

Auxiliary Selection Revisited

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Auxiliary Selection Revisited

Gradience and Gradualness

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Introduction

The papers collected in the present volume deal with the so-called phenomenon of *auxiliary selection*, which has been studied extensively since the second half of the 20th century (see also Levin and Rappaport Hovav 1995; Müller 1999; Alexiadou, Agnostopoulou, and Everaert 2004; Mackenzie 2006: chapter 1). The volume provides new insights into a series of characteristics of both the synchronic rules and the historical development of auxiliary selection that are common to most of the European languages in which auxiliary selection is or was attested, i.e. Catalan, Corsican, Danish, Dutch, English, French, German, Greek, Icelandic, Italian, Norwegian, Spanish and Swedish.

In the first section of these introductory remarks, a brief overview of previous research on auxiliary selection is given. Subsequently, we will outline the structure of our volume, underlining the main idea of each chapter. We will conclude with a short summary and an outlook on perspectives for further research.

1 Auxiliary selection between gradience and gradualness

Many Modern European languages exhibit an alternation between the auxiliaries HAVE and BE in the perfect tense in intransitive sentences, as exemplified by the French, German and Italian tokens in (1–2).¹

- | | | | |
|-----|----------------------|------------------------------|------|
| (1) | <i>Nous avons</i> | <i>dormi.</i> | Fr. |
| | we | have.PRS.1PL sleep.PTCP.M.SG | |
| | <i>Wir haben</i> | <i>geschlafen.</i> | Ger. |
| | we | have.PRS.1PL sleep.PTCP | |
| | <i>(Noi) abbiamo</i> | <i>dormito.</i> | It. |
| | we | have.PRS.1PL sleep.PTCP.M.SG | |
| | 'We have slept.' | | |

¹ Like many papers in this volume, we use HAVE and BE in capital letters to refer to the corresponding (language non-specific) lexemes; italicised small letters are used to refer to the language-specific lexeme (e.g. It. *avere* 'have').

- (2) *Nous sommes allés à Fribourg.* Fr.
 we be.PRS.1PL go.PTCP.M.PL to Freiburg
- Wir sind nach Freiburg gefahren.* Ger.
 we be.PRS.1PL to Freiburg go.PTCP
- (Noi) siamo andati a Friburgo.* It.
 we be.PRS.1PL go.PTCP.M.PL to Freiburg
 'We have gone to Freiburg.'

In the world's languages, perfect constructions typically derive from the copula verb BE or dynamic verbs with meanings such as 'come', 'come from' or 'finish' (Bybee, Perkins, and Pagliuca 1994: 64–65). In contrast, the perfect formed with the auxiliary HAVE is an areal feature typical of Romance and Germanic languages as well as Albanian, Czech, Greek and Macedonian (Dahl 1995; Dahl and Velupillai 2013). This is why Haspelmath (2001: 1495–1496) characterises the presence of HAVE-perfects as a defining feature of *Standard Average European*. Drinka (2013) attributes the spread of HAVE as a perfect auxiliary to the Carolingian scribal tradition, which would explain the almost complete restriction of HAVE-selection to the *Charlemagne Sprachbund* (van der Auwera 1998: 824).

Perlmutter's (1978) influential approach to auxiliary selection, developed in the framework of Relational Grammar, attributes the variation in auxiliary selection to the *Unaccusative Hypothesis*, i.e. the fact that "certain intransitive clauses have an initial 2 but no initial 1" (1978: 160). In other words, Perlmutter assumes that the sole argument of a verb such as *go* is an underlying object that gets promoted to subject. Contrastingly, the sole argument of a verb such as *sleep* is an underlying subject. As a result, no promotion of the argument takes place in sentences including verbs such as *sleep*. In Perlmutter's terms, verbs such as *go* are called *unaccusatives*, whereas verbs such as *sleep* are called *unergatives*.

The Unaccusative Hypothesis was integrated into the Government and Binding Theory by Burzio (1981, 1986). He argues that while the argument of an unergative verb is base-generated in the *Spec*-position of IP, the argument of an unaccusative verb is generated in the complement position of VP and subsequently rises to the *Spec*-position of IP. Burzio explains this movement process with case assignment: since an unaccusative verb cannot assign structural accusative case to the sister of V°, the argument of an unaccusative verb can only receive its case after moving to the *Spec*-position of IP (structural nominative). BE-selection is thus the result of the binding relation between the derived subject in the *Spec*-position of IP and the trace of the NP in the original position.

Burzio's proposal had the advantage of accounting for (a) the similarity of sentences containing unaccusative verbs to passival sentences and (b) the auxiliary selection behaviour of reflexive constructions in Italian and French, as illustrated in (3).²

- (3) *Ci siamo sposati questa mattina.* It.
 PRO.REFL be.PRS.1PL marry.PTCP.M.PL this morning
Nous nous sommes mariés ce matin. Fr.
 We PRO.REFL be.PRS.1PL marry.PTCP.M.PL this morning
 'We got married this morning.'

Work on the Unaccusative Hypothesis in Generative Grammar focused on identifying other syntactic parameters sensitive to the unaccusative – unergative distinction.³ Thus, it has been claimed that unaccusative verbs can be used in absolute constructions (4), allow for partitive cliticisation in Italian (5), and appear in sentences with postverbal subjects with low definiteness (6), unlike unergative verbs (Perlmutter 1978, 1983; Burzio 1986: 23–26; Belletti 1988: 4; Cinque 1990: 24)

- (4) *Arrivata in ritardo, Maria non si scusò* It.
 arrive.PTCP.F.SG in delay Maria not PRO.REFL excuse.PST.PFV.3SG
neppure.
 even
 'Having arrived late, Maria did not even excuse herself.'
 (Cinque 1990: 24)
- *?*Telefonato a casa, Maria seppe che* It.
 phone.PTCP.M.SG to home Maria know.PST.PFV.3SG that
era stata promossa.
 be.PST.IPFV.3SG be.PTCP.F.SG promote.PTCP.F.SG
 'Having phoned home, Maria learned that she had passed.'
 (Cinque 1990: 24)

² Nonetheless, further research has shown that the syntactical behaviour of unaccusatives and reflexives in French is not identical (see Abeillé and Godard 2002).

³ Burzio's proposal has also been taken up by Kayne (1993) and Cocchi (1994), who argue that in the underlying syntactic representation, there is only a BE auxiliary which is realised as HAVE in certain syntactic contexts.

- (5) *Ne arrivano molti.* It.
 PART arrive.PRS.3PL many
 ‘Many of them arrive.’
 (Burzio 1986: 20)
- *Ne telefonano molti.* It.
 PART phone.PRS.3PL many
 ‘Many of them phone.’
 (Burzio 1986: 20)
- (6) *Il est arrivé trois filles.* Fr.
 EXPL be.PRS.3SG arrive.PTCP.M.SG three girls
 ‘Three girls have arrived.’
 (Belletti 1988: 4)
- *Il est arrivé la fille.* Fr.
 EXPL be.PRS.3SG arrive.PTCP.M.SG the girl
 ‘The girl has arrived.’
 (Belletti 1988: 4)

However, neither the unaccusativity diagnostics exemplified in (4–6), nor perfect auxiliary selection always neatly mirror the unaccusative–unergative distinction (Alexiadou, Agnostopoulou, and Everaert 2004). Van Valin (1990) is concerned with examples such as (7–8), which illustrate variation in auxiliary selection:

- (7) *Luisa ha corso (di proposito) nel parco.* It.
 Luisa have.PRS.3G run.PTCP.M.SG (on purpose) in.the park
 ‘Luisa ran in the park (on purpose).’
 (Van Valin 1990: 235)
- (8) *Luisa è corsa (di proposito) a casa.* It.
 Luisa be.PRS.3G run.PTCP.F.SG (on purpose) to house
 ‘Luisa ran home (on purpose).’
 (Van Valin 1990: 235)

The variable auxiliary selection of verbs such as It. *correre* ‘run’ suggests that such verbs cannot be classified as either unaccusative or unergative. In order to account for this observation, Van Valin develops a semantic approach to auxiliary selection. Essentially, he proposes that auxiliary selection is not an invariable feature of verbs, but rather depends on the sentence aspect. In (8),

therefore, the goal *a casa* leads to a telic interpretation of the situation expressed in the sentence. This means that the subject referent *Luisa* is affected by the resultant state of a situation, namely being at home. While *ha corso* in (7) is interpreted as an activity predicate, *è corsa* in (8) is interpreted as an accomplishment. In Italian, HAVE is selected with activities, whereas BE is selected with accomplishments, achievements and states. This is due to the presence of a state predicate in the logical representation of these three *Aktionsart* classes (Van Valin 1990: 233).

Other authors have claimed that the semantic role of the subject argument triggers the choice of the auxiliary. Dowty (1991: 606) showed that the subject of Dutch intransitive verbs that select *hebben* (HAVE) is a prototypical agent while the subject of verbs that select *zijn* (BE) is not a prototypical agent. In the LFG framework, Schwarze (1996) argues in the same direction. According to Schwarze, there are cases in which the variation between *essere* (BE) and *avere* (HAVE) for the same Italian intransitive verb is related to agentivity (9–10). The proto-role approach was also applied to the historical development of auxiliary selection in Spanish by Aranovich (2003), who claimed that verbs that have a prototypical patient as the only argument display a greater longevity in the BE + PtcP construction than verbs with a prototypical agent.

- (9) *Il temporale era cominciato a notte fonda* It.
 the storm be.PST.IPFV.3G begin.PTCP.M.SG at night deep
 ‘The storm had begun in the middle of the night.’
- **Il temporale aveva cominciato a notte fonda* It.
 The storm have.PST.IPFV.3G begin.PTCP.M.SG at night deep
 ‘The storm had begun in the middle of the night.’
- (10) *Il panettiere aveva cominciato a lavorare a notte fonda* It.
 the baker have.PST.IPFV.3G begin.PTCP.M.SG to work at
 night deep
 ‘The baker had begun to work in the middle of the night.’
- **Il panettiere era cominciato a lavorare a notte fonda* It.
 the baker era.PST.IPFV.3G begin.PTCP.M.SG to work at night
 fonda
 deep
 ‘The baker had begun to work in the middle of the night.’

Although the *Aktionsart* and the proto-role approaches to auxiliary selection explain some cases of variation in auxiliary selection, variable auxiliary selec-

tion behaviour is more widespread than suggested by these approaches. Consider the examples in (11–12) given by Sorace (2000).

- (11) *La pianta ha fiorito due volte* It.
 the plant have.PRS.3SG blossom.PTCP.M.SG two times
quest’=anno.
 this=year

La pianta è fiorita due volte quest’=anno. It.
 the plant be.PRS.3SG blossom.PTCP.F.SG two times this=year
 ‘The plant has blossomed twice this year.’
 (Sorace 2000: 865)

- (12) *Il presidente ha durato in carica due anni.* It.
 the president have.PRS.3SG last.PTCP.M.SG in post two years

Il presidente è durato in carica due anni. It.
 the president be.PRS.3SG last.PTCP.M.SG in post two years
 ‘The president has lasted in post for two years.’
 (Sorace 2000: 868)

The variation in auxiliary selection in (11–12) does not seem to result from a difference in the expressed situation. Given that the adverbial *due volte* ‘twice’ in (11) provides a goal and thus telicises the situation, both sentences express accomplishments. As indicated by the durative adverbial *due anni* ‘for two years’ in (12), these sentences express states. According to Van Valin’s (1990) approach, *essere* ‘be’ should be selected in all of the tokens in (11–12). As a result, this variation escapes the aspectual–semantic approach to auxiliary selection. Dowty’s (1991) proto-role approach fares slightly better. The subjects in (11–12) show mixed semantic entailments regarding their role as proto-agents or proto-patients, which is why variation would be expected. However, given that the semantic entailments in the proto-role approach are not ordered (see the criticism in Mateu 2009), the approach can only predict the existence of this variation without making predictions regarding the degree of this variation.

In addition to the variation regarding auxiliary selection in languages such as Italian, there are systematic differences between genetically related languages regarding auxiliary selection with the same type of predicates, as illustrated in (13).

- (13) *I dinosauri sono esistiti 65 milioni di anni fa.* It.
 the dinosaurs be.PRS.3PL exist.PTCP.M.PL 65 millions of years
before
Les dinosaures ont existé il y a 65 millions d'ans. Fr.
 the dinosaurs have.PRS.3PL exist.PTCP.M.SG EXPL there
a 65 millions d'=ans.
 have.PRS.3SG 65 millions of=years.
 'The dinosaurs existed 65 million years ago.'
 (Sorace 2000: 869)

Sorace (2000) observes that the degree of variation in auxiliary selection, both within a language and between languages, differs according to the involved predicate class. This observation is integrated in the *Auxiliary Selection Hierarchy* (ASH). As illustrated by the examples in (13), variable auxiliary selection behaviour is common with state predicates. By contrast, activity and manner-of-motion predicates select HAVE more consistently, while change of state and change of location predicates select BE more consistently (see Sorace, this volume, for a more precise account of how the ASH is modelled). The crucial insight from Sorace's approach (taken up, for instance, in Keller and Sorace 2003; Bentley and Eythórsson 2004; Cennamo and Sorace 2007; Larsson 2009; Mateu 2009; Kailuweit 2011; Rosemeyer 2014) is that the variation in auxiliary selection is modelled in gradients. Although Sorace (2000) proposes that to some degree, this variation is due to the greater susceptibility of state predicates to template augmentation processes. The exact reasons for the gradience in auxiliary selection across the languages in Europe are still under investigation.

While Kayne and Cocchi claimed that HAVE and BE derive from the same auxiliary and thus posit an allomorphy between the two auxiliaries, a series of recent studies take the opposite view, proposing that HAVE and BE cannot always be characterised as allomorphs (Mackenzie 2005, 2006; McFadden and Alexiadou 2006, 2010; Loporcaro 2007; Rosemeyer 2012, 2014). Thus, auxiliary selection is interpreted as an opposition between two construction types or syntactic configurations. For instance, Earlier English *have* + PtcP is a perfect construction in which the auxiliary HAVE has attained a temporal function, while *be* + PtcP is a copula + participle construction whose temporal meaning arises compositionally and often has a resultative function (14–15).

- (14) *I am come as ze bade Me* E.En.
 I be.PRS.1SG come.PTCP as you ask.PST.3.SG Me
 'I have come as you asked me.'
 (Mirk, 75.2015, apud McFadden and Alexiadou 2010: 391)

- (15) *he haþe foghten wyth þe Fend* E.En.
 he have.PRS.3SG fight.PTCP with the Enemy
 ‘He has fought with the enemy.’
 (Mirk, 116.3171, apud McFadden and Alexiadou 2010: 391)

One reason for this assumption is the so-called *irrealis* or *counterfactual effect*, attested in older stages of Dutch (Kern 1912), English (McFadden and Alexiadou 2010), German (Magnusson 1939; Shannon 1990, 1995), Neapolitan and Sicilian (Formentin 2001; Ledgeway 2003), Spanish (Stolova 2006; Rosemeyer 2014) and Swedish (Larsson 2009: 157–168). In earlier forms of these languages, split auxiliary selection appears to have been conditioned to some degree by modality. HAVE + PtcP is used relatively more frequently in contexts marked by counterfactuality than BE + PtcP. McFadden and Alexiadou (2010: 412–415) argue that these sentence-level constraints – previously neglected both by syntactic and semantic approaches to auxiliary selection – suggest that BE + PtcP is a copula construction with resultative function. In their analysis, HAVE has been grammaticalised to a perfect tense marker, whereas BE has not. Assuming that the functional category T(ense) can only appear once per clause and BE does not carry tense morphology, BE + PtcP clauses cannot have a past counterfactual meaning. Rather, they are interpreted as having a present counterfactual meaning, as in (16).

- (16) *The Fellow looks as if he were broke out of* E.En.
 the fellow look.PRS.3SG as if he be.PST.3SG break.PTCP out of
Bedlam
 Bedlam
 ‘The fellow looks like he broke out of Bedlam (and is still loose).’
 (Farq, 60.477, apud McFadden and Alexiadou 2010: 406)

This short summary of the research on auxiliary selection from the second half of the 20th century to today illustrates that from a typological perspective, both unifying and diverging tendencies are discernible. Although the Unaccusative Hypothesis does not apply universally and without exception, there is a strong tendency for unaccusative verbs across languages to select BE and for unergative verbs to select HAVE. Variable auxiliary selection behaviour is sometimes, but not always, the result of template augmentation processes such as telicisation. While languages vary regarding the question as to which predicate class occurs with which predicate, this variation itself displays regular trends, as predicted by the ASH; state predicates typically display highly variable auxiliary selection behaviour, whereas activity and manner-of-motion predicates, as

well as change of state and change of location predicates, are typically consistent regarding their use with HAVE or BE. Lastly, an irrealis effect has been documented in the earlier stages of many European languages that exhibit or exhibited auxiliary selection.

The similarities between the European languages concern not only synchronic rules of auxiliary selection, but also extend to the historical development of auxiliary selection. Many European languages in which auxiliary selection is or was common exhibit a trend towards HAVE-selection. Thus, in Standard Catalan, English, Portuguese and Spanish, HAVE has replaced BE as an auxiliary. Likewise, there are indications that BE-selection was more common in earlier stages of French (Förster 1908: 69–100; Mackenzie 2006: 129–144; also cf. Heidinger this volume) and Swedish (Larsson 2009: 233–299). The stability or even extension of the use of BE-selection in other European languages such as Dutch, German and Italian appears to be correlated to a general high frequency of use of the HAVE + PtcP construction (Sapp 2011).

For some of the languages where the frequency of use of HAVE expanded to the detriment of BE, there is evidence that the expansion process followed a similar course. At least in Catalan (Mateu 2009), Neapolitan (Cennamo 2008), Spanish (Aranovich 2003; Mateu 2009; Rosemeyer 2014) and Swedish (Larsson 2009: 233–299), the process of HAVE replacing BE was gradual, affecting certain predicate classes before others.⁴ With the exception of Aranovich's (2003) work, all of these studies propose that the spread of HAVE followed the Auxiliary Selection Hierarchy, going from state predicates to change of state and change of location predicates. The gradualness of the expansion of the use of HAVE appears to concern not only the semantic but also the syntactic perspective. In particular, it has been claimed that the spread of HAVE affected certain syntactic contexts earlier than others, especially sentences containing reflexive constructions and dative arguments (Loporcaro 2011; Rosemeyer 2014).

The working hypothesis of this volume is that these data can be analysed in terms of the interplay between gradience and gradualness recently described by Traugott and Trousdale (2010). The fact that synchronic variation is often ordered in gradients results from diachronic gradualness, i.e. the well-attested fact that historical changes typically proceed in small steps, affecting one usage context before another (Timberlake 1977; Andersen 2001b, 2001a; Hopper and Traugott 2003: 45–50; Brinton and Traugott 2005: 150; de Smet

⁴ Regarding the situation in Neapolitan, however, Loporcaro (this volume: section 8.1) argues that Cennamo's analysis is flawed because she does not control for modal constraints – in particular, irrealis modality – on (Old) Neapolitan auxiliary selection. This refers to the “irrealis effect” on auxiliary selection mentioned above.

2012). Gradience in turn leads to gradualness. In Traugott and Trousdale's (2010: 39) words, "variation over time involves the emergence of grammatical constructions: a gradual, global process, but one which involves a series of local micro-reanalyses". This means that it might be possible to explain at least a part of the variation in auxiliary selection described in this chapter as a result of gradual language change processes.

2 Structure of the volume

The papers presented in this volume are divided into three separate sections that explore three aspects of this working hypothesis. First, they discuss semantic and syntactic gradience in auxiliary selection, as well as the limits of the concept of gradience. Second, they deal with the question of whether the opposition between HAVE + PtcP and BE + PtcP can always be interpreted as an allomorphic relationship. Third, they investigate mechanisms in the gradual change from BE to HAVE.

2.1 (Limits of) semantic and syntactic gradience

The first three papers discuss gradience in auxiliary selection. *Antonella Sorace's* paper "The cognitive complexity of auxiliary selection: from processing to grammaticality judgements" describes the cognitive underpinnings of gradience, arguing that semantic gradience as modelled in the Auxiliary Selection Hierarchy does not exclude syntactic explanations to auxiliary selection. Sorace presents extensive evidence from experimental research supporting the hypothesis that certain predicates are more susceptible to variable auxiliary selection behaviour, and that this gradience results from the underspecification of the event-semantic template of these predicates. Predicates that are atelic and have non-agentive subject arguments, such as state predicates, allow properties common to both unergative and unaccusative verbs and therefore appear in variable auxiliary selection contexts. However, this gradience does not contradict the Unaccusative Hypothesis, as the existence of variable behaviour verbs does not imply that these verbs are mixed forms: rather, their meaning is flexible enough for contexts that trigger an unaccusative or unergative interpretation. Sorace proposes to reconceptualise the Unaccusative Hypothesis in terms of a model of the syntax-semantics interface in which the binary syntactic outcome is determined by the compatibility of certain verb meanings with usage context, thus leading to gradience.

In “Perfective auxiliation with reflexives in Medieval Romance: syntactic vs. semantic gradients”, *Michele Loporcaro* argues that it is impossible to reduce unaccusativity to semantic features such as telicity and agentivity. Instead, he suggests that between the two poles of unaccusative and unergative verbs, reflexive verbs of different types occupy intermediate positions. This scale leads to syntactically motivated gradience between the selection of BE and HAVE, a fact which is not predicted by semantic approaches to auxiliary selection. Loporcaro demonstrates the relevance of this observation in his analysis of the development of auxiliary selection in Medieval Romance languages. Thus, Loporcaro’s syntactic scale is implicational in that in order for BE-selection to spread to unaccusative verbs, it first needs to spread to (different types of) reflexives. Loporcaro analyses the replacement of BE by HAVE in the history of Old Spanish, Old Neapolitan and Old Sicilian, suggesting that, in contrast to the findings from Aranovich’s (2003) study, the spread of HAVE to reflexive verbs is not secondary to the spread of HAVE to verbs whose subject is a proto-patient argument. Although the semantic factors modelled in e.g. the Auxiliary Selection Hierarchy indeed determine the directionality of the spread of HAVE, these semantic factors are subordinate to the syntactic factor of reflexivity.

Like Loporcaro’s contribution, *Pierre-Don Giancarli*’s paper “Auxiliary selection with intransitive and reflexive verbs: the limits of gradience and scalarity, followed by a proposal” provides a non-scalar global representation of auxiliaries including both reflexive verbs and intransitive (non-reflexive) verbs. After a general discussion of the nature of gradience in syntactic phenomena, Giancarli adduces data from Corsican, Acadian and Standard French on modal and aspectual auxiliaries used in the perfect tense, e.g. in auxiliary + *can* + PTCP constructions. He argues that because these data demonstrate syntactic constraints, they escape approaches to auxiliary selection that make use of scalarity. The ellipsis or displacement of the infinitive in such constructions leads to HAVE-selection with unaccusatives, as in *s’elli avianu pussutu (vultà)* ‘if they had been able to return’. Giancarli proposes an account of auxiliary selection in terms of semantic macro-roles in which subjects with the macro-role “Source” cause HAVE-selection, while subjects that simultaneously satisfy the two macro-roles “Source” and “Goal” cause BE-selection.

2.2 Between constructional variation and auxiliary selection

The papers presented in the second section of the volume provide evidence for the assumption that HAVE and BE in perfect constructions cannot always be

considered allomorphs and discuss the implications of these findings for the analysis of the historical development of auxiliaries.

In “On the irrealis effect on auxiliary selection”, *Artemis Alexiadou* addresses the observation that in the older stages of the European languages, counterfactual or irrealis modality typically leads to the selection of HAVE over BE. She explores two questions: (a) does the irrealis effect apply to auxiliary selection in the strict sense, i.e. between two allomorphic expression types, and (b) is the switch from BE to HAVE in irrealis contexts responsible for the historical process of HAVE replacing BE? Alexiadou adduces data from Earlier English and Old Greek that prove the existence of an irrealis effect in auxiliary selection in these languages. In line with her earlier research (see section 1 of this introduction), Alexiadou argues that the irrealis effect evinces a difference in the function of HAVE + PtcP and BE + PtcP. In addition, she claims that the assumption of a constructional difference between HAVE and BE can explain why English and German differ with regard to the historical development of auxiliary selection. While the loss of BE in Early English was caused by the grammaticalisation of HAVE to an experiential perfect, BE-selection was not lost in German since BE + PtcP was also grammaticalised to an experiential perfect. Consequently, her approach leads to the prediction that across languages, BE-selection is only lost if HAVE + PtcP is grammaticalised to an experiential perfect.

Ida Larsson takes a similar approach in her contribution “The HAVE/BE alternation in Scandinavian – perfects, resultatives and unaccusative structure”, arguing that in Swedish, Norwegian and Icelandic, auxiliary selection must be characterised as a contrast between two constructions with different functions: perfects and resultatives. She bases this hypothesis on the distribution of HAVE and BE in these languages regarding counterfactual/irrealis modality, pseudoclefts and manner adverbials. Larsson also addresses the directionality of the spread of HAVE-selection in the Scandinavian languages, illustrating that the actualisation of HAVE followed the pattern modelled in the Auxiliary Selection Hierarchy. She suggests accounting for these two findings – constructional difference and directionality of spread of HAVE – in terms of Ramchand’s (2008) decomposition of a verb phrase in three subeventualities (*initP*, *procP* and *resP*). Only prototypical unaccusative verbs like *arrive* denote complex events in which every subeventuality is specified. These verbs have a highly specific lexical entry and, as a result, display very stable auxiliary selection. This model allows Larsson to explain the interaction between gradience and gradualness in the development of auxiliary selection in the Scandinavian languages.

The third paper in this section, *Jaume Mateu and Mar Massanell*’s “A constructional approach to auxiliary selection: evidence from existential construc-

tion”, approaches the functional difference between HAVE + PtcP and BE + PtcP from a slightly different perspective. Mateu and Massanell observe that in Old Catalan, HAVE-selection is typical of sentences with indefinite subjects, whereas BE-selection is typical of sentences with definitive subjects. They account for this effect in terms of a construction difference between HAVE + PtcP and BE + PtcP: existential constructions usually involve indefinite subjects, while resultative constructions usually involve definite subjects. Consequently, Mateu and Massanell argue that contexts involving existence were catalysts of the replacement of BE with HAVE: Old Catalan tokens of core unaccusatives such as *venir* ‘come’ in HAVE + PtcP constructions are existential constructions. This explains the high position of verbs of existence and appearance on Sorace’s Auxiliary Selection Hierarchy. As a result, the authors suggest that (a) unaccusativity is not a property of verbs but of constructions and (b) auxiliary selection does not depend on the involved verb but rather on the involved construction type.

Peter Öhl’s paper “Periphrasis as a precursor of analytic inflection” analyses the development of auxiliary selection in German. Öhl argues that the German HAVE-perfect originated as a periphrastic construction that over time acquired the function of analytic inflection. He distinguishes between *periphrasis* and *inflection* in terms of paradigmaticity: due to grammaticalisation processes, periphrases evolve into a paradigmatic means of functional marking. Öhl’s proposal of modelling this process aims at combining insights from generative and functional approaches to grammaticalisation. Thus, he claims that the Old High German HAVE + PtcP construction originally had a predicative function. Since the usage frequency of this construction increased until the 9th century, it became the input for the learners’ reanalysis. The verb *haben* ‘have’ in the periphrastic construction was reanalysed as an auxiliary representing anteriority, while the semantic value of perfectivity results from the participle. This led to the creation of the new paradigm of analytic tense. According to Öhl, this mechanism explains the interplay between gradual historical change and abrupt syntactic reanalysis.

2.3 Mechanisms of gradual change: BE > HAVE

Given that Öhl’s paper discusses the interplay between grammatical function and processes of historical change, it already has a bearing on the topic discussed in the last section of the volume, i.e. the mechanisms of gradual change that have caused HAVE to spread to contexts previously occupied by BE in some European languages. The four papers in this section focus on the inci-

dence of the semantic features of locomotion, telicity and agentivity on the gradual development of auxiliary selection.

In “BE or HAVE in Contemporary Standard French – residua of semantic motivation”, *Rolf Kailuweit* analyses auxiliary selection in French. He argues that in earlier French, auxiliary selection mirrored a functional split between an anterior and resultative construction. However, this functional split is obsolete in Contemporary Standard French: the variation between HAVE and BE is no longer driven by the anterior-resultative opposition. Kailuweit discusses unaccusativity as modelled by the Auxiliary Selection Hierarchy and reaches the conclusion that the semantic factor “change of location” is only a weak unaccusativity criterion. However, in Contemporary Standard French, this factor is highly relevant, as all BE-selecting verbs can be characterised as change of location verbs in a literal or metaphorical sense. Kailuweit explains this finding as a frequency effect: due to their high usage frequency, verbs expressing change of location conventionalised BE-selection over time. BE-selection in Contemporary Standard French is thus a residue of previous semantically motivated constraints.

With his paper “The auxiliary selection in French *monter* ‘move upward’ from the 16th to the 20th century, *Steffen Heidinger* sheds light on the question of gradualness in the development of French auxiliary selection. As already mentioned above in the context of Kailuweit’s contribution, BE-selection was more widespread in earlier stages of French than Modern French. Surprisingly, Heidinger’s data suggest that *monter* ‘move upward’ follows a different path. In particular, the relative frequency of use of *monter* in the BE + PtcP construction expands over time. Heidinger analyses this process as a function of the three features “locomotion”, “telicity” and “agentivity”, which can be used for a semantic decomposition of the Auxiliary Selection Hierarchy. He demonstrates that the use of BE + PtcP with *monter* is conserved in contexts where *monter* has a change-of-location acceptation. In Heidinger’s words, the development of *monter* shows “the consolidation of a decreasing form in a restricted domain”. The paper thus suggests that the development of auxiliary selection in the European languages does not necessarily proceed unidirectionally from HAVE to BE.

Similarly to the previous two papers, *Malte Rosemeyer*’s contribution “Entrenchment and discourse traditions in Spanish auxiliary selection” investigates the gradual development of Spanish auxiliary selection as a function of semantic verb features. Rosemeyer claims that due to the high usage frequency of verbs that typically express a change-of-location semantics, these verbs resisted the replacement process of BE with HAVE longer than other verbs. He compares data from Early Modern Spanish letters, historiographical texts and

administrative documents. The results from the analysis suggest that this conserving effect led to the establishment of a new rule of auxiliary selection, i.e. “select BE when expressing a change-of-location event”. Rosemeyer claims that the conserving effect of frequency is context-dependent: given that in the corpus of Early Modern Spanish letters, change-of-location predicates are particularly frequent, verbs with this semantics exhibit a stronger conserving effect in this discourse tradition than in the others investigated. This assumption offers an explanation for the apparently disproportionately high relative usage frequency of BE + PtcP in these texts.

In “Auxiliary selection in closely related languages: the case of German and Dutch”, *Melitta Gillmann* compares the development of auxiliary selection in German and Dutch. In a similar fashion to the papers in section 3, she claims that in earlier stages of these languages, auxiliary selection has to be characterised as an opposition between a resultative and a perfect/anterior construction. Gillmann argues that the distributional differences in the auxiliary selection in these languages result from differences in its historical development: although in both German and Dutch HAVE + PtcP has grammaticalised to a perfect construction, this process is more advanced in German than in Dutch. While in German the semantic feature [+ locomotion] has become a predictor of auxiliary selection, the aspectual feature [+ completion] remains the most important predictor of auxiliary selection in Dutch. Gillmann claims that the expansion of the originally intransitive *zijn* ‘be’ + PtcP construction to transitive verbs such as *vergeten* ‘forget’ is closely associated with the resultative function of *zijn* ‘be’ + PtcP and consequently the feature [+ completion]. According to Gillmann, this process of host class expansion is due to the higher degree of case syncretism in Dutch than in German.

3 Summary and future directions

In this section, we give a concise summary of the conclusions that can be drawn from the content of this volume and indicate future directions for research on auxiliary selection.

Most of the papers in this volume analyse split-intransitivity in terms of the interplay between synchronic gradience and diachronic gradualness which is central to research in historical linguistics (see, e.g., Hopper and Traugott 2003: 45–50). Thus, they explain variation in synchrony as the result of gradual changes in diachrony. This procedure enables the identification of both converging and diverging trends in the development and use of auxiliary selection in European languages.

Although most papers agree that gradience is common to auxiliary selection in all languages studied, this gradience is caused not only by semantic but also by syntactic features (Giancarli, Loporcaro, Mateu and Massanell, Sorace). To give an example, according to Mateu and Massanell, the high position of predicates that express “existence or appearance” is the result of the affinity of HAVE + PtcP constructions for existential constructions, in other words a syntactic feature. It is not necessary (and probably impossible) to find a monocausal explanation for gradience. The challenge for future approaches to auxiliary selection is to provide models that can unify semantic and syntactic explanations for gradients in auxiliary selection.

In addition, many papers share an interest in whether or not HAVE + PtcP and BE + PtcP stand in a paradigmatic relationship. These papers emphasise the functional differences between HAVE + PtcP and BE + PtcP, suggesting that particularly in earlier stages of the languages studied auxiliary selection is not auxiliary selection in the strict sense, i.e. allomorphy between two semantically synonymous auxiliaries (Alexiadou, Gillmann, Kailuweit, Larsson, Mateu and Massanell, Öhl). This claim is substantiated by the existence of an irrealis effect in many of these languages (Alexiadou, Loporcaro). Several of these authors take a diachronic perspective in the investigation of the paradigmatic relationship. Over time, the degree of functional similarity between the two constructions appears to have increased (Gillmann, Kailuweit, Larsson, Öhl). Consequently, the results of this volume suggest that the analysis of auxiliary selection must account for a wide range of contextual factors as indicators of the distribution of HAVE and BE.

Finally, a series of papers address the interplay between semantic gradience and gradualness in auxiliary selection (Gillmann, Heidinger, Kailuweit, Larsson, Rosemeyer). These papers demonstrate the predictive power of synchronic gradience for the diachronic actualisation of HAVE + PtcP in several European languages. The results in this chapter suggest that (a) the Auxiliary Selection Hierarchy can serve as a model for the actualisation of HAVE + PtcP in the European languages, (b) frequency effects further modified the course of actualisation of HAVE + PtcP and (c) discourse traditions had an influence on the actualisation of HAVE + PtcP. In modelling the historical trajectory of the replacement of BE, all of the papers in the section attribute a high relevance to the semantic parameter of “change of location” (Kailuweit, Heidinger, Rosemeyer, Gillmann). Thus, it appears that in German, French and Spanish, BE-selection came to be associated with change of location contexts, while in Dutch telicity remained the most important predictor of auxiliary selection. Such developments could lead to local increases in the usage frequency of BE + PtcP and thus to rising syntactic productivity.

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Section 1: **(Limits of) Semantic and syntactic gradience**

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The cognitive complexity of auxiliary selection: from processing to grammaticality judgements

However much all things may be so and not so, still there is a more and a less in the nature of things.

Aristotle, *Metaphysics*

1 Split intransitivity and auxiliary selection: from the Unaccusative Hypothesis to now

According to the Unaccusative Hypothesis (Perlmutter 1978; Burzio 1986), there are two types of intransitive verbs – unaccusative and unergative – with distinct syntactic properties. The essential insight is that the subject of unaccusative verbs is syntactically comparable to the object of a transitive verb, while the subject of an unergative verb is a true subject. Evidence for the distinction is both syntactic and semantic. For example, in several European languages unaccusative verbs generally select BE as a perfective auxiliary while unergative verbs select HAVE, as shown in (1) and (2):

- (1) a. *Il postino è / *ha arrivato in ritardo*
The postman is / has arrived late
- b. *Marie est / *a venue à la fête*
Marie is / has come to the party
- c. *De brief is / *heeft vandaag gekomen*
The letter is / has today arrived
- d. *Der Zug ist / *hat spät angekommen*
The train is / has late arrived
- (2) a. *I musicisti hanno / *sono suonati tutto il pomeriggio*
The musicians have / are played whole the afternoon
- b. *Les ouvriers ont / *sont travaillés toute la nuit*
The workmen have / are worked whole the night
- c. *De trompettist heeft / *is met bolle wangen geblazen*
The trumpeter has / is with with all his might blown

- d. *Hans hat / *ist den ganzen Tag gearbeitet*
 Hans has / is the whole day worked

Semantically, the subject of unaccusative verbs tends to be a patient or a non-volitional causer while that of unergative verbs tends to be an agent (Dowty 1991; Van Valin 1990). However, it has proved difficult to fit many verbs unambiguously into one class or the other. On the one hand, there are verbs that do not satisfy unaccusativity diagnostics in consistent ways, both within and across languages; on the other hand, there are verbs that can display either unaccusative or unergative syntax depending on the characteristics of the predicate (see Levin and Rappaport Hovav 1995; Alexiadou et al. 2004; McFadden 2007; van Gelderen et al. 2013 for fuller discussions).

One of the main challenges posed by the Unaccusative Hypothesis is therefore to account for the variable behaviour of verbs. Theoretical linguistic research in the last 15 years – expressed in both “projectionist” and “constructional” approaches – has focused on the complex mappings between a lexical-semantic level of representation and the level of syntactic structure (Levin and Rappaport Hovav 2005; Ramchand 2008). Projectionist approaches enrich the lexical entry of verbs with fine-grained semantic specifications which project to the syntax via a complex system of linking rules. Constructional approaches, on the other hand, assume “bare” lexical entries that are free to project onto enriched syntactic configurations, which in turn determine interpretation (Borer 1994, 2005). However, the projectionist view allows for too little variation because of the deterministic nature of its linking rules, whereas the constructionist view allows too much variation because it lacks a mechanism that rules out impossible mappings. These limitations have been highlighted in particular by work by Sorace and colleagues (see e.g. Sorace 2000, 2004) which has shown that there is systematic variation that cannot be explained by either approach. Instead, her proposal is that intransitive verbs are organized in a hierarchy defined primarily by aspectual notions (telicity/atelicity) and secondarily by the degree of agentivity of the verb. This hierarchy was originally found for auxiliary selection and therefore termed “Auxiliary Selection Hierarchy”; then it was attested for other diagnostic of split intransitivity, which led to the more general term of “Split Intransitivity Hierarchy” (SIH), as in Figure 1.

The array of verb classes represented on the SIH reduces to two key factors – telicity and agentivity – whose interaction affects the syntax of split intransitivity and creates gradient satisfaction of morphosyntactic diagnostics of split intransitivity: “telic change” at the core of unaccusativity and “agentive atelic non motional activity” at the core of unergativity. The closer to the core

CHANGE OF LOCATION >	categorically unaccusative
CHANGE OF STATE >	
CONTINUATION OF STATE >	
EXISTENCE OF STATE >	
UNCONTROLLED PROCESS >	
CONTROLLED MOTIONAL PROCESS >	
CONTROLLED NON-MOTIONAL PROCESS >	categorically unergative

Fig. 1: The Split Intransitivity Hierarchy (SIH).

a verb is, the more determinate its syntactic status as either unaccusative or unergative, and thus its compatibility with morphosyntactic diagnostics of unaccusativity or unergativity. Sensitivity to contextual or compositional factors also correlates with the distance of a verb from the core: verbs that are stative and non-agentive are the most indeterminate and therefore the most susceptible to alternations and variable syntactic behaviour across languages.

What kind of gradience is represented by the SIH? It is important to distinguish *gradience* from the more general meaning of *variation*. Variation refers to the existence of linguistic structures that may alternate freely or randomly (albeit within limits); in contrast, gradience refers to alternations that obey tighter constraints and result in *degrees* of variation (in the sense of graded likelihood to alternate) and graded perception of (un)acceptability. It is gradience – rather than simply variation – that has been the object of investigation in studies on the SIH. Gradience is a property of speakers' mentally represented grammar because individual speakers agree on intermediate degrees of unacceptability (see e.g. Fanselow et al. 2006 for recent theoretical treatments). In this respect, the gradience embodied by the SIH is also different from Creissels's (2008) concept of *fluid intransitivity*: this is defined as "fluctuation" in the behaviour of intransitive verbs leading to "vacillations" in their assignment to the unaccusative or unergative class which are inevitably "exceptions" if a strictly syntactic split is maintained. In contrast, gradience on the SIH, as part of speakers' linguistic knowledge, is much more systematic and far from being exceptional. Importantly, it affects only certain verbs and coexists with the categorical behaviour of other verbs. Gradience in this sense is typically left unaccounted for by traditional linguistic models of the syntax-lexicon interface. For example, optimality-theoretic accounts (e.g. Legendre's 2007 work on auxiliary selection) address the issue of variation, but not the phenomenon of gradience. Similarly, projectionist accounts such as Levin and Rappaport Hovav (1995) could not explain the fact that in English verbs of (sound) emission exhibit more variation than verbs of change, or that in Italian *durare* 'last' can take

both auxiliary *essere* 'be' and *avere* 'have' but *partire* 'leave' can take only *essere*.

There is now evidence for SIH-style gradience in split intransitivity in more than a dozen typologically diverse languages, including Basque, French, Catalan, Chinese, Croatian, Dutch, German, Irish, Italian, Japanese, Paduan, Sardinian, Spanish, Turkish and, in addition, some sign languages (Sorace, to appear). The SIH has also received support in the literature on diachronic change. Variable verbs in terms of the SIH are diachronically unstable and prone to change, as is well attested in the pan-Romance BE→HAVE shift: change starts from non-core verbs and affects core verbs last (Tuttle 1986 on Italian; Benzing 1931 and Aranovich 2003 on Spanish; Legendre and Knipe 2003 on French; Sankoff and Thibault 1977 on Canadian French; Rohlf 1969 on Italian; Cennamo 2008 on Old Neapolitan).

While effects of the SIH have been found on a variety of manifestations of split intransitivity (e.g. *ne*-cliticisation in Italian, Sorace 1995; quantifier floating in Japanese, Sorace and Shomura 2000), the original and most detailed demonstrations of the SIH have focused on auxiliary selection. The typological predictions made possible by the SIH can therefore be best illustrated by a comparison of different languages that allow this phenomenon. The SIH predicts that, across languages, telicity is the primary factor, separating BE verbs from HAVE verbs and distinguishing subclasses of BE verbs; agentivity further differentiates among atelic verbs of process, identifying verb subclasses that require HAVE to different degrees (see Sorace 2000 for details). The SIH makes it possible to account for cross-linguistic variation in auxiliary selection systems. Not all languages are predicted to make the same differentiations among verb classes, but core verbs are predicted to select the auxiliary BE or HAVE across all languages, while intermediate verbs are predicted to exhibit cross-linguistic variation: an intermediate verb class could select BE in one language and HAVE in another and exhibit auxiliary alternations within the same language. These predictions have been borne out in several auxiliary-selecting languages (Cennamo and Sorace 2007; Legendre and Sorace 2003, 2007; Sorace 2000; Sorace, to appear).

These concepts can be exemplified by a comparison of two auxiliary-selecting languages such as Italian and German. While the SIH has been amply documented for Italian (Sorace 2000, 2004), the literature on German split intransitivity and auxiliary selection has focused on the syntactic bases of the distinction (Grewendorf 1989) and on its semantic bases (Seibert 1993; Kaufmann 1995). Among the researchers working on argument structure and the syntax-semantics interface, Van Hout, Randall, and Weissenborn (1993), emphasise the centrality of the concept of *change* for unaccusativity in German (equiva-

lent terms are Brinkmann's 1992 "transition" and "locomotion" used by Randall et al. 2004 and Randall 2010), as opposed to the more restricted notion of telic change which has been found to determine unaccusativity in other languages, such as Italian and Dutch. This parametric difference is necessary, in these authors' view, to account for the fact that Dutch and German select different auxiliaries for verbs denoting displacement without a specific endpoint, as shown in (3):

- (3) a. *Paul und Rita sind stundenlang durch den Saal getanzt.*
 Paul and Rita are for.hours though the room danced
 'Paul and Rita have been dancing around in the room for hours.'
- b. *Paul en Rita hebben urenlang door de zaal gedanst.*
 Paul and Rita have for.hours though the room danced
 'Paul and Rita have been dancing around in the room for hours.'

Keller and Sorace (2003) set out to assess the validity of the SIH for German by testing (a) auxiliary choice and impersonal passivisation, (b) the extent of the correlation between auxiliary selection and impersonal passivisation in German, i.e., whether the two tests broadly identify the same syntactic classes of verbs and whether they display variation with respect to the same semantic verb classes and (c) the correlation between dialectal variation in auxiliary choice and the position of verbs in the SIH. Based on Magnitude Estimation acceptability judgment data (Bard, Robertson, and Sorace 1996), Keller and Sorace were able to confirm that auxiliary selection in German, as in other languages, is sensitive to telicity and agentivity. Native speakers' intuitions are most determinate for core verb types (e.g. *ankommen* 'arrive', *abreisen* 'depart' which are strongly preferred with *sein*; *reden* 'talk', *arbeiten* 'work' which are strongly preferred with *haben*). Nevertheless, native German intuitions do not differentiate between verbs of change of location and verb of change of state with a telicity-inducing prefix (e.g. *verrosten* 'rust', *verwelken* 'wilt'), but exhibit indeterminacy in auxiliary selection with unprefixated indefinite change verbs, which are not inherently specified for telicity (see Sorace 2000 for examples in other languages). As will be seen below, the difference between prefixated and unprefixated change of state verbs is confirmed by experimental data obtained in online tasks. The class of motional process verbs (e.g. *swimmen* 'swim', *rennen* 'run') elicit a strong preference for *sein* in German, unlike many other languages in which these verbs select HAVE when they are not accompanied by a prepositional phrase indicating the endpoint of the process. Taken together, these results indicate that telicity is a crucial determinant of *sein*-selection, but not the only one: the factor "locomotion" or "spatial transition"

also underpins the choice of *sein*. The factor “transition” by itself (i.e. not specifically spatial) is not sufficient to guarantee the selection of *sein*, as indicated by the indeterminate behaviour of verbs of indefinite change.

Intermediate verbs on the SIH are more variable, as predicted, but do not exhibit precisely the same pattern in German as in other languages. Auxiliary selection is most indeterminate with stative verbs denoting position (e.g. *baumeln* ‘dangle’, *liegen* ‘lie’). Verbs of uncontrolled non-motional process (e.g. *shaudern* ‘shudder’, *zittern* ‘shiver’) and uncontrolled emission (e.g. *rumpeln* ‘rumble’, *klappern* ‘rattle’) show a weaker preference for *haben* than verbs of controlled, non-motional process – also in line with the SIH. Verbs of continuation of state (e.g. *überleben* ‘survive’, *verharren* ‘persist’), however, show a definite preference for *haben* and no sensitivity to other factors, such as subject agentivity. As Keller and Sorace suggest, it is possible that these verbs are conceptualized as processes rather than continuations of a pre-existing state: the underspecified event structure of these verbs makes them potentially compatible with different conceptualizations.

2 Beyond the Unaccusative Hypothesis: some open questions

The SIH is, by itself, a generalization and not a theory. This generalization appears at first sight to suggest that, within their respective classes, some verbs are “more unaccusative” and “more unergative” than others (Legendre, Miyata, and Smolensky 1991). But the unaccusative/unergative split is a binary *syntactic* distinction and therefore is not compatible with the idea that unaccusativity and unergativity are inherently gradient notions. Does this mean that the Unaccusative Hypothesis should be abandoned after 35 years? The key issue, recently re-proposed by Perlmutter (2010) himself, is whether the relevant phenomena can be accounted for in semantic terms without invoking a syntactic representation of unaccusativity (as in e.g. Bentley and Eythórsson 2003; Bentley 2006).

The thesis defended here is that the fundamental intuition underlying the Unaccusative Hypothesis can be maintained (although not the details of the original syntactic analysis – see Alexiadou et al. 2004), but needs to be re-conceptualized within a model of the lexicon-syntax interface that explains how a multi-dimensional lexical-semantic level maps onto a binary syntactic level. Depending on the interplay of the lexical semantics of the verb and the aspectual composition of the predicate, some verbs allow only one type of syntactic projection whereas other verbs are compatible with different projections

to variable degrees. This is the reason why any “syntactocentric” or “semantico-centric” approaches that focus exclusively on either the syntactic or the semantic side of split intransitivity at the exclusion of the other are ultimately bound to provide only a partial picture of this phenomenon. One important limitation of these approaches is the fact that they are either based on purely theoretical argumentations or on corpora and/or offline data. On the one hand, linguistic theories cannot determine exactly when syntactic, lexical and aspectual factors are computed and how they become integrated in the comprehension and production of intransitive verbs appearing in the typical constructions that have served as diagnostics of unaccusativity/unergativity. On the other hand, acceptability judgment data, which have been the main source of evidence for the SIH, do not capture the relative weight of syntactic and semantic factors and their interplay in real-time processing of auxiliaries with intransitive verbs. For example, Keller and Sorace’s study raises some intriguing questions about the role of telicity and agentivity in processing German auxiliary selection that are difficult to address on the basis of their off-line judgmental data. In particular, the difference between telicity inherently encoded in the verb’s argument structure (as in *ankommen*) and telicity morphologically induced by the presence of a prefix (as in *verwelken*) is one of compositionality: is one type of telicity more complex than the other? Is compositional telicity computed at a later stage than inherent telicity?

3 Split intransitivity: acquisition, attrition and processing

Data from experiments using online measures are potentially more suitable to address these questions, since they do not rely on explicit responses to stimuli on which the speaker has conscious control and therefore provide a more direct picture of implicit knowledge that cannot be consciously manipulated: in other words, they can shed light on the processes that necessarily precede particular acceptability judgments. We will consider some of the more recent experimental evidence supporting the SIH, distinguishing between studies supporting the gradience in verb behaviour and studies supporting the binary distinction between unaccusative and unergative verbs. It is the existence of evidence for both sides – briefly summarized in the next section – that represents a strong argument in favour of modelling their interface.

3.1 Evidence for the syntactic distinction

Some of the most telling evidence for the “psychological reality” of the unaccusative/unergative distinction comes from studies of second language acquisi-

tion and first language attrition. Developmental studies generally show a split between the syntactic distinction underlying split intransitivity, which is acquired early and remains stable, and the interface conditions determining gradience, which display more variation and instability. Sorace (1993a, 1993b), for example, demonstrated that the linguistic intuitions of non-native Italian speakers initially are most determinate for core verbs and then gradually approximate the SIH, without reaching the determinacy shown by native Italian speakers even at the highest proficiency level. Adult second language learners of languages that do not have overt and consistent morphosyntactic markers of split intransitivity go through a transitional stage in which they introduce these markers in the language (Zobl 1989; Balcom 1997; Hirakawa 2001; Oshita 2001). For example, learners of English from various language backgrounds overextend the passive constructions with core unaccusative verbs:

- (4) a. *My mother was died when I was a baby*
 b. *People are fallen in love*
 c. *What is happened?*

Overpassivisation with unaccusative verbs is a strong indication that learners expect to find overt markers of unaccusativity/unergativity in the second language. When these are not found, learners apply markers typically available in other languages (such as auxiliary selection) even if they are not instantiated in either their native language or the target language.

Montrul's (2005) study of native language attrition in second-generation Spanish speakers in the US ("heritage speakers") shows that these speakers maintain robust knowledge of the syntactic reflexes of unaccusativity in Spanish, since they correctly discriminated syntactically between unaccusative and unergative verbs in contexts requiring postverbal subjects, the absolute construction and postverbal bare plural subjects. However, these speakers do lose sensitivity to the gradient distinctions along the SIH. Attrition therefore appears to affect the lexicon-syntax interface mappings but not the unaccusative/unergative syntactic distinction itself.

A number of psycholinguistic studies of native language processing offer evidence of the syntactic distinction underlying the Unaccusative Hypothesis. Friedmann et al. (2008) used a cross-modal lexical priming technique, which tests whether or not the subject NP is reactivated after unergatives and unaccusative verbs during the online processing of a sentence. The experiments revealed that only subjects of unaccusatives reactivate after the verb, but subjects of unergatives do not. The fact that sentences with unaccusative and unergative verbs are processed differently directly supports the Unaccusative

Hypothesis and the underlying analysis based on the different structural status of the single argument of unaccusative and unergative verbs. Interestingly, some verbs that enter transitive-unaccusative alternations do not show a consistent pattern of trace reactivation, a fact that the authors themselves suggest might be related to their intermediate position on the SIH.

The psychological reality of abstract semantic features, such as telicity and agentivity, is addressed in a study of a Semantic Dementia patient by Romagno et al. (2010). This patient showed a dissociation between impaired access to the referential semantic features of verbs (*dying*, for example, refers to stopping living or existing) and the lexical-semantic features, such as telicity, affecting the syntactic behaviour of verbs, including auxiliary selection. Impairment selectively affected referential semantic features but not abstract lexical semantic features. A body of neurolinguistic studies of aphasia (e.g. Thomson 2003, among others) also supports the reality of the Unaccusative Hypothesis in processing terms.

Neurological evidence for the Unaccusative Hypothesis comes from a study by Shetreet, Friedmann, and Hadar (2009). The authors show that the brain distinguishes between unaccusative and unergative verbs, even when they appear in identical structures. Furthermore, different patterns of brain activation were found for syntactic and lexical operations: the inferior frontal gyrus appears to be involved with the execution of the syntactic operation of moving the argument from an object to a subject position, whereas the middle temporal gyrus may be responsible for other lexical operations that are associated with unaccusative verbs in particular languages.

In sum, a range of studies offers processing and neurological arguments in support of the syntactic split originally assumed by the Unaccusative Hypothesis. This evidence complements the linguistic arguments for maintaining a syntactic characterization of split intransitivity as a way of accounting for generalizations that unify transitive and intransitive clauses (Levin and Rappaport Hovav 1995; Perlmutter 2010).

3.2 Evidence for gradience

Is there real-time processing evidence for the gradient variation of the SIH? Recent studies have begun to provide a perspective on gradience that is complementary to that resulting from earlier acceptability judgment studies.

In eye-tracking experiments with native Italian speakers, Bard, Frenck-Mestre, and Sorace (2010) explored the processing correlates of the SIH by using real-time measures of eye movements in sentence reading. Effects of the

SIH were found on second pass reading times, although not on first pass reading times: participants took longer to read sentences with core unaccusative or unergative verbs (as in 5a and 6a) than those with non-core verbs (as in 5b and 6b) when presented with the incorrect auxiliary (i.e. *avere* in 5 and *essere* in 6):

- (5) a. *Alla festa il miliardario ha entrato / è entrato da solo nella sala*
 b. *Alla festa il miliardario ha rimasto / è rimasto da solo nella sala*
 ‘At the party the millionaire entered/remained alone in the room.’
- (6) a. *A quella vista il codardo ha urlato / è urlato per lo spavento*
 b. *A quella vista il codardo ha trasalito / è trasalito per lo spavento*
 ‘At that sight the coward shouted/jumped in fright.’

The effect was replicated in an eye-tracking experiment by Sorace and Vernice (forthcoming), who found longer reading times in first pass as well as second pass reading measures. In both studies, another signature of the SIH was a “spill-over” effect for non-core verbs, (especially for non-core unergatives) in the words immediately following the past participle, which is interpretable as non-commitment of the processor on auxiliaries with underspecified verbs until the rest of the sentence is encountered. The eyetracking data in Sorace and Vernice reveal another striking difference: auxiliary violations with unergatives trigger more fixations on the subject than auxiliary violations with unaccusatives, which can be interpreted as a sign that the subject of unergatives is more salient for auxiliary selection than the subject of unaccusatives.

The eye-tracking data overall suggest that auxiliary selection violations with verbs fully specified for telicity cause more processing disruption than violations with underspecified verbs. Moreover, auxiliary violations with underspecified verbs cause more extended processing disruption than those to core verbs because non-core verbs depend on compositional factors beyond the auxiliary-verb combination. Although at first glance the data do not seem to support a model of auxiliary selection as an operation involving two independent and sequential stages (i.e. the syntactic computation of unaccusativity/unergativity followed by the integration of aspectual and semantic information from the context), the results are open to multiple interpretations, including one that assumes the parallel (late) processing of the syntax and the semantics of split intransitivity (see Bard et al. 2010 for discussion).

Event-related brain potentials (ERPs) provide a different and potentially more direct measure of cognitive processing. Because of the high sensitivity and multidimensionality of this measure in combination with the method’s high temporal resolution, ERPs are very well suited to an examination of the