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Gradience at the Lexicon–Syntax Interface: Evidence from Auxiliary Selection and Implications for Unaccusativity

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9.1. INTRODUCTION

The Unaccusative Hypothesis (UH), as a syntactic explanation of split intransitivity, has generated a large number of studies since it was first proposed (Perlmutter 1978; Burzio 1986). The original formulation of the hypothesis incorporates two claims. One is that the single argument of unaccsative verbs is an underlying direct object, and thus displays many syntactic properties of direct objects of transitive verbs; in contrast, the single argument of unergative verbs is a subject at all levels of representation, and thus displays the same syntactic behaviour as the subject of transitive verbs. The other claim is that the distinction is also systematically related to the semantic characteristics of the predicate: agentivity correlates with unergativity and patienthood correlates with unaccusativity (Perlmutter 1978; Dowty 1991). The UH is thus conceptually simple, elegant, and broad in scope, encompassing both the syntax and the semantics of split intransitivity; it assumes a relationship of almost complete

predictability between the two, as expressed by the Universal Alignment Hypothesis (Perlmutter and Postal 1984).

However, the UH has recently been challenged on two fronts. First, linguistic theory has moved away from formal models of grammar that inspired the hypothesis (Relational Grammar and Government and Binding). Recent models of generative grammar do not include some of the fundamental tenets of the UH, such as the distinction between internal and external arguments (see the introduction to this volume for details). The most recent syntactic accounts of unaccusativity (Kayne 1993, for instance) regard apparent auxiliary 'selection' as an epiphenomenon of a syntactic operation of incorporation of an abstract preposition, thus detaching it completely from the UH.

Second, a vast body of empirical research (see Levin and Rappaport Hovav 1995 for a review) has repeatedly shown inconsistencies in the alignment between the syntactic and semantic properties of split intransitivity: some verbs with similar semantics have different syntactic behaviour across languages (for example, *blush* is unaccusative in Italian but unergative in Dutch), and some verbs are classified as both unaccusative and unergative by the same diagnostic (for example, *continuare* ('continue') can take both auxiliary *essere* and auxiliary *avere* in Italian). It has become apparent that these 'unaccusative mismatches' are problematic only to the extent that one expects unaccusative and unergative verbs to represent syntactically *and* semantically homogeneous classes, as in the original formulation of the UH. Most of the syntactic diagnostics of unaccusativity and unergativity (such as auxiliary selection in Italian, impersonal passives in Dutch, resultative constructions in English) tend in fact to identify semantically coherent subsets of verbs within the unaccusative and unergative classes (Levin and Rappaport Hovav 1995), suggesting that a proper explanation of these phenomena has to be placed at the syntax–semantics interface. From this perspective, the main endeavour of the theory of split intransitivity has thus become the identification of the syntactically relevant components of meaning in different languages and the search for an account of their interaction with the syntactic configurations in which a verb can appear. The principle is that neither a verb's ability to be found in the unaccusative or unergative syntactic configuration, nor the verbs' particular semantic characteristics are, by themselves, sufficient conditions to satisfy particular diagnostics: split intransitivity is 'syntactically encoded and semantically determined' (Levin and Rappaport Hovav 1995).[1]

[1] Several purely semantic models of split intransitivity have been proposed (such as Centineo 1986, Van Valin 1990, Cummins 1996, among others), which assume that a syntactic characterization of the distinction is unnecessary. However, much research has shown that a level of syntactic explanation is necessary to account for phenomena not easily reducible to purely semantic explanations: for example, the resultative construction in English (Levin and Rappaport Hovav 1995), scrambling involving quantifiers in Japanese (Tsuijmura 1990, 1991), the distribution of possessive and reflexive datives in Hebrew (Borer 1994), and *ne*-cliticization in Italian (Belletti and Rizzi 1981). In all these cases the distribution of the constructions that separate unaccusative from unergative verbs can be captured at the most general level by configurational factors, regardless of the semantics of the verb.

Various theories of argument structure (focused on the syntactically relevant lexical properties of verb arguments) and event structure (focused on the temporal and aspectual organization of the event described by a verb) which have been developed in recent years have set out to pursue the goal of explaining how lexical semantic or aspectual representations underlying individual verbs are mapped onto the binary syntactic representations underlying split intransitivity (Grimshaw 1990; Pesetsky 1995; Pustejovsky and Busa 1995; van Hout 1996; Rappaport Hovav and Levin 1998, among others). Following Levin and Rappaport Hovav (1996), two main perspectives can be distinguished (see also Rappaport Hovav and Levin 1998 for in-depth discussion): the 'projectionist' approach and the 'constructional' approach. The defining features of the two approaches will be briefly illustrated in the following section.

9.2. PROJECTIONIST THEORIES

The projectionist approach maintains that lexical entries deterministically project onto syntactic positions according to universal linking principles which map particular arguments onto particular syntactic positions; this in turn produces the syntactic behaviour associated with unaccusativity or unergativity (Hale and Keyser 1986, 1993; Levin and Rappaport Hovav 1992*a*, 1994, 1995, among others). Since unaccusativity and unergativity are lexical properties of verbs, verbs exhibiting variable behaviour are assumed to have different lexical–semantic representations, each of which is mapped onto syntactic representations in regular ways. One of the most comprehensive accounts of this type is Levin and Rappaport Hovav's (1995) model, in which a small number of linking rules map lexical semantic components of verb meaning (such as Immediate Cause, Directed Change, and Existence) onto positions at argument structure. The Immediate Cause Linking Rule is the only rule that maps the single argument of the verb onto the position of external argument. The Directed Change and the Existence Linking Rules map the argument onto the position of internal argument. The external and internal argument positions map 'trivially' onto the syntactic positions of subject and direct objects respectively, thus classifying a verb as unergative or unaccusative.

A number of problems are immediately apparent, of which only two will be mentioned here (for a full discussion see Sorace 2000). First, linking rules are language-specific: the existence Linking Rule, for example, produces unaccusative verbs in English and Italian (as shown by their ability to select auxiliary BE in Italian and appear in the *there*-construction in English, but not in Dutch or French

(1) I vampiri non sono mai esistiti. (Auxiliary BE)
the vampires not are never existed
'Vampires never existed.'

(2) There exist three versions of the manuscript. (*There*-insertion)

(3) Die Dinosaurier haben/*sind wirklich existiert. (Auxiliary HAVE)
the dinosaurs have/were really existed
'The dinosaurs really existed.'

(4) Il *est/a été à l'université. (Auxiliary HAVE)
'He is/was at the university.'

The cross-linguistic variation exhibited by stative verbs is in net contrast with the relative uniformity and invariance of verbs governed by the other two linking rules, a fact for which the model does not have an immediate explanation.

Second, linking rules are too broad. No distinction is made between directed change and inherent telicity, even though there is an asymmetric relationship between the two. All telic verbs involve a directed change, but directed change does not necessarily imply telicity: degree-achievement verbs such as *rise* and *cool* imply an indefinite change in a particular direction but they do not denote the achievement of a final state. The asymmetry is relevant for split intransitivity because verbs of telic change behave differently from verbs of directed change in a number of languages. This can be illustrated by a comparison of verbs of directed motion in French and Italian. It is possible to distinguish four types of verb of movement (cf. Donadio 1996), according to the extent to which they express telicity, and whether they express it lexically or syntactically.

A verbs denoting telic and inherently delimited movement: *arriver* ('arrive');
B verbs denoting directed, but not delimited, movement: *monter* ('rise');
C verbs lexically denoting atelic, non directed movement, which can telicize compositionally in some contexts: *courir* ('run');
D verbs denoting atelic, non-directed movement that cannot telicize in any context: *vagabonder* ('stroll').

The distribution of auxiliaries with these verbs in the two languages is summarized in Table 9.1, where E stands for *essere*/*être* and A for *avere*/*avoir*.[2] Only inherently delimited verbs of motion consistently select E in modern French, whereas auxiliary choice is variable for non-delimited verbs of directed change; E cannot be selected by verbs belonging to the other two classes. In Italian, both inherently delimited and directed non-delimited movement verbs select E, atelic verbs that telicize compositionally may take both auxiliaries depending on the context, and atelic verbs that cannot telicize in any context take A. Inherent telicity, and not just directed change, therefore appears to be the determining factor in the consistent selection of E in French.[3]

[2] Here the selection of auxiliary *être* is taken as a marker of unaccusativity in French. This is somewhat controversial. There are other syntactic diagnostics of unaccusativity that have been reported in the literature which, arguably, identify a larger class of verb. Legendre (1989) lists nine tests of unaccusativity, which single out distinct and only partly overlapping subsets of verbs. In her view, a verb is unaccusative if it satisfies at least one of these tests; conversely, a verb is unergative if it fails all the tests. Labelle (1992) discusses, in addition to auxiliary selection, six diagnostics (impersonal constructions, *en*-cliticization, infinitival relatives, *tough* construction, adjectival passives, and participial constructions). See Sorace and Legendre (in press) for updated discussion.

[3] Table 9.1 shows that Italian has more E-selecting verbs than French; see also Sorace (2000) and Legendre and Sorace (in press) for a fuller discussion.

Table 9.1. Distribution of auxiliaries for verbs of motion in Italian and French

	Telic, delimited	Telic Non-delimited	Atelic Can telicize	Atelic Cannot telicize
Italian	E	E	E/A	A
French	E	E/A	A	A

Similarly, agentivity and internal causation are not differentiated in Levin and Rappaport Hovav's model, but there are languages in which agentive verbs are consistently unergative whereas non-agentive internally caused verbs fluctuate in their syntactic behaviour. For example, the so-called verbs of emission, which are internally caused but not agentive, are classified by Levin and Rappaport Hovav as 'variable-behaviour verbs' in English because they are basically unergative but behave like unaccusatives if they are interpreted as verbs of directed motion, as shown in (5). Agentive activity verbs never show this alternation—see (6). These verbs are also unstable in their selection of auxiliary in Italian, whereas agentive activity verbs are not:

(5) The curtains creaked open. Resultative construction OK

(6) *John laughed down the stairs.
(meaning: John laughed his way down the stairs)

(7) L'eco ha risuonato/è risuonato nella valle. Auxiliary HAVE/BE
'The echo has resounded/is resounded in the valley.'

(8) Paolo ha riso/*è riso fino a sentirsi male. Auxiliary HAVE
'Paolo has laughed/is laughed until he felt sick.'

Third, it appears that some of the rules can be arranged in order of priority: both the Directed Change and the Existence Linking rules take precedence over the Immediate Cause rule. but Levin and Rappaport Hovav offer no explanation of why such an ordering should obtain.

A fourth, more general, problem with this type of projectionist model is that it is unable to account for variation without positing double entries in the lexicon and elaborated lexical rules which change the basic classification of verbs by mapping members of one class onto a different class. Verbs of manner of motion and verbs of emission, which are the only two classes showing rule-governed behaviour in the model, are basically unergative verbs in that they fall under the Immediate Cause Linking Rule, but they can become verbs of directed motion in the presence of particular adverbials and be reclassified as unaccusative. These verbs therefore have a double lexical–semantic representation, each corresponding to a distinct lexical entry that deterministically projects onto the syntax in a regular way. This solution is viable only as long as variable-behaviour verbs are regarded as the exception to a general pattern of deterministic mapping. If variation is the rule rather than the exception, a lexicon burdened with a proliferation of entries becomes uneconomical and unlearnable.

Finally, Levin and Rappaport Hovav's projectionist model is unable to predict which verb or verb classes are consistent and uniform in their mappings and which ones are variable. In their words, 'we do not have any explanation for the fact that only verbs from certain semantic classes can become verbs of directed motion or for the fact that they can become verbs of directed motion but not verbs of change of state. These explanations must await a full theory of possible and impossible meaning shifts.' (Levin and Rappaport Hovav 1995: 202).

9.2.1. Probabilistic versions

The question of systematic variation in verb behaviour is addressed by other projectionist accounts in a probabilistic way. Dowty's (1991) analysis treats the thematic roles of Agent and Patient as clusters of semantic entailments, with no discrete boundaries. These inherently fuzzy concepts (called Proto-agent and Proto-patient) are characterized by open lists of semantic features (Dowty 1991: 572):

- Proto-Agent: volitionality; sentence and/or perception; causer of an event or a change of state in another participant; movement; exists independently of the event named by the verb.
- Proto-Patient: undergoes a change of state; incremental theme; causally affected; stationary; does not exist independently of the event named by the verb.

Variation in the unaccusative–unergative classification arises from cumulative effects. Dowty in fact predicts that

> In any language which manifests unaccusativity, predicates that are 'high' in agentivity AND 'low' in patient properties are invariably unergative, while those low in agent properties and high in patient properties are invariably unaccusative; only those high in both kinds of entailments, or low in both, should be unstable. (Dowty 1991: 608)

These predictions are imprecise and difficult to substantiate empirically: which verbs would be characterized by a high, or by a low, number of both agent and patient entailments? Are there verbs with two maximally agent-like, or two maximally patient-like properties? Tenny (1994: 102–5) demonstrates that such verbs, though not excluded in principle, are not attested. In an attempt to substantiate Dowty's predictions, Zaenen (1993) suggests that the crucial difference is not that between verbs high in agentive properties and low in patient-like properties, on the one hand, and verbs low in agentive properties and high in patient-like properties, on the other. Rather, what matters is the difference between verbs that have an equal number of proto-Agent and proto-Patient entailments and verbs that have no entailments. The former, exemplified by verbs of inherently directed motion (which have both the agent property volition and the patient property incremental theme), are usually unaccusative; the latter, exemplified by verbs of emission (which, being stative, have no agent or patient properties; although they do have at least the property of being stationary), are usually unergative. However, there are two problems with this characterization of variation. One is that it

is unmotivated: it is unclear why there should be a relation between having an equal number of entailments and unaccusativity, or between having no entailments and unergativity. The other problem is that Zaenen's observations are correct for Dutch, but happen to be wrong for Italian, in which stative verbs denoting existence, including positional verbs in their 'simple position' sense, are unaccusative. As Zaenen suggests, Dowty's system does not pay sufficient attention to the notion of state, it being only one among the Proto-patient entailments:

> It is unlikely, however, that across languages, verbs like staan (to stand) and verbs like bloeden ('to bleed') behave in the same way. In general it seems that among the stative verbs there are more semantic distinctions to be made than Dowty's list of properties allows for. (Zaenen 1993: 150)

As in Levin and Rappaport Hovav's model, what is still lacking is an explanation of why stative verbs tend to be variable across languages, whereas verbs denoting inherently directed motion are not. It seems that consideration of thematic factors alone, even when couched in probabilistic rather than deterministic terms, does not lead us sufficiently close to such explanation. As Grimshaw (1990) notes, Dowty's lists of entailments include both thematic and aspectual properties but do not consider how they combine with each other in determining argument realization. As she states,

> Dowty's proposal is a response to the failure of purely thematic theory to provide illuminating accounts for argument realization [. . .]. Nevertheless it is undesirable to retreat to a probabilistic theory [. . .] because some of the restrictions are absolute and can *never* be overridden.

9.3. CONSTRUCTIONAL APPROACHES

'Constructional' approaches have gained ground in recent years as alternatives to lexical theories of linking (cf. Borer 1994, 1998; McClure 1995; van Hout 1996, 2000; Arad 1998*a*). These approaches have two main characteristics:

(*a*) unaccusativity and unergativity are considered to be a sentence-level property of the predicate, rather than a lexical property of the verb;
(*b*) there is a closer and more immediate link between the aspectual interpretation and the syntactic configuration of unaccusative and unergative predicates: specific aspectual readings are determined by the appearance of the verb argument in particular syntactic configurations.

In Borer's constructional model (1994, 1998, in this volume), lexical entries are 'bare': they contain only an unordered list of arguments. The 'core' (lexical) meaning of verbs serves as a modifier, rather than as a determinant of structural properties. Unaccusativity and unergativity become constellations of phenomena derived from the verb's ability to appear in particular syntactic configurations, which in turn determine aspectual interpretations. Syntactic structure and lexical specification are thus

divorced and may follow different developmental timetables in language acquisition (Borer 2003 and in this volume).

A telic reading is derived by the presence of an argument in the specifier position of a functional projection labelled AspE; an activity reading is derived by the verb's appearance in the specifier position of AspP.[4] Since the lexical entry of verbs does not contain any specification of whether an argument is internal or external, any verb is free to enter into more than one syntactic configuration and, consequently, to receive multiple aspectual interpretations. For example, an ambiguous verb like *wilt* may be interpreted as a telic, completed event (as in *At that temperature, the plant wilted in a few hours*) or as a process (*The plant wilted for a few hours but then recovered*): whether it receives one or the other interpretation depends on whether the verb argument is positioned in AspE or AspP. Optionality is therefore built into the system: the unaccusative–unergative classification of intransitive verbs is inherently unstable.

This approach, unlike the projectionist model, predicts flexibility in the syntactic realization of arguments, but at the price of massive overgeneration. The problem is that variation is *not* unconstrained: some verbs can appear in only one configuration; others can appear in more than one but to different degrees. This is a concern for Borer herself:

> It is thereby predicted that a verb such as *run* is perfectly ambiguous between a so-called unergative and unaccusative reading [. . .] this prediction appears problematic [. . .] clearly one would need to explain why some intransitives are much more susceptible to the MEASURE/NON-MEASURE alternation than others. A possible explanation may be found in the appropriate characterization of particular verbs and their contribution to the meaning of the predicate in which they are embedded. *Specifically, it may be that the meaning of some verbs entails delimitation much more strongly that other verbs*. (Borer 1994: 32; emphasis added)

What mechanism can, then, prevent such verbs as *arrive* from ever appearing in an unergative syntactic configuration? Constraints on overgeneration have to be present to rule out impossible matches, but this type of model does not specify exactly how such constraints operate and at what level. The model, furthermore, focuses only on the aspectual distinction between events and processes, but is completely silent on stative verbs which, as seen earlier, tend to be inherently ambiguous in many languages.

9.3.1. Feature-checking versions

Different versions of the constructional approach, closer to the Minimalist model, incorporate a feature-checking component. The assumption in this case is that aspectual features of the predicate, such as telicity, have to be discharged through the

[4] Other proposals use different labels for what essentially is the same specifier position. For example, Agro in van Hout (1996) and den Dikken (1994), AP_{inner} in McClure (1995). These proposals share much common ground with recent, purely syntactic, theories of auxiliary selection (Kayne 1993; also Cocchi 1994), in which the choice of auxiliary with intransitive verbs also hinges on the presence vs absence or inactivity of an AgrObjP projection (which is, however, not characterized as the locus of aspectual interpretation).

movement of arguments to some specifier of a functional projection. In van Hout's approach (1996, 2000, and in this volume), the lexicon–syntax mapping system is sensitive to event types, instead of deriving them as the outcome of lexical or syntactic operations on the arguments and their positions. This model shares with Borer's the assumption that the mapping system is defined on the event structure of the whole VP in which the verb appears, rather than projecting up from purely lexical properties of the verb alone. What characterizes van Hout's model is the requirement that unaccusative verbs incorporate telicity, which is introduced in the syntactic computation as an interpretable feature that needs to be checked in AgrOP, thereby triggering movement of the object to the Specifier of AgrO. This model therefore is, at least in principle, more constrained than Borer's, since telicity checking requires that the verb's (or predicate's) event-type properties must match or be compatible with the telic feature; it is unclear, however, how compatibility is checked and how incompatible matches are ruled out. Moreover, nothing is said about how mapping works with stative verbs.[5]

9.4. PREDICTIONS FOR LANGUAGE ACQUISITION

Language acquisition, of both first and second languages, is an important testing ground for theories of the lexicon–syntax interface. An explanatory theory, in fact, should be powerful enough to account for the rapid acquisition of interface constraints, and particularly for the fact that language acquirers are inherently conservative and tend to make generalizations from which they are able to retreat. Projectionist and constructional theories of the lexicon–syntax interface make different predictions for language acquisition, which are not always easy to distinguish empirically on the basis of current methodologies. While an exhaustive review of research in this area is beyond the scope of the chapter, the main positions may be summarized here as follows (see Borer, in this volume, for a more detailed overview).

9.4.1. The projectionist view: semantics has developmental priority

Projectionist theories assume that children are predisposed to notice the syntactically relevant meaning components of verbs through their interaction with the environment; and that they also have knowledge of the set of (potentially universal) linking rules that map semantic components onto syntactic positions. Children are therefore endowed with innate knowledge of the shape of both semantic and syntactic represen-

[5] Van Hout's model may be modified in such a way as to incorporate the notion of underspecification. Verbs may be lexically specified or unspecified for telicity: a configuration with AgrO would unambiguously attracts verbs with a [+telic] feature, whereas underspecified verbs (statives, for instance) may project in more than one way (van Hout, personal communication).

tations, and of the constraints that rule the interface between the two. The combination of semantic knowledge and linking rules allow them to break into the syntactic system: this position has become known in the literature as the 'semantic bootstrapping' hypothesis (see Pinker 1989 and Gleitman 1990, among many others). The hypothesis leaves a substantial amount of learning for children to be accomplished: the semantic components of individual verbs, the verb structures permitted by the ambience language, the verb (sub)classes to which lexical rules apply, and the morphosyntactic expression of lexical alternations, all have to be learned on the basis of exposure to the language.

Intriguing learnability questions arise. Consider the subcategorization requirements of locative verbs in English, which sometimes alternate between two different argument structures (*I'm stuffing the turkey with breadcrumbs*; *I'm stuffing breadcrumbs into the turkey*) and sometimes do not (*I filled the jar with cookies*; **I filled cookies into the jar*). Or the well-known case of transitivity alternations, in which only a particular semantically defined subset of transitive verbs have intransitive alternants, that is, allows the possibility of mapping the Theme argument onto the subject position: *the price increased* is well-formed, but *the paper cut* is not. How does the child figure out which alternations are possible and which are not? The problem is quite complex: alternations with non-alternating verbs simply do not occur, so in the absence of negative evidence the child will have no reliable indication that they are disallowed; furthermore, verbs do not consistently occur with all arguments, since some arguments are optional in both alternating and non-alternating verbs. Unless it is assumed that the child actually keeps track of the non-occurrence of certain alternations, one has to conclude that the child comes to the task already equipped with knowledge of the possible ways in which human languages can organize meaning in lexical categories.

Some projectionist models assume an in-built bias to try out hypotheses in a given order. In Pinker's version of the model, for example, children first acquire general, broad-range linking rules based on the basic semantics of the event; these rules are later re-analysed with the incorporation of finer semantic distinctions and narrow-range rules are added, in such a way as to differentiate the possible, narrow-range domains of application from the impossible ones. There is evidence that some meaning components have a privileged status over others: for example, children display an earlier sensitivity to 'change of location' than to 'change of state' (see Pinker 1989 and Gropen et al. 1991 for details). However, the origin of linking rules and of their underlying semantic primitives is still an unresolved question (Gleitman 1990).

For L2 acquisition, the relevant research questions revolve around the well-known distinction between universal developmental paths and transfer: can adult L2 learners acquire properties of the L2 lexicon that are not deducible from the input and that cannot be transferred from the L1? Research on the acquisition of lexical alternations in a second language has shown that the problems encountered by L2 learners in the initial stages, and the overgeneralizations they make, are consistent with those found in L1 acquisition, regardless of the native language (see Juffs 1996 and Montrul 1997 for overviews). Both L1 and L2 learners have to acquire universal argument structure

alternations, the narrow semantic constraints operating on them, and the morphological expression of the alternation instantiated by the target language. While the 'syntactically relevant' components of meaning are determined by Universal Grammar, the morphological expression of alternations is language-specific. The former are acquired through the same developmental path across languages, both in L1 and in L2 acquisition, whereas the latter are initially approached by L2 learners through the particular analyses imposed by the native language. For example, languages that do not mark the transitivity alternation with overt morphology, such as English, are more difficult to acquire than languages, such as Spanish or Turkish, that differentiate members of this alternations morphologically (Montrul 1997).

Similar developmental patterns are found in both children and adults. One such pattern is an asymmetry in the directionality of overgeneralization errors involving transitivity: there are more causative errors involving the causativization of intransitives (*I'm going to disappear the ball*) than anticausative errors, involving the intransitivization of transitives (*The machine will fix*). Montrul's account of this asymmetric pattern of overgeneralization is partly consistent with Pinker's (1989) distinction between broad- and narrow-range rules: adult L2 learners, like L1 acquirers, start from a default transitive template, which represents all the basic subevents and semantic primitives (causative, inchoative, and stative) and the canonical realization of arguments. This template is initially applied to non-alternating verbs. At a later stage, learners have to learn the specific aspects of meaning (i.e. external causation and unspecified agency) that characterize alternating verbs: in Pinker's terms, the narrow-range rules that further constrain transitivity. Knowledge of these narrow-range rules involve 'turning off' the CAUSE node from the basic template only for verbs that instantiate these meaning components.

These convergences may be interpreted as evidence that L2 learners do not start from their L1, but somehow revert to default universal principles. They indicate that L2 learners, again like L1 acquirers, are initially constrained by syntactic principles (i.e. the canonical alignment of thematic roles with syntactic positions that the default template represents), rather than purely semantic ones (such as the relative simplicity of intransitive forms, which lack the subevent CAUSE, compared to transitive forms). Hence, the L2 data may be construed as compatible with both a projectionist and a constructional account. What seems established is that both L1 and L2 learners rely on knowledge of universal syntax–semantics correspondences; L2 learners have the L1 as an additional source of hypotheses, but they use it in a conservative and modular fashion.

9.4.2. The constructional view: syntax has developmental priority

Constructional theories (so far applied only to L1 acquisition) turn the relationship between syntactic and lexical knowledge upside down (see Borer, in this volume, for a detailed illustration; Gleitman 1990). Rather than acquiring the syntactic expression of verb arguments from knowledge of their syntactically relevant meaning compon-

ents, children deduce word meaning from the semantically relevant syntactic structures associated with verbs. If the learner uses in-built knowledge of subcategorization frames and of basic syntax-semantic relations, the range of configurations in which a verb appears may narrow the hypothesis space for acquiring the verb meaning: this is, in essence, the syntactic bootstrapping hypothesis. For example, verbs denoting change of possession tend to appear in sentences with three NPs, which canonically express the old possessor, the new possessor, and the entity that goes from one to the other. Verbs denoting perception and cognition are associated with sentences with an object NP, representing specific entities that can be perceived, or with sentential complements, representing whole events. There is evidence that visually impaired children acquire lexical and semantic distinctions underlying verbs of vision (*look* and *see*) and colour terms, which they could not possibly acquire through experience (Landau and Gleitman 1985). These authors suggest that the syntactic contexts in which the verbs are used are the most probable basis for their acquisition, along with innate syntactic and lexical categories. The role of experience does not seem to be a crucial one.

Recent constructionist models (see Borer, this volume) reinterpret the evidence from child overgeneralizations in terms of imperfect lexical learning. Lexical verb meanings act as modifiers of the aspectual meaning carried by the merger of the verb with a specific functional head: thus, they are gradually memorized as vocabulary lists. The discrepancy between syntactic knowledge (which is in place early on) and lexical knowledge (which takes more time to develop) suggests a 'dual mechanism' model of the kind envisaged by Pinker and collaborators for the acquisition of past tense forms (see Marcus 2000 for a comprehensive overview): children make more overgeneralizations than adults because they have shorter vocabulary lists and weaker memory traces. When memory fails them, children will resort to the more general computational, rule-governed behaviour which consists of projecting verbs onto any syntactic configuration: so they produce *Daddy disappear rabbit* because they have not been exposed to a sufficient number of exemplars of this verb to know that it does not allow this type of projection in English. It is unclear, however, why only certain kinds of configurations are generalized by children—why is the transitive configuration more likely to be extended to intransitive verbs rather than the opposite? Can statistical frequency be the only explanation? Constructional models, in their most extreme form, predict protracted and unconstrained projection errors in language learners, just as they predict massive variation in the syntactic behavious of verbs. It seems plausible to assume, with Gleitman (1990), that semantic and syntactic bootstrapping do not exclude each other, and that the evidence from acquisition is not entirely consistent either with a purely projectionist or with a purely constructional model.

9.4.3. Summary

To review so far, both projectionist and constructional approaches to split intransitivity attempt to explain the fact that verbs may vary in the syntactic realization of their

arguments. Projectionist models do so either by assuming lexical operations on the lexical–semantic representation of verbs, which create multiple lexical entries, or by positing probabilistic mappings based on a number of semantic entailments incorporated by the verb's lexical entry. These explanations have two disadvantages: they do not explain why certain verbs are more susceptible to variable behaviour, and they lead to a proliferation of lexical entries.

The common denominator of constructional approaches is their emphasis on syntax as the main determinant of interpretation, rather than the interpretation affecting syntactic behaviour. The verb's syntactic specification is reduced to a set of simple features that have to be discharged in canonical checking positions, or to unstructured sets of arguments. While freeing the lexicon from syntactic specification allows more flexibility in mapping, it cannot deal with the fact that some verbs do not exhibit flexibility at all.

A problem shared by both the projectionist and the constructional approaches is their relatively limited empirical basis. Data from language acquisition at the present stage do not unambiguously support either approach. Recent research on auxiliary selection has begun to fill this gap, and it is this research that will now be examined in detail.

9.5. THE AUXILIARY SELECTION HIERARCHY

An empirical challenge to both the projectionist and the constructional views has come from a series of studies by Sorace and her collaborators (Sorace 1993*a*, *b*, 1995*b*, 2000; Keller and Sorace 2000; Sorace and Cennamo 2000). The starting point of these studies is the set of facts that are long-established in the literature: (*a*) across languages, some verbs tend to show consistent unaccusative–unergative behaviour, whereas others do not; (*b*) within languages, some verbs are invariably unaccusative–unergative regardless of context, whereas others exhibit variation. These studies provide supporting evidence for these generalizations, mostly based on experiments testing native speakers' intuitions about auxiliary selection (perhaps the best known diagnostic of unaccusativity) in various languages that have a choice of perfective auxiliaries (such as Dutch, German, French, Italian, and Paduan). In all these languages, unaccusative verbs tend to select the counterpart of English auxiliary *be* and unergative verbs tend to select the counterpart of auxiliary *have*. However, native intuitions on auxiliaries are categorical and consistent for certain types of verb, but much less determinate for other types.

The suggestion is that the systematic differences within the syntactic classes of unaccusative and unergative verbs may be captured by a hierarchy in which 'core' monadic verbs are distinguished from progressively more 'peripheral' verbs. This hierarchy is shown in (9).

(9) *The Auxiliary Selection Hierarchy*

CHANGE OF LOCATION	Selects BE (least variation)
CHANGE OF STATE	
CONTINUATION OF A PRE-EXISTING STATE	
EXISTENCE OF STATE	
UNCONTROLLED PROCESS	
CONTROLLED PROCESSES (MOTIONAL)	
CONTROLLED PROCESS (NON-MOTIONAL)	Selects HAVE (least variation)

Verbs at the extremes of the hierarchy ('core' verbs) are change of location verbs at the BE end and non-motional process verbs at the HAVE end. They are characterized by the following properties:

- categorical and consistent syntactic behaviour across languages;
- consistent behaviour within individual languages; insensitivity to compositional properties of the predicate;
- determinacy of native speakers' intuitions;
- primacy in acquisition;
- diachronic stability;

Let us examine some evidence in support of these properties.

9.5.1. Core verbs

Core verbs tend to be categorical and consistent in auxiliary selection across languages/language varieties. This is exemplified in (10)–(11), which show that the auxiliary selected by change of location verbs in the present perfect is BE, and that selected by non-motional process verbs is HAVE, in all the languages that have a choice of auxiliary.

(10) *a.* Paolo è venuto/*ha venuto all'appuntamento. Italian
Paolo is come/has come to the meeting

b. Ma sœur est arrivée/*a arrivé en retard. French
my sister is arrived/has arrived late

c. De brief is/*heeft aangekomen. Dutch
the letter is/has arrived

d. Der Zug ist/*hat spät angekommen. German
the train is/has late arrived

e. Maria est/*at arrivata a domo. Sardinian
Maria is/has arrived at home

(11) *a.* I delegati hanno parlato/*sono parlati tutto il giorno.
the delegatess have talked/are talked whole the day

b. Les ouvriers ont travaillé/*sont travaillés toute la nuit.
the workmen have worked/are worked whole the night

c. De trompettist heeft/*is met bolle wangen geblazen.
the trumpettist has/is with all his might blown

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

Core verbs display consistent behaviour within languages; in particular, they tend to select the same auxiliary regardless of the contribution of other aspectual or thematic elements in the sentence in which they appear. So in (12) *arrivare* ('arrive') selects BE even though the predicate is atelic; *cadere* ('fall') in (13*a*) selects BE despite the fact that the event described by the verb clearly denotes intentionality, just as it does when the event is clearly unintentional (13*b*). Conversely, *lavorare* ('work') selects HAVE regardless of the telicity of the predicate, as in (14).

(12) *a.* Sono arrivate lettere in continuazione. (Atelic predicate)
are arrived letters continuously
b. Sono apparse decine di imitazioni per anni
are appeared dozens of imitations for years

(13) *a.* Maria è caduta apposta per non andare a lavorare. (Agentive)
Maria is fallen on purpose to not go to work
b. Il bicchiere è caduto dal tavolo. Non-agentive
the glass is fallen from-the table

(14) I poliziotti hanno lavorato fino all'alba. (Telic predicate)
the policemen have worked until the dawn

The data from studies on other languages (e.g. Paduan; see Sorace and Cennamo 1999) confirms that, in general, inherent lexical aspect determines auxiliary choice with core verbs, whereas compositional aspect (the event structure of the whole predicate) affects auxiliary selection with peripheral verbs. The data support the conclusion that auxiliary selection with core verb types is a lexical phenomenon and is relatively insensitive to compositional factors. The degree of sensitivity to these factors increases for non-core verb types as they get more distant from the core.

Core verbs tend to elicit categorical intuitions from native speakers of languages with auxiliary selection, who categorically accept sentences in which these verbs appear with the 'correct' auxiliary and reject those in which they appear with the 'wrong' auxiliary. Evidence of differential judgements is particularly strong for Italian (see Sorace 1993*a*, *b*, 1995*b*; Bard, Robertson, and Sorace 1996 for experimental evidence). Furthermore, descriptive studies of Italian (Berruto 1987 and Rohlfs 1969, for instance) indicate that there is more variation in auxiliary usage for peripheral verbs than for core verbs, which is consistent with the predictions of the hierarchy. Supporting evidence also comes from Germanic languages. Experiments on Dutch (Sorace and Vonk 1998) show orderly gradience in the judgements of native Dutch speakers on *zijn* and *hebben* largely corresponding to the intransitive hierarchies identified for Italian. In addition, they show that the acceptability of impersonal passives (a construction traditionally regarded as a diagnostic of unergativity) is affected by semantic factors, particularly agentivity, which cut across the unaccusative–unergative distinction (a fact that had already been established by Zaenen 1993). For German, Keller

and Sorace (2002) provide similar findings for native judgements on *sein*, and *haben*, and also show that inter-dialectal variation in auxiliary usage between Northern and Southern varieties is mostly found with peripheral (but not with core) verbs.

Core verbs are the first ones to be acquired with the correct auxiliary both in first- and second-language acquisition. Data from the acquisition of Italian as a non-native language show that the syntactic properties of auxiliary selection are acquired earlier with core verbs and then gradually extended to more peripheral verb types (Sorace 1993*a*, 1995*a*). Moreover, Italian learners of French find it more difficult to acquire *avoir* as the auxiliary for verbs closer to the core than for peripheral verbs (Sorace 1993*b*, 1995*b*), and do not completely overcome this difficulty even at the advanced level. These developmental regularities can be explained by assuming that the acquisition of the syntax of unaccusatives crucially depends on the internalization of two elements: one is the hierarchical ordering of meaning components, and the other is the lexicon–syntax mapping system instantiated by the target language.[6] The pattern uncovered by these data is consistent with an enriched constructional model, equipped with a checking mechanism that is sensitive to the degree of lexical specification of verbs. As it is the position of verbs on the ASH, rather than their frequency, which determines the order of acquisition, it seems that L2 learners do rather more than engaging in the kind of statistical learning envisaged by a basic constructional model.

Finally, core verbs tend to be diachronically stable. There is evidence from studies on the historical development of auxiliaries in Romance (Benzing 1931; Tuttle 1986, for instance) showing that core verb types tend to be the last to be affected by the replacement of ESSE-reflexes by HABERE-reflexes, whereas peripheral verb types are the most vulnerable to the change. A recent study by Cennamo (1999) suggests that the development of reflexives *se*/*sibi* in Late Latin as markers of split intransitivity followed a path largely consistent with the unaccusative–unergative hierarchies.

9.5.2. Intermediate (non-core) verbs

While core verbs are categorical in their auxiliary selection behaviour, non-core verbs show increasing variation. The greater flexibility of these verbs will be illustrated here by Italian examples (for cross-linguistic evidence see Sorace 2000).

[6] The primacy of (overt/inherent) telicity characterizing change-of-location verbs is also shown by Dutch children who, even at 5 years old, differ markedly from the adults in their interpretation of full transitives, allowing more atelic readings than adults do. A sentence is telic only if it includes an overt marker of telicity such as a particle. A quantized direct object on its own is not sufficient (van Hout 2000).

(1) *a.* Heeft de rode muis *kaas gegeten*?
has the red mouse cheese eaten
b. Heeft de rode muis *zijn kaas gegeten*?
has the red mouse his cheese eaten
c. Heeft de rode muis *zijn kaas opgegeten*?
has the red mouse his cheese eaten up

Children learn the overt and transparent telicity markers before the more indirect ones.

A class that exhibits regular alternations is that of verbs denoting 'indefinite change' in a particular direction (such as *rise*), change of condition (*wilt*), and appearance (*appear*). BE is strongly preferred by these verbs, but HAVE is not completely rejected. The strength of preferences is a function of the (±) inherent telicity of the verb: as the Italian sentences in (15)–(16) show, many of these verbs allow two readings—one telic and one atelic—which may be disambiguated by the context.

(15) *a.* La popolarità del governo è scesa/ha sceso
the popularity of the government is gone down/has gone down
notevolmente.
noticeably
b. La pianta è cresciuta/?*ha cresciuto molto da quest'inverno.
the plant is grown/has grown a lot since last winter
c. Il fantasma è apparso/?*ha apparso in soffitta.
the ghost is appeared/has appeared in the attic
d. E' successa/*ha successo una tragedia.
is happened/has happened a tragedy

(16) *a.* L'albero è/ha fiorito due volte quest'anno. (Indefinite change)
the tree is/has blossomed twice this year
b. Le arance sono marcite /hanno marcito al sole.
the oranges are rotten/have rotten in the sun
c. Il grano è/ha finalmente germogliato.
the plant is/has finally blossomed

Verbs denoting continuation of a pre-existing condition (such as *stay*) are less determinate: BE is preferred but HAVE is not rules out categorically, and is in fact accepted with many of these verbs. The agentivity of the subject correlates with the degree of acceptance of HAVE, suggesting that these verbs, unlike core verbs, are sensitive to the feature contributed at the predicate level.

(17) *a.* Ancora una volta sono/?ho rimasto senza soldi.
again one time am/have remained without money
b. La discussione è/?ha durato a lungo. Non-agentive
the discussion is/has lasted for long
c. Il primo ministro è/ha durato in carica tre mesi. (Agentive)
the prime ministert is/has lasted in post three months
d. I miei genitori sono/?hanno sopravvissuto alla guerra.
my parents are/have survived to the war
e. Questa situazione è/?ha persistito per troppo tempo.
this situation is/has persisted for too long
f. Gianni *è/ha persistito nel suo atteggiamento.
paolo is/has persisted in his attitude

Stative verbs (including both verbs of physical and abstract existence and psycho-

logical verbs) are the most indeterminate in Italian, consistent with the findings from other studies. Auxiliary alternations (some restricted to regional or non-standard varieties) are shown in (18) and (19).

(18) *a.* I mammut sono esistiti/??hanno esistito molti milioni di anni fa.
the mammouts are existed/have existed many millions of years ago
b. Il libro è piaciuto/?*ha piaciuto soprattutto ai bambini.
the book is pleased/has pleased especially to the children
c. Lo zucchero non è bastato/??ha bastato per fare i biscotti.
the sugar not is lasted/has lasted to make the cookies
d. Il film è sembrato/??ha sembrato noioso a tutti gli spettatori.
the film is seemed/has seemed boring to all the spectators

(19) *a.* La villa ha appartenuto/è appartenuta alla mia famiglia.
the villa has belonged/is belonged to my family
b. Le medicine sono scarseggiate/hanno scarseggiato tra i terremotati.
the medicines are/have run in short supply among the earthquake victims
c. Il partito è/?ha sussistito senza le sovvenzioni dei politici.
the party is/has subsisted without the contribution of the politicians
d. Il suo testamento non è/?ha servito a nulla.
his will not is/has served to nothing

The use of HAVE induces an agentive reading, whereas BE does not. So in (20), the verb *mancare* is understood as intentional in (*b*) and non-intentional in (*a*).

(20) *a.* L'alunno è mancato all'appello. Non-agentive
the pupil is missed at the^roll call
b. Il presidente ha mancato all'appuntamento. Agentive
the president has missed at the appointment

Peripheral verbs closer to the 'unergative' core include verbs denoting motional processes (e.g. *swim*). Native intuitions are less determinate: HAVE is preferred but BE is not completely rejected.

(21) *a.* Gli atleti cinesi non hanno corso/?*sono corsi alle Olimpiadi.
the athletes Chinese not have run/are run at the Olympic Games
b. I bambini hanno saltato/?*sono saltati sul letto tutto il pomeriggio.
the children have jumped/are jumped on the bed all the afternoon

(22) *a.* Giovanna ha corso/?è corsa più velocemente di tutti.
Giovanna has run/is run faster than everyone else
b. Piera è corsa/?*ha corso al supermercato.
Piera is run/has run to the supermarket
c. Paola ha nuotato/?*è nuotata a stile libero.
Paola has swum/is swum
d. Paola ha nuotato/?*è nuotata fino all'altra sponda.
Paola has swum/is swum to the shore

In German, these verbs are preferred with BE (see Keller and Sorace 2002 for an interpretation in terms of the feature 'locomotion' being a stronger determinant of unaccusativity in German than in other languages).

The effects of agentivity on auxiliary selection are shown in (23), where HAVE is the preferred auxiliary with a human subject, BE is the preferred one with an inanimate subject.

(23) Il pilota ha/?è atterrato sulla pista di emergenza.
the pilot has/is landed on the runway of emergency
L'elicottero è/?ha atterrato sul tetto del grattacielo.
the plane is/has landed on the runway of emergency

Next, the hierarchy includes various types of uncontrolled processes (such as bodily functions; *sweat*, for instance), involuntary reaction (*tremble*), and emission (*rattle*). These verbs are internally caused but tend to be non-agentive.

(24) *a.* Il convincimento politico ha tentennato/?è tentennato anche nei più anziani.
the political belief has wavered/is wavered even in the oldest people
b. Paolo ha tentennato/*è tentennato a lungo prima di prendere una decisione.
Paolo has wavered/is wavered for long before making a decision
c. *Paolo ha tentennato apposta prima di decidersi.
Paolo has wavered on purpose before of decide-self
d. La terra ha tremato/?è tremata.
the earth has trembled/is trembled
e. Mario ha tremato/*?è tremato dallo spavento.
Mario has trembled/is trembled of the fear
f. Il mendicante ha rabbrividito/è rabbrividito dal freddo.
the beggar has shivered/is shivered from the cold

(25) *a.* L'innesto non è attecchito/ha attecchito.
the transplant not is caught/has caught

b. *L'innesto ha attecchito apposta.
the transplant has taken root on purpose
d. L'acqua ha/?è scarseggiata.
the water has/is gotten scarce
e. La bicicletta ha/?è sbandata senza preavviso.
the bicycle has/is skidded suddenly

(26) *a.* La sveglia ha/è squillata.
the alarm clock has/is rung
b. L'eco ha/è risuonato.
the echo has/is resounded
c. Il tuono ha/è rimbombato.
the thunder has/is rumbled
d. L'orologio ha ticchettato/?è ticchettato.
the clock has ticked/is ticked
e. La campana ha/?è rintoccata.
the bell has/is tolled
f. La stella ha brillato/??è brillata.
the star has shone/is shone

9.5.3. Typological predictions

The hierarchy makes it possible to advance some specific typological predictions. Note that it does *not* predict that all languages differentiate among all verb classes, but only that there should not be complete reversals of the hierarchical order of verb types (for example, languages in which stative verbs select BE most categorically, or verbs denoting involuntary processes select HAVE more consistently than non-motional activity verbs). The data on auxiliary selection suggest that within any given language there is a cut-off point between verbs that select auxiliary BE and verbs that select auxiliary HAVE. The cut-off point cannot be identical in all languages, since if it were, all languages with a choice of auxiliary would have exactly the same system of auxiliary selection. Thus, the locus of variation must be in the mapping governing the interface between the lexicon and the syntax. Mapping must be language-specific because the location of the cut-off point along the hierarchy may be different. However, variation in the location of the cut-off point is found among the verbs in the middle of the hierarchy, but does not affect the core.

9.5.4. A split-intransitivity hierarchy?

Since the data reviewed so far pertain to auxiliary selection, the question of relevance to a theory of split intransitivity is whether the hierarchy is a peculiar property of this construction, or whether it underlies not only auxiliary selection but split intransitivity in general. To substantiate the latter claim it is necessary to demonstrate that:

- other syntactic reflexes of split intransitivity in Romance (and Germanic) languages are affected by the hierarchy;
- syntactic reflexes of split intransitivity in languages without auxiliary selection are affected by the hierarchy;
- core verbs satisfy a greater number of syntactic diagnostics of split intransitivity than non-core verbs.

While more investigation is needed, some research findings are already available with respect to each of these points. Lack of space permits only a brief summary.

(*a*) *Other diagnostics in languages with auxiliary selection*. There is some evidence that other syntactic manifestations of split intransitivity might also be sensitive to this hierarchy. Sorace (1995*a*, 1995*b*) shows that *ne*-cliticization in Italian displays similar systematic variation as auxiliary selection, that is, there is a scale of acceptability for this construction depending on the position of a verb along the ASH. This is shown in order of increasing acceptability in (27).

(27) *a.* *Ne hanno lavorato molti, di studenti, in questo ristorante.
of-them have worked many, of students, in this restaurant
b. ?*Ne hanno camminato tanti, di turisti, su questa strada.
of-them have walked many, of tourists, on this street
c. ??Ne hanno squillato/?sono squillati tanti, di telefoni.
of-them have rung/are rung many, of telephones
d. ??Non ne ha risuonato/?è risuonata nessuna, di voce.
not of-it has resounded/is resounded any, of voice
e. ?Ne sono bastati due, di documenti.
of-them are sufficed two, of documents
f. Ne sono sopravvissuti pochi, di soldati.
of-them are survived few, of soldiers
g. Ne sono passati tanti, di anni.
of-them are gone by many, of years
h. Ne sono venuti molti, di turisti.
of-them are come many, of tourists

(b) *Diagnostics in languages without auxiliaries*. Sorace and Shomura (2001) indicate that syntactic diagnostics such as Quantifier Floating with intransitive verbs in Japanese may be sensitive to the semantic distinctions represented on the hierarchy.

In Japanese, an NP and its numeral quantifier must be adjacent in order to enter a relation of reciprocal C-command. So (28*a*) and (29*a*) are both grammatical. If the quantifier is separated from the NP that it modifies, only (29*b*) with an unaccusative verb is grammatical, but not (28*b*) with an unergative verb; the reason is that the quantifier c-commands the trace left behind by the apparent subject of the unaccusative verb.

(28) *a.* Kodomo-ga hutari [$_{VP}$ inu-to yukkuri aruita].
child-NOM two dog-with slowly walked
'Two children walked slowly with a dog.'

b. *Kodomo-ga [$_{VP}$ inu-to yukkuri hutari aruita].
child-NOM dog-with slowly two walked
'Two children walked slowly with a dog.'

(29) *a.* Kodomo-ga hutari [$_{VP}$ inu-to (gakko-ni) tuita].
child-NOM two dog-with school-at arrived
'Two children arrived at school with a dog.'

b. Kodomo-ga [$_{VP}$ inu-to hutari (gakko-ni) tuita].
child-NOM dog-with two school-at arrived
'Two children arrived at school with a dog.'

Native Japanese speakers do not distinguish between verbs denoting non-motional processes and verbs denoting a motional process (unlike Italians), but seem to judge both categories as core, to the extent that they have clear and determinate judgements about the ungrammaticality of these verbs with QF. In contrast, they have significantly less determinate intuitions about the ungrammaticality of QF with other unergative verb types, and express the least determinate judgements on verbs of emission.

(c) *Consistency across a range of diagnostics for the same verb*. Evidence from French (a language in which auxiliary selection is no longer a strong diagnostic of unaccusativity), shows that other, arguably stronger, diagnostics such as participial constructions, are satisfied more consistently by core verbs and less so by non-core verbs (see Legendre and Sorace, in press, for discussion). From a study by Labelle (1992) it also emerges that the verbs selecting *être* also behave like unaccusatives with respect to the other tests, and the verbs selecting *avoir* also fail the other unaccusativity tests (see also Zubizarreta 1985). While it is true that there are some verbs that usually select *avoir* and pass one or more tests of unaccusativity, such verbs are inconsistent in their behaviour, or are less felicitous in these tests than the *être*-selecting verbs: an example mentioned by Labelle is *disparaître*, which can appear in the impersonal construction (*Il a disparu des douzaines de livres*) but sounds less natural than *Il est arrivé trois hommes*. In Labelle's words 'the verbs constructed with *être* form the core cases of unaccusative verbs in French.' (p. 380).

9.6. TOWARDS A MODEL OF GRADIENCE

The generalization that is beginning to emerge from these studies is that as soon as one moves from the core one finds substantial but predictable indeterminacy in the syntax–semantics mapping with intransitive verbs. This indeterminacy is difficult to accommodate within a projectionist model of the lexicon–syntax interface, since it would require multiple lexical semantic classifications for a great number of verbs (see van Hout 1996 and Rappaport Hovav and Levin 1998 for discussion). It is also problematic for a constructional model, since core verbs display categorical behaviour and the other verbs are variable, but to different degrees.

With respect to auxiliary selection, telicity is the primary factor that separates BE-verbs from HAVE-verbs. Agentivity is a secondary factor that differentiates among HAVE-verbs. Core verbs (those at the extremes of the hierarchy) are inherently specified for telicity and agentivity, respectively, and their syntactic behaviour is insensitive to non-lexical properties contributed by the predicate. Intermediate verbs, which are neither telic not agentive, are the most variable and least determinate in many languages; unlike core verbs, they vary in their syntactic behaviour depending on the properties of the predicate in which they appear.

Ideally, a theory that accounts for these facts is a constructional model which identifies the factors underlying the differential flexibility exhibited by verbs and incorporates a set of compatibility constraints capable of ruling out inappropriate lexicon–syntax mappings. These constraints would be a crucial component to be acquired in language development.

Such a model has not yet been proposed, although potential elements of it already exist. For example, the greater 'elasticity' displayed by stative verbs has been addressed in some detail by McClure's (1995) analysis, which is essentially couched within the constructional approach. McClure addresses the ambiguity exhibited by stative verbs in the context of a general theory of aspect. His theory combines Parson's situation semantics with a modified version of the Vendler–Dowty classification, which includes only three logical event types: states, achievements ('changes'), and activities ('processes').[7] McClure's analysis revolves around the structure of predicates internal to events. The notion of state is the basic aspectual component in the system, in agreement with Dowty (1991) and Van Valin (1989). Unlike the latter, however, McClure argues that there exists an aspectual hierarchy such that a state component is part of the logical semantic structure of both achievements and activities: achievements are pairs of states, whereas activities are open-ended collections of spatio-temporally connected achievements controlled by the same individual (the Locus of Change). The aspectual hierarchy is represented in (30).

(30) *a.* *Aspectual structures*
States = s, a situation
Achievement = ⟨s, s′⟩
Activities = {⟨s, s′⟩, ⟨s′, s″⟩, ⟨s″, s′⟩, ⟨s″ . . .}

b. *Aspectual types*
BECOME: sets of states → sets of pairs of states
DO: sets of becomings → sets of sets of becomings having the same protagonist (McClure 1993: 316)

The aspectual hierarchy establishes a basic distinction between verbs denoting activities and achievements, which specify a Condition of Change in their lexical entry, and stative verbs, which do not. The pairs of changes characterizing achievements are directed and temporally ordered, whereas the changes characterizing activities are

[7] Accomplishments are not considered as a separate class because they are regarded as a particular type of activity leading to a conclusion. See Pustejovsky (1995) for similar arguments.

linked head to tail, in the sense that the final state of one change is the initial state of the next change, and all states have equal importance. Further, the changes are non-directed: every state can be either an onset or a result.

These logical aspectual structures are essentially constant across languages, although event conceptualization, which leads to the classification of individual predicates in one aspectual class or another, may vary from language to language. Variation (both within and across languages) arises from aspectual ambiguities, which are are common feature of many verbs, and is particularly frequent with statives. Statives, in fact, 'begin with almost no aspectual content' (McClure 1995: 131) and can therefore take on the aspectual properties of either achievements or activities compositionally, as indicated by the English examples in (31) and the Italian examples in (32).

(31) SPARKLE
- *a.* This kind of paint sparkles the most. (State)
- *b.* I've just seen that star sparkle. (Achievement)
- *c.* The stars sparkled all last night. (Activity)

(32) CONTINUARE ('continue')
- *a.* Il saggio è continuato alla pagina seguente. (State)
  the essay is continued on the page following
  'The essay continued on the following page.'
- *b.* Lo spettacolo è continuato alle tre. (Achievement)
  the show is continued at three o'clock
  'The show continued at three o'clock.'
- *c.* Il discorso ha continuato per ore. (Activity)
  the speech has continued for hours
  'The speech continued for hours.'

Many of the aspectual ambiguities exhibited by stative verbs, such as those exemplified in (33)–(35), may also be accounted for on the basis of their aspectual underspecification.

(33) Paola è vissuta/ha vissuto per tre anni a Parigi. (State/process)
Paola is lived/has lived for three years in Paris

(34) L'aiuola è fiorita/ha fiorito. (State/process)
the plant is blossomed/has blossomed

(35) La moda grunge è attecchita/ha attecchito in Italia. (State/process)
the grunge fashion is caught on/has caught on in Italy

Thus, states do not have a fixed mapping, as in Levin and Rappaport Hovav's model: rather, their syntactic status varies across languages according to the conceptualization they are given in a particular language, and within languages according to the interpretation they receive in a particular context.[8]

[8] A distinction between lexical and compositional unaccusativity is also central to Pustejovsky's Gen-

A step in the same direction is Rappaport Hovav and Levin's (1998) sketch of a generative theory of verb meaning, aimed at establishing the constraints underlying the flexibility exhibited by some verbs. Assuming a conventional theory of predicate decomposition, they provide a (potentially universal) inventory of lexical semantic templates corresponding to the basic event types:

(36) *a.* [x ACT ⟨MANNER⟩]
b. [x STATE]
c. [BECOME [x ⟨STATE⟩]]
d. [[x ACT] CAUSE [BECOME [y ⟨STATE⟩]]]
e. [x CAUSE [BECOME [y ⟨STATE⟩]]]

Constants may be paired with one of these event-structure templates via canonical realization rules, which must satisfy certain compatibility constraints. For example, the constant 'lengthen' is mapped onto the template (36*d*) to produce [[x ACT] CAUSE [BECOME [y ⟨LONG(ER)⟩]]]

Complex event structure may be built from simpler ones in an incremental, monotonic fashion. The mechanism responsible for these derived verb meaning is called Template Augmentation (Rappaport Hovav and Levin 1998): 'Event structure templates can be freely augmented up to other possible templates in the basic inventory of event structure templates.'

The operation of Template Augmentation is constrained by well-formedness conditions on syntactic realization, such as the Subevent Identification Condition, which requires that each subevent must be identified by a lexical head, and the Argument Realization Condition, which involves the presence of an argument in the syntax for each event structure participant.

Accomplishments may be derived from activity through Template Augmentation (*Mary swept the floow clean* from *Mary swept the floor*). The systematic ambiguity of some change-of-state verbs such as *blossom*, *wilt*, and *decay* between a stative and an eventive interpretation may also be regarded as an effect of Template Augmentation, which derives an achievement template from a basic state template. In contrast, achievement verbs have a rigid event template structure which cannot be augmented further (for example by adding another state) or turned into an activity template (which would create a non-existent structure [BECOME [x ACT⟨MANNER⟩]], which does not belong to the universal inventory of event structure templates). What this suggest is that stative verbs, but virtue of their less specified event structure, are more suscep-

erative Lexicon Theory. Within this theory, a set of generative devices operate on semantic representations of verbs, determining their 'event headedness', which in turn causes the foregrounding of particular event arguments: unaccusatives are right-headed predicates, for which the result state is the focus of interpretation; unergatives are left-headed predicates, for which the agentive cause of the event is in focus. While these devices can operate on unspecified lexical representations (such as *sink*) or inherently unergative predicates (*run*) to obtain derived unaccusative predicates compositionally, other unaccusatives (*arrive*, for instance) are specified as right-headed in the lexicon and are not subject to event-type shifts via semantic rules (see Pustejovsky and Busa 1995). I argue that it is precisely these verbs that are at the core of unaccusativity.

tible to shifts in interpretation, consistent with McClure's account and with the cross-linguistic facts.

The unresolved question is whether Template Augmentation and the other conditions on argument realization are lexical or interpretive operations. Ultimately, both projectionist and constructional theories recognize the need for a theory of the relationship between the meaning of verbs and the structures in which they can appear. Within a projectionist model, event structure templates are part of the lexical entry of verbs but, as Rappaport Hovav and Levin (1998) suggest, it may be incorporated in a constructional model as a post-lexical, checking mechanism.

9.7. CONCLUSION

The Auxiliary Selection Hierarchy provides a generalization that captures the systematic variation exhibited by intransitive verbs in their choice of auxiliary across a number of languages. By doing so, it offers a stronger empirical basis to a range of observations and data that had been presented in the literature on split intransitivity. The ASH also accounts for the developmental paths followed by second-language learners of Italian and French, who start acquiring auxiliary selection from core verbs and are more likely to retain non-native intuitions with respect to non-core verbs at advanced stages of development. Further research is needed to corroborate the still limited evidence that the ASH may underlie not only auxiliary selection but also other syntactic reflexes of split intransitivity. The ASH suggests that both a syntactic and a lexical characterization of split intransitivity is necessary to account for the complexity of the phenomenon: a syntactic characterization is needed to account in a general way for the distributional properties of unaccusative and unergative verbs; a lexical account is needed to explain the constraints that govern the lexicon–syntax interface and the variation that results from mapping one level onto the other. Neither existing projectionist nor constructional theories are able to do full justice to the pattern of variation represented by the ASH, because they do not incorporate a fully worked-out mechanism for checking possible and impossible pairings of lexical meanings and structural configurations. The evidence available so far indicates that a variant of the constructional approach that includes a specification of such mechanism may well become a solution to the problem: future research will tell whether this is the right track to follow.