Parameterized auxiliary selection
A fine-grained interaction of features and linking rules*

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Auxiliary selection is paradoxical: categorical for some verb classes, indeterminate for others; inconsistent across languages; and misaligned with other diagnostics. After critiquing one solution to the paradox, the Auxiliary Selection Hierarchy (Sorace 2000), we propose an alternative: Parameterized Linking, which approaches the semantic underpinnings of the unaccusative/unergative distinction and the syntactic-semantic mapping in a parameterized way. Languages can differ either in the Conceptual Structure features on which their linking rules are built – telicity, agentivity, locomotion – or on the linking rules they choose, or both, leading to different intransitive mappings. Using sets of parameterized, interacting, but still deterministic linking rules, the model can allow two features to produce a single continuum of gradience, predicting a hierarchy in auxiliary selection both within and across languages.

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o. Introduction

Three challenges have been raised to the classic view that auxiliary selection, in languages that exhibit it, is a syntactic diagnostic of intransitive verb class: (a) auxiliary selection does not always make the same split as other syntactic unaccusativity diagnostics; (b) within one language, a verb can choose different auxiliaries, or both, depending on the context; and, most strikingly, (c) across different languages, a verb in the same context can choose different auxiliaries. This article will focus on (b) and to a greater extent (c), the variation in auxiliary selection within and between two closely related languages, Dutch and German.

After Section 1 lays out some of the data that challenge auxiliary selection as a reliable verb class diagnostic, Section 2 introduces one proposal for resolving these apparent contradictions, Sorace’s Auxiliary Selection Hierarchy (ASH), and two experiments on German (Keller & Sorace 2003) that test it. Section 3 critiques the ASH proposal and experiments, then offers an alternative approach, Parameterized Linking, based on Conceptual Structure (CS) representations and linking rules. This approach incorporates semantic features similar to Sorace’s – but in a parameterized way – to account for the variation both within and across languages. Section 4 briefly reviews experimental evidence from Dutch and German for Parameterized Linking.

The final section briefly considers how Parameterized Linking offers the beginnings of a solution to the challenges faced by pure Projectionist or pure Constructionist models of the syntax-semantics interface, by bringing together aspects of the two models in a compatible way.

1. A brief review: Is auxiliary verb selection a reliable verb class diagnostic?

Since the Unaccusativity Hypothesis (Perlmutter 1978; Burzio 1986) identified two syntactic classes of intransitive verbs, auxiliary selection has been used as one diagnostic for distinguishing them, as shown for Dutch and German in (1). (For an overview, see Grimshaw 1987).

(1) unergatives unaccusatives
Dutch Ik heb gelachen. Ik ben vertrokken.
German Ich habe gelacht. Ich bin weggegangen.
'I have laughed' 'I am left'

As shown in (2): unergative verbs have an external argument at the Argument Structure (AS) level, which maps to subject position at d-structure (DS). Unac-
Auxiliary selection joins two other unaccusativity diagnostics for these languages, impersonal passivization and the attributive use of the past participle (Hoekstra 1984; Wunderlich 1985; Everaert 1986; Zaenen 1988, 1993; Grewendorf 1989; Hoekstra & Mulder 1990; Van Valin 1990; Seibert 1993; van Hout 1998). Impersonal passivization can apply to unergatives (3a) but not unaccusatives (3b), because it suppresses an external argument, which unergatives have but unaccusatives lack.

\begin{align*}
(3) & \quad \text{Dutch} \\
& \quad a. \quad \text{Er werd hardop gelachen.} \\
& \quad \quad \text{there was aloud laughed} \\
& \quad b. \quad \ast \text{Er werd stiekem verdwenen.} \\
& \quad \quad \text{there was sneakily disappeared} \\
& \quad \text{German} \\
& \quad a. \quad \text{Es wurde (von Peter) getanzt.} \\
& \quad \quad \text{it was (by Peter) danced} \\
& \quad b. \quad \ast \text{Es wurde (von Peter) gefallen.} \\
& \quad \quad \text{it was (by Peter) fallen}
\end{align*}

Conversely, the attributive use of the past participle applies to unaccusatives (4b) but not unergatives (4a), which lack a necessary underlying object.

\begin{align*}
(4) & \quad \text{Dutch} \\
& \quad a. \quad \ast \text{de gelachen leerlingen} \\
& \quad \quad \text{the laughed pupils} \\
& \quad b. \quad \text{de gevallen vaas} \\
& \quad \quad \text{the fallen vase} \\
& \quad \text{German} \\
& \quad a. \quad \ast \text{der geblutete Mann} \\
& \quad \quad \text{the bled man} \\
& \quad b. \quad \text{der ertrunkene Mann} \\
& \quad \quad \text{the drowned man}
\end{align*}

But as is well documented, these diagnostics do not always align. German unexpectedly forms an impersonal passive from fall in (5a), which according to (3b), is unaccusative (Zaenen 1988; Perlmutter 1978):

\begin{align*}
(5) & \quad \text{German} \\
& \quad \text{Es wurde von dem Schauspieler im richtigen Moment gefallen.} \\
& \quad \quad \text{there was by the actor in the right moment fallen}
\end{align*}
The attributive use of the past participle, though ungrammatical for *bleed* in (4a) and predicted to be grammatical for *fall*, gives opposite results in (6) and mixed results in (7) (Seibert 1993).

(6)  

**German**  

Der zu Tode geblutete Mann lag auf dem **Boden**.
the to death bled man lay on the ground

(7)  

**German**  

a. *das gefallene Kind  
the fallen child

b. das auf den **Boden** gefallene Kind
the onto the ground fallen child

c. das runtergefallene Kind
the downfallen child

And auxiliary selection is also problematic. A verb can switch auxiliaries depending on the subject, (8) (Keller & Sorace 2003) or other arguments it appears with, (9) (van Hout et al. 1993; Randall et al. 2004):

(8)  

**German**  

a. Die Taterin **hat/ist** betreten dagestanden.
the offender **HAS/IS** sheepishly there-stood

b. Der Korb **hat/ist** unbeachtet dagestanden.
the basket **HAS/IS** unnoticed there-stood.

(9)  

**Dutch**  

Marie **heeft** uren in het rond gerend.
Mary **HAS** run around for hours

**German**  

Paul & Rita haben in dem Saal getanzt.
Paul & Rita **HAVE** danced in the room

b. ***HAVE/BE**

**Dutch**  

Marie is in 5 **minuten** naar huis gerent.
Mary **IS** run home in 5 minutes

**German**  

Paul & Rita sind in den Saal getanzt.
Paul & Rita **ARE** danced into the room

Some verbs allow either auxiliary, such as (10) (Seibert 1993)² and (11) (van Hout et al. 1993).

(10)  

**German**  

a. Der Reis **hat/ist** gekocht.
the rice **AUX** boiled

b. Der Mann **hat/ist** geschwommen.
he **AUX** swum

c. Paul & Rita haben/sind getanzt.
Paul & Rita **AUX** danced

² Seibert (1993) also accepts *joggen* (jog) and *fahren* (drive), though one reviewer accepts only *tanzen*. 
(11) **Dutch** De temperatuur **heeft/is** 3 uurlang gestegen, maar is **toen** weer **gezakt**. The temperature **aux** 3 hours risen, but is then again dropped

Finally, and most strikingly, the same sentence can choose opposite auxiliaries even in closely related languages (Brinkmann 1992; van Hout et al. 1993; Randall et al. 2004):

(12) **Dutch:** John **heeft** urenlang door de zaal rondgedanst.
**German:** John ist **ist** stundenlang durch den Saal herumgetanzt.

John **aux** been dancing around the room for hours

Given these "unaccusative mismatches", how can these diagnostics be reliable indicators of verb class?

The explanation, according to most approaches, lies in semantic and aspectual characteristics of the verb and its arguments. Beneath the syntactic distinction that links "unergative" and "unaccusative" to external or internal position of an argument, the split has been tied to a number of semantic factors: telicity (Dowty 1991; Hoekstra 1984; Van Valin 1990; Tenny 1994; van Hout et al. 1993; van Hout 1998), transitionality /affectedness (Seibert 1993), change (van Hout et al. 1993); change over locations (Brinkmann 1995), directed change (Levin & Rappaport Hovav 1995), inferrable eventual position or state (Lieber & Baayen 1997); locomotion (Randall et al. 2004); and/or to properties of the subject: internal control (Levin & Rappaport Hovav 1992), internal/external/immediate causation (Levin & Rappaport Hovav 1995, and others). Considering these deeper properties is the key to resolving the seemingly contradictory data above.

2. The Auxiliary Selection Hierarchy: An approach to unaccusative mismatches

2.1 The theory: Two semantic dimensions in a hierarchy of verb types

Sorace (2000) proposed that auxiliary selection (and other syntactic behaviors) is sensitive to two of these "aspectual and thematic dimensions": (a) telic change, correlating with **be**, and (b) agentive unaffecting process, correlating with **have**. Based on these she formulates a hierarchy of verb types, in (13).


4. Some investigators have abandoned the syntactic distinction altogether, claiming that the split is due to semantic differences alone. (Van Valin 1990; Dowty 1991; Seibert 1993; Lieber & Baayen 1997).
According to Sorace, core change-of-location verbs denote telic change; core non-motion controlled process verbs denote agentive activity in which the subject is unaffected. These categories tend to make categorical auxiliary choices. Intermediate classes "incorporate telicity and agentivity to lesser degrees," and "tend to have a less specified (basically stative) event structure". They exhibit variation and inconsistency in auxiliary selection, both within and across languages, the degree correlating with their position on the hierarchy.

Sorace cites evidence for her model from core and intermediate verbs. First, verbs at the top and bottom of the hierarchy, such as arrive in (14), and work in (15), are consistent across languages.

(14) **Italian** a. Maria è arrivata in ritardo.
    **Dutch** b. Marie *is* *laat* gekomen.
    **German** c. Marie *is* spat angekommen.
'Mary *is* arrived late'

(15) **Italian** a. I poliziotti *hanno* lavorato tutta la notte.
    **Dutch** b. De politieagenten *hebben* de hele nacht gewerkt.
    **German** c. Die Polizei *hat* die ganze Nacht gearbeitet.
    the policemen *have* worked all night

Second, within languages, core verbs' auxiliary choices are not affected by other sentential elements: the core unaccusative verb, fall, takes *be* even with an agentive subject:

(16) **German** Der Apfel/Peter *ist* gefallen.
    the apple/Peter *is* fallen

Third, the intermediate categories vary both within and across languages. Continuation of state verbs like last and continue prefer *have* in Dutch and German but *be* in Italian, though they allow *have* with agentive subjects (Sorace 2004: 259; 2000: 867–868).
Parameterized auxiliary selection

(17) **Dutch**  a. Het concert heeft/is een hele tijd geduurd.
   the concert HAS/IS a long time lasted

**German**  b. Die Apfel haben/²sein den ganzen Winter gehalten.
   the apples HAVE/²ARE the whole winter lasted

(18) **Italian**  a. Il dibattito è continuato.
   the debate IS continued

   b. Il presidente ha/è durato in carica due anni.
   the president AUX lasted in post two years

   c. Mario ha continuato.
   Mario HAS continued

Existence of state verbs require HAVE in Dutch (19a) and German (b) but BE in Italian (c).

(19) **Dutch**  a. Het magische zwaard heeft echt bestaan.
   the magic sword HAS really existed

**German**  b. Die Dinosaurier haben wirklich existiert.
   the dinosaurs HAVE really existed

**Italian**  c. I vampiri non sono mai esistiti.
   the vampires NOT ARE never existed

Uncontrolled processes\(^5\) (20) select HAVE in Dutch (a) and German (b) but vary in Italian (c):

(20) **Dutch**  a. De zon heeft geschenen.
   the sun HAS shone

**German**  b. Der Zug hat laut gerumpelt.  (K&S 2003: 25)
   the train HAS noisily rumbled

**Italian**  c. Il tuono ha/è rimbombato.  (from Sorace 2004)
   the thunder AUX rumbled

Finally, controlled process motion verbs in (21) select BE with a telic PP, (b), but select HAVE when the motion is construed as not involving a transition, (a):

(21)  a. HAVE/*BE

   **Italian**  Luigi ha corso velocemente
   Luigi HAS run fast

   **Dutch**  Max heeft uren in het rond gerend.
   Max HAS run around for hours

   **German**  Paul & Rita haben in dem Saal getanzt.
   Paul & Rita HAVE danced in the room

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5. These are internally caused but non-agentive, with no volitional 'actor':
b. *HAVE/BE

<table>
<thead>
<tr>
<th>Language</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italian</td>
<td>Luigi è corsa alla stazione</td>
</tr>
<tr>
<td></td>
<td>Luigi IS run to the station</td>
</tr>
<tr>
<td>Dutch</td>
<td>Max is in 5 minuten naar huis gerent.</td>
</tr>
<tr>
<td></td>
<td>Max IS run home in 5 minutes</td>
</tr>
<tr>
<td>German</td>
<td>Paul &amp; Rita sind in den Saal getanzt.</td>
</tr>
<tr>
<td></td>
<td>Paul &amp; Rita ARE danced into the room</td>
</tr>
</tbody>
</table>

2.2 Experimental evidence: Keller & Sorace (2003)

Sorace cites further evidence for the Auxiliary Selection Hierarchy (ASH) from experimental work. Two studies (Keller & Sorace 2003) focused on German.

2.2.1 Experiment 1

In Experiment 1, native German speakers judged the relative acceptability of sentences across 8 verb classes, (22).^6^7

(22) Auxiliary Selection Hierarchy (Keller & Sorace 2003)

<table>
<thead>
<tr>
<th>B</th>
<th>Change of location</th>
<th>abreisen</th>
<th>'depart'</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b) Change of state</td>
<td>versterben</td>
<td>'die'</td>
</tr>
<tr>
<td>(b)</td>
<td>(c) Continuation of a pre-existing state</td>
<td>verweilen</td>
<td>'stay'</td>
</tr>
<tr>
<td>(c)</td>
<td>(d) Existence of state (position)</td>
<td>schweben</td>
<td>'hover'</td>
</tr>
<tr>
<td>(d)</td>
<td>(e) Uncontrolled process (involuntary reaction)</td>
<td>tauen</td>
<td>'stagger'</td>
</tr>
<tr>
<td>(e)</td>
<td>(f) Uncontrolled process (emission)</td>
<td>klappern</td>
<td>'rattle'</td>
</tr>
<tr>
<td>(f)</td>
<td>(g) Controlled process (motion)</td>
<td>rennen</td>
<td>'run'</td>
</tr>
<tr>
<td>(g)</td>
<td>(h) Controlled process (non-motion)</td>
<td>reden</td>
<td>'talk'</td>
</tr>
</tbody>
</table>

For each class, 16 test sentences were constructed using 8 German verbs and the two auxiliaries. Each subject saw 16, two from each class. Seven of the eight classes had animate subjects. (Class (f) had inanimate subjects.) (23) illustrates a test sentence of class (f), which was presented with one of the two auxiliaries.

(23) Der Zug hat/ist laut gerumpelt.
the train AUX noisily rumbled

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6. In a "magnitude estimation" task, 54 subjects (mean age, 28) assigned each stimulus a number representing acceptability relative to a previously presented "modulus item". The study also tested impersonal passives and investigated dialectal variation, which I will not discuss here.

7. The 8 classes were formed from the 7 in (13) by splitting the uncontrolled process verbs into two types: (e) involuntary reaction and (f) emission. Class (e) contained both motion ('stagger') and non-motion ('shiver'). Class (d) was limited to position verbs.
According to Keller & Sorace, the ASH makes two predictions:

(24) a. Auxiliary selection will be categorical for core verbs and gradient for intermediate verbs.

b. Subjects will prefer be for transitions and states and have for atelic processes.

(24a) follows from the Hierarchy: class (a) should elicit be and class (h), have. Classes (b)–(g) should elicit weak preferences, if any. However, prediction (24b) is problematic. States, and all transitions but change-of-locations, being intermediate, should elicit have, not be. We will return to this in Section 2.3.2, below.

The results, in the left-most column of (25), showed that the two core classes, (a) and (h), behaved as predicted. However, for the intermediate classes, all but (d) significantly preferred one auxiliary over another. (The lower case "have" for class (e) indicates that the preference was weak.)

(25) Results of Experiment 1

<table>
<thead>
<tr>
<th>BE</th>
<th>B</th>
<th>(a) Change of location</th>
<th>abreisen 'depart'</th>
</tr>
</thead>
<tbody>
<tr>
<td>BE</td>
<td>(b) Change of state</td>
<td>versterben 'die'</td>
<td></td>
</tr>
<tr>
<td>HAVE</td>
<td>(c) Contin. of pre-existing state</td>
<td>verweilen 'stay'</td>
<td></td>
</tr>
<tr>
<td>no prefer.</td>
<td>(d) Existence of state(position)</td>
<td>schweben 'hover'</td>
<td></td>
</tr>
<tr>
<td>have</td>
<td>(e) Uncontr. process (invol. react.)</td>
<td>taumeln 'stagger'</td>
<td></td>
</tr>
<tr>
<td>HAVE</td>
<td>(f) Uncontr. process (emission)</td>
<td>zittern 'shiver'</td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td>(g) Controlled process (motion)</td>
<td>klappern 'rattle'</td>
<td></td>
</tr>
<tr>
<td>HAVE</td>
<td>(h) Controlled process(non-motion)</td>
<td>rennen 'run'</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>reden 'talk'</td>
<td></td>
</tr>
</tbody>
</table>

2.2.2 Experiment 2

To investigate the unexpected strong preferences among the intermediate verbs in Experiment 1, Keller & Sorace ran a follow-up, Experiment 2, on 66 subjects, using the same procedure, instructions, and design, but modified materials. Experiment 2 also tested two assumptions that they claim are inherent in the ASH:

(26) Assumptions

(a) For core verbs, auxiliary selection is exclusively determined by the verb's inherent lexical-aspectual features. Moving from the core, verbs become increasingly sensitive to other characteristics of the verb and non-lexical features of the predicate.

(b) While telicity is the main factor separating be and have verbs, agentivity further distinguishes among have verbs.

8. Overall, the results showed a significant interaction of auxiliary and verb class, indicating that the verb classes differ in their auxiliary selection behavior.
It is possible that in Experiment 1, class (b), change-of-state verbs, may have strongly preferred BE because it included telic (erscheinen 'appear') with atelic (wachsen 'grow') verbs. Experiment 2, whose predictions are shown in (27), split these classes into: (k), atelic verbs (rostenn 'rust'), which become telic when prefixed, (j) (verrosten 'rust'). The prefixed (j) forms were predicted to invoke BE more than the unprefixed (k) forms.

Class (c), continuation-of-state verbs, may have elicited a preference for HAVE due to animacy, which they expected was relevant for all the intermediate classes. To test this, Experiment 2 changed the subjects of class (c) and (d) to inanimate, (l) and (m), which should elicit weaker preferences for HAVE.

For (e), uncontrolled process (involuntary reaction) verbs', which also elicited HAVE, they noted that the class collapsed two subtypes: motion, taumeln ('stagger'), and non-motion, zittern ('shiver'). Since for German, motion, not telicity, has been claimed to be the relevant factor for unaccusativity (van Hout et al. 1993; Randall et al. 2004), Experiment 2 used only non-motion verbs (o). If the motion verbs raised the BE responses in Experiment 1, type (o) verbs should drop it.

In addition to the six modified classes, the two core classes (i), (p), served as controls. (27) shows the 8 classes, (i)–(p), the classes of Experiment 1 that they correspond to, the predicted auxiliaries and, in the leftmost column, the results. Again, weaker preferences are in lower case:

(27) Predictions and Results of Experiment 2

<table>
<thead>
<tr>
<th>Results</th>
<th>Predictions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BE</strong></td>
<td></td>
</tr>
<tr>
<td>BE</td>
<td>[i] change of location [+animate] 'depart'</td>
</tr>
<tr>
<td>BE</td>
<td>[j] change of state (prefix) [−animate/ 'grow up' +telic]</td>
</tr>
<tr>
<td>no pref.</td>
<td>[k] change of state (no prefix) [−animate/ 'grow' −telic]</td>
</tr>
<tr>
<td><strong>HAVE</strong></td>
<td></td>
</tr>
<tr>
<td>HAVE</td>
<td>[l] continuation of state [−animate] 'continue'</td>
</tr>
<tr>
<td>no pref.</td>
<td>[m] existence of state (position) [−animate] 'hover'</td>
</tr>
<tr>
<td>no pref.</td>
<td>[n] existence of state (position) [+animate] 'hover'</td>
</tr>
<tr>
<td>have</td>
<td>[o] uncontrolled process (-motion) [+animate] 'shiver'</td>
</tr>
<tr>
<td><strong>HAVE</strong></td>
<td></td>
</tr>
<tr>
<td>HAVE</td>
<td>[p] controlled process (-motion) [+animate] 'talk'</td>
</tr>
</tbody>
</table>

9. Recall that with animate subjects, position verbs mean "act (volitionally) to maintain a position", while with inanimate subjects, they mean "be in a position" and, as shown in (8), prefer different auxiliaries. This intuition is confirmed in English: only (8a) passes the Actor test (Jackendoff 1990: 126):

(i)  a. What the offender did was stand there sheepishly.
    b. *What the basket did was stand there unnoticed.

10. Again, the results (from 66 subjects) showed a significant interaction of auxiliary and verb class.
Considering the two sets of results together, consistent with (26a), the "core" classes yielded the clearest judgements" and most indeterminate were the intermediate existence of state classes (d, m, n). However, counter to (26) were the BE results for class (bl), telic change-of-state verbs, and the lack of an animacy effect either for (c) vs. (l) continuation of state or (m) vs. (n) position verbs. Overall, these results point to telicity as a factor in auxiliary selection, but not animacy. An important but unexpected finding, which we will return to below, was that class (g) controlled process motion verbs in Experiment 1 selected BE just as categorically as core change-of-location verbs (bl). Keller & Sorace adopt the suggestion (van Hout et al. 1993; Randall et al. 2004) that in German "locomotion" (motion involving displacement) is what determines unaccusativity for change-of-location verbs. This is supported by uncontrolled process verbs, (e), whose weak preference for HAVE strengthened once motion verbs were removed in (o).

2.3 Questions and issues

A number of questions arise both from the ASH as a model of auxiliary selection and from Keller & Sorace’s experiments to test it.

2.3.1 Two features – one hierarchy

One issue is how to encode two features on a one-dimensional continuum. The ASH ranks verbs on telicity. But telicity and agentivity are not inversely related: verbs can be [+telic +agentive]. To address this, Sorace weights telicity more, claiming in (26b) that agentivity matters only for [−telic] verbs. But this weighting does not follow from the Hierarchy. (And it may not be true; core telic verbs were only tested with [+animate] subjects.)

2.3.2 Contradictory assumptions?

Intermediate verbs should have weak preferences or none. Yet (24b) claims that states (c, d) and change-of-states (b), being transitions, should elicit BE. And the goal of Experiment 2 was to show preferences among the intermediate verbs based on agentivity. Moreover, if agentivity is a factor in the intermediate verbs, then why is class (f), which requires [−agentive] subjects lower on the hierarchy than

11. However, strikingly, in both experiments, both core verb classes elicited some opposite responses and in Experiment 1, change-of-location verbs (a) elicited more HAVE responses than change-of-state (b) verbs. See Keller & Sorace (2003) for details.

12. However, the weak vs. strong HAVE responses in (o) vs. (p) suggests that while [±animate] is not relevant, a feature like [±agent] or [±actor] is. But the lack of an effect in the other classes differing on this feature (l) vs (c), (m) vs. (d), and (j) vs. (b), is still not explained.
(e), which can take [+agentive] subjects? And why was no experimental evidence for agentivity found?

2.3.3 More features?
As mentioned in Section 2.2.2 above, the strong preference of class (g) [−telic] motion verbs for be, counter to its ranking, led Keller & Sorace to adopt our proposal that [± locomotion] is a relevant feature for distinguishing verb class in German. But how would a third feature fit into the Hierarchy?

2.3.4 "Gradient" auxiliary selection?
For non-core verbs, Keller & Sorace predict "gradient auxiliary selection": "what is gradient are the lexical-aspectual representations of individual verbs, which make them compatible with unergative or unaccusative syntax or both." (K&S Fn.3) Does each verb have two representations? An underspecified representation? Sorace (2004) says that we need a model that explains why gradience exists in the non-core verbs. The ASH describes the output of such a model, but it is not the model itself.

2.3.5 "BE-verbs" and "HAVE-verbs"?
The ASH classifies only the two core classes as true HAVE or BE verbs; only change-of-location verbs, (a), are core telic verbs. But class (b) change-of-state verbs are also telic and patterned just like class (a) verbs in Experiment 1. According to (26b), telicity separates BE from HAVE verbs; agentivity distinguishes among HAVE verbs. In more recent work, Sorace (2004:1) says: "languages may have different cut-off points along the hierarchy." But the ASH, at this point, does not integrate this suggestion.

2.3.6 Known verbs
One final issue is methodological. The experiments testing the ASH used actual verbs. But German, one reviewer suggests, may have some frozen auxiliaries. If so, then the actual factors underlying unaccusativity for German speakers would be better revealed by experiments using made-up verbs.

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13. See Lee-Schoenfeld (this volume), who takes the position that auxiliaries in German are to a large degree frozen, and not indicators of verb class.
3. Parameterized **Linking**: An alternative **account**

We now turn to an alternative proposal for resolving the auxiliary selection challenges mentioned above: (a) inconsistent diagnostics, (b) language-internal variation and indeterminacy, (c) cross-linguistic auxiliary differences and (d) frozen auxilaries. This approach, Parameterized **Linking**, shares some features of the ASH but avoids many of its shortcomings.

3.1 Linking rules, compositional linking, and language-internal variation

Underlying the syntactic distinction between unaccusatives and unergatives is a difference in the positions of their arguments at the level of Argument Structure (AS), as shown in (2). But these arguments are mapped to their AS positions by linking rules, from the level of Conceptual Structure (CS), as shown in (28) (Jackendoff 1990; Carrier & Randall 1993; Randall forthcoming).

\[
\begin{align*}
(28) & \quad \text{unergative} & \quad \text{unaccusative} \\
S-structure: & \quad [\text{NP we }] & \quad [\text{NP we }] \\
D-structure: & \quad [\text{NP we }] & \quad [\text{NP we }] \\
agebra argument structure: & \quad (a) & \quad (a) \\
conceptual structure: & \quad [P(x)] & \quad [R(y)]
\end{align*}
\]

CS encodes semantic representations, consisting of predicates, symbolized by variables (P, R) and their arguments (x, y) and it is at this level where semantic/aspeuctal features are registered. The distinct AS linkings result from differences in these features, which the linking rules are tied to. We can see how linking works by beginning with linking rules for two features: [actor]\(^{14}\) and [telic].\(^{15}\)

---

14. This is Sorace's [agent], and we will use the terms [actor] and [agent] interchangeably throughout, setting aside their differences. These features also roughly correlate with: [control], [internal cause], [no direct external cause], [volitional cause]. Space prevents us from discussing the differences among them, which are not relevant here (see, for example, Jackendoff 1990).

15. So far, because our discussion of telicity has been in the context of Sorace's work, we have been using the term 'telic' as she has. However, it is used in different ways in the literature. From here on, we will use it in its classic sense: a telic event is one that has an intrinsic endpoint. Atelic events are simply processes without outcomes that can stop at any time; they have arbitrary final endpoints (see Comrie 1976; Smith 1997: 19). (van Hout (1998), in contrast, considers as telic not just events that reach endpoints but all event types with a moment of temporal transition, including inchoative and causative events.)
The Actor Linking Rule, (29), applies in predicates that contain $\text{ACT}$. It links the CS argument of this predicate, $x$ (an "actor"), unergatively, to the external AS position. CS actors pass the "actor test" (Jackendoff 1990): What John did was: sing, dance (on the table), *arrive, *disappear.

(29) Actor Linking Rule (laugh, sing, dance (on the table))

\[
\begin{align*}
\text{AS:} & \quad a \quad (\quad ) \\
\text{CS:} & \quad \left\{ \begin{array}{l}
\text{DO} (x) \\
\text{ACT}
\end{array} \right.
\end{align*}
\]

The Actor Linking Rule links (30) unergatively in both Dutch and German.

(30) Dutch: John heeft urenlang op de tafel gedanst.
German: John hat stundenlang auf dem Tisch getanzt.

John has been dancing on the table for hours.

Telic predicates contain $\text{INChoative BE}$, which means "come to be" (Jackendoff 1990) and is sometimes expressed as $\text{BECOME}$. The Telicity Linking Rule, (31), links an argument, $x$, that comes to be at a new place or state unaccusatively, to an internal AS position.

(31) Telicity Linking Rule (arrive, appear, dance into the room)

\[
\begin{align*}
\text{AS:} & \quad (a) \\
\text{CS:} & \quad \text{INC BE} (x, \text{AT} \ldots )
\end{align*}
\]

(31) applies to all verb CSs containing $\text{INC BE}$ (arrive, appear). But it also applies when the INC BE is supplied by a PP, as in dance into the room, in (32).

(32) Dutch: John is in 2 sekonden de kamer in gedanst.
German: John ist in 2 Sekunden ins Zimmer getanzt.

John danced into the room in 2 seconds.

To form the CS of the VP, the CS of $[\text{+telic}]$ dance in (33) combines with the CS of into in (34), a two-place predicate containing $\text{INC BE}$ (Carrier & Randall 1993). The $[\text{-telic}]$ result, in (35), means: “go into the room by dancing” with the CS for dance subordinated under the CS for into:

(33) \[\text{dine} \quad \left\{ \begin{array}{l}
\text{DO}_{[\text{+motion}]} (z) \\
\text{ACT}
\end{array} \right.\]

(34) \[\text{into} \quad \text{INC BE} (x, \text{AT} (y))\]
Linking proceeds hierarchically from the highest clause. INC BE triggers the Telicity Linking Rule and the entire VP links unaccusatively. Notice that although the Actor Rule is also satisfied in (35) by the presence of \textit{ACT}, the geometry of CS prevents it from applying. As a result, dance links differently depending on the arguments it appears with, resulting in the different auxiliaries in (30) and (32). We now have an explanation for the first challenge with which we began, how a single verb can choose opposite auxiliaries in the same language.

Notice that there is no inherent relationship between the features [telic] and [agent] or the rules based on them. But a hierarchical weighting is imposed on them by the geometry of CS, with the result in (36).

\begin{equation}
\text{(36)}
\end{equation}

All [+telic] predicates (e.g., dance into the room), to the left of A, link unaccusatively. [+agent] predicates, provided they are [−telic] (e.g., dance on the table), to the right of B, link unergatively. Predicates between the lines are either indeterminate or are linked with a default rule. We discuss these possibilities below. Notice that the inherent weighting in (36), interestingly, coincides with Sorace’s assumption (26b) that [±agent] affects auxiliary choice only for [−telic] predicates. But here it does not have to be stipulated. And her distinction in (26a) between fixed "core verb" outcomes (outside the lines) and variable "intermediate verb" outcomes (between the lines) also falls neatly out of this two rule system.

### 3.2 Cross-linguistic variation: Parameterized linking rule systems

Interactions among linking rules can also explain seeming contradictions in auxiliary selection across languages. The Locomotion Linking Rule, (37), applies to CSs containing [+locomotion] to link an argument, x, internally.\(^{16}\)

\(16\). This rule should be taken as a first approximation, since probably the [+location] feature in \textit{dance around the room} is not affixed to the DO function of the verb but is in the higher clause.
(37) Locomotion Linking Rule  (dance into the room, dance around the room)
AS:

Locomotion predicates, like telic predicates, are derived compositionally, depending on the PP. They include both [+telic] predicates, dance into the room, and [-telic] predicates, dance around the room, but not dance on the table or wiggle, which involve motion, but not locomotion.

Recall that Dutch and German, though matched on the auxiliaries for [+telic] sentences like (32) and [-telic] sentences like (30), are not completely aligned. (38) (=12) takes HAVE in Dutch and BE in German.

(38) Dutch:  John *heeft urenlang* door de zaal rondgedanst.
German:  John *ist* stundenlang durch den Saal herumgetanzt.
John AUX been dancing around the room for hours

(38) is not telic like (32). So the Telicity Linking Rule does not apply. However it is [+locomotion], whereas (30) is [-locomotion]. The three cases are shown in (39):

(39)

contributed by the PP. What is important here is that the rule is triggered by a [+locomotion] feature in the predicate.

17. These denote no endpoint or necessary transition: Mary can "dance around the room" and end up where she started.
This difference would result if the languages used two different features – and two different linking rules – to split these manner-of-motion intransitives, Dutch, telicity; German, locomotion.

The Locomotion Linking Rule does not replace the Telicity Linking Rule in German. For change-of-state predicates, (40), German, like Dutch, uses telicity.

(40) a. *Dutch* De klei heeft in de zon gedroogd.  
    *German* Der Ton hat in der Sonne (die ganzen Tag) getrocknet.  
    the clay *has* in the sun (the whole day) dried

b. *Dutch* De klei is in de felle zon helemaal uitgedroogd.  
    *German* Der Ton ist in der *glühenden* Sonne ausgetrocknet.  
    the clay *is* in the blazing sun out-dried

The effect is clear in cases like (41), which change telicity with a prefix:

(41) a. *Dutch* De man heeft gebloed.  
    *German* Der Mann hat geblutet.  
    the man *has* bled

b. *Dutch* De man is doodgebloed.  
    *German* Der Mann ist verblutet.  
    the man *is* bled to death

The sets of rules are parameterized across the two languages; German selects both, Dutch only one:

(42)  

<table>
<thead>
<tr>
<th></th>
<th>Dutch</th>
<th>German</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telicity Linking Rule</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Locomotion Linking Rule</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

So while Dutch can be characterized by the tree in (36), German requires the additional [locomotion] feature, as in (43).  

---

18. One question arises about (38). The Locomotion Linking Rule clearly applies, not the Actor Linking Rule, though the predicate contains ACT and CS geometry does not appear to be embedding ACT under [+locomotion] to rank these rules. This raises the possibility that when the geometry of CS allows two linking rules to apply, they may be extrinsically ordered. We leave this to further investigation.
Notice that this tree, with two cuts, essentially depicts Keller & Sorace’s data in (25) and (27): all motion verbs, whether [+telic] (a–i) or [−telic] (g), as well as [+telic] change-of-state verbs (b, j), all falling to the left of A, select \textsc{be}; non-motion controlled processes [−telic] [+agent], (h, p) strongly select \textsc{have}. But uncontrolled processes, (o), which fall between the lines, show a weaker preference.

Though (43) appears to account for German, the complete picture may be even more complex. Linking rules could be built on finer semantic distinctions, which would make additional cuts in the motion verbs: directed change (Levin & Rappaport Hovav 1995) or inferrable eventual position or state “[ieps]” (Lieber & Baayen 1997). It so, auxiliary selection would vary cross-linguistically depending on which features a language used, as shown in (44).
And while some languages might use additional rules, it is possible that the Telicity Linking Rule is universal. This would produce the invariant behavior of Sorace’s core telic verbs across languages.¹⁹

Linking rules in other semantic domains could also be built on a range of features that languages could choose from, as in (45).²⁰

The difference in (46a) and (47a) (Sorace 2000), for example, suggests that Italian and German split uncontrolled process verbs along different lines, either as a result of using different features or of using linking rules in a different way.

(46)  
Italian a. Il tuono ha rimbombato. (from Sorace 2004)  
the thunder **aux** rumbled

German b. Der Zug hat laut gerumpelt. (K&S 2003: 25)  
the train **has** noisily rumbled

(47)  
Italian a. Paolo ha riso fino a sentirsi male.  
Paolo **has** laughed until he felt sick

German b. Paul hat gelacht.  
Paul **has** laughed

¹⁹. It would also explain our experimental findings that in selecting auxiliaries for locomotion verbs, German 4-year olds behave like Dutch speakers, not like German adults, incorrectly using telicity instead of locomotion as the relevant feature (Randall et al. 2004).

²⁰. We are not distinguishing between actor and agent here, though a thorough discussion of these features would. On the distinction between agents and causers (non-volitional initiators), see Arad (1998).
And (45) could also account for indeterminate auxiliary choice as in (46a). If Italian uses an Actor Linking Rule linking [+ACT] predicates externally and an Internal Cause Linking Rule linking [−INTERNAL CAUSE] predicates internally, then all other predicates, falling between the INTERNAL CAUSE and ACTOR splits, would be indeterminate.

Another parameter emerges from how languages formulate linking rules. Stative existence verbs, (48), (from (19), above) are unaccusative in English and Italian but unergative in Dutch and German.

(48) English a. There exist three versions of the manuscript.
    Italian b. I vampiri non sono mai esistiti.
            the vampires not be never existed
            'Vampires never existed.'
    Dutch c. Het magische zwaard heeft echt bestaan.
            the magic sword have really existed
    German d. Die Dinosaurier haben wirklich existiert.
            the dinosaurs have really existed

The same basic Existence Linking Rule could be built on the semantic primitive be, set to link in two different ways, the Italian/English rule internally, the Dutch/German rule, externally.

(49) Existence Linking Rules (exist, seem, belong)
    a. Italian, English
       AS: (a)
       CS: Be (x, AT ...)
    b. Dutch, German
       AS: a
       CS: Be (x, AT ...)

3.3 Where linking rules do not decide: Indeterminate linking, default linking, multiple CSs and competing rules

We have shown how the interaction of linking rules in the Parameterized Linking approach produces the cross-linguistic Dutch/German contrast in (40). Where no rules apply, for cases that fall between the lines in (36) and (43), we have predicted indeterminate auxiliary selection. However, there is another possibility: linking could be assigned by default, as in the unaccusative "Default Linking Rule" proposed for English and Italian (Levin & Rappaport Hovav 1995). In (9), repeated in (50), where there is no possibility in (a) of a [+actor] feature, this could account
for a preference for \textit{be} in Italian. (The acceptability of \textit{have} in (b,c) exists to the extent that a [+actor] reading is possible.\textsuperscript{21}

\begin{equation}
\textit{Italian} \begin{align*}
\text{a. } \text{Il dibattito } & \text{è continuato.} \\
\text{The debate } & \text{is continued} \\
\text{b. } \text{Il presidente } & \text{ha} \text{t durato in carica due anni.} \\
\text{the president } & \text{lasted in post two years} \\
\text{c. } \text{Mario } & \text{ha} \text{ continuato.} \\
\text{Mario } & \text{has continued}
\end{align*}
\end{equation}

In contrast, Dutch and German, which select \textit{have} for the same class of verbs, as shown in (18), above, could have an unergative Default Linking Rule. This would explain the clear choice of \textit{have} in (51a), which is [-telic][-agent] (in contrast to [+telic] (51b), which selects \textit{be}):\textsuperscript{22}

\begin{equation}
\textit{Dutch} \begin{align*}
\text{a. } \text{Het water } & \text{heeft uurenlang langs de muren gelopen.} \\
\text{the water } & \text{has hours-long along the walls walked} \\
\text{b. } \text{Het water is } & \text{binnen een minuut de zee ingelopen.} \\
\text{the water } & \text{is within a minute the sea in-walked}
\end{align*}
\end{equation}

A Default Linking Rule also offers a second possible explanation for the difference in (48). If some or all of these languages had no Existence Linking Rule, then differently set Default Linking Rules, unaccusative for \textit{English/Italian} (a, b) and unergative for \textit{Dutch/German} (c, d), would produce the same results.

Cases that a Default Linking Rule cannot explain are (52) (=10) and (53) (=11), where both auxiliaries are allowed. If German and Dutch had an unergative (or even an unaccusative) Default Linking Rule, then these should unambiguously select one auxiliary.

\begin{equation}
\textit{German} \begin{align*}
\text{a. } \text{Der Mann } & \text{hat/ist geschwommen.} \\
\text{the man } & \text{has/swum} \\
\text{b. } \text{Paul } & \text{& Rita haben/sind getanzt} \\
\text{Paul } & \text{& Rita have/danced} \\
\text{c. } \text{Der Reis } & \text{hat/ist gekocht.} \\
\text{the rice } & \text{has/swum}
\end{align*}
\end{equation}

\begin{equation}
\textit{Dutch} \begin{align*}
\text{De temperatuur } & \text{heeft/is 3 uurlang gestegen, maar is toen weer gezakt.} \\
\text{the temperature } & \text{has/3 hours risen, but is then again dropped}
\end{align*}
\end{equation}

\textsuperscript{21} Durato in (b) may be ambiguous like English stay, which can have a volitional reading.

\textsuperscript{22} van Hout (1998), the source of these examples, claims that the choice of \textit{have} here argues against the [+agent] feature. But as is clear, the result arises naturally from the interaction of ranked Telicity and Agent rules and a \textit{have} default for [-agent] predicates.
The explanation here comes from an ambiguity in whether or not a transition has occurred (Rosen 1984; Seibert 1993). The two interpretations for each verb correspond to two different CSs. The CS of *cook*, on its telic change-of-state interpretation, contains INC BE, and links unaccusatively with the Telicity Linking Rule. *Swim* and dance, if conceptualized as [+locomotion] predicates, will link unaccusatively with the Locomotion Linking Rule. On their process interpretations, these verbs contain neither INC BE nor [+locomotion], so ACT in their CSs will trigger unergative linking with the Actor Linking Rule.

Notice that invoking multiple CSs for these verbs does not run into the problem cited for "Projectionist" theories of the syntax-lexicon interface that assign each verb a different CS for every syntactic context that it appears in.23 They would assign run one CS for run around the woods, another for run in the woods, a third for run into *the* woods and so on, and would do so for every manner-of-motion verb whose auxiliary shifts with its PP. We are invoking double listing only when the verb itself has two readings.

Though we will not explore this issue here, one more source of indeterminacy language-internally may be linking conflicts. It is possible that features that trigger two opposite linking rules are both present at the same CS level. If there is no weighting between them, then both auxiliaries may surface.

3.4 Parameterized linking rules and inconsistent diagnostics

A final challenge that Parameterized Linking can answer is conflicting diagnostics within a language. Recall that German auxiliary selection does not always line up with impersonal passivization (IP). Fall takes BE, even with a [+agent] subject, because it is linked as an unaccusative, by either the Telicity or Locomotion Linking Rule.

(54) German Der Apfel/Peter ist gefallen. the apple/Peter is fallen

IP has been claimed to apply to unergative verbs, like (55), but not unaccusatives, because it requires an external argument. So *fall* should block IP, as in (56a).

(55) German a. Es wurde (von Peter) getanzt it was (by Peter) danced

Dutch b. Er werd hardop gelachen There was aloud laughed

Parameterized auxiliary selection

(56)  

German  a.  *Es wurde (von der Apfel/von Peter) gefallen.
     it was (by the apple/by Peter) fallen

Dutch  b.  *Er werd stiekem verdwenen.
     there was sneakily disappeared

But fall allows IP when the subject is a volitional agent:

(57)  

Es wurde von dem Schauspieler im richtigen Moment gefallen.
     there was by the actor in the right moment fallen

This would be explained if Impersonal Passivization in German used a different feature from auxiliary selection. If what matters for IP is solely [+agent], it will apply to verbs with either linking pattern – provided they have ACT in their CS. The results of one test will cross-cut the other, but now no conflict arises.

If this is the case, then verbs like dance, which as we saw, link unergatively with some PPs, (58a), but unaccusatively with others, (58b, c), should form impersonal passives across all PPs as long as they have an agentive meaning. This prediction is borne out, as the corresponding IP cases in (59) show.

(58)  

German  a.  Paul & Rita haben in dem Saal getanzt.
     'Paul & Rita HAVE danced in the room.'
   b.  Paul & Rita sind in den Saal getanzt.
     'Paul & Rita ARE danced into the room.'
   c.  John ist stundenlang durch den Saal herumgetanzt.
     'John IS been dancing around the room for hours.'

(59)  

a.  Es wurde in dem Saal getanzt.
   b.  Es wurde in den Saal hineingetanzt.
   c.  Es wurde durch den Saal getanzt.

That [agent] is the relevant feature for IP has also been claimed for Dutch (Pollman 1970; cited in van Hout 1998). Whistle in (60), though compatible with both [+agent] and [-agent] subjects (a), is unambiguously [-agentive] in the impersonal passive, (b):

(60)  

Dutch  a.  Piet/De ketel floot.
     Piet/the kettle whistled
   b.  Er werd gefloten.
     somebody/*something whistled

24. Zaenen (1988) calls the relevant feature "protagonist control", Wunderlich (1985) and Seibert (1993), "agent". In support of this, in Keller & Sorace's (2003) experiments, while auxiliary choice was not sensitive to animacy, impersonal passivization was.
4. Support for Parameterized Linking: Experimental data

One feature of the Parameterized Linking approach that is missing from the ASH is its capacity to include different sets of linking rules for different languages. By positing an additional linking rule based on a [locomotion] feature in German but not in Dutch, this theory accounts for the striking difference between these two languages on \([-\text{telic}] [+\text{locomotion}]\) predicates like *dance around* the room, which are unaccusative in German and unergative in Dutch. Interestingly, Keller & Sorace's experiments found evidence for this feature, yet it was not predicted by the 2-feature ASH.

Keller & Sorace's studies also found evidence for telicity in auxiliary selection, but as mentioned above, they failed to find an effect of agentivity. And they had a methodological shortcoming: in using actual verbs, with possibly frozen auxiliaries, they may not have tapped into the features speakers productively use to make verb classifications. A way to get around this problem is to confront speakers with new, unfamiliar verbs (for new, unfamiliar, actions), that they must categorize for the first time. Using novel verbs also makes it possible to systematically vary their features, control exactly what speakers know about each verb, and ensure uniform input across speakers, even speakers of different languages.

These issues were addressed by a series of experiments that tested the three features, \([\pm \text{actor}], [\pm \text{telic}]\) and \([\pm \text{locomotion}],\) experiment 1 on Dutch adults and children (van Hout et. al. 1993) and experiment 2 comparing Dutch and German adults and children (Randall et.al 2004). Though we will only briefly sketch the experiments and the results for the adults here, they provide strong evidence for Parameterized Linking.

In both experiments, after watching an experimenter act out a scene showing a novel action (using balls, puppets, stones, boxes, etc.) and describe it with a novel verb (live in Experiment 1, on videotape in Experiment 2), subjects were taught the new verb and then asked to help a forgetful puppet complete a sentence of the form in (61), by producing the new verb in participle form and crucially, the auxiliary that he or she thinks goes with it:

\[
\text{I saw that Jan [PP \text{ge-}[\text{VERB}]} [\text{AUX}]
\]

The verb/scene pairs were constructed to systematically vary the three features. One \([-\text{telic} – \text{locomotion} +\text{actor}]\) scene (from Experiment 2) shows an Ernie puppet sitting on a pile of books, continually wiggling his mouth in a back-and-forth wavy motion. The sentence eliciting the auxiliary for the novel verb *plurgen*, 'plurging' is in (62):
As predicted, Experiment 1, on Dutch, showed \([\pm telic]\) to be highly significant and \([\pm locomotion]\) to have no effect. But \([\pm actor]\) also did not appear to play a role. This was predicted for \([+telic]\) verbs (because of the inherent ranking of the Telicity and Actor linking rules) but not for \([-telic]\) verbs. However, it is possible that the Actor Linking Rule did assign \(\text{HAVE}\) to the \([+actor][-telic]\) verbs, but its effect was masked by an unergative Default Linking Rule, assigning \(\text{HAVE}\) to \([-actor][-telic]\) verbs, where neither the Telicity Linking Rule nor the Agent Linking Rule would be invoked.

Experiment 2 confirmed the presence of a [telic] feature in Dutch. \(\text{BE}\) was highly preferred for all verbs with clear \([+telic]\) endpoints. But these \([+telic]\) cases were assigned \(\text{BE}\) less in the \([+actor]\) cases than in the \([-actor]\) cases, suggesting that an [actor] feature is in fact also used productively by Dutch adults.\(^{25}\) However, as in Experiment 1, the \([\pm actor]\) difference was not visible in the \([-telic]\) verbs, which overwhelmingly selected \(\text{HAVE}\). But this difference, in fact, lends more support to the suggestion that the effect of \([\pm actor]\) was indeed masked by a Dutch unergative Default Linking Rule.

In German, as in Dutch, [telic] and [actor] both appeared as productive features. But significantly, German speakers did not make the same split as Dutch speakers. They added \([+locomotion]\) verbs to the unaccusative category along with all detectably \([+telic]\) cases. This result confirms the suggestion that Keller & Sorace's similar findings on motion verbs were attributable to a [locomotion] feature in German, and supports the claim of the Parameterized Linking model that German differs from Dutch in using an additional Locomotion Linking Rule.

In sum, Randall et al. (2004)'s experiments found evidence for the parameterized set of linking rules in (63):

\[
\begin{array}{|c|c|c|}
\hline
\text{Rule} & \text{Dutch} & \text{German} \\
\hline
\text{Telicity Linking Rule} & x & x \\
\text{Locomotion Linking Rule} & x & x \\
\text{Actor Linking Rule} & x & x \\
\text{Default Linking Rule (unergative)} & x & x \\
\hline
\end{array}
\]

\(^{25}\) But see van Hout (1998) for another interpretation.

\(^{26}\) Though there may be an unergative Default Linking Rule in German, we found no evidence for one. In the \([-locomotion][-telic][-actor]\) cases the results were at chance, with equal numbers of \(\text{HAVE}\) and \(\text{BE}\).
5. Conclusions

This article addressed three challenges that arise if auxiliary selection is used as a diagnostic of syntactic class: a) within languages, is categorical for some verb classes but indeterminate for others; b) cross-linguistically, it can give opposite results for the same sentence; and c) it splits the intransitives in a different place than some other supposed unaccusativity diagnostics. Our approach to these challenges, Parameterized Linking, maintains a syntactic distinction between unergatives and unaccusatives, and accounts for the mismatches semantically and in the linking rules that map semantic representations to syntactic positions.

Underlying the syntactic level distinguishing the two verb classes is the semantic level of Conceptual Structure (CS), where semantic features are registered and where verbs and their arguments are hierarchically composed with CS functions. The resulting CS representations are related to the syntax by sets of deterministic linking rules. It is these elements, interacting parametrically, that produce the range of syntactic outcomes within and across languages.

Within one language, two sentences containing the same verb can trigger opposite linking patterns depending on the semantic features of the other elements in the sentence. If two features that trigger opposite linking rules are both present in the same sentence, the hierarchy in its CS representation can effectively weight one feature over another to determine the ultimate linking pattern. In CSs of sentences whose linking conflicts are not resolved by geometry or where no linking rules apply, judgements will be indeterminate. Indeterminacy can also come from one verb being conceptualized in two different ways, leading to opposite linking patterns, with two possible auxiliaries.

Across languages, opposite linkings for the same sentence will arise when one language has a linking rule that another lacks, as we proposed for Dutch and German, or when two languages have a linking rule that links in opposite ways, a possibility we raised for an Existence Linking Rule and for default linking rules.

The misalignment of auxiliary selection with other supposed unaccusativity diagnostics is also explained. Unaccusative/unergative syntax is determined compositionally by interacting features. While auxiliary selection is tied to this syntax, other "diagnostics", like impersonal passivization, may be tied, instead, to the presence of just one of the interacting features.

By hypothesizing that linking rules in a variety of semantic domains can be formulated on any of a spectrum of features, making cut-offs in different places in different languages, Parameterized Linking provides a way to reconcile competing claims in the literature about which features are relevant to the intransitivity split cross-linguistically. In our own experimental studies, perhaps the most striking finding was support for this prediction of cross-linguistic differences. Subjects'
categorization of made-up verbs confirmed our hypothesis that two different sets of semantic features—and linking rules—operate in Dutch and German.

We showed how Parameterized Linking solved problems left by another approach to the auxiliary selection puzzle, Sorace’s Auxiliary Selection Hierarchy (ASH), which aims to characterize the variance (and non-variance) in auxiliary choices with only two features. Parameterized Linking provides the necessary algorithm that can take two features and produce one continuum of gradience, out of interacting, but still deterministic, linking rules. And by incorporating additional features, which may operate in some languages and not others, it makes finer distinctions than the ASH. As such, it actually predicts Keller & Sorace’s unexpected experimental results showing more than two features at work in German. And it predicts, too, the weighting of telicity over agentivity in determining verb class, something that the ASH simply assumed.

In discussing the ASH, Sorace (2004) calls for a model of the lexicon-syntax interface that explains why gradience exists in non-core verbs; while the ASH describes the output of such a model, she says, it is not the model itself. And the correct model must overcome the problems facing strict Projectionist and Constructionist interface approaches. The Projectionist view, which deterministically pairs each verb with a unique auxiliary, is incompatible with the indeterminacy in actual auxiliary selection. Constructionist accounts cannot explain the difference between categorical core verb behavior and the variable behavior of intermediate verbs. What is needed, Sorace claims, is a model that can integrate the detailed lexical semantics of verbs with the effects of the constructions they appear in, and explain the constraints on verbs’ lexical and structural meanings so as to prevent inappropriate lexicon-syntax mappings.

Parameterized Linking is a theoretical account aimed in this direction. It takes into account sentence-level properties of verbs in construction with their arguments, linking each fixed output deterministically to a syntactic position by the linking rules that a given language parametrically draws from a universal set of linking options. Within this framework, further analyses of the semantic features of verbs and their arguments and of the specifics of linking rules will lead to a more detailed picture of the unaccusative/unergative split and, with it, a better understanding of auxiliary selection across languages.

27. In fact, the specific individual linking rules proposed here, each one based on a semantic feature, we believe, will ultimately be derived from more general linking principles, determined by the geometry of Conceptual Structure representations. See Randall (forthcoming).
References


Split Auxiliary Systems
A cross-linguistic perspective

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