Split intransitivity in English[1]

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This article proposes a hierarchy of functional heads encoding the features [±control], [±initiation], [±state], [±change] and [±telic] (see Ramchand 2008). It is argued that this allows for a superior analysis of split intransitivity in English than the traditional notion of 'unaccusativity' – the idea that there are two classes of intransitive verbs which differ in relation to the underlying status/positions of their arguments. Rather, it is shown – on the basis of a systematic consideration of a wide range of English verbs – that the proposed diagnostics for unaccusativity in English identify multiple classes, whose behaviour can be captured in terms of the proposed hierarchy. Good correlation is found between the classes identified by the English diagnostics and Sorace's (2000) Auxiliary Selection Hierarchy (ASH), providing further support for the cross-linguistic applicability of the ASH to split intransitive patterns.

Keywords: syntax, split intransitivity, unaccusativity, argument structure

1 Introduction

In this article, I consider the phenomenon of split intransitivity – the notion that there is a 'split' amongst different classes of intransitive verbs in relation to the behaviour of their arguments, with a focus on English.

The most widely accepted analysis of split intransitivity is the so-called Unaccusative Hypothesis, first developed by Perlmutter (1978) in the framework of Relational Grammar. The Unaccusative Hypothesis was later re-expressed in terms of Government and Binding (GB) Theory by Burzio (1986) and has received a great deal of attention in the literature in relation to a wide range of languages.

The core notion of the Unaccusative Hypothesis is that in all languages there are two classes of intransitive verb – 'unaccusatives' and 'unergatives' – which differ as regards the grammatical relation borne by their single argument, or in GB and minimalist terms the deep structure / first-merged position of that argument. The argument of unaccusatives is at some level like a (direct) object of a transitive verb; the argument of unergatives behaves more like an (active voice) transitive subject. All intransitives must be employed either as unaccusatives or unergatives; some verbs arguably alternate between the two (Rosen 1984: 66).

In standard minimalist terms, unergatives are said to have an external argument, first-merged in the specifier position of vP (as are the subjects, in the active voice, of transitive verbs). Unaccusatives have an internal argument which is merged as the

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complement to the lexical verb V (i.e. in the same position as transitive objects). This distinction between the two classes of verbs may be represented as follows:[2]

(1) Unergatives:
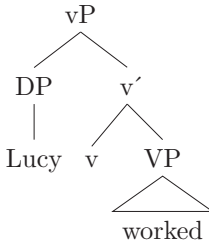
(2) Unaccusatives:
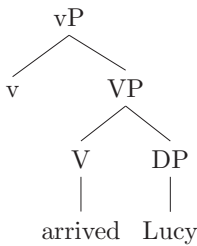
It is widely held that the identification of an intransitive verb as either unergative or unaccusative may be determined via various language-specific 'unaccusativity diagnostics'. On the basis of systematic consideration of these diagnostics in relation to English verbs, I will contend in this article that this two-way grouping of intransitive predicates into just two classes is too simplistic. Instead, I will show that the diagnostics pick out multiple different classes; I argue the behaviour of these can be captured in terms of the following hierarchy of multiple functional heads:[3]

(3)

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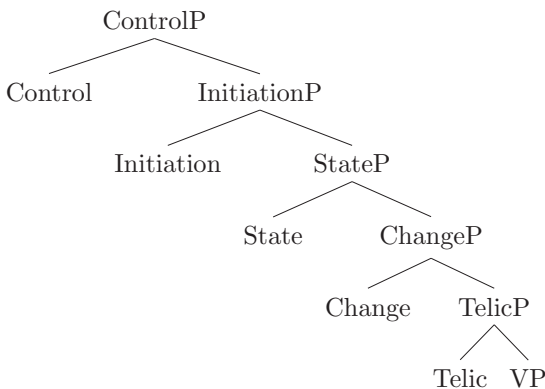
[2] In this and all subsequent trees I omit all structure outside of the thematic domain.

[3] This structure bears a certain similarity to that proposed by Ramchand (2008), which consists of three functional heads [*init* [*proc* [*res*]]]; as on the present account, arguments are merged in the specifier positions of these heads. Ramchand's division of argument positions does not account for all the classes of intransitives identified here, however.

This structure is a more articulated version of the standard 'vP'; I will discuss the denotation of each of the functional heads in the structure very shortly. Different verbs merge their arguments at different levels of the structure: for example, a [+control] predicate has an argument in Spec,ControlP, a [+initiation] predicate one in Spec,InitiationP, and so forth. A single argument may be merged in multiple positions within this domain. Split intransitivity behaviours arise as a result of sensitivity of different diagnostic constructions to different heads (or different feature values on those heads) – this will be discussed at length in the remainder of the article.

The representation of the structure of the lower part of the clause in this way can be seen as an extension of the cartographic programme (Rizzi 1997; Cinque 1999 and many others) to the thematic domain, a point on which I elaborate in Baker (2017; see especially section 1.2).

I assume that each functional head in the hierarchy is always present in clausal constructions,[4] and that they each bear bivalent features corresponding to their categories: [±control] on Control, [±initiation] on Initiation, [±state] on State, [±change] on Change, and [±telic] on Telic. Each feature must bear either a positive or a negative value in any given construction. Where a head X bears the corresponding feature [+x] (e.g. [+control] on Control) an argument must be merged in its specifier (in clausal constructions – arguments may be absent in nominalised or participial constructions); where X bears [–x] no argument is merged. I also assume the verbal root V incorporates successively into each of these functional heads via head movement, resulting in a complex of heads bearing all these features, though for clarity of presentation I do not illustrate this movement in tree diagrams.

The multiple-head approach retains a central insight of the Unaccusative Hypothesis – that split intransitivity can be connected to syntactic argument structure – but through the inclusion of multiple argument positions is also able to account for the patterning of intransitive verbs into multiple classes. Accordingly, each of the heads in the proposed hierarchy is posited on the basis of the behaviour of different classes of verbs, to be discussed throughout this article. The composition of these classes seems to have a semantic basis: compare semantically-based approaches to unaccusativity such as that of Van Valin (1990), but note that on the present approach the relevant semantic properties are directly encoded in the functional structure. This semantic basis is reflected in the semantic labels given to the heads in question. Starting at the bottom of the tree, the Telic head describe whether or not the verb denotes a telic event – one semantic definition of telicity is that of an event which reaches a culmination point (Kratzer 2004), representable in simple formal terms as follows:

(4) [+telic]: [e & culminate(e)]

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[4] Higher heads may be absent in derived constructions, e.g. I suggest in section 4 that prenominal past participles lack State, Initiation and Control projections.

Change, State and Initiation can be defined in terms closely based on semantic classes identified by Rappaport Hovav & Levin (1998; henceforth RH&L):

(5) [+change]: [BECOME [x ⟨*STATE*⟩]] or [BECOME [x ⟨*PLACE*⟩]]
    [+state]: [x ⟨*STATE*⟩]
    [+initiation]: [x ACT ⟨*MANNER*⟩][5]

Initiation necessarily involves causation. RH&L represent this in terms of a CAUSE primitive, but we might conceive of causation as a fundamental component of all instances of ⟨*MANNER*⟩ – even sometimes the only component, as in the case of change of location verbs like *go* which are initiated by their argument and may be represented as follows:

(6) [+initiation, +change]: [x ACT$_{CAUSE}$ [BECOME [x ⟨*PLACE*⟩]]]

Note that initiation is separate from volition or control – some verbs (e.g. *cough*) may describe events that are initiated but not controlled by the entities denoted by their subjects – and hence is a necessary but not a sufficient condition for 'agentivity'. This is part of the motivation for a separate Control head, for which we can say x volitionally controls an event e if and only if: (i) x possesses a state of desire that e occurs, and (ii) e occurs (where desire(e) is an instance of ⟨*STATE*⟩):

(7) [+control]: [[x desire(e)] & e]

Causation is not itself represented on Control, as this aspect of meaning is contributed by the Initiation head.

This approach fits into a tradition of analysing argument structure in terms of syntactic structure (see Marantz 2013 for further discussion of this tradition, on which the discussion in this paragraph builds).[6] Following most other approaches at present, the properties determining this structure are mostly event-related (following a tradition beginning with Generative Semantics, represented by e.g. Postal 1970). In particular, close parallels can be seen between the [+change] and [+initiation] features adopted here and Generative Semantics' BECOME and CAUSE primitives. However, these are parallels only, and the features are by no means identical to the primitives. It will also be noted that these features are independently motivated on the basis of the syntactic behaviours discussed.

There are also parallels to the theory of thematic roles of the sort originating in Fillmore (1968): most clearly, the 'Agent' role corresponds to the interpretation of an argument merged in both Spec,ControlP and Spec,InitiationP. Following the 'lexicalist' tradition (originating in Chomsky 1970), I identify several classes of intransitive verbs, but this is integrated with the 'constructivist' approach (of e.g. Hale & Keyser 1993,

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[5] The Initiation head is based on Ramchand's (2008) *init*; see also Ramchand's more formal definition of the semantic content of that head.

[6] Thanks are also due to an *ELL* reviewer for comments on which this present discussion is in partly based.

Table 1. *Classes of intransitives*

	Initiation	State	Change	Inherently telic
A. *talk*, *swim*, *cough* …[7]	+	–	–	–
B. *stay*, *sit* …[8]	+/–	+	–	–
C. *melt*, *burn*, *sink* …	–	–	+	–
D. *break*, *tear* …	–	–	+	+
E. *blush*, *wilt* …	(+)	–	+	–
F. *come*, *arrive* …	+	–	+	+

2002) so that these different classes are represented in terms of different syntactic structures, with semantic properties encoded on functional heads.

In this article, I will discuss the various split intransitivity diagnostics that have been proposed for English in the literature, the classes of verbs they pick out, the evidence this provides for the multiple-head approach over the traditional Unaccusative Hypothesis, and the ways in which these diagnostics may be analysed under my proposal. For reference, the principal classes of intransitives I identify are as shown in table 1.[9] After a brief overview of the methodology by which the data have been procured (section 2), this discussion and analysis will form the bulk of the article, considering, in turn: resultatives and the causative alternation (section 3), prenominal past participles (section 4), *for hours* (section 5), and what I term the 'process' diagnostics (section 6); in section 7, I discuss two proposed diagnostics (locative inversion and *there*-insertion) which I argue should not be related to argument structure. In section 8, I discuss some further arguments for preferring the proposed analysis over the traditional one, including arguments for assuming the features identified to be encoded in a hierarchically ordered series of functional heads.

2 Methodology

The classification of verb classes to follow, as summarised in table 1, is based primarily on the analysis of a core sample of around 35 verbs from a range of semantic classes, namely those discussed by Sorace (2000) in relation to their crosslinguistic

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[7] This class can be further subdivided according to [±control], though this feature does not play as strong a role as others in acceptability judgements. See section 6.

[8] I have conflated initiated and uninitiated states (class B) because the verbs in this class seem to vary quite freely between internally initiated and non-internally initiated readings, for example:

  (i) [+initiation]: Lucy stayed in the room deliberately.
  (ii) [–initiation]: The five-pound note stayed on the table.

This is a departure from Ramchand's (2008: 78, 106) assumption that all stative verbs have initiators: this seems to me intuitively incorrect for sentences like (ii) where *the five-pound note* cannot obviously be held as causing or initiating the state of staying.

[9] Note that some conceivable combinations of features do not occur. I leave the matter of why this may be aside for future research.

Table 2. *The Auxiliary Selection Hierarchy (Sorace 2000)*

Controlled process (non-motional)	*work*, *play*, *talk* …
Controlled process (motional)	*swim*, *run*, *walk* …
Uncontrolled process	*tremble*, *skid*, *cough*, *rumble* …
Existence of state	*be*, *belong*, *sit* …
Continuation of a pre-existing state	*stay*, *remain*, *last*, *survive*, *persist* …
Change of state	*rise*, *decay*, *die*, *grow* …
Change of location	*come*, *arrive*, *leave*, *fall* …

auxiliary selection behaviour (see table 2), plus some additional verbs which undergo the (anti)causative alternation like *burn* and *tear*. A few verbs discussed by Sorace which in English are either not strictly intransitive in the sense of having exactly one argument (e.g. *please*) or are phrasal in nature (e.g. *be born*, *catch on*) are not considered.

The results presented here are drawn primarily from online surveys, supplemented by my own judgements as a native speaker in a few cases. Six surveys were undertaken in all: as a full discussion of the design and results is beyond the scope of this article, the reader is referred to Baker (in preparation) where more details and in-depth statistical analysis will be provided. However, I give here an overview of the most important features. I focus on the first survey which provided most of the data; other surveys were of similar design though differing in slight details, and generally much shorter.

The surveys all employed the Qualtrics platform (www.qualtrics.com). Respondents were asked at the beginning of each survey if they were native speakers of English and non-native speakers were excluded from continuing to the main body of the survey.

Respondents were presented in each survey with a series of items designed to test the constructions under consideration, in an order randomised for each respondent. These included full sentences (e.g. *Lucy outarrived Chris*), shorter phrases (e.g. *the arrived man*) and single words (e.g. *arriver*). Respondents were asked to judge whether each item constituted a natural example of English (something they might say themselves, or expect to hear). By and large, the first survey tested each verb in the core sample with each construction, although some verb/construction pairs were omitted: 241 items were tested in all. Most of the constructions were presented in simple sentences with semantically appropriate arguments: a subject (most often *Lucy*) and, where relevant, also an object, e.g. *Lucy was talking away*, *Lucy outtalked Chris*, *Lucy broke the window*, *The lake froze solid*. Occasionally a longer context was provided for the full-sentence items to clarify the intended meaning (e.g. *Lucy was swimming away, round and round the lake*). Judgements were requested in terms of a three-way choice between 'OK', 'Not OK' and 'Not sure' responses. This survey drew the largest number of respondents, with around 110 useable responses per item.

The results as presented here represent an 'average' speaker drawn from a numerical idealisation of these results. Each judgement was valued as follows:

(8) OK: +1
   Not OK: –1
   Not sure: 0

An average response value was then calculated for each item. With a very small number of exceptions, an average less than –0.6 is idealised as an ungrammatical ('*') judgement, an average between –0.6 and +0.6 as an uncertain ('?') judgement and one above +0.6 as a grammatical judgement. Thus, an ungrammatical judgement as presented here corresponds to agreement among about 80 per cent of respondents that an item was 'Not OK' and a grammatical judgement to about 80 per cent agreement that an item was 'OK'.[10]

In general these idealised judgements correspond closely to my personal native-speaker judgements. Most sentences marked here as grammatical (on the basis of the surveys) are those I myself consider grammatical, most marked ungrammatical are ones I consider ungrammatical, and most marked as uncertain I myself do not have clear-cut judgements for. I believe this is good reason to be confident in the reliability of the results.

The subsequent sections contain overviews of the findings of the study; judgements for each diagnostic with each verb tested are presented in table 3.

3 Verbs denoting uninitiated changes: resultatives and the causative alternation

3.1 Data

A number of intransitive verbs in English may participate in the resultative construction, denoting a change with an end-state expressed through an adjective or preposition phrase. With transitives employing this construction, the affected argument is always the lower argument,[11] e.g.:

(9) Lucy hammered the metal flat.

This provides a basis for the argument that resultatives are a diagnostic of the presence of an internal argument and hence of unaccusativity (see Levin & Rappaport-Hovav 1995: ch. 2). The resultative construction occurs firstly with intransitives denoting a change of state:

(10) (a) The lake froze solid.
     (b) The window broke into pieces.

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[10] In spite of being encouraged to give 'Not sure' responses where appropriate, respondents were reluctant to do so; the percentage of such responses was never greater than about 20 per cent and generally much lower than that.

[11] Except in reference to ideas that follow directly from the Unaccusative Hypothesis in its traditional form, I avoid using the terms 'external argument' and 'internal argument' as these terms seem less appropriate when multiple argument positions are proposed. In discussion of (mono)transitives, I instead refer to the 'higher argument' corresponding to the traditional external argument / (active voice) subject, and the 'lower argument' corresponding to the internal argument / direct object.

Table 3. *Typical judgements for each diagnostic*

	resultative	causative	prenominal past participle	*for hours*	V *one's way into*	V-*ing away*	cognate object	*-er*	*out-*	*there-*insertion	locative inversion
come	*	*	*	*	*	*	*	(✓)	*	?	✓
arrive	*	*	(✓)	*	*	*	*	*	*	?	?
leave	*	*	*	?	*	*	*	✓	*	*	*
fall	*	*	✓	?	*	*	*	*	?	?	✓
die	*	*	*	?	*	*	✓	*	*	?	?
decay	*	✓	✓	✓	?	?	*	*	?	?	?
rise	✓	*	✓	✓	?	?	*	(✓)	?	✓	✓
sink	✓	✓	✓	✓	?	?	*	*	?	?	?
grow	✓	✓	✓	✓	✓	?	*	*	✓	✓	✓
wilt	?	✓	✓	✓	?	?	*	*	?	?	?
melt	?	✓	✓	✓	?	?	*	*	?	?	?
burn	✓	✓	✓	✓	✓	?	*	*	?	✓	?
freeze	✓	✓	✓	?	✓	✓	*	*	?	?	?
break	*	✓	✓	*	*	*	*	*	*	?	*
tear	*	✓	✓	?	*	*	*	*	*	*	*
stay	*	*	*	✓	*	*	*	(✓)	✓	?	?
remain	*	*	*	✓	*	*	*	*	*	✓	?
last	*	*	*	✓	*	*	*	(✓)	✓	?	?
survive	*	*	*	✓	?	?	*	✓	?	?	?
persist	*	*	*	✓	?	?	*	*	?	?	?
be	*	*	*	✓	*	*	*	*	*	✓	✓
belong	*	*	*	✓	*	*	*	*	*	*	*
sit	*	*	*	✓	*	*	*	*	?	✓	✓

Table 3. *Continued*

	resultative	causative	prenominal past participle	*for hours*	V *one's way into*	V-*ing away*	cognate object	*-er*	*out-*	*there-* insertion	locative inversion
tremble	*	*	*	✓	?	?	?	?	?	?	?
cough	*	*	*	✓	?	✓	✓	?	?	?	?
skid	*	*	*	?	✓	✓	?	?	?	?	?
rumble	*	*	*	✓	✓	✓	?	?	*	?	?
swim	*	*	*	✓	✓	✓	✓	✓	✓	?	✓
run	*	(✓)	*	✓	?	✓	✓	✓	✓	?	?
walk	*	(✓)	*	✓	?	?	✓	✓	✓	?	✓
work	*	(✓)	*	✓	✓	✓	(✓)	✓	?	?	✓
play	*	*	*	✓	✓	✓	(✓)	✓	✓	?	?
talk	*	*	*	✓	✓	✓	(✓)	✓	✓	?	?

Key: ✓ – grammatical; * – ungrammatical; ? – uncertain judgements; (✓) – grammatical in restricted contexts only.

It also occurs with change of location verbs, provided they are not inherently telic (see section 5):

(11) (a) The sun sank low.
   (b) *Lucy came low.

Resultatives do not occur with verbs denoting states (e.g. *stay*, *sit*) or with what Sorace (2000) terms 'process' verbs – best defined as those intransitives which describe neither a state, a change of state or an (inherent) change of location.[12]

Close examination of the intransitive verbs which allow the resultative construction reveals them to comprise very almost the same class as those allowing the causative alternation, i.e. those verbs which have a transitive alternant where the higher argument is the external cause of the change:

(12) (a) Lucy froze the ice cream.
   (b) Chris broke the window.
   (c) The storm sank the ship.

(13) *Chris talked/ran/coughed/survived/came Lucy. (intended meaning: 'Chris made Lucy V')

An analysis of the causative alternation as the addition or removal of an external argument (see Schäfer 2009: sections 3.1, 3.2 for references to both sides of this debate) also makes it a candidate diagnostic for unaccusativity (Perlmutter 1978: 162).

The overall characterisation, then, is that intransitive verbs which allow these constructions are those denoting changes which are not inherently telic changes of location. This is essentially Levin & Rappaport Hovav's (1995) characterisation of intransitives which allow resultatives. Ramchand's (2008) analysis of the causative alternation may also shed light on the matter. Ramchand characterises the verbs which allow the causative alternation as those which lack an expressed 'initiator': I represent such verbs as [+initiation]. I will take it as a fact of the English lexicon that intransitive change verbs do not take initiators (they are [–initiation]), with the exception of inherently telic changes of location which are [+initiation] by default and hence disallow the resultative and causative constructions. Thus, for example, *melt*, *break*, *sink* etc. are [–initiation] but *come*, *arrive* are ordinarily [+initiation]. Note however that the inherently telic change of location verbs may also have non-initiated readings:

(14) The letters arrived.

These verbs nevertheless never allow resultatives or causatives. Only intransitive verbs which never have [+initiation] interpretations allow these constructions, therefore.

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[12] The process verbs include 'motional processes' which usually denote a change of location but do not absolutely have to, e.g. *run*, *swim* and *walk*, while excluding verbs like *arrive* and *go* where a change of location is always implied. Compare:

   (i) Lucy is running on the spot.
   (ii) *Lucy is coming/going/arriving on the spot.

See also Legendre (2007a: 159).

One other exception to the general rule that verbs denoting changes of state allow this construction is *die*:

(15) (a) *The man died lifeless.
    (b) *Curiosity died the cat.

Note that the event described by *die* is not typically initiated by its subject. It is possible *die* is merely a lexical exception to the general rule (as a very frequent verb, it would be a prime candidate for lexically idiosyncratic behaviour). Another possibility is that *kill* acts as its (morphologically suppletive) alternant (cf. McCawley 1968, Dowty 1979: 44–51), although this does not explain the absence of any resultative form.

Another potential complication is posed by the non-agentive 'internally caused' verbs: *grow*, *wilt*, *blossom*, *blush* etc. (Levin & Rappaport-Hovav 1995: 90–8). These seem to vary, or produce uncertain judgements, as far as resultatives and the causative alternation are concerned (see McKoon & Macfarland 2000; Alexiadou *et al.* 2006):

(16) (a) The daffodils grew tall.
    (b) Chris blushed scarlet.
    (d) ?The tulips wilted brown.

(17) (a) Lucy grew daffodils.
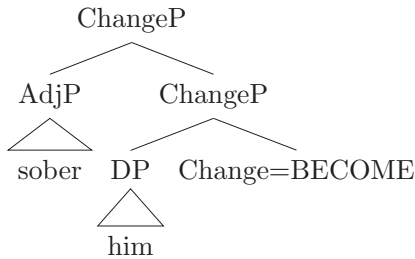   (b) *Lucy blushed Chris.
    (c) The heat wilted the tulips.

Arguably these verbs have initiators, the 'internal causers'. I suggest, however, that their grammaticalised status as [+initiation] is uncertain: as far as the syntax is concerned, they are sometimes conceived as having initiators and sometimes not: the degree to which one or the other is true depends on the verb in question. This is possible on account of the conceptual distance between the causation in these cases, which most often involves an inanimate, non-volitional argument, and prototypical initiation (neither animacy nor volition is necessary for initiation, but it is usual for these properties to co-occur). It does seem to me that if a verb like *die* or *break* (particularly in contexts like *The branch broke by itself*) lacks an initiator, then verbs like *bloom* or *blush* can (sometimes) be conceptualised of as lacking initiators also. This explains why they pattern with the other verbs which allow the resultative construction and the causative alternation, but only to an extent.

3.2 *Formal analyses*

Hoekstra (1988) analyses the affected argument plus result phrase part of a resultative as a small clause.[13] I suggest small clauses in general can be conceptualised as StatePs or ChangePs containing an argument and a modifier, with State or Change interpreted as abstract verbal elements, respectively BE or BECOME. For example:
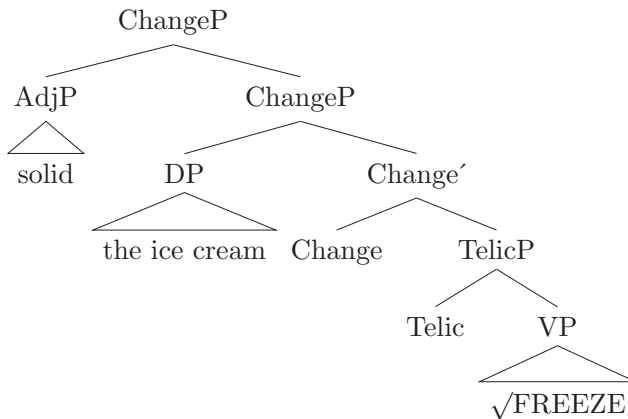
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[13] See Zhang (2009: section 2) for an overview of other approaches to resultatives.

(18) (Lucy wants) him sober.

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              ChangeP
             /      \
          AdjP       ChangeP
         /  \        /      \
      sober  DP   Change=BECOME
             /\
            him
```

Resultatives also contain a ChangeP containing a modifier (the result phrase):

(19) The ice-cream is freezing solid.[14]

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              ChangeP
             /      \
          AdjP       ChangeP
         /  \        /      \
      solid  DP        Change´
            /  \       /      \
   the ice cream  Change   TelicP
                          /     \
                       Telic     VP
                                /  \
                            √FREEZE
```

A result state can only arise from a change, and hence the result phrase can naturally only refer to arguments which undergo a change and are merged in Spec,ChangeP. Additionally, recall that the result phrase cannot describe an argument which is an initiator. This may be because ChangeP is here interpreted as a small clause: thematically complete domains whose arguments do not need to receive thematic roles from outside the small clause. Plausibly such domains constitute phases, and once the phase is sent to LF to receive its thematic interpretation no new thematic roles can be assigned to the arguments contained within it. This means that the argument cannot move to Spec,InitiationP, and therefore cannot be interpreted as an initiator; intransitives which require an initiator are thus incompatible with the construction.

As for the causative alternation, whether is viewed as the addition of an argument to an intransitive base, or as the removal of an argument from a transitive, the argument that is present in the transitive but not the intransitive alternant is that which is merged in Spec,InitiationP. The alternation is thus ruled out with any intransitive verb that is already [+initiation], as Spec,InitiationP is already filled: e.g. a verb like *talk* does

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[14] The upper part of this structure is omitted from the diagram. I assume the surface word order is achieved via movement.

not have a causative alternant as it already takes an initiator argument and there is no position for an additional causer to be merged.

This analysis has various advantages over the traditional approach to argument structure of the Unaccusative Hypothesis. The notions of Initiation, State and Change, which are key to understanding which verbs do and do not allow resultatives and causatives, are on this approach encoded directly in the syntax. This contrasts with the traditional approach, which cannot map the arguments of verbs to their syntactic positions in such a systematic manner. Levin & Rappaport-Hovav (1995: ch. 4) posit a number of 'linking rules' mapping the arguments of verbs into one of two positions (external vs direct internal arguments) on the basis of their semantics. These can be summarised as follows:

(20) (a) immediate cause → external argument
    (b) entity undergoing directed change → internal argument
    (c) entity whose existence is asserted → internal argument
    (d) other argument → internal argument

However, it is unclear why these rules should take the forms they do, how they might be constrained (i.e. which rules could not occur) or how they are acquired. While the approach presented here may not completely solve these problems at this stage, it does allow us to generalise the linking between semantics and syntax, to something like the following:

(21) *Generalised Linking Rule:* An argument of which the property [+a] is predicated is merged in the corresponding Spec,AP.

Hence, an argument which is an initiator (of which the property [+initiation] is predicated) is merged in Spec,InitiationP, an argument of which a state (the property [+state]) is predicated is merged in Spec,StateP, etc. This constrains the possible forms of the rules considerably, which may in turn ease the process of acquisition. In addition to the single generalised rule, the language learner must only acquire the features and heads involved (many of which seem conceptually basic and for which a good deal of evidence may exist in the input data) and the hierarchical order in which they occur.

The traditional approach, if it assumes (as is usual) that stative verbs are unaccusative, must also postulate that these are an exception to the general rule that the resultative and causative constructions occur with unaccusatives (see e.g. Levin & Rappaport-Hovav 1995: section 2.3.3) – an exception which does not necessarily appear particularly well motivated. On the present approach, [+state] and [+change] verbs form entirely separate classes: we can state that resultatives/causatives are only available with the latter, and do not need to postulate an exceptional class. Additionally, the association of State and Change with the abstract elements BE and BECOME allows for a neat formalisation of the parallels between small clauses and resultatives. Further, more general advantages of the multiple-head approach will be presented in subsequent sections.

The Generalised Linking Rule can be compared to Baker's (1988) Uniformity of Theta Assignment Hypothesis:

(22) *Uniformity of Theta Assignment Hypothesis (UTAH):* Identical thematic relationships
between items are represented by identical structural relationships between those items
at the level of D-structure.

Specifically, UTAH effects can be seen as a consequence of the Generalised Linking Rule, which states much the same thing in a more precise way. Note, however, that for UTAH to hold cross-linguistically we would need, in addition to the Generalised Linking Rule, to assume that the features in question and their hierarchical ordering are universal. I will not discuss this issue further here.

4   Change verbs and prenominal past participles

Prenominal past participles are another purported diagnostic of unaccusativity in English (Levin & Rappaport 1986: 654). This construction has been considered diagnostic of unaccusativity on the grounds that it picks out a subset of intransitives, and the same construction with transitive verbs is used to describe nouns which would be the lower arguments of equivalent clausal constructions, for example *the destroyed city* (a city that has been destroyed, not a city that destroys). This is evidence, then, that the construction, like the resultative construction and causative alternation discussed above, should be analysed in terms of argument structure – an analysis which the present approach retains.

Amongst intransitives, prenominal past participles are restricted to verbs of change of state, including those which undergo the causative alternation[15], and verbs of (inherent) change of location:[16]

(23) (a) fallen leaves
      (b) a decayed corpse
      (c) the broken window
      (d) *the remained/trembled/run/talked man

Amongst the verbs which allow the construction, however, there are further restrictions. For example, *arrived* can only occur prenominally with certain modifiers, e.g. *the recently arrived recruits*. Furthermore, some verbs of change (e.g. *come*, *go*, *die*) do not seem to allow the construction at all. Overall, however, the statement that this construction is permitted with only (a subset of) change of state verbs holds up very well.
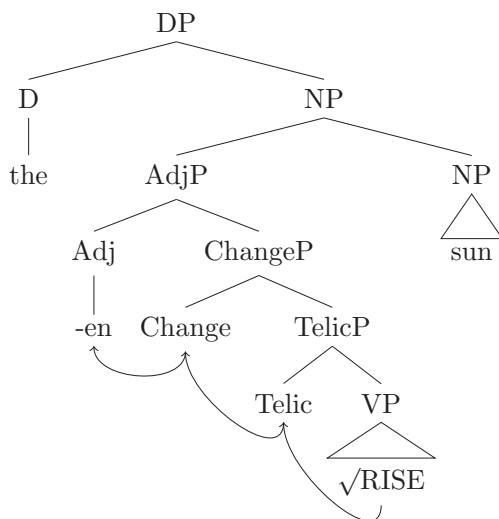
A formal analysis of this behaviour can be formulated in terms of selectional restrictions under a Distributed Morphology-type framework in which the morphological processes which derive these constructions take place in the syntax according to the usual constraints on syntactic formations. Under such an approach, the past participle morphology (realised in various ways, often as *-ed* or *-en* – I shall denote it here by the latter) can be viewed as an Adj head, which incorporates the root

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[15] With the alternating verbs, however, it could be argued that this construction is derived from the transitive alternant.

[16] Motional processes like *run*, which do not inherently express a change of location, are excluded; see fn. 13.

and categorises it as an adjective.[17] That the prenominal past participle is restricted to (a subset of) [+change] verbs suggests -*en* selects a [+change] ChangeP with intransitives:

(24) the risen sun

```
                          DP
               ┌──────────┴──────────┐
               D                     NP
               │            ┌────────┴────────┐
              the         AdjP                NP
                      ┌────┴────┐              △
                    Adj       ChangeP         sun
                     │       ┌───┴───┐
                    -en   Change   TelicP
                                  ┌───┴───┐
                               Telic     VP
                                         △
                                        √RISE
```

The fact that this construction is not possible with all [+change] verbs may be related to the often idiosyncratic nature of derivational morphology.

The present proposal, which distinguishes [+state] and [+change] verbs in terms of the positions of their arguments, is thus able to capture the occurrence of prenominal past participles with the latter but not the former in terms of structural considerations alone. This distinguishes it favourably from the traditional approach to syntactic argument structure, which in addition to restricting prenominal past participles to 'unaccusative' verbs (i.e. those which take only an internal argument) must also provide some separate explanation for the non-occurrence of the construction with state verbs (which are also held to be unaccusative).

5 Inherently telic verbs

Split intransitivity has often been connected in various ways to telicity (for example by Zaenen 1988 and Borer 2005). Diagnostics of telicity and hence purportedly unaccusativity in English are adverbials like *for hours*, *for seconds*, *for years* etc., which supposedly only occur with atelic/'unergative' verbs (Schoorlemmer 2004: 227). Most verbs in English occur with phrases like *for hours* very freely:

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[17] In standard Distributed Morphology, roots do not themselves bear category labels and categorisation is via heads bearing the labels *n*, *v*, *a* etc. (Embick & Noyer 2007: 296). For consistency – I have elsewhere denoted the verbal root as of category V – I do not reflect this in my notation here, although my examples could easily be reworked to fit. I do not intend to make any claims about the categorial status of roots here.

(25) Lucy stayed/sat/coughed/swam/worked for hours.

Some verbs, however, allow *for hours* more restrictedly. These verbs belong to the change of location and change of state classes:

(26) (a) *Lucy arrived/died for hours.
     (b) *The window broke for hours.

I will describe such verbs as 'inherently telic'. Note, however, that most of these do allow *for hours* in specific contexts; these contexts vary from verb to verb:

(27) (a) Lucy came for hours. (= 'Lucy came and stayed for hours')
     (b) The guests were arriving for hours.

Several change of state verbs do freely allow the construction:

(28) (a) The corpse decayed for years.
     (b) The butter melted for hours.

The overall generalisation I propose is that the inherently telic verbs comprise the change of location verbs and a subset of the (uninitiated) change of state verbs, but that the inherent telicity of these verbs can be overridden in certain contexts.[18]

As to the formal analysis of this diagnostic, the incompatibility of adverbials like *for hours* with inherently [+telic] verbs (i.e. verbs which must occur with a [+telic] Telic head) can be seen to result from the adverbials bearing their own [–telic] features: a clause cannot contain both [+telic] and [–telic] values at the same time.

This approach allows us to maintain the popular idea that telicity relates to argument structure (see, for example, Tenny 1987 and Borer 2005).[19] But at the same time, by identifying multiple argument positions, we can also maintain the idea that other split intransitivity diagnostics, unrelated to telicity, also relate directly to argument structure. This, then, is another advantage of this approach over the traditional Unaccusative Hypothesis.

6 Process verbs

6.1 Data

A number of tests pick out sets of verbs in English each corresponding more-or-less to Sorace's (2000) 'process' class – which basically corresponds to most conceptions of

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[18] The 'semelfactive' class of punctual processes like *jump* and *hiccough* pose something of a problem: Rothstein (2004: 183–7) argues that they are basically telic, in contrast to Smith (1991) who claims they are basically atelic. Given that they occur with *for hours* far more easily than telic verbs of change like *come* and *break*, I shall here adopt the latter view. Nothing crucial hinges on this decision for the wider purposes of this article, however – although it would be necessary to postulate an additional class in table 1 if the semelfactives were to be analysed as inherently [+telic].

[19] Some support for this connection between telicity and argument structure comes from languages like Finnish, where telicity relates to structural case assignment (Kiparsky 1998), itself related to argument positions.

the traditional 'unergative' class insofar as it is ever defined explicitly. Each of these tests does, however, pick out a slightly different group of verbs.

The diagnostics in question which I have been able to identify in the literature are: V *one's way into* (Marantz 1992), V *away* (Keyser & Roeper 1984), the cognate object construction (Massam 1990), agentive suffix *-er* (Burzio 1981: 255–8), and prefix *out-* (Keyser & Roeper 1984). These are all illustrated below with the verb *swim*, with which they can all occur:

(29) (a) Lucy swam her way into the harbour.
     (b) Lucy was happily swimming away, round and round the lake.
     (c) Lucy swam a swim.
     (d) swimmer
     (e) Lucy outswam Chris.

None of these constructions, on the other hand, can occur with a verb like *arrive*:

(30) (a) *Lucy arrived her way into the building.
     (b) *Lucy was arriving away.
     (c) *Lucy arrived an arrival.
     (d) *arriver
     (e) *Lucy outarrived Chris.

To reiterate, the overall generalisation is that these constructions are acceptable with process verbs and ruled out with other intransitives. There are a few nuances, however. Certain of the tests produce doubtful results with certain process verbs, particularly with the class Sorace (2000) calls 'uncontrolled processes':

(31) (a) ?Lucy trembled a tremble / skidded a skid.
     (b) ?Lucy outtrembled/outcoughed Chris.

This difference in the strength of judgements between controlled and uncontrolled processes is evidence for the operation of the [±control] feature in English, and therefore for the Control head.

With other verbs the cognate object test is restricted to certain meanings, e.g. *Lucy talked a talk* can refer to a presentation to an audience, but not to acts of talking in general. Speakers' intuitions about the cognate object diagnostic seem in general to be much weaker than those concerning the other diagnostics, though a distinction between process verbs and others (which are hardly ever accepted with cognate objects to any degree) is still apparent.

The diagnostics may also sporadically pick out various verbs that do not belong to the process class. This varies between diagnostics, and in some cases there does not seem to be much of a consistent semantic basis as to which verbs are identified, for example:

(32) (a) The musical died a death.
     (b) survivor, early-riser

Some groups of exceptions appear more systematic. In particular, the V *one's way into* construction is frequently accepted with non-inherently telic verbs which undergo the causative alternation (*burn*, *melt* etc.):

(33) The butter melted its way into the cake.

This same group of verbs tends to receive mixed or uncertain judgements with regards the *out-* construction (see Keyser & Roeper 1984: section 4.4), as do several members of Sorace's 'continuation of state' class; however some verbs in these classes are widely accepted with this construction:

(34) (a) Lucy outgrew her older brother.
      (b) ?Lucy's butter outmelted Chris's butter.

(35) (a) Lucy outstayed Chris.
      (b) ?Lucy outpersisted Chris.

Change of state verbs seem to receive similarly mixed/uncertain judgements with regards V *away* (cf. Keyser & Roeper 1984: section 4.3):

(36) (a) ?Lucy was freezing away outside in the snow.
      (b) ?The weeds were growing away in the garden.

To summarise, these tests all pick out verbs primarily of the process class, plus some other verbs with varying degrees of semantic systematicity. In featural terms, we can say that they identify primarily [–state, –change] verbs (with the *out*-prefixation and cognate objects additionally preferring but not absolutely requiring [+control] verbs).

6.2 Formal analyses

I will now consider analyses for each of these diagnostics in turn.

6.2.1 *V* one's way into *and cognate objects*

Both the V *one's way into* and cognate object constructions involve the addition of an argument to the clause (see also the discussion of *out*-prefixation in subsection 6.2.4). Like the other diagnostics discussed in this section, these constructions are restricted primarily to verbs which are ordinarily [–change, –state] (the cognate object construction is in addition dispreferred with [–control] verbs). Considering firstly the V *one's way into* construction, I suggest that the new argument *one's way* is merged in Spec,ChangeP – it undergoes the change of coming into existence as a result of the event described by the verb. The presence of this argument in Spec,ChangeP prevents the occurrence of the construction with verbs which would ordinarily merge an argument in this position (i.e. verbs which are ordinarily [+change]). It is also prevented with [+state] verbs, as the same verb cannot express both a change and a state.

(37) Lucy talked her way into the room.
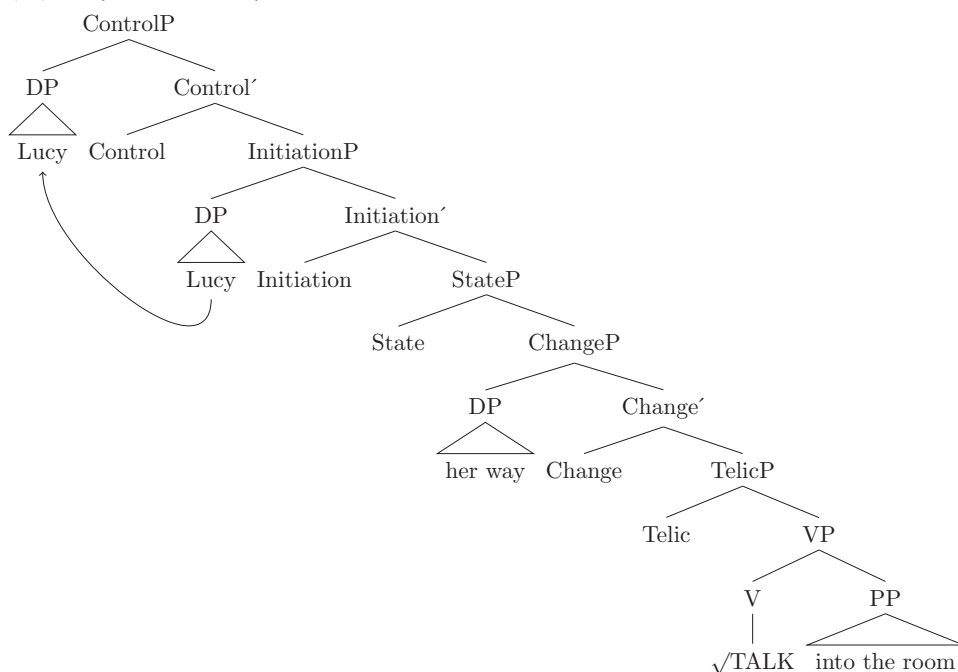
V *one's way into* is accepted, to varying degrees, with some verbs denoting states and changes of state (e.g. *persist*, *grow*). I suggest that the semantics of these verbs is loose enough to permit or at least not entirely rule out the possibility of a reconceptualisation of the verbs as denoting (motional) processes, thus allowing them to occur with the construction.

Like V *one's way into*, the cognate object construction also involves the addition of a new argument (the 'cognate object'), which can also be analysed as being merged in Spec,ChangeP (again, it undergoes a change of coming into existence due to the event), again rendering the construction incompatible with [+change] and [+state] verbs:
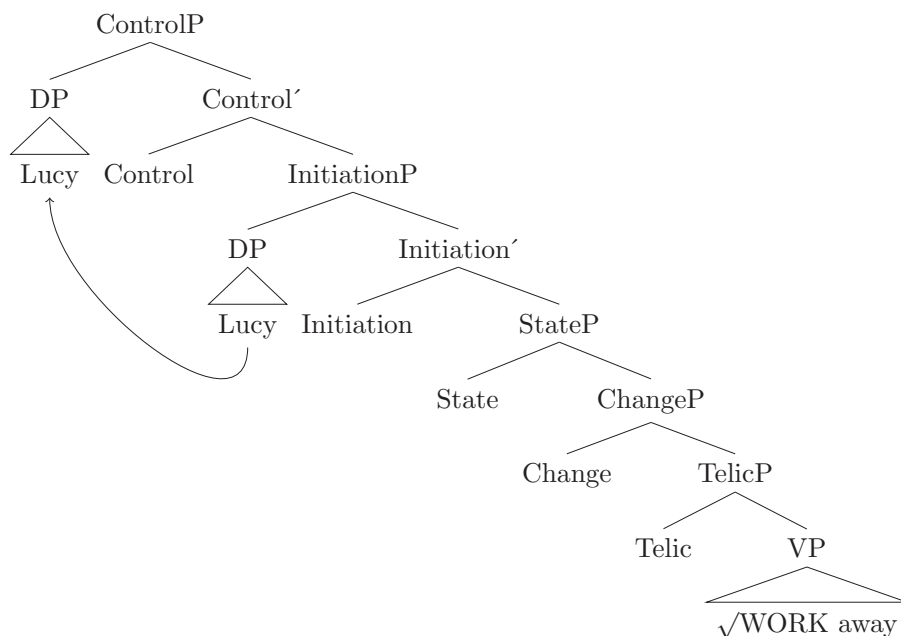
(38) Lucy talks the talk.
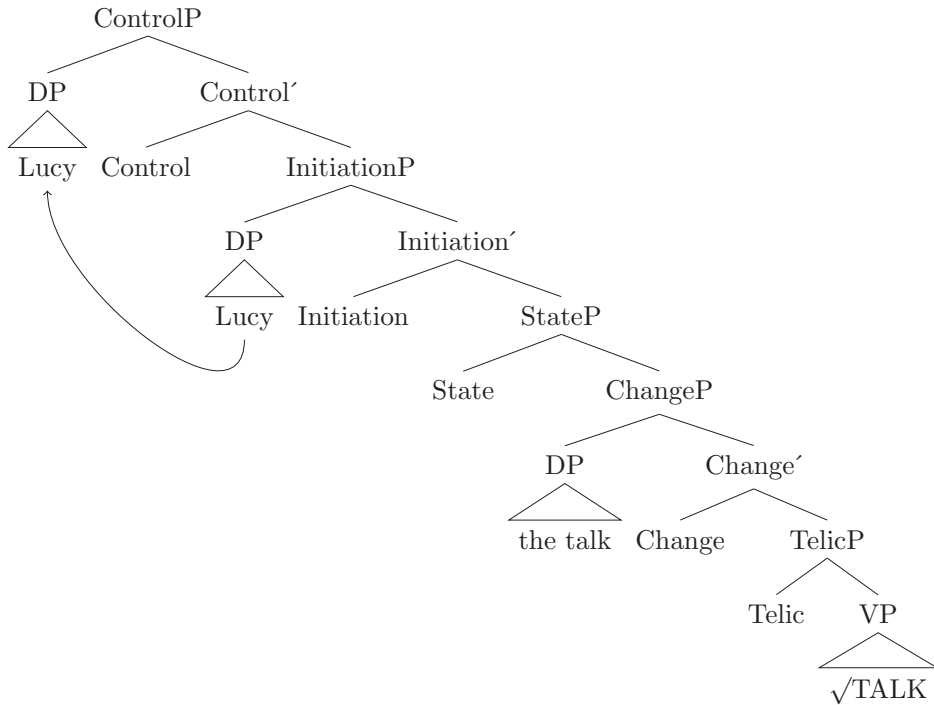
A further restriction on the cognate object construction is that it prefers the presence of [+control] ControlP.

6.2.2 *V* away

The V *away* construction does not introduce a new argument, but a similar analysis to that adopted for V *one's way into* and cognate objects is still possible. I suggest that the particle *away* induces a stative reading:

(39) Lucy is working away.[20]

```
                        ControlP
                       /        \
                    DP          Control´
                   /  \         /      \
                 Lucy Control      InitiationP
                                   /         \
                                 DP          Initiation´
                                /  \         /        \
                             Lucy Initiation      StateP
                                                 /      \
                                              State    ChangeP
                                                       /      \
                                                  Change      TelicP
                                                              /     \
                                                           Telic    VP
                                                                   /   \
                                                              √WORK  away
```

Evidence for this stative analysis of the construction comes from the fact that in a sentence like *Lucy was freezing away outside in the snow*, the subject *Lucy* need not be undergoing an actual change from an unfrozen to a frozen state; rather, the sentence describes an ongoing state. Likewise, a construction like *Chris was working away* may be interpreted as 'Chris is in the ongoing state of working'. This analysis is supported by the behaviour of V *away* with the diagnostics of stativity (from Dowty 1979: 55–6), as it appears to be restricted in contexts where statives are restricted, such as the following:

(40) (a) *Lucy forced Chris to play away.
     (b) *Play away!
     (c) *Lucy deliberately/carefully played away.
     (d) *What Lucy did was play away.

V *away* is accepted at least to an extent with verbs denoting changes of state, e.g. ?*The weeds were growing away in the garden*. This suggests that some speakers allow such verbs to be reconceptualised as expressing states, although the inherent change-denoting nature of these verbs may present an obstacle. V *away* does not appear to occur with change of location verbs, presumably because it is not possible to reinterpret these in a stative sense. Its incompatibility with verbs which are [+state] regardless may be because additional marking of the stativity of such verbs is redundant, though

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[20] I am agnostic as to the position of *away*. Plausibly it is itself merged in State or as an adjunct or additional specifier to State.

note that a considerable minority of speakers do allow this construction with at least some verbs, e.g. they accept *Lucy was surviving away*.

6.2.3 *Suffix* -er

I now turn to agentive suffix *-er*. Note that this suffix also occurs with transitive verbs, and its behaviour in such contexts provides evidence for analysing it in terms of argument structure. Thus, when *-er* occurs with a transitive root, it denotes the higher argument of the transitive, not the lower: *destroyer* means 'a person or thing who destroys' not 'a person or thing who is destroyed'. This suggests that we should retain the traditional intuition that intransitive verbs which allow *-er* merge their arguments in the same position(s) as transitive higher arguments – here, that both sorts of argument are first-merged in Spec,InitiationP (transitive higher arguments are prototypically initiators of the event described).

For *-er*, as with prenominal past participles above (section 4), I shall adopt an analysis in the style of Distributed Morphology (cf. Alexiadou 2001, particularly pp. 128–31). Intransitive *-er* selects primarily for [–state, –change] complements: this suggests it selects a StateP, on the head of which both [±state] and [±change] can be assumed to be marked,[21] provided it has the correct feature values. I shall assume *-er* is a nominal head which essentially occupies the same position as Initiation does in the clause:

(41) walker
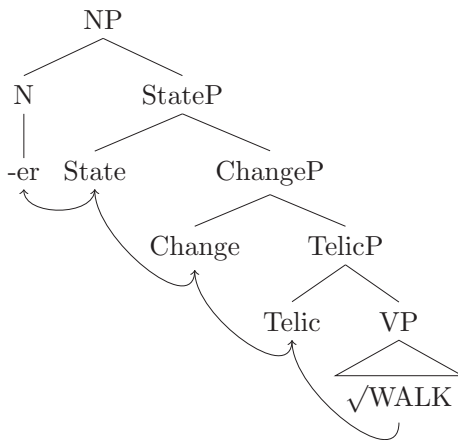
The sporadic occurrence of *-er* with non-process verbs (e.g. *survivor*, *early-riser*) can be taken as lexical idiosyncrasies of the sort which are commonplace with derivational affixes.

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[21] This follows from the assumption that the verbal root and the Telic and Change heads all incorporate into State: hence the features of Change are present on State as well.

6.2.4 *Prefix* out-

out-prefixation involves both a morphological process and the addition of an argument. The construction is curious from a thematic perspective in that both arguments appear to be initiators of the event described by the verbal root: thus, *Lucy outran Chris* entails both *Lucy ran* and *Chris ran*. This is surprising as we do not expect to find two arguments within a clause bearing the same thematic role.

Irube (1984: 114) suggests that prefix *out-* may be analysed as a sort of preposition (with the internal/lower argument in its complement) with the meaning X-*er than*, into which the verbal root incorporates. Drawing on this, I propose that *out-* is a head which selects a clausal complement, analogous to the selection of a clause in comparative contexts introduced by phrases like *more than*:

(42) Lucy outran Chris.
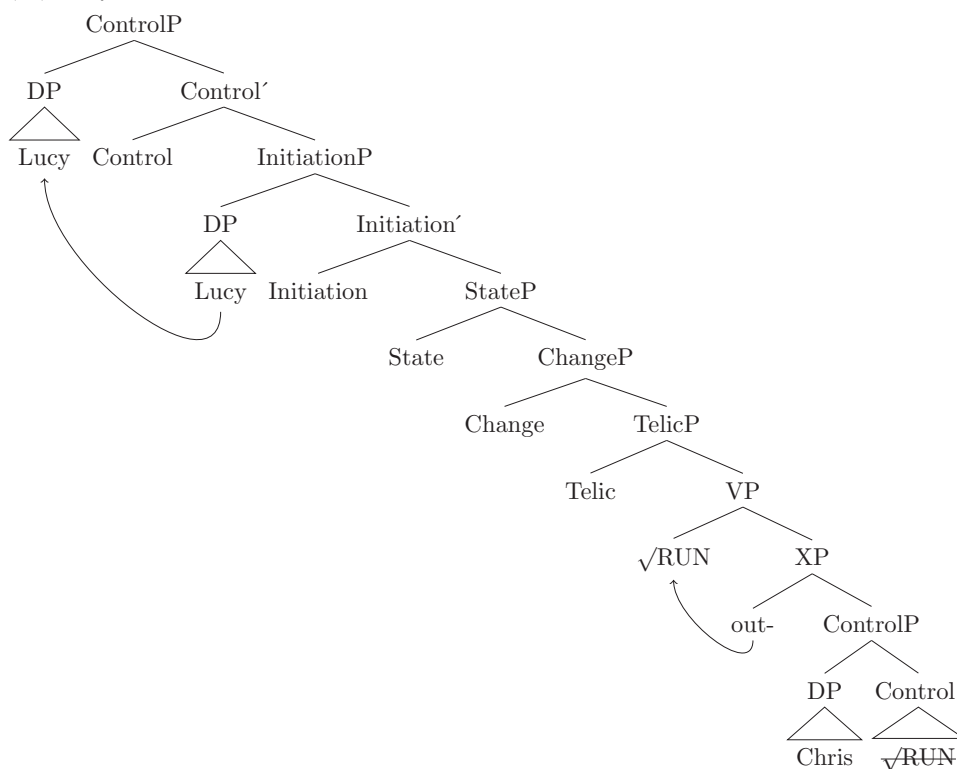
Lucy is merged in the specifiers of InitiationP and ControlP in the higher clause; *Chris* in those same positions in the lower clause: this enables them both to be interpreted as volitional initiators. *out-* incorporates into the higher V whereas the lower V is deleted: this is analogous to the deletion of the lower VP in sentences like

Lucy eats sandwiches more than Chris ~~eats sandwiches~~. *out*-prefixation is in general limited to [–state, –change] (and preferentially [+control]) verbs; this may be due to a restriction on the type of complements *out-* may c-select.

The acceptance (albeit usually marginal) of *out-* with verbs denoting states and changes of state (e.g. *outlast*, ?*outmelt*) may reflect the marginal possibility of the reconceptualisation of these verbs as processes which was also posited for V *one's way into*.

6.2.5 *Advantages of this approach*

This approach to argument structure has certain advantages over the traditional approach in regard to these diagnostics in particular. Firstly, it explicitly encodes in the syntax the [–state, –change] nature of the verbs which prototypically allow these constructions. It is not enough merely to state that external arguments are initiators (or 'causes', or 'agents') of the event described: this wrongly predicts, for example, that change of location verbs like *come* and *arrive* (which are typically agentive) would group with verbs like *work* and *play* in regard to the diagnostics. The [+change] status of the former set of verbs is important. The position of arguments, taking the featural properties of the predicate into account, can be encoded in the syntax on the present proposal without recourse to the more complex 'linking rules' some problems with which were addressed in section 3.2.

The present approach also captures the variation between this set of diagnostics in regard to [±control]: we can state that certain of the constructions prefer the presence of a [+control] head, whereas others are neutral as to the presence or absence of such a head. This is in contrast to the traditional approach which does not make an explicit syntactic distinction between controlled and uncontrolled events, and cannot relate the different behaviour of these diagnostics to argument structure alone.

7 Two non-diagnostics: locative inversion and *there*-insertion

Various authors have associated the locative inversion ((37)) and *there*-insertion ((38)) constructions with unaccusativity (see Levin & Rappaport-Hovav 1995: 19).

(43) Into the room arrived a man.
(44) There arrived a man.

However, this association has been disputed. Levin & Rappaport-Hovav (1995: ch. 6) argue that locative inversion is related to discourse function, not argument structure, and speculate that the same may be true of *there*-insertion (p. 277); Ramchand (2008: 78, fn. 6) also assumes *there*-insertion is not an unaccusativity diagnostic.

Speakers seem to vary widely in regard to which verbs they accept these constructions with, at least when they are presented with examples out of context. The rate with which the diagnostics are accepted appears to bear little relation to the semantic class of the verb: unlike many of the other diagnostics (see section 8.2), they do not exhibit any correlation with Sorace's (2000) Auxiliary Selection Hierarchy.

Thus, speakers appear no less likely to accept these constructions with prototypical 'unergatives' than with prototypical 'unaccusatives': e.g. *There worked a man* is about as readily accepted as *There arrived a man*, and speakers are similarly doubtful about both *?In the room talked a man* and *?In the room died a man*. Therefore I shall follow Levin & Rappaport-Hovav (1995) and Ramchand (2008) in assuming these are not truly argument structure diagnostics, and set them aside.

8 Further issues

8.1 *Further advantages of the multiple-head analysis*

In this subsection I shall present some further advantages of the analysis of split intransitivity presented in this article which I have not been able to address above.

One problem of the traditional binary analysis is that it does not account for variation *within* the 'unaccusative' class. Whereas the 'process' verbs – which seem to be the strongest candidates for the class of 'unergatives' – behave as a reasonably coherent set in regard to the diagnostics (though we can make some distinction in regards to [±control]), the remainder of intransitives exhibit a great deal of heterogeneity. The change verbs, the subsets of that class which are inherently telic and/or those which allow the resultative construction and undergo causative alternations, and the stative verbs all behave differently with regard to various of the purported diagnostics of unaccusativity presented in the literature.

A multiple-head analysis largely overcomes this problem. The behaviour of each of the different (sub)classes can be captured by relating the different diagnostics to the different heads, and multiple different argument positions (see section 5). Whilst some problems nevertheless remain in relation to the apparently idiosyncratic behaviour of certain verbs, the proposed analysis nevertheless provides a level of explanation which is lacking in the traditional Unaccusative Hypothesis.[22]

Another issue for the traditional analysis is apparent overlap between the classes. In particular, the *for hours* diagnostic groups with the prototypical 'unergatives' a number of verbs which otherwise seem to test as 'unaccusative', creating a new problem of unwanted overlap between the classes identified: we do not expect verbs be both unaccusative and unergative, at least not without a corresponding shift in meaning – which does not obviously take place here. We could simply say that telicity does not relate to split intransitivity (at least not in English). However, as discussed in section 5, such a relation has frequently been posited both for English and other languages and

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[22] Alexiadou & Schäfer (2011) account for certain differences they claim to exist in the behaviour of change of state and change of location verbs by positing an extra projection ResultP. This, too, is a departure from the traditional Unaccusative Hypothesis, along very broadly the same lines as proposed here (i.e. proposed additional functional structure); it may be that Alexiadou & Schäfer's insights could be incorporated into the present approach. However, I am not convinced by their analysis, largely on the grounds that I (and my informants) do not share many of the empirical judgements they report.

there does seem to be some sort of connection between telicity and argument structure. The multiple-head analysis allows us to maintain the relation between telicity, split intransitivity and argument structure whilst overcoming the problem that telicity does not directly relate to the classes identified by the other diagnostics.

Another advantage of the multiple-head analysis is that it captures the fact that each diagnostic picks out a more-or-less semantically coherent set of verbs; the classes that arise, therefore, are similarly semantically coherent. The stipulation of separate 'unaccusative' or 'unergative' properties would seem redundant, then, when the observed behaviour can be adequately described without them.

The binary analysis, further, makes no clear predictions as to the exact membership of the classes. That this is a problem becomes particularly clear when it is considered that there are a number of verbs – the statives in particular, plus some others: *go*, *come*, *leave*, *die* – which fail both the 'unergative' diagnostics (or at least, pass them only sporadically) and the 'unaccusative' ones; i.e. they are not positively identified as belonging to one class or the other by any diagnostic.[23] How is the linguist to decide whether such verbs are to be classified as unergative or unaccusative? The language learner faces the same problem: to assume that the membership of the two classes is encoded directly in Universal Grammar would seem to run contrary to minimalist ideals. The lack of crosslinguistic uniformity in the putative classes (Rosen 1984 and much of the subsequent literature) would also suggest that the composition of the classes is something which would have to be learned.

Of course this problem does not simply disappear when a number of smaller classes are posited instead. But its significance is perhaps reduced. Under the binary classification the stative verbs must be placed, presumably quite arbitrarily, in one class or the other. When multiple classes are posited, however, stative verbs can simply be omitted from all the other classes – and thus placed, quite literally, in a class of their own.[24] Additionally, as the multiple class analysis has a more straightforward relation between the syntactic classes and semantics, the semantic property of stativity may be sufficient for such a class to be posited.

What about the other exceptional verbs (*go*, *come*, etc.)? As with all (actual or apparent) lexical idiosyncrasies, these pose a problem. One possible solution may simply be to postulate that these verbs, too, form their own class, one which lacks any of the features to which the diagnostics are sensitive. This is problematic, though,

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[23] *for hours* does group the statives with the unergatives, but this group also includes a number of [+change] verbs, as discussed above, which otherwise appear to be unaccusative. Thus this diagnostic is of little help in this regard.

[24] There are of course a number of separate diagnostics for statives: see Dowty (1979: 55–6). Note that even these, however, seem generally to do with behaviours which statives *do no*t allow, e.g. pseudo-clefts and *do so* constructions: the only construction of which I am aware which positively identifies statives by occurring only with them and no other verbs is their ability to occur in the simple present tense in a non-habitual sense: compare (stative, non-habitual) *Lucy knows the answer* with (non-stative, habitual) *Lucy reads books*. Many intransitive statives do not share this behaviour, however: *Lucy persists* or *Lucy sits* expresses habitual meaning.

given that we have postulated [±change] as the feature governing most of the patterns under discussion, and these verbs would also seem to denote changes either of state or location. Perhaps the semantic evidence alone is enough for these verbs to be classified as [+change] verbs, and they fail to partake in the constructions otherwise available to verbs associated with this feature for separate reasons. It may be notable that the verbs in question all seem to be extremely frequent, and hence perhaps particularly liable to show exceptional behaviour.

In summary, there are a number of advantages of an analysis which identifies multiples classes and features over a traditional, binary one. Advantages are also apparent in comparison with another approach which identifies multiple argument positions in intransitives, that of Ramchand (2008). I will only summarise these advantages briefly here. Firstly, Ramchand's approach does not systematically distinguish changes from processes: for example, *jump* and *arrive* are not distinguished in spite of showing different behaviours:

(45) (a) the recently arrived/*jumped recruits
    (b) jumper/*arriver
    (c) Lucy outjumped/*outarrived Chris

Ramchand also does not account for the [±control] distinction, which though marginal for English intransitives is more apparent elsewhere (see for example Oerhle 1976 on the distinction between agents and causes in ditransitive constructions, and discussion throughout Baker 2017). On Ramchand's system it is also necessary to analyse stative verbs as initiated, which seems questionable (see fn. 9). In all these respects, then, my approach is better able to account for the data.

Having presented here an argument for identifying a particular set of features, in the following subsection I shall discuss one further outstanding issue: the encoding of these features in a hierarchy of functional heads.

8.2 *Hierarchical encoding of features*

I have argued that multiple different classes of intransitives can be identified in English, and that these can be described in terms of features ([±control], ([±initiation] etc.) I have also argued that these features should be seen as encoded in a hierarchy of functional heads, each corresponding to a different feature: this hierarchy was presented in (3). However, two questions which naturally arise in relation to this are: firstly, why should one encode these features in terms of a hierarchy of heads at all, and secondly, why is this particular hierarchical ordering posited?[25] To answer both questions at once, it does seem that adopting a particular ordering captures certain empirical facts. There are various reasons for taking the order of heads given above.

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[25] A deeper question concerns the ultimate source of the feature hierarchy. On this I can only speculate that it may have its origins in general properties of human cognition. However, the linguistic evidence alone is sufficient to posit the hierarchy, even if we do not (yet) have independent evidence for how it may have come to be this way in the first place. I discuss this matter further in Baker (2017: section 9.5).

One of these concerns transitives: there is reason to believe that arguments associated with InitiationP are merged higher than those associated with ChangeP and/or TelicP – in active sentences, the former are typically subjects and the latter objects. A detailed discussion of transitives is beyond the scope of this article, but consider a sentence like *Lucy eats cake*, which on the present assumptions about functional structure lends itself to an analysis along the following lines:

(46) Lucy eats cake.
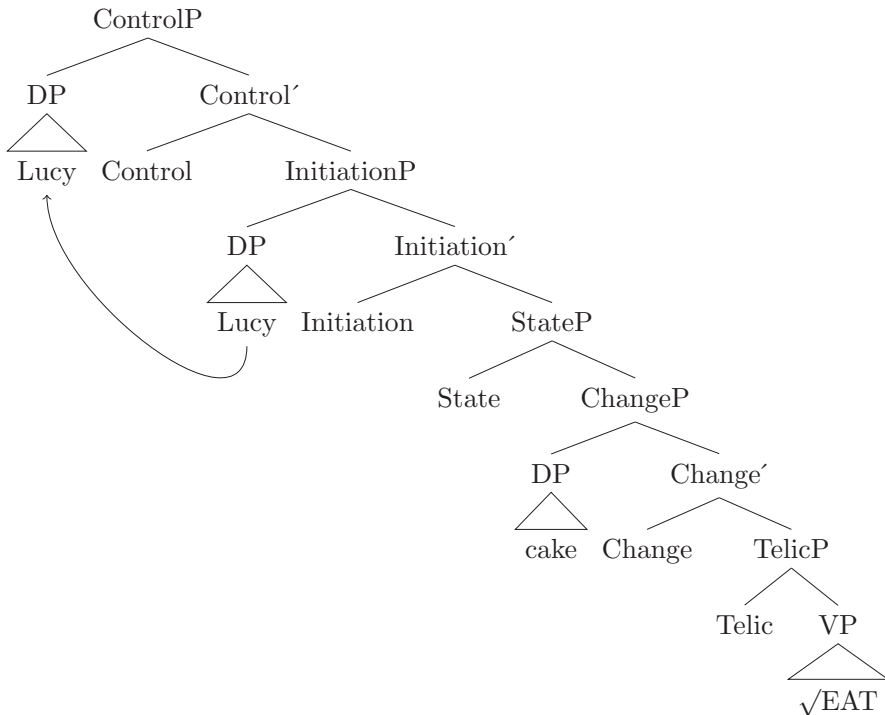
Lucy, the volitional initiator of the action, is merged in Spec,InitiationP and Spec,ControlP; *cake*, which undergoes a change as a result of the action, is merged in Spec,ChangeP. The assumption that Initiation c-commands Change also permits the analyses of causatives and resultatives in section 3.2 and of V *one's way into* and cognate objects in section 6.2.1. In telic sentences, such as *Lucy ate the cake (in an hour)*, the direct object might additionally be merged in Spec,TelicP, given the link between telicity and direct objects argued for by many authors (e.g. Kratzer 2004; Borer 2005).

We can also note that, amongst intransitives, [–state, –change] verbs seem only to be [+initiation] (see table 1), which is most easily captured by assuming Initiation to be higher than Change or State, with restrictions on the featural values of the heads it may c-select (i.e. [–initiation] Initiation cannot c-select [–state, –change] State[26]); compare

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[26] Recall that it is assumed that Change incorporates into State; see fn. 21.

Table 4. *Auxiliary selection in four Western European languages, after Sorace (2000)*

	French	Dutch	German	Italian
Change of location	BE	BE	BE	BE
Change of state	BE/HAVE	BE/(HAVE)	BE	BE/(HAVE)
Continuation of a pre-existing state	HAVE	BE/HAVE	BE/HAVE	BE/(HAVE)
Existence of state	HAVE	(BE)/HAVE	(BE)/HAVE	BE/(HAVE)
Uncontrolled process	HAVE	HAVE	HAVE	(BE)/HAVE
Controlled process (motional)	(BE?)/HAVE	BE/HAVE	BE/HAVE	(BE)/HAVE
Controlled process (non-motional)	HAVE	HAVE	HAVE	(BE)/HAVE

Note: Parentheses denote a more marginal option.

the analysis of suffix *-er* in section 6.2.3 which rests on a similar assumption. Likewise, the restriction against [+control] Control occurring with [–initiation] Initiation can also be reduced to a selection relation if Control c-commands Initiation: namely, [+control] Control must c-select [+initiation] Initiation. Note also [+change] and [+state] do not co-occur – this may be taken to suggest that the Change and State heads occupy similar positions in the hierarchy.

The order of heads is also intended to capture some of the key facts described by Sorace's (2000) Auxiliary Selection Hierarchy (ASH), which was given in table 2. The ASH is formulated by Sorace on the basis of auxiliary selection patterns in Western European languages; table 4 summarises Sorace's (2000) findings as to which classes of intransitive select BE or HAVE as the auxiliary in periphrastic perfect constructions. The ASH is also hypothesised to be applicable to split intransitivity patterns more generally (Sorace 2000: 887, 2004: 268). This hypothesis is that where a diagnostic identifies a split between two different sets of intransitives, one set will contain verbs further toward the top of the ASH and the other those further toward the bottom, although the 'cut-off point' may vary between languages and/or diagnostics.

Many of the split intransitivity diagnostics proposed for English show reasonably good to excellent correlation with the ASH, as predicted. The *for hours* diagnostic (section 5) picks out all intransitives apart from those in the bottommost category, change of location, and a subset of those in the next-from-bottom category (change of state). Prenominal past participles (section 4) are only permitted with verbs in these bottom two categories. The 'process' verbs, a class of verbs in categories toward the top of the hierarchy, are identified by a number of diagnostics, as discussed in section 6. As also discussed, some of these diagnostics also received stronger judgements with controlled as opposed to uncontrolled processes (the latter are lower in the hierarchy). This is good support for the wider applicability of the ASH, adding to that already in the literature (in addition to Sorace 2000, see Sorace 2004 and Montrul 2005; Legendre 2007b presents some evidence from diachronic patterns).

Table 5. *Summary of relations between the ASH and the features of the functional heads*

	[control]	[initiation]	[state]	[change]	[telic]
Controlled process (non-motional)	+	+	–	–	–
Controlled process (motional)	+	+	–	–	–
Uncontrolled process	–	+	–	–	–
Existence of state	+/–	+/–	+	–	–
Continuation of a pre-existing state	+/–	+/–	+	–	–
Change of state	+/–	+/–	–	+	+/–
Change of location	+/–	+/–	–	+	+

Thus it makes sense that a functional hierarchy intending to capture split intransitive patterns should reflect the ASH, and the order of heads has been selected in order to do this. The Telic head, at the bottom of the functional hierarchy, is inherently positively valued (i.e. is [+telic] not [–telic]) only with verbs at the very bottom of the ASH: change of location and some change of state verbs.[27] The next head up, Change, has a positive value ([+change]) with a slightly larger selection of verbs, namely the change of location and change of state classes in their entirety. The State head, which is above both Change and Telic, is positively valued ([+state]) with the next highest classes in the ASH, those containing continuation of state and existence of state verbs. The remainder of verbs, towards the top of the hierarchy, by default have negative values on all three of these heads; they are [–state, –change, –telic]. These remaining verbs are all [+initiation], but only a subset (which, again, are higher on the hierarchy) have a positive value ([+control]) on Control, the highest of the heads. These facts are summarised in table 5. (Compare Legendre 2007a, 2007b for another approach to the ASH in terms of an ordered hierarchy of formal features, but employing Optimality Theory rather than a functional structure.)

These behaviours are one reason to prefer the structure presented here over an approach like that of Alexiadou, Anagnostopoulou & Schäfer (2015). Following Kratzer (1996), the authors posit different varieties of Voice: incorporating these into the system adopted here, Voice AGENT can be seen to occur with controlled processes, Voice CAUSE with uncontrolled processes, and Voice HOLDER with states. However, because these heads all occupy the same position in the structure, the sorts of properties captured by the ASH are not derived so easily as in my approach.

9 Conclusion

The main contribution of this article has been twofold. It is has systematically considered the composition of the classes of verbs identified by various proposed split intransitivity diagnostics for English, and it has proposed a hierarchy of functional heads (given in (3)) to account for the behaviour of these diagnostics in relation to these

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[27] On the assumption that semelfactives are not inherently [+telic]; see fn. 18.

classes. It has been argued on several grounds that this functional hierarchy accounts better for split intransitivity in English than the traditional Unaccusative Hypothesis, which divides intransitives into only two groups. The analysis retains, however, the central insight of many interpretations of the Unaccusative Hypothesis in relating split intransitivity to argument structure. It allows for a characterisation of split intransitivity that has a semantic basis directly reflected in syntax. It should not be seen, therefore, as a radical alternative to the Unaccusative Hypothesis, but rather a development of it.

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