verbs specify the type and number of the GFS that are expected (as per basic LFG theory), but do not contain additional information about case.<sup>1</sup>

$$(2) \quad \%vstem \quad \text{V} \quad (\uparrow \text{PRED})=\langle \%vstem \langle (\uparrow \text{SUBJ}), (\uparrow \text{OBJ}) \rangle \rangle'$$

<sup>1</sup>The lexical entry in (2) has been adapted from the original with respect to how a verb stem is represented. The % indicates a variable that can be filled by some value (Crouch et al. 2011). In the lexical entry in (2), this might be the verb 'kill', for example.



ellipsis. The example in (4b) additionally shows that agreement is not an indicator of subjecthood in Icelandic since the third singular verb does not agree with the first person singular subject.

(4) Icelandic

- a. Barn-inu      batnaði                      veik-in.  
 child-DEF.DAT recovered.from.3SG disease-DEF.NOM  
 ‘The child recovered from the disease.’
- b. Mér er      kalt.  
 I.DAT be.3SG cold  
 ‘I am cold.’

Andrews (1982) also discusses instances of non-accusative objects<sup>3</sup> and notes that nominative objects are the rule in dative subject examples as in (4a). These and other considerations lead Andrews to provide a rich and detailed analysis of the case marking patterns in Icelandic as part of a longer paper on Icelandic syntax.

The overall approach to case is similar to that taken by Neidle, though the formalization is quite different. Like Neidle, Andrews (1982) invokes Jakobson on case, but does not adopt a feature decomposition approach. Rather, he builds on Jakobson’s idea that the nominative should be analyzed as a default, unmarked (almost non-case) in Indo-European. As a consequence, Andrews develops an account by which nominative is assigned as a default case as part of the syntax (c-structure rules) if no other case has been specified. Accusative is assigned to objects as a default as well, but only in a structure where there is a nominative subject. All other case marking is specified as part of the lexicon.

Andrews specifically notes that the choice of non-default case marking is not arbitrary, but can be tied to semantic generalizations such as experiencer/perception semantics, the semantics of verbs of lacking and wanting, etc. (Andrews 1982: 463). Essentially, non-nominative subjects all seem to mark non-agentivity of one sort or another. However, despite a sense of systematicity underlying the connection between semantics and case marking, Andrews decides that because there is no invariant meaning one can assign to a case, a strategy of encoding non-nominative subject (and non-accusative object) case as part of the lexicon should be followed: “case selection is basically lexical and idiosyncratic, but subject to regularities keyed to the semantics of the matrix verb” (Andrews 1982: 464). As in Neidle’s approach, further structurally motivated instances of non-default case marking are allowed. This is exemplified by structural genitives in

<sup>3</sup>Also see Svenonius (2002) for a more recent in-depth analysis of non-accusative object marking.

Russian, and in Icelandic non-default case occurs in some instances of passivization. Other case marking that goes beyond the core patterns is dealt with via lexically (or otherwise) stipulated information.

Interestingly, Andrews' basic approach foreshadows the notion of *Dependent Case* (Marantz 2000; Baker 2015). This sees the central problem of case theory as deciding on how to apportion structural case between two core argument participants, with the case marking of one being dependent on the structure of the other. So, if a subject is ergative, there are mechanisms in place which ensure that the object is nominative/absolute. This is similar (but not identical) to Andrews' treatment of nominative objects in the presence of dative subjects and accusative objects in the presence of nominative subjects.

### 2.3 Malayalam

A different approach to case is taken by Mohanan (1982). Working on Malayalam, Mohanan entertains an approach pioneered by the Sanskrit grammarian Pāṇini (Böhtlingk 1839–40) and taken up by Ostler (1979). This holds that the distribution of case can be expressed in terms of generalizations referring directly to thematic/semantic roles. However, Mohanan shows that it is also necessary to assume a structural level at which GFS are encoded in order to be able to properly account for the distribution of case in Malayalam. That is, the level of GFS (f-structure) must mediate between the overt expression of case and the lexical semantics of verbs. In line with Andrews' findings for Icelandic, Mohanan establishes a systematic relationship between lexical semantics and case, but not a one-to-one relationship. In a precursor to Mapping Theory (Section 3), Mohanan proposes the principles in (5).<sup>4</sup>

#### (5) Principles of Case Interpretation

- a. Interpret accusative case as the direct object (OBJ).
- b. Interpret dative case as either the indirect object (OBJ2) or the subject (SUBJ).
- c. Interpret nominative case as either the subject (SUBJ) or the direct object (OBJ) if the NP is [–animate]; otherwise interpret nominative case as the subject (SUBJ).

There are several things to note about these principles. For one, they assume that case marking plays a central role in the determination of GFS (rather than

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<sup>4</sup>These have been simplified slightly with respect to the dative for ease of exposition.



verb classes, with detailed work such as that by Jackendoff (1990) and Levin (1993) providing inspiration. As such, the conclusions arrived at by Mohanan that the case patterns in Malayalam are too irregular to be governed by general principles deserve a second look from today's perspective. Consider, for example, the contrasts in (8) and (9), taken from Mohanan (1982: 540–541).<sup>5</sup> Mohanan considers the verbs to "...presumably have the same thematic roles" (Mohanan 1982: 540), namely to all have experiencer arguments. However, the 'became' in (8a) is rather more indicative of an undergoer/patient so this is more likely to be an unaccusative, rather than an experiencer verb. This difference in lexical semantics is likely to govern the difference in subject case so that experiencer semantics is expressed via a dative subject while unaccusatives simply receive a nominative subject by default.

(8) Malayalam

- a. awaḷ taḷarṇṇu.  
she.NOM was tired  
'She became tired.'
- b. awaḷ-kkə wiṣaṇṇu.  
she-DAT hungered  
'She was hungry.'

Similarly, the contrast between (9a) and (9b) can potentially be explained by (9b) involving a metaphorical location ('happiness came to me'), which lends itself to dative subjects, as argued for by a.o. Landau (2010) and suggested by Localist approaches to case and argument structure, e.g. Gruber (1965); Jackendoff (1990).

(9) Malayalam

- a. ṅāan saṅṅoṣiccu.  
I.NOM was happy  
'I was happy.'
- b. eni-kkə saṅṅoṣam waṇṇu.  
I-DAT happiness came  
'I was happy.'

Contrasts such as in (9) are standardly and systematically found in South Asian languages and they thus deserve a better explanation than being relegated to

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<sup>5</sup>The glosses in these Malayalam examples provide slightly more detail than in the original.



lexical stipulation. The same applies to contrasts as in (10), from Mohanan (1982: 542), where a difference in modality is expressed solely in terms of a difference in case marking on the subject.

(10) Malayalam

- a. *kutti*     *aanaye*     *ṇuḷḷ-aṇam*.  
 child.NOM elephant.ACC pinch-MOD  
 ‘The child must pinch the elephant.’
- b. *kutti-kkə* *aanaye*     *ṇuḷḷ-aṇam*.  
 child-DAT elephant.ACC pinch-MOD  
 ‘The child wants to pinch the elephant.’

Mohanan again resorts to lexical stipulation to model the two different readings (permission vs. promise), but given that these types of contrasts are also widely found in other South Asian languages (Butt & Ahmed Khan 2011; Bhatt et al. 2011), again a more principled analysis is in order (see Section 7).

### 3 Mapping Theory

Over time, the understanding of case and its relationship with predicate arguments deepened and LFG developed a dedicated *Mapping Theory* to model and explain the systematicity found across a typologically diverse set of languages. A subset of the semantics associated with case has thus by now been covered by this more principled account of the relationship between lexical semantics and GFS. This section briefly charts the development of Mapping Theory from early ideas and formulations to today’s standard instantiation, focusing particularly on the role of case. The reader is referred to Findlay & Kibort forthcoming [this volume] for a fuller discussion of Mapping Theory and more recent developments.

#### 3.1 Association Principles with case

It is perhaps no accident that the beginnings of LFG’s Mapping Theory were first articulated with respect to Icelandic (Zaenen et al. 1985) – a language with robust case marking that attracted intense linguistic interest in the 1980s because of its demonstrated use of non-nominative subjects (Andrews 1976). Zaenen et al. (1985) present a detailed study of the interaction between Icelandic case and GFS, which bears similarities to the approaches sketched in the previous section. However, the Icelandic Association Principles formulated by Zaenen et al. (1985) in

(11) contrast with Mohanan's principles for Malayalam. Where Mohanan linked case directly to GFS, Zaenen et al. (1985) postulate a complex interrelationship between case, thematic roles and GFS. Another feature of the principles is that they include universal as well as language-specific postulations, as can be seen via a comparison of Icelandic and German, for which Zaenen et al. (1985) provide a comparative analysis.

**(11) Icelandic Association Principles**

1. AGENTS are linked to SUBJ. (Universal)
2. Casemarked THEMES are assigned to the lowest available GF. (Language Specific)
3. If there is only one thematic role, it is assigned to SUBJ; if there are two, they are assigned to SUBJ and OBJ; if there are three, they are assigned to SUBJ, OBJ, 2OBJ.<sup>6</sup> This principle applies after principle 2 and after the assignment of restricted GFS. (Universal)
4. Default Case-Marking: the highest available GF is assigned NOM case, the next highest ACC. (Universal)

**(12) German Association Principles**

1. AGENTS are linked to SUBJ. (Universal)
2. Casemarked THEMATIC ROLES are assigned to 2OBJ. (Language Specific)
3. If there is only one thematic role, it is assigned to SUBJ; if there are two, they are assigned to SUBJ and OBJ; if there are three, they are assigned to SUBJ, OBJ, 2OBJ. This principle applies after principle 2 and after the assignment of restricted GFS. (Universal)
4. Default Case-Marking: the highest available GF is assigned NOM case, the next highest ACC. (Universal)

Like the 1982 approaches of Neidle, Mohanan and Andrews, Zaenen et al. (1985) rely on a mix of universal and structurally determined case assignment (default nominative on subjects and accusative on objects), language-specific rules and lexically stipulated case marking patterns. However, Zaenen et al. (1985) differ significantly from Andrews' approach to Icelandic in that they include thematic roles in the statement of generalizations and associate case as one of several features with a given GF. Andrews, on the other hand, argued for the use of a "composite function" in which GF and case information are welded together to provide

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<sup>6</sup>This corresponds to OBJ<sub>θ</sub> within later LFG approaches.



case marked theme is assigned to the lowest available GF (Principle 2, language-specific), which is the secondary object. That leaves the goal argument to be assigned to the OBJ, since by Principle 3 (universal) if there are three thematic roles, they need to be assigned to SUBJ, OBJ and 2OBJ. In this case SUBJ and 2OBJ have already been assigned, leaving only OBJ.

When the goal argument is not present, the agent is again linked to SUBJ and receives nominative case via the universal principles in 1 and 4. But this time the genitive case marked theme is assigned to OBJ as the lowest available GF, as shown in (14b). The status of OBJ is significant as it is this argument that can be realized as a subject under passivization. The lexically determined case marking is also significant, as these cases tend to be retained in constructions like the passive, as shown in (15) (Zaenen et al. 1985: 471).

(15) Icelandic

- a. þess var óskað (\*henni)  
this.GEN was wished her.DAT  
'This was wished.'
- b. Henni var óskað þess  
her.DAT was wished this.GEN  
'She was wished this.'

Today's standard Mapping Theory relates GFs to thematic roles via two abstract linking features,  $[\pm o]$ (b)jective and  $[\pm r]$ (e)strictive, by which both thematic roles and GFs can be classified (Bresnan & Zaenen 1990; Bresnan 2001; Butt 2006). Additionally, a number of principles govern the association of GFs and thematic roles. These principles were worked out on the basis of a wide range of data, including Bantu, Germanic and Romance. LFG's Mapping Theory can account for a wide range of argument changing operations such as locative inversion, causativization, passives (argument deletion) or applicatives (argument addition), e.g. see Levin (1987); Alsina & Mchombo (1993); Bresnan & Kanerva (1989); Bresnan & Moshi (1990); Alsina & Joshi (1991).

Based on his work with Romance languages (mainly Catalan), Alsina (1996) proposed an alternative version of Mapping Theory and in recent years, Kibort has worked out a revised version, which abstracts away from the use of thematic roles, instead working with abstract argument positions and a complex interplay between syntax and semantics (Kibort 2007, 2013, 2014; Kibort & Maling 2015). This chapter does not delve further into the details of linking as the role of case in most versions of linking has stayed much as it was in Zaenen et al.'s analysis of Icelandic: an extra piece of information that helps determine the mapping

between GFS and thematic roles and that needs to be accounted for as part of the mapping between argument structure and GFS. See Butt (2006) and Findlay & Kibort forthcoming [this volume] for overview discussions.

However, we will include a discussion of Schätzle (2018) in Section 6, as she works with Kibort's revised version of linking, and develops an event-based theory of linking for an analysis of the historical rise and spread of dative subjects in Icelandic (yes – again Icelandic!).

### 3.3 Quirky case

Before moving away from the early LFG approaches to case and linking, this section takes a look at a significant concept that also resulted from the concentrated work on Icelandic: *lexically inherent* or *quirky case*. The data from Icelandic and other languages support a distinction between at least two types of case assignment/licensing. In the papers discussed so far, this was thought of as a distinction between structurally assigned and “lexically inherent” case. The latter also came to be known as “quirky case”.

However, the anchoring of case marking information in lexical entries together with the term “quirky” suggests a random lawlessness that must be idiosyncratically stipulated as part of lexical entries. This view on non-default case has become widely accepted within linguistics, but lacks empirical support. As already noted by Andrews (1982) for Icelandic, for example, and confirmed by the data and analyses in Zaenen et al.'s paper, the correlation between thematic role and case marking in Icelandic is actually quite regular in that the “quirky” cases are generally regularly associated with a given thematic role. There seem to be only very few instances of truly idiosyncratic case marking that do not follow from general semantic principles.

Van Valin (1991) explicitly revisited the Zaenen et al. paper and made this point, working out an alternative analysis within Role and Reference Grammar (RRG). Van Valin (1991) takes an event-based approach, working with differences between Vendlerian states, activities, achievements and accomplishments in combination with a macro-role approach to the arguments of a predicate. The paper mainly focuses on dative arguments, whereby dative case is assigned to those arguments which cannot be assigned a macro-role (either actor or undergoer). Dative arguments thus constitute the ‘elsewhere’ case and do not need to be lexically encoded/stipulated. Van Valin does not explicitly address the other types of non-default case marking.

Although Van Valin frees dative marked arguments from being lexically stipulated, he also essentially works with a bipartite system: case marking which is

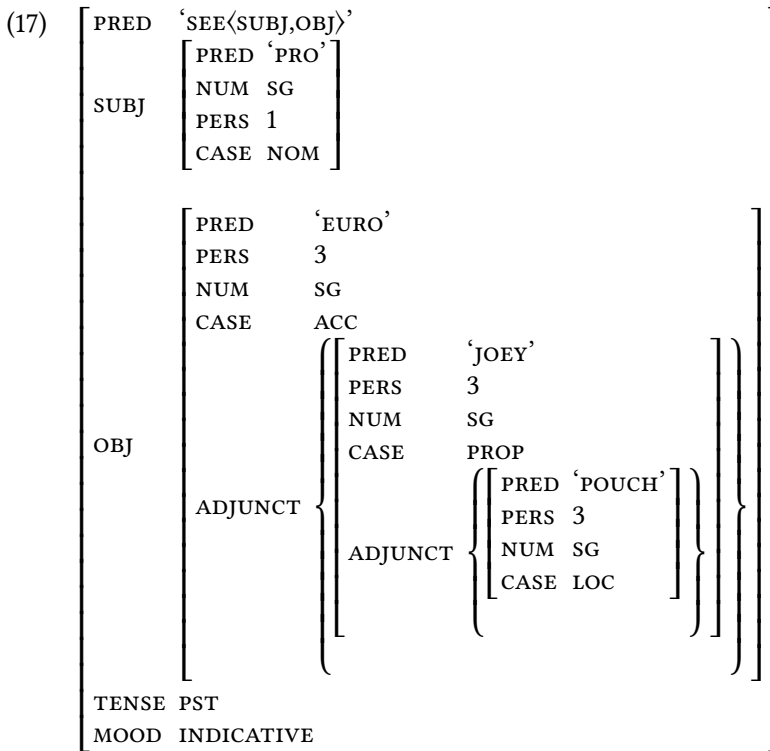
determined systematically via reference to macro-roles vs. case marking that is idiosyncratic. However, the empirical evidence supports a tripartite, rather than a bipartite approach to case: 1) structural case (e.g., nominative/accusative), 2) semantically conditioned case; 3) idiosyncratic case. Despite the empirical evidence for a tripartite view, this approach constitutes an exception rather than the rule in the literature. Versions of a tripartite view of case marking have been argued for by Donohue (2004) and Woolford (2006), for example. Within LFG this view was first clearly articulated by Butt & King (2004), see Section 7.

## 4 Constructive case

In this section we turn to a very different type of case marking, namely a phenomenon that has come to be known as *case stacking*, illustrated in (16). Within LFG, Nordlinger (1998, 2000) took on this phenomenon with respect to Australian languages and proposed a strongly lexicalist analysis in which the case markers themselves contribute information about the GFs of a clause.

- (16) Martuthunira (Dench 1995: 60)  
Ngayu nhawu-lha ngurnu tharnta-a mirtily-marta-a  
I.NOM saw-PST that.ACC euro-ACC joey-PROP-ACC  
thara-ngka-marta-a.  
pouch-LOC-PROP-ACC  
'I saw the euro with a joey in (its) pouch.'

In (16) the main predicate is 'see', which takes a nominative subject ('I') and an accusative object, 'euro' (a type of kangaroo). The clause also contains two modifying NPs, 'joey' (a baby kangaroo) and 'pouch'. The accusative on these nouns signifies that they modify the OBJ 'euro', the proprietive shows that these are part of a possessive or accompanying relation to another word and the locative on 'pouch' signals that this is the location of the joey. The f-structure in (17) shows these dependency relations among the NPs.



None of this case marking by itself is out of the ordinary. What is special is the ability of languages like Martuthunira to stack cases on top of one another. In a language like Martuthunira that has fairly free word order, this stacked marking of dependents unambiguously indicates which elements belong to which other elements syntactically (see Butt 2000 for some discussion).

The individual case markers could be dealt with straightforwardly by a mix of structural and lexically inherent case, as had been done in the past. However, the case stacking is a different matter. It is not particularly feasible to stipulate all possible case stacking patterns in the lexical entries of the verbs. This kind of “anticipatory” case marking would lead to an unwanted proliferation of disjunctions in the verbal lexicon. Given that Martuthunira has fairly free word order, trying to write rules in the syntax that would anticipate all possible patterns of case stacking would result in an unwieldy and un insightful treatment of the phenomenon.

Instead, Nordlinger’s solution is to see case morphology as being *constructive* in the sense that a case marker comes with information as to what type of GF it is expecting to mark. Formally, this is accomplished via *inside-out functional*

*designation* (Dalrymple 1993, 2001), as illustrated in the (sub)lexical entries for the case markers in (18). The first line in each of the entries is standard: each case marker specifies that the attribute CASE is assigned a certain value (ergative, accusative, etc.). This ensures that whatever constituent carries the case marker will be analyzed as ergative, or accusative, or locative, etc.

The second line in each entry has the  $\uparrow$  behind the GF rather than in front of it, signaling inside-out functional designation (Belyaev forthcoming: §3.2.4 [this volume]). This has the effect of adding a constraint on the type of GF the case marker can be associated with. In (18) the effect is that the ergative is constrained to appear within a SUBJ, the accusative within an OBJ, etc.<sup>8</sup>

- (18) a. ERGATIVE:      ( $\uparrow$  CASE) = ERG  
                              (SUBJ  $\uparrow$ )
- b. ACCUSATIVE:    ( $\uparrow$  CASE) = ACC  
                              (OBJ  $\uparrow$ )
- c. LOCATIVE:      ( $\uparrow$  CASE) = LOC  
                              (ADJUNCT  $\uparrow$ )
- b. PROPRIETIVE: ( $\uparrow$  CASE) = PROP  
                              (ADJUNCT  $\uparrow$ )

Nordlinger works on the Australian language Wambaya and develops an analysis of the complex interaction between morphology and syntax that characterizes case stacking. Reproducing the entire analysis including an explanation of Wambaya morphosyntax goes far beyond the limited space available in a handbook article: this section therefore stays with the Martuthunira example for purposes of illustrating the general idea behind constructive case.

For the sake of concreteness, this section assumes a view of the morphology-syntax interface in which sublexical items are produced by rules which are analogous to phrase structure rules. This is the approach generally adopted in the ParGram grammar development world (Butt et al. 1999) and as such is useful for a concrete illustration. Note, however, that current LFG literature differs on assumptions as to the morphology-syntax interface. The illustration here adopts the general architecture articulated in Dalrymple (2015).

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<sup>8</sup> Andrews (1996) also takes on case stacking and also uses LFG's inside-out functionality. However, his focus is on the interaction between morphology and syntax, rather than on case per se.



To begin with, let us consider the partial f-structure resulting from just the information on ‘pouch’ shown in (19). The stacked case marking on this noun not only provides information on the case of the noun (the innermost case morphology), it also “anticipates” the larger structure it will be embedded in. The PREDs of that larger structure will be filled in as part of the overall annotated c-structural analysis, with the partial f-structures corresponding to each of the nouns (and the verb) unifying into the full f-structure in (17).

$$(19) \left[ \text{OBJ} \left[ \begin{array}{l} \text{CASE} \\ \text{ACC} \end{array} \left[ \text{ADJUNCT} \left\{ \begin{array}{l} \text{CASE} \\ \text{PROP} \end{array} \left[ \begin{array}{l} \text{CASE} \text{ LOC} \\ \text{PRED} \text{ 'POUCH'} \\ \text{NUM} \text{ SG} \\ \text{PERS} \text{ 3} \end{array} \right] \right\} \right] \right] \right] \right]$$

Recall that the inside-out function designation only serves as a constraint on f-structure. That, is the information found on ‘pouch’ postulates that there should be an OBJ into which it can be embedded. This condition will only be fulfilled if such an OBJ ends up being introduced somewhere so the actual introduction of the OBJ thus needs to come from some other part of the syntax or lexicon.

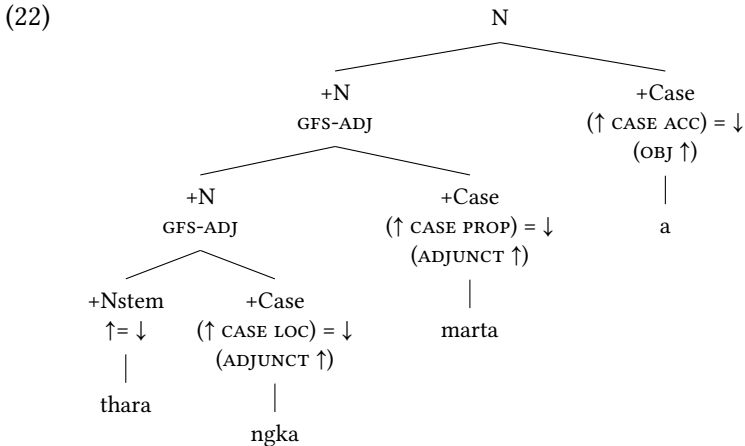
For purposes of illustration, let us assume a (simplified) phrase structure rule for clauses as in (20), which reflects the tendency in Australian languages for a (finite) verb to be in second position and models the general free word order for Australian languages. We can thus have one GF or an adjunct introduced by the XP before the verb and any GF or adjuncts after the verb. Note that “GFS-ADJ” is a template that is expandable as in (21). Similarly, XPs could be expanded to a number of different phrase structure categories, including NPs.

$$(20) S \longrightarrow \text{XP} \quad \text{V} \quad \text{XP}^* \\ \text{@GFS-ADJ} \quad \uparrow=\downarrow \quad \text{@GFS-ADJ}$$

$$(21) \text{GF-ADJS} = \{ (\uparrow \text{SUBJ}) = \downarrow \mid (\uparrow \text{OBJ}) = \downarrow \mid (\uparrow \text{OBL}_\theta) = \downarrow \\ \mid (\uparrow \text{OBJ}_\theta) = \downarrow \mid \downarrow \in (\uparrow \text{ADJUNCT}) \}$$

Since most of the action takes place in the morphological component in Mar-tuthunira, let us take a look at a possible sublexical structure (for a discussion of sublexical structure and sublexical rules, see Belyaev forthcoming: §2.2 [this volume]). In (22) the N expands into a set of sublexical categories, marked with a + for ease of exposition. In our example, we have a noun stem that can combine

with a case marker, yielding a sublexical N (+N). This can combine with further case markers, as shown in (22), finally yielding an N.<sup>9</sup>



The inside-out functional designation on *ngka*, for example, requires that this be part of an ADJUNCT. This is only a constraint and as such does not “construct” the ADJUNCT per se. However, taken together with the space of possibilities licensed by the functional annotations on the mother +N node, the inside-out designation has the effect of selecting exactly the ADJUNCT among the space of possibilities provided by the expansion of GFS-ADJ in (21) and thus, in effect, serving to “construct” this GF by way of the sublexical specification on the case marker.

The same formal effect is found with the accusative marker — here the governing GF is constrained to be an OBJ and this causes the OBJ option to be selected from the set of possibilities in (21), but this time they are selected from the functional annotations on the XP in rule (20), which is instantiated by an NP and expands into the N in (22).

Overall, taking together the functional annotations in the phrase structural and the sublexical space within the N leads us to the f-structure in (19). This partial f-structure can then be unified straightforwardly with information coming from other parts of the clause via the standard unification mechanism in LFG. For example, the unification of (19) with the partial f-structure corresponding to the word *mirtily-marta-a* ‘joey-PROP-ACC’ shown in (23) results in the unified f-structure in (24). This unification takes place with respect to the information com-

<sup>9</sup>Of course, the possible space of combinations in the morphological component must be constrained and this can be done quite simply by writing suitable sublexical rules, but describing all the details here would take us too far afield.

ing from the other words in the clause as well, resulting in the final f-structural analysis in (17).

$$(23) \left[ \text{OBJ} \left[ \begin{array}{l} \text{CASE ACC} \\ \text{ADJUNCT} \left\{ \begin{array}{l} \text{CASE PROP} \\ \text{PRED 'JOEY'} \\ \text{NUM SG} \\ \text{PERS 3} \end{array} \right\} \end{array} \right] \right]$$

$$(24) \left[ \text{OBJ} \left[ \begin{array}{l} \text{CASE ACC} \\ \text{ADJUNCT} \left\{ \begin{array}{l} \text{CASE PROP} \\ \text{PRED 'JOEY'} \\ \text{NUM SG} \\ \text{PERS 3} \\ \text{ADJUNCT} \left\{ \begin{array}{l} \text{CASE LOC} \\ \text{PRED 'POUCH'} \\ \text{NUM SG} \\ \text{PERS 3} \end{array} \right\} \end{array} \right. \right] \right]$$

Nordlinger's constructive case idea thus establishes case marking as carrying important information for the overall clausal analysis and invests case markers with (sub)lexically contributed information. Because the GF specifications on the case markers clearly signal which parts of the clause belong together, effects of free word order are accounted for automatically. For example, the discontinuous constituents, as illustrated in the Wambaya example in (25), can be treated very naturally. As sketched above for Martuthunira, each word in the clause produces a partial f-structure. These partial f-structures are then unified with others to produce the overall analysis, with the particular position in the clause or adjacency not mattering for the f-structural analysis. What matters is the compatibility of the information coming from the various bits and pieces of the clause, which means that discontinuous constituents which are each marked as ergative will end up being unified under the same GF at f-structure, in this case the ergative subject.

- (25) Wambaya (Nordlinger 1998: 96)  
galalarrinyi-ni gini-ng-a dawu bugayini-ni  
dog.I-ERG 3SG.M.A-1.O-NFUT bite big.I-ERG  
'The big dog bit me.'

Butt & King (1991, 2004) take a similarly constructive approach to case in addressing the case marking and free word order patterns of Urdu and they combine

this with a theory of linking. This is discussed in Section 7. Before moving on to this and some further aspects governing the distribution of case from an LFG perspective, we however first delve into the insights offered by an adoption of Optimality Theory into LFG.

## 5 Optimality-Theoretic approaches

Optimality Theory (OT) was originally formulated with respect to phonological phenomena (Prince & Smolensky 1993; Kager 1999), but quickly found its way into syntactic work (Grimshaw 1997) and analyses of case patterns (Legendre et al. 2000). OT assumes an architecture by which several input candidates are generated by a given grammar. These input candidates are subject to a series of ranked constraints and result in just one of the candidates being picked as the most “optimal”, i.e. as the resulting surface string. This version of OT is essentially focused on production, but a *bidirectional* version of OT, which could take both the production and the comprehension perspective into account, has been formulated as well (Blutner 2000; Dekker & von Rooy 2000). Constraints are assumed to be universally applicable across all languages, but the rankings of the constraints may differ, giving rise to language-particular patterns (see Kuhn forthcoming [this volume] for an overview).

Bresnan (2000) introduced a version of OT that is compatible with LFG, arguing for the merits of this approach. Within OT-LFG, the input to an evaluation by OT constraints is assumed to be f-structure and c-structure pairings and the task of the OT constraints is to pick out the most optimal pairing. Work on case within OT-LFG has generally built on Bresnan’s blueprint as well as the notions introduced by bidirectional OT.

### 5.1 Harmonic Alignment and DCM

OT-LFG work on case also made crucial use of the ideas in Aissen’s seminal OT papers (Aissen 1999, 2003), in which she proposes a series of typologically motivated “Harmonic Alignment Scales” to account for DCM. For example, Aissen works with Silverstein’s famous person and animacy hierarchy with respect to split ergativity (Silverstein 1976). She distills his and other insights found in the literature into three *universal prominence scales* shown in (27). These scales are applied to DCM, for example, with respect to differential subject marking of the type illustrated in (26) for Punjabi. In Punjabi third person subjects, but not first or second person subjects, may be overtly marked with ergative case.

## (26) Punjabi

- a. mĕ                      bakra                      vec<sup>h</sup>-i-a  
 PRON.1.SG.F/M goat.M.SG.NOM sell-PST-M.SG  
 ‘I (male or female) sold the goat.’
- b. o=ne                      bakra                      vec<sup>h</sup>-i-a  
 PRON.3.SG.F/M=ERG goat.M.SG.NOM sell-PST-M.SG  
 ‘He/She sold the goat.’

- (27) Thematic Role Scale: Agent > Patient  
 Relational Scale: Subject > Non-subject  
 Person Scale: Local Person (1st&2nd) > 3rd Person

The three separate preference scales interact across languages. Within OT this interaction is modeled via the concept of *Harmonic Alignment* (Prince & Smolensky 1993), by which each element of a scale is associated with an element of another scale, going from right to left. The Harmonic Alignment of just the Relational and the Person scale in (27) is shown in the second column in (28) (Aissen 1999: 681). The third column in (28) shows the OT constraints derived from the Harmonic Alignment of the two scales. The constraints are arrived at by interpreting the ranked elements in the Harmonic Alignment as situations which should be avoided, whereby lower ranked elements are the ones to be avoided more strongly than a higher ranked element. So in column 2 the ‘ $x > y$ ’ means ‘ $x$  is less marked/more harmonic than  $y$ ’, and in column 3 the ‘ $x \gg y$ ’ means that the  $x$  constraint is ranked higher, i.e., is stronger, than the  $y$  constraint.

(28)

Scales	Harmonic Alignment	Constraint Alignment
Local > 3	Su/Local > Su/3	*Su/3 >> *Su/Local
Su > Non-Su	Non-Su/3 > Non-Su/Local	*Non-Su/Local >> *Non-Su/3

Constraints within OT are understood to interact with a notion of markedness, with constraints conspiring to work towards unmarked situations and against marked situations. The Harmonic Alignment scales above state that 1st and 2nd person subjects are less marked than 3rd person subjects and that 3rd person non-subjects are less marked than 1st or 2nd person non-subjects (as per typological observations). Under the assumption that overt case is used to flag those NPs which are marked in some way, these scales and the constraints derived from them correctly predict that ergative case is more likely to occur on 3rd person subjects (the more marked situation), rather than on 1st person subjects. And this is indeed what is observed in Punjabi (26) and crosslinguistically.

Aissen derives another set of constraints targeting the realization of case on objects, and these are provided in (29). She uses these constraints to provide an analysis of well-known Differential Object Marking (DOM) phenomena, such as the definiteness and specificity effects discussed for Turkish by Enç (1991); see also Butt (2006) for an overview discussion.

- (29) Relational Scale:      Subject > Non-subject  
Animacy Scale:          Human > Animate > Inanimate  
Definiteness Scale:    Pronoun > Proper Name > Definite >  
   Indefinite Specific > Nonspecific

Again, these relational scales are based on crosslinguistic observations. We have already seen animacy playing a role in Malayalam case assignment (Section 2). This feature, along with others, also plays a role in Indo-Aryan case marking, as illustrated via the specificity alternation (see 31 for an example).

## 5.2 OT-LFG and case

Working broadly within OT-LFG, Deo & Sharma (2006) take on the interaction between verb agreement and “core” case marking (ergative, accusative and nominative) on subjects and objects in a range of Indo-Aryan languages. The patterns are complex, but Deo and Sharma identify a set of generally applicable constraints whose variable ranking accounts for the patterns they find across Indo-Aryan and with respect to dialectal variation. In this, they build on Aissen’s work, which is geared mostly towards accounting for the overt morphological realization of case, and combine this with arguments and proposals by Woolford (2001), who focuses more on the abstract realization of case.

Asudeh (2001) contributes to discussions on OT and case by taking on the question of how optionality should be dealt with within OT. This is an interesting problem as OT assumes there should be exactly one optimal candidate, not two or more. Asudeh focuses on data from Marathi as compiled by Joshi (1993), who shows that certain verb classes (mostly involving datives) allow for variable linking. In (30), for example, either one of the arguments could be linked to SUBJ, and the other is then linked to OBJ.

- (30) Marathi  
sumaa-laa ek pustak milaale  
Suma-DAT one book.NOM got  
‘Suma got a book.’

In order to account for this type of undisputed optionality in linking possibilities in Marathi, Asudeh makes use of the stochastic version of OT (Boersma 2000), which allows for the ranking of constraints on a continuous rather than a discrete scale and thus provides a way of allowing for optionality. Building on Joshi's original analysis, Asudeh works with Proto-Roles (see Section 6) to steer case assignment and takes up bidirectional OT in the discussion of OT approaches to optionality and, by extension, ambiguity.

Lee (2001a,b) focuses on word order freezing problems in two languages that otherwise allow fairly free scrambling of major constituents: Hindi and Korean. For example, in Hindi subjects and objects can in principle occur in any order, as illustrated by (31), in which the object is overtly marked as accusative, expressing specificity on the object.

(31) Hindi

- a. patt<sup>h</sup>ar botal=ko toḍ-e-g-a  
 stone.NOM bottle=ACC break.3.SG-FUT-M.SG  
 'The stone will break the (particular) bottle.'
- b. botal=ko patt<sup>h</sup>ar toḍ-e-g-a  
 bottle=ACC stone.NOM break.3.SG-FUT-M.SG  
 'The stone will break the (particular) bottle.'

However, when both arguments have the same case marking the clause-initial argument must be interpreted as the subject, as illustrated in (32). This situation occurs when the object is also nominative (and thus non-specific in this Hindi DOM phenomenon) and if all else is equal, e.g., both arguments are equally non-animate as in (32).

(32) Hindi

- a. patt<sup>h</sup>ar botal toḍ-e-g-a  
 stone.NOM bottle.NOM break.3.SG-FUT-M.SG  
 'The stone will break a/the bottle.'
- b. botal patt<sup>h</sup>ar toḍ-e-g-a  
 bottle.NOM stone.NOM break.3.SG-FUT-M.SG  
 'The bottle will break a/the stone.'

Lee works with notions of markedness in conjunction with bidirectional OT constraints to model phenomena such as these. The idea is that constraints from both the production and the comprehension side conspire together to allow for only

clause-initial subjects in situations like (32) and that this working together of constraints makes visible the fact that unmarked word order in Hindi and Korean is SOV (“emergence of the unmarked”).

Word order in Hindi and Korean has been shown to be associated with information structural effects and Lee’s work accordingly includes a larger treatment of word order in terms of information structure. Lee proposes OT constraints which model the interaction of case marking, word order and discourse functions (e.g., topic and focus).

Like Lee, Dalrymple & Nikolaeva (2011) identify information structure as playing a central role in case marking phenomena. Unlike Lee, Dalrymple & Nikolaeva (2011) see the notion of topicality being directly linked to case marking and the innovation of case marking. Dalrymple & Nikolaeva (2011) take on DOM in a large swathe of languages and argue that the OT approaches to case pioneered by Aissen do not go deep enough and that information structural concerns must be taken to play a central role. They develop an alternative LFG analysis which uses LFG’s projection architecture to model a complex interaction between c-structure, f-structure, i(nformation)-structure and semantic interpretation. The semantic component is modeled via glue semantics, see Asudeh forthcoming [this volume]. Dalrymple & Nikolaeva (2011) analyze a large variety of DOM in very different languages from this clausal semantic perspective on case. In more recent work, Donohue (2020) analyzes the case marking system of Fore, a Papuan language, by building on OT-LFG, Aissen’s prominence scales and the bidirectional OT approach to case pioneered by Lee (2001a,b). The account focuses on instances of word order freezing and, more generally, on the strategies for case disambiguation found in Fore.

## **6 Clausal vs. lexical perspectives**

LFG’s original approach to linking, argument alternations and valency changing relations such as passives, applicatives or causatives was formulated to apply entirely within the lexicon, in keeping with LFG’s primarily lexical perspective on syntax, cf. Findlay & Kibort forthcoming [this volume] and Section 3 of this chapter. Mohanan (1994); Butt (1995) and Alsina (1996) established that this lexical version of linking could not account for argument structure phenomena found with syntactically formed complex predicates. As a consequence, linking within LFG is no longer confined to apply within the lexicon.

In addition to this basic insight into the domain of linking, there is another dimension to the lexical vs. clausal divide which is relevant for an understanding



of case. Case is classically understood as marking the relationship between a head and its dependents (Blake 2001). This relationship can be expressed entirely lexically. But, as we have already seen, case expresses much more than specifying how a dependent is related to a head/predicate. Section 5 on OT showed that case regularly marks degrees of agentivity, animacy and referentiality across a wide range of languages. Dalrymple & Nikolaeva (2011) furthermore conclusively demonstrate that information structure plays a large role in the development and structure of case systems, and we saw in the examples from Malayalam in (10) that case can be used to express modality. These semantic reflexes of case marking necessarily need to be taken into account, with Dalrymple & Nikolaeva (2011) rightly criticizing the existing OT accounts for being inherently too limited to provide a full account of the empirically attested patterns.

One underlying reason for this limitation is that while the OT accounts make reference to semantic concepts, they are primarily concerned with accounting for a structural relationship between the two core arguments of a clause (generally the *SUBJ* and *OBJ*) and the alternations found in case marking on these two core arguments. An approach to case which allows for the systematic expression of semantic dimensions in conjunction with structural considerations has been articulated clearly by Butt & King (2003, 2004) and has been recently extended in Schätzle (2018) and Beck & Butt (2021). As discussed in Section 7, this approach is quite complex and builds on a number of important semantic insights and formal ingredients. These are presented as part of this section.

## 6.1 Proto-roles

Classic LFG's Mapping Theory works with thematic roles such as *agent*, *patient*, *goal*, etc. The use of such thematic role labels has repeatedly been shown to be problematic, with Grimshaw (1990) advocating for an approach that separates out arguments slots from semantic content and Dowty (1991) instead proposing to see predicate arguments as a collection of semantic entailments from which prototypical Agent vs. Patient roles can be defined. Van Valin (1991) and Van Valin & LaPolla (1997) propose a similar approach whereby the Macro-Roles Actor vs. Undergoer are defined on the basis of event-based properties (e.g., activities vs. results).

Taking these observations and proposals on board, Kibort has formulated a new version of LFG's Mapping Theory in a series of papers (Kibort 2007, 2013, 2014; Kibort & Maling 2015). This revised version adopts Grimshaw's idea of separating out argument slots from semantic content, but does not incorporate a notion of Proto-Roles. However, the idea of Proto-Roles has been adopted within

LFG in a variety of other work, e.g., Alsina (1996), Asudeh (2001) and perhaps most significantly, by Zaenen (1993).

Zaenen shows how Dowty's collection of Proto-Agent vs. Proto-Patient semantic entailments as shown in (33) can be mapped onto LFG's existing Mapping Theory, which uses the features  $[\pm o, r]$  to relate GFS and thematic roles (see Findlay & Kibort forthcoming [this volume]). Zaenen's principles are shown in (34). These principles interact with other principles of LFG's Mapping Theory to ensure that  $[-o]$  marked participants are realized either as SUBJ or an OBL,  $[+o]$  marked participants are linked to an OBJ or an OBJ $_{\theta}$ , etc.

(33) **Proto-Role Entailments**

**Proto-Agent Properties**

- a. volitional involvement in the event or state  
(Ex.: Kim in *Kim is ignoring Sandy*.)
- b. sentience (and/or perception)  
(Ex.: Kim in *Kim sees/fears Sandy*.)
- c. causing an event or change of state in another participant  
(Ex.: loneliness in *Loneliness causes unhappiness*.)
- d. movement (relative to the position of another participant)  
(Ex.: tumbleweed in *The tumbleweed passed the rock*.)
- e. (exists independently of the event named by the verb)  
(Ex.: Kim in *Kim needs a new car*.)

**Proto-Patient Properties**

- a. undergoes change of state  
(Ex.: cake in *Kim baked a cake*., error in *Kim erased the error*.)
- b. incremental theme  
(Ex.: apple in *Kim ate the apple*.)
- c. causally affected by another participant  
(Ex.: Sandy in *Kim kicked Sandy*.)
- d. stationary relative to movement of another participant  
(Ex.: rock in *The tumbleweed passed the rock*.)
- e. (does not exist independently of the event, or not at all)  
(Ex.: house in *Kim built a house*.)

(34) **Association of Features with Participants** (Zaenen 1993:150,152)

1. If a participant has more patient properties than agent properties, it is marked  $[-r]$ .

2. If a participant has more agent properties than patient properties it is marked [-o].
3. If a participant has an equal number of properties, it is marked [-r].
4. If a participant has neither agent nor patient properties, it is marked [-o].

Neither Kibort nor Zaenen deals with case marking per se. Zaenen applies her formalism to Dutch, which does not exhibit case. Kibort works with Slavic languages and Icelandic, which do have case, but she treats case as a piece of information which informs the linking, rather than as a phenomenon that needs to be explained. In contrast, Schätzle (2018) explicitly works on case and combines Kibort's revised linking theory with Zaenen's integration of Proto-Roles for her analysis of the diachronic trajectory of Icelandic dative subjects, see Section 7.

## 6.2 Clausal semantics

The idea of Proto-Roles can in principle be applied within the lexicon to refer to the lexical semantics of the predicate. However, properties such as undergoing a change of state, being an incremental theme or attaining an endpoint along a path have by now been firmly established as resulting out of an interaction of the semantics of the Proto-Patient argument with the semantics of the event described by the verb (e.g., Krifka 1992; Verkuyl 1993). The quantizedness of the Proto-Patient argument has been shown to be crucial in determining the telicity of an event; more recently the effect is referred to in terms of scalarity (Hay et al. 1999; Kennedy & Levin 2008). The DCM alternation in (35) provides a representative example of this phenomenon in Finnish (also recall the Russian genitive alternation with respect to quantizedness discussed by Neidle, Section 2) When 'bear' is accusative, it definitely undergoes a change of state (dies) and the entire event is telic. In contrast, when one wishes to express that the intended endpoint of the action was not achieved, 'bear' appears in the partitive.

(35) Finnish

- a. Ammu-i-n karhu-n  
shoot-PST-1SG bear-ACC  
'I shot the/a bear.' (Kiparsky 1998: 267)
- b. Ammu-i-n karhu-a  
shoot-PST-1SG bear-PART  
'I shot at the/a bear (bear is not dead).'

Ramchand (1997) discusses the Finnish data along with Scottish Gaelic alternations as in (36) and (37). She analyzes the differences in terms of boundedness. The alternation in (36) is essentially parallel to the Finnish example in (35). The alternation in (37) presents an interestingly different situation, but one that can also be analyzed in terms of boundedness: it expresses the difference between wanting something (unbounded) and getting it (bounded).

(36) Scottish Gaelic

- a. tha Calum air na craobhan a ghearradh  
be.PRS Calum ASP the trees.DIR OAGR cut.VN  
'Calum has cut the trees.'
- b. tha Calum a' ghearradh nan craobhan  
be.prs Calum ASP cut.VN the trees.GEN  
'Calum is cutting the trees (no tree has necessarily been cut yet).'

(37) Scottish Gaelic

- a. tha mi air am ball iarraidh  
be.prs I ASP the ball.DIR want.VN  
'I have acquired the ball.'
- b. tha mi ag iarraidh a'bhuilt  
be.prs I ASP want.VN the ball.GEN  
'I want the ball.'

Ramchand (2008) extends and refines her analysis so that events are seen as being built up out of a tripartite structure consisting of an *init(iation)* subevent, a *proc(ess)* subevent and a *res(ult)* subevent. This tripartite structure contrasts with the more common bipartite approach found in the majority of event-based approaches to linking. For example, Jackendoff (1990) assumes a basic *CAUSE-BECOME* (*init-res*) relationship and makes provisions for activity verbs (*proc*), but does not combine all three subevent types into one tripartite template (see Levin & Rappaport Hovav 2005 for an overview), Ramchand demonstrates that her system works for a number of varied phenomena across languages and it has been adopted within LFG by Schätzle (2018) and Beck & Butt (2021), as discussed in the next section.

## 7 A comprehensive theory

This section first introduces an overall framework for case as developed by Butt and King in various papers (Section 7.1) and then goes on to look at the relationship between case and the theory of linking developed by Schätzle (2018) and Beck & Butt (2021) in Section 7.2.

### 7.1 Types of case

Butt & King (2003, 2004) develop a theory of case that allows for four basic types: 1) structural case; 2) default case; 3) semantic case; 4) idiosyncratic case. This categorization differs significantly from other theories of case and is explained in some detail via examples in the next subsections. Notably, Butt and King's notion of semantic case is often conflated with idiosyncratic case in other theories and referred to as just one category of quirky/inherent case. Butt and King, on the other hand, argue that the two types need to be separated out for an effective understanding of case systems. Butt and King also define structural case as being that type of case which is only due to purely structural factors. The most common type of case marking in their system is that of semantic case, which exhibits a mix of systematic semantic and structural factors. Crucially, Butt and King center their analysis around an explanation of case alternations (including DCM) and consequently dub their theory *Differential Case Theory* or DCT. Butt and King illustrate their analyses mainly with respect to Urdu, but also include data from Georgian.

#### 7.1.1 Semantic case: Mix of structure and semantics

Urdu has a complex system of case marking. Most of the case marking involves a mixture of structural and semantic factors as illustrated by the core examples in (38) and (39). Overt case marking generally takes the form of case clitics (see Butt & Ahmed Khan (2011) for a history of the development of case marking in Urdu) and the absence of any case marking is glossed as nominative (Mohanani 1994). The ergative is required with (di)transitive agentive verbs when the verb morphology is perfective, see (38a) vs. (38b). The accusative *ko* and the null nominative engage in DOM, with the accusative expressing specificity (Butt 1993) and generally required on animate objects, see (38a,b) vs. (38c).<sup>10</sup>

<sup>10</sup>Agreement in Urdu/Hindi works as follows. The verb will only agree with a nominative (unmarked) argument. If the SUBJ is unmarked, the verb agrees with this (38b), else the verb agrees with OBJ if that is unmarked (38a). If neither the SUBJ or the OBJ is available for agreement, the verb defaults to a masculine singular form, as in (38c). See Mohanani (1994) for a comprehensive discussion and Butt (2014) and references therein for information about verb agreement beyond the simple clause.

(38) Urdu

- a. nadya=ne      gaṛi      cāla-yi      hε  
 Nadya.F.SG=ERG car.F.SG.NOM drive-PFV.F.SG be.PRS.3.SG  
 ‘Nadya has driven a car.’
- b. nadya      gaṛi      cāla-ti      hε  
 Nadya.F.SG.NOM car.F.SG.NOM drive-IPFV.F.SG be.PRS.3.SG  
 ‘Nadya drives a car.’
- c. nadya=ne      gaṛi=ko      cāla-ya      hε  
 Nadya.F.SG=ERG car.F.SG=ACC drive-PFV.M.SG be.PRS.3.SG  
 ‘Nadya has driven the car.’

The Urdu ergative and accusative are structural in that they can only appear on subjects and objects, respectively. However, they are also semantically constrained in that they express object referentiality and animacy (accusative) and subject agentivity. The latter is illustrated by (39) where the presence of the ergative case on an unergative verb yields an ‘on purpose’ reading that is absent when the subject is nominative.

(39) Urdu

- a. ram      k<sup>h</sup>ās-a  
 Ram.M.SG.NOM cough-PFV.M.SG  
 ‘Ram coughed.’ (Tuite et al. 1985: 264)
- b. ram=ne      k<sup>h</sup>ās-a  
 Ram.M.SG=ERG cough-PFV.M.SG  
 ‘Ram coughed (on purpose).’ (Tuite et al. 1985: 264)

Most case markers in Urdu exhibit this mix of structural and semantic properties and fall under the category of semantic case in DCT.

Butt and King model semantic case via an essentially lexical semantic approach to case in that they associate the relevant information directly with the case marker, specifying both the GF the case marker is compatible with and any attendant semantic information. This is illustrated for the accusative in (40).

- (40) ko (↑ CASE) = acc  
 (OBJ ↑)  
 (↑SPECIFICITY) = +

Butt and King’s approach uses inside-out functional designation like Nordlinger’s Constructive Case approach (Section 4) and bears similarities to that approach in that case markers are taken to contribute to the overall analysis of the

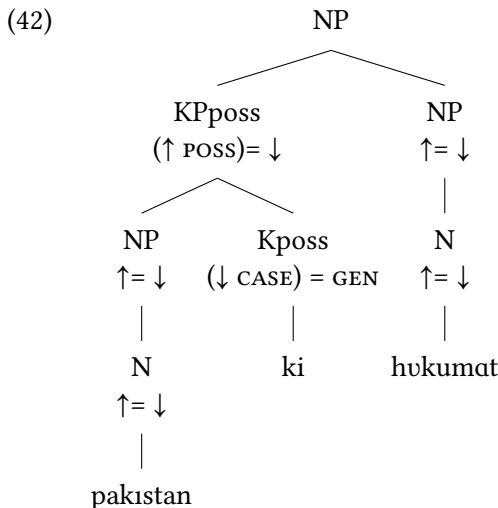
clause with information that goes beyond just the statement of what type of case is involved.<sup>11</sup> However, the approach goes beyond Constructive Case in providing a more complete view on the interaction between the lexical semantics of a verb, case semantics and structural case requirements.

### 7.1.2 Structural case

Examples of structural case tend to be restricted. In Urdu, an example of a purely structural case is the genitive in NPs, such as in (41), taken from Bögel & Butt (2012).

- (41) Urdu  
 pakistan=ki          hukumat  
 Pakistan=GEN.F.SG    government.F.SG  
 ‘The government of Pakistan’

Genitive within NPs is assigned on purely structural grounds – there are no particular semantics associated with it. As in the early LFG approaches (Section 2) this type of case is therefore assigned only on the basis of c-structure configuration, by means of f-structure annotations on the appropriate c-structure nodes. An example, based on Bögel & Butt (2012), is provided in (42).



<sup>11</sup>Butt & King (2003, 2004) build on initial proposals by Butt & King (1991), foreshadowing Nordlinger's (1998) ideas on Constructive Case.

### 7.1.3 Reassessment of quirky case

Butt and King's category of semantic case separates out those case marking patterns which are associated with systematic semantic import from truly idiosyncratic case marking that needs to be stipulated (mostly as part of lexical entries). The dative is a prime example for a type of case that is often analyzed as an instance of quirky/inherent/idiosyncratic case despite the fact that it is demonstrably and very systematically associated with a certain semantic import (cf. the discussions in Section 2 and Section 3 above).

In Urdu the dative is also realized by the clitic *ko*. In its function as a dative, the *ko* can appear on indirect goal objects as in (43) and on experiencer subjects, as shown in (44).

- (43) Urdu  
nadya=ne billi=ko dud di-ya he  
Nadya.F=ERG cat.F.SG=DAT milk.M.NOM give-PFV.M.SG be.PRS.3.SG  
'Nadya has given milk to the cat.'

- (44) Urdu  
nadya=ko dar lag-a  
Nadya.F.SG=DAT fear.M.SG.NOM be attached-PFV.M.SG  
'Nadya was afraid.' (lit. Fear is attached to Nadya.)

The dative alternates systematically with the ergative to express a contrast in agentivity, with the dative signaling reduced agency, generally giving rise to experiencer semantics as in (44) and (45a), but also to deontic modality as in (46a).

- (45) Urdu  
a. nadya=ko kahani yad a-yi  
Nadya.F.SG=DAT story.F.SG.NOM memory come-PFV.F.SG  
'Nadya remembered the story.'  
b. nadya=ne kahani yad k-i  
Nadya.F.SG=ERG story.F.SG.NOM memory do-PFV.F.SG  
'Nadya remembered the story (actively).'

- (46) Urdu  
a. nadya=ko zu ja-na he  
Nadya.F.SG=DAT zoo.M.SG.OBL go-INF.M.SG be.PRS.3.SG  
'Nadya has/wants to go to the zoo.'



- b. nadya=ne            zu            ja-na            he  
 Nadya.F.SG=ERG zoo.M.SG.OBL go-INF.M.SG be.PRS.3.SG  
 ‘Nadya wants to go to the zoo.’

The systematic dative-ergative alternation as well as the tie in to modality indicates that these case patterns are not exclusively due to the lexically specified inherent semantics of a verb, but that the information associated with the case marker is making a significant contribution to the overall semantics of the clause. Generally, the dative marks goal arguments, whether these be recipients (43) or experiencers (44). In a very systematic alternation with the ergative, the dative signals reduced agentivity. The dative and its attendant signaling of reduced agency is pressed into service in the expression of modality in Urdu more generally, see Bhatt et al. (2011) for an overview of modals in Urdu/Hindi. The Urdu dative *ko* is thus also analyzed as an instance of semantic case in DCT.

#### 7.1.4 Idiosyncratic case

Idiosyncratic case is the type of case where no systematic generalizations, either of a structural or of a semantic kind, can be found. This is what distinguishes idiosyncratic case from both semantic and structural case. Instances of idiosyncratic case are typically due to diachronic developments that render the original reason for the case marking opaque, or which result in morphophonological changes that cause the case markers themselves to change and to be reclassified.

An example of truly idiosyncratic marking in Urdu is shown in (47). Recall that Urdu requires the ergative on subjects of agentive transitive perfect verbs. However, while the verb ‘bring’ in (47) falls into this category, its subject is nominative.

- (47) nadya            kitab            la-yi  
 Nadya.F.SG.NOM book.F.SG.NOM bring-PFV.F.SG  
 ‘Nadya brought a book.’

There are no other straightforwardly agentive transitive verbs which behave like this, so this exceptional and idiosyncratic nominative case must be stipulated as part of the lexical entry of *la* ‘bring’. Another exceptional verb is *bol* ‘speak’, which is unergative and should therefore allow for an ergative subject in the perfective, but does not.

### 7.1.5 Default case

Finally, Butt and King also provide for default case marking. Default case marking occurs when an NP is not already specified for a case feature via some part of the grammar (lexicon, syntax). In languages which require all NPs to be case marked, such NPs receive a default case. In Urdu the default case is the phonologically null nominative, which can only appear on subjects and objects. Default case can be assured via well-formedness statements in the functional annotations on the NP node at c-structure, as shown in (48).

- (48)
1. Well-formedness principle: NP: ( $\uparrow$  CASE)
  2. Default: ( $\uparrow$  SUBJ CASE)=NOM
  3. Default: ( $\uparrow$  OBJ CASE)=NOM

These rules constrain every NP to be associated with a case feature and to make sure that subjects and objects are assigned nominative case in the absence of any other specification. Basically the annotations check if there is a case feature realized. If not, then nominative is assigned by default. This type of if-then realization of functional annotations is slightly more complex than illustrated in (48), which is kept simple for purposes of illustration. A full implementation can be found in the Urdu ParGram grammar (Butt & King 2002; Bögel et al. 2009).

## 7.2 Event-based linking

The theory in Section 7.1 as to the types of case that must be accounted for does not make reference to linking. However, a theory of linking is clearly also needed as it determines how the event semantics of a verb plays out in terms of syntactic valency and case marking. We saw in Section 6 that an *event-based* approach is necessary for an understanding of DCM patterns (e.g., for telicity or boundedness/scalarity more generally). An event-based approach is also what underlies the generally accepted ideas behind Dowty's Proto-Roles or Van Valin's Macro-Roles, as the prototypical Agent/Patient properties are defined in terms of how the participant is related to the event being described (change of state is being effected, one participant is stationary with respect to another participant, etc.).

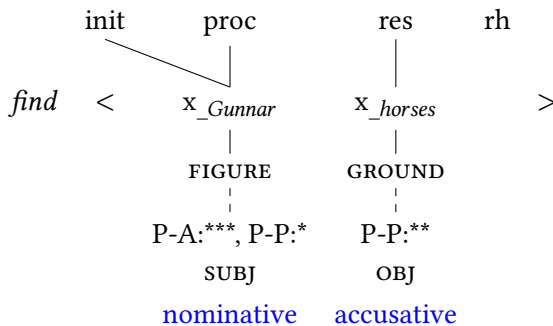
Event-based approaches to linking are common (e.g., Jackendoff 1990; Van Valin & LaPolla 1997; Rappaport Hovav & Levin 1998; Croft 2012, see Levin & Rappaport Hovav (2005) for an overview), but are employed within LFG only in a subset of linking approaches. This occurs either indirectly via the incorporation of a notion of Proto-Roles, or explicitly in adaptations of Jackendoff's Lexical-Conceptual Structures, as done by Butt (1995).

Kibort’s revised version of Mapping Theory improves on the classic version of mapping within LFG by separating out argument slots from semantic content and formulating new mapping principles that make reference to semantics (Kibort 2014). However, semantic principles are made use of only occasionally and relatively indirectly.

Schätzle (2018) bases herself on Kibort’s revised Mapping Theory but brings in semantic information explicitly on several dimensions. Importantly, she adopts Ramchand’s (2008) tripartite division of events into three types of subevents: *init*(iation), *proc*(ess), *res*(ult). This event semantic dimension is used to derive Proto-Role properties and these in turn are used to determine the linking between argument slots and GFS. Schätzle also integrates a Figure/Ground dimension. This is intended to do justice to the information-structural effects found with respect to case. However, she does not need the full-fledged representation of information-structure developed by Dalrymple & Nikolaeva (2011), instead adopting the basic Figure/Ground distinction first developed by Talmy (1978).

Schätzle’s basic system is illustrated below with respect to the Icelandic example in (49), which is taken from Beck & Butt (2021) and represents a revised version of the original in Schätzle (2018).

- (49) Gunnar    fann            seint hrossin            um    daginn  
 Gunnar.NOM find.PST.3SG late horse.PL.DEF.ACC during day.DEF.ACC  
 ‘Gunnar found the horses late during the day.’  
 (IcePaHC, 1400.GUNNAR.NAR-SAG,.281)



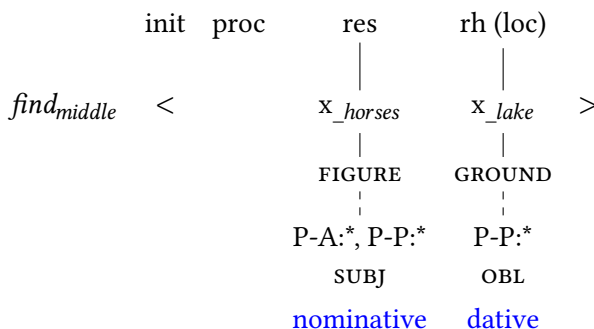
The main predicate here is *finna* ‘find’, which expresses a dynamic event. The event consists of an initiation of the event, a process during which the event takes place and a result. The initiator of the event is ‘Gunnar’ so this role is linked to the *init* subevent. The initiator is also the participant involved in the event as it unfolds, so is also linked to the *proc* subevent. The ‘horses’ argument is linked to

the result subevent as finding the horses represents the successful culmination of the event. As a sentient initiator that is also the Figure of the clause, Gunnar thus picks up three Proto-Agent (P-A) properties (sentience, init, Figure). As an undergoer of a process, Gunnar receives one Proto-Patient (P-P) property (the occurrence and number of Proto-Role properties is indicated via the number of of “\*” on the features P-A and P-P). The ‘horses’ argument is the Ground and the resultee and as such picks up two Proto-Patient properties and no Proto-Agent properties. The participant with the most Proto-Agent properties is linked to the SUBJ, leaving the horses to be linked to OBJ. The case marking on the SUBJ and OBJ in this case is an instance of default case: the subject is nominative and the object is accusative in the absence of any other specification.

Schätzle (2018) is primarily concerned with investigating the diachronic increase in the occurrence of dative subjects in Icelandic. Using corpus linguistic methodology, she pinpoints the lexicalization of former middles as experiencer verbs as a major reason for the increased use of dative subjects in Icelandic. One of the verbs that has undergone such lexicalization is the verb *finna* ‘find’, featured in (49). This was reanalyzed as a stative experiencer and raising predicate via middle formation with the middle morpheme *-st* in the history of Icelandic and came to mean ‘find, feel, think, seem’.

Schätzle (2018) shows how this process of reanalysis can be understood as a form of locative inversion. There are several steps to this posited diachronic change. First, consider the linking configuration for the middle version of the example in (49), as shown in (50). Under middle formation, *finna* becomes *finna-st*, meaning ‘be found, meet’, and the initiation subevent is absent for the purposes of linking. The middle predication essentially describes a result, which is that there are found horses.

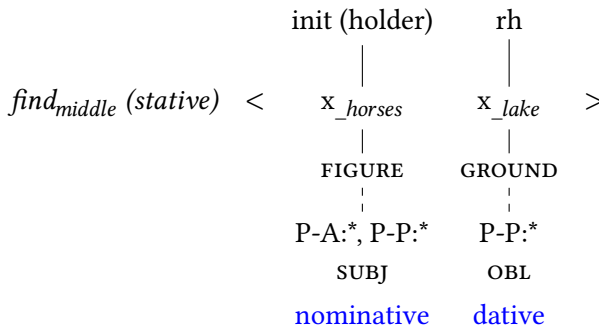
(50) The horses were found at the lake.



Schätzle also adopts Ramchand's (2008) notion of a *rh(eme)*. A rheme serves as a complement slot that modifies the core predication. In (50) this rheme slot is occupied by the locative 'at the lake'. Rhemes are generally not compatible with the Figure role: they provide a Ground argument. So in (50) 'horses' acts as the Figure, picking up one Proto-Agent property. This argument is linked to the result subevent, which yields one Proto-Patient property. The horses thus have more Proto-Agent properties (one) than the lake (none) and so the horses are linked to SUBJ. The rheme is also a locative and this configuration yields a linking to OBL. The SUBJ is nominative per default, and the OBL is marked with the Icelandic spatial dative.

The configuration in (50) in fact very closely resembles that of a straightforwardly stative predication, which is also one possible interpretation of the middle form of 'find'. In this case it means something along the lines of 'be situated/located'. Schätzle posits that in this case the original result participant is interpreted as the holder of a state. The holder of a state is linked to the init subevent in Ramchand's system. As shown in (51), there is no change in the overall linking configuration and the attendant case marking, but there is a change in the interpretation of the event semantics: (51) shows a stative predication rather than the result part of a dynamic event.

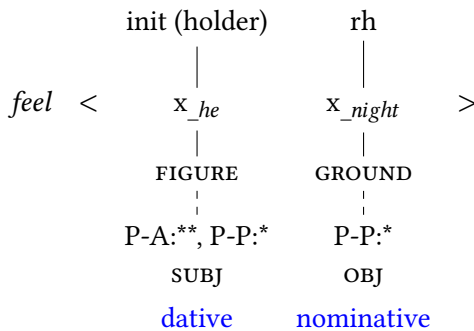
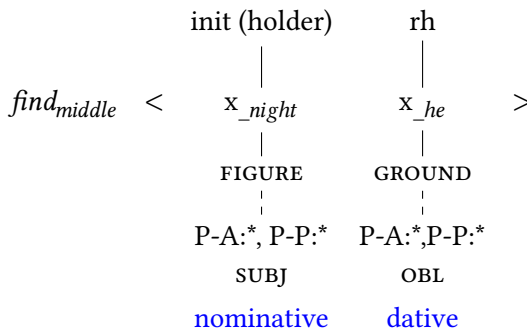
(51) The horses were (located/situated) at the lake.



Schätzle postulates that over time, this type of stative predication via middle formation led to lexicalized experiencer predicates as in (52), where *finna* means 'feel'. These experiencer predicates feature a dative SUBJ synchronically and Schätzle proposes that the dative SUBJ is the result of a flip in the linking relation that occurred when the Ground argument is sentient, as shown in the linking configurations in (52). The first configuration corresponds to a literal locative reading of 'The night was found at him.' and shows the same relations as in

(51), just with a sentient Ground. But this small difference results in an equal distribution of Proto-Role properties across the two event participants. This taken together with a crosslinguistic preference for sentient participants to be interpreted as a Figure rather than as a Ground leads to an unstable linking configuration.

- (52) og fannst honum nótt.  
 and feel.PST.MID.3SG he.DAT night.NOM  
 ‘and he felt the night.’  
 (IcePaHC, 1861.ORRUSTA.NAR-FIC.,1670)



This unstable linking configuration can be resolved by flipping the Figure/Ground relations and associating the sentient argument with the holder of the state, as shown in the lower linking configuration. With this simple configurational change, the sentient argument now picks up two Proto-Agent properties (Figure and sentience), and one Proto-Patient property as a holder of a state. The other argument receives only one Proto-Patient property as the Ground. The overall effect is that the sentient argument is now linked to SUBJ, the other (non-spatial) argument to OBJ. The originally spatial dative marking is retained on the

newly minted SUBJ and feeds into a general pattern of dative marked experiencer subjects in the language.

Beck & Butt (2021) use the same analysis of locative inversion to account for patterns of dative subjects in Indo-Aryan. Their approach also provides an account for the Marathi optional dative subjects discussed by Asudeh (2001) and in Section 5 of this chapter. In Beck and Butt's account the observed optionality is attributed to an unstable linking configuration of the type shown in the upper part of (52). This leads to an optionality that is slowly resolved over time in favor of a dative subject constellation as shown in the lower part of (52). Deo (2003) shows that this is the change that is indeed happening in Marathi, verb class by verb class, verb by verb.

Overall, in this event-based approach to linking, case is matched with certain linking configurations. For example, in Icelandic and Marathi, the holder of a state as in the lower linking configuration in (52) must systematically be associated with a dative and this expresses experiencer semantics.

## 8 Summary

This chapter has surveyed LFG work on case from some of the earliest LFG papers to some of the most recent developments. The LFG perspective, particularly with respect to Icelandic, was instrumental in establishing a basic division between structural and lexically specified case, where the latter also came to be known as 'quirky' case. Later work put the relationship between predicate arguments and GF on a more systematic footing via the formulation of Mapping Theory. Case was always relevant for Mapping, but not integrated into the theory itself. The event-based linking developed by Schätzle (2018) and Beck & Butt (2021) offers a more natural way of integrating case information, while also building on Kibort's revised Mapping Theory and allowing for an integration of Proto-Role properties. The integration of such Proto-Role properties into accounts of case and linking has been experimented with in a number of ways within LFG over the years, especially in terms of work done within OT-LFG.

Butt and King formulate a theory of case, which distinguishes between four types of case: 1) structural, 2) default, 3) semantically generalizable and 4) idiosyncratic. Their notion of semantic case centrally applies to core arguments of a verb and includes accounts of Differential Case Marking, including modality. Case markers are considered to have their own lexical entries and to be associated with syntactic and semantic information which contributes to the overall syntactic and semantics analysis of the clause. This is in line with Nordlinger's idea of Constructive Case, which can additionally account for case stacking.

This chapter has not included a comparison of LFG with other theories. In terms of linking, LFG employs a distinct version, but the essence of, and the insights behind, linking have very much in common with other theories of the interface between lexical semantics and syntax. The same is true for the OT-LFG approaches to case, which build directly on mainstream OT insights and proposals. However, as far as I am aware, the idea of Constructive Case and the four-way distinction between different types of case is unique to LFG.

## Abbreviations

Besides the abbreviations from the Leipzig Glossing Conventions, this chapter uses the following abbreviations.

A	agent	O	object
ASP	aspectual marker	OAGR	object agreement
DIR	directional	PART	partitive
I	class I	PRON	pronoun
MID	middle	PROP	proprietive
MOD	modal	VN	verbal noun

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