Event Structure of the Anticausative and Unaccusative in Russian[*]

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1 Introduction

The goal of this paper is, first, to single out a previously unattested difference between unaccusatives and anticausatives and, secondly, to show that this difference provides an argument for an analysis in which unaccusatives differ from anticausatives in event-structural terms.

It has long been assumed that the causative and anticausative/inchoative/unaccusative (AIU), illustrated in (1), form a binary distinction both syntactically and semantically. AIUs describe a change of state that some entity undergoes. The causative renders information about the agent's activity, an impact from a natural force, an event, etc., that brings the change about.

(1) a. The door opened.
     b. John opened the door.

This binarity view of the distinction between the causative and AIU replicates in a number of analyses of the phenomenon (Lakoff 1965, Dowty 1979; Levin and Rappaport Hovav 1995; Pesetsky 1995, Wunderlich 1997, Piñón 2001, Reinhart 2002; Chierchia 2004; Kalulli 2006, 2007; Koontz-Garboden 2009, Rappaport Hovav, Levin 1995, 1998, 2012). These analyses may disagree on the structure they assign to the causative and AIU and offer different answers to the question if the two are derivationally related. Nevertheless, the common (often tacit) assumption has long been that there are exactly two configurations, one for the causative, and one for the AIU.

The binarity view, however, faces a challenge if one looks at the languages where morphologically unmarked unaccusatives and morphologically marked anticausatives co-exist.[1] Modern Greek is one of these languages, as illustrated in (2):

(2) Unaccusative; active morphology
     i   sakula   adias-**e**   apo   moni tis.
     the bag.NOM   emptied-**ACT** by   itself
     'The bag emptied by itself.'   (Alexiadou & Anagnastopoulou 2004:122)

(3) Anticausative; non-active morphology
     O   Giannis   giatref-**tike**   apo monos tu.
     the Giannis   healed-**NACT** by himself
     'John healed by himself.'   (Alexiadou & Anagnastopoulou 2004:123)

Can we maintain that (2) and (3) and their counterparts in other languages are different phonological spell-outs of the same configuration? In a number of recent studies, the negative answer has been advocated (Folli 2002, Alexiadou & Anagnostopoulou 2004, Alexiadou et al. 2006, Schäfer 2008, Labelle, Doron 2010, among others). Alexiadou et al. (2006) argue that cross-linguistically, at least two AIU syntactic configurations are to be identified. They differ as to whether the Voice head merges on top of *v*P or the structure lacks Voice altogether. Voice, which is part of the anticausative structure, does not project a specifier and bears the [-external argument], [- agent] feature specification.

(4) AIU structure I; unaccusative
     [*v*/CAUS [Root]]

(5) AIU structure II; anticausative
     [Voice (-ext. arg., -AG) [*v*/CAUSE [Root]]]

In Modern Greek the presence of Voice(-ext. arg., - AG) is said to correlate with the non-active verbal morphology. Unaccusatives are associated with the AIU structure I and appear with the active morphology.

Folli (2002), Schäfer (2008), Labelle & Doron (2010) and others, too, argue that unaccusatives and anticausatives project distinct syntactic configurations and differ semantically. However, their accounts are sharply different both in terms of the structure they assign to unaccusatives and anticausatives and semantic peculiarities they identify. Schäfer provides a number of significant refinements of Alexiadou et al's (2006) approach. For Folli, the difference between anticausatives and unaccusatives reduces to the resultative projection, which, only being part of the anticausative structure, makes anticausatives obligatorily telic. In Labelle & Doron's system, the verbal root merges with *v* in anticausatives, focusing the result, but with V in unaccusatives, highlighting the process.

Part of this theoretical discrepancy obviously stems from the fact that morphosyntactic patterns differentiating between unaccusatives and anticausatives, if any, tend to vary across

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[1] To avoid terminological confusion, in what follows I will be referring to morphologically unmarked AIUs as unaccusatives, morphologically marked AIUs as anticausatives, and keep on using the cover term "AIU" when my focus is not the difference between the two.

languages and even within the same language. The goal of this paper is, however, not to offer a way of reducing intra- and cross-linguistic variation to a general mechanism accounting for the distribution of all AIUs. Rather, I will discuss a previously unattested semantic difference between anticausatives and unaccusatives and argue that it supports the following conclusion: unaccusatives and anticausatives in languages like Russian denote distinct event predicates. Unaccusatives are predicates of events in which the theme undergoes change. Anticausatives denote events that bring "unaccusative" events about.

The rest of the paper is structured as follows. In Section 2, I will examine data from Russian and isolate a class of contexts where anticausatives fail to entail unaccusatives. However, I will reject an explanation relying on the assumption that extensions of the two predicates enter a subset relation. In Section 3, I will argue that sets of events they denote are entirely disjoint. Unaccusatives denote events in which an individual undergoes change. Anticausatives are event predicates that have events that cause the change in their extension. Section 4 completes the analysis by offering compositional derivations for unaccusative, anticausative and transitive predicates.

2 Russian Unaccusatives and Anticausatives

2.1 A few Facts about Morphology

In Russian, a number of verb stems can produce not a pair of predicates of the form "causative – AIU", but a triple like the one in (6).

    (6)   sox-nu-t'   —   sus˙-i-t' —   sus˙i-t'-sja
         dry, unaccusative   dry, tr.   dry, anticausative

The transitive verb *sus˙it'* 'dry, tr.' is shown in (7). Two intransitive members of the triple are illustrated in (8):

    (7)   Vasja   sus˙-it   bel'je.
         V.   dry.IPFV-PRS.3SG linen.ACC
         'Basil is drying the linen.'
    (8)   Bel'je sox-n-et || sus˙-it-sja.
         linen   dry.IPFV-CL-PRS.3SG dry.IPFV-PRS.3SG-REFL
         'The linen is drying (unacc.) || (anticaus.).'

Volovich (2008) lists about 35 triples of this type, a few of which are shown in (9):

    (9)   Unaccusative   Transitive   Anticausative
       a. kip-e-t'   — kipjat-i-t'   — kipjat-i-t'-sja
          'boil, unacc.'   'boil'   'boil, anticaus.'
       b. (na)mok-nu-t' — (na)moc˙-i-t' — (na)moc-˙i-t'-sja
          'get wet, unacc.'   'wet'   'get wet, anticaus.'

    c. zamerz-nu-t'   — zamoroz-i-t'   — zamoroz-i-t'-sja
       'freeze, unacc.'   'freeze'   'freeze, anticaus.'
    d. osty-t'   — ostud-i-t'   — ostud-i-t'-sja
       'cool down, unacc.' 'cool down'   'cool down, anticaus.'
    e. rastaj-a-t'   — rastop-i-t' — rastop-i-t'-sja
       'melt, unacc.'   'melt'   'melt, anticaus.'

Even a few examples in (9) indicate that morphological relations between transitive and anticausative members of a triple are fully regular and predictable: the anticausative stem is a transitive stem plus the reflexive morpheme *-sja*. The *-sja* (< 'self') morpheme also occurs in reflexive, reciprocal, middle, and passive environments, being comparable in that respect to its Romance counterparts.

Unlike reflexive-based anticausatives, unaccusatives do not differ from transitives in a uniform fashion. In the examples in (7)-(9), various morphophonological processes are involved, including vowel alternations like *o/u* in *sox-/sus'-* in (7)-(8), consonant alternations like *x/s'* in the same stem or *mok-/moc'* in (9b) (*sux+i* → *sus'-i*; *mok+i* → *moc'-i*), and different types of "thematic elements" occurring between the root and inflection (cf., for example, *-nu-* (unacc.) and *-i-* (tr.) in 'dry', 'get wet' and 'freeze'). Low total number of triples like (9) presumably has to do with the unproductive character of morphosyntactic processes that relate stems like *sox-nu-* and *sus'-i-*.

If we are after the difference between unaccusatives and anticausatives, verbs like *soxnut'* and *sus'it'sja* are natural candidates for manifesting this difference. *Soxnut'*-type verbs are minimally morphologically marked, like, for example, the intransitive *open* in English[2]. *Sus'it'sja* looks like a product of the derivation that takes a transitive stem and combines in with the reflexive morphology, which makes it look similar to reflexive-based anticausatives in Romance languages and in German. Whatever the theory predicts about the meaning of the two types of AIUs, we expect these predictions to be relevant to *soxnut'* and *sus'it'sja*.

In the rest of this section we take the following path. We will first see that verbs like *soxnut'* and *sus'it'sja* have identical properties with respect to the vast majority of diagnostics mentioned in the literature on AIUs. However, the apparent similarity breaks in the most critical way as we approach the data from section 2.3. We discover that there are environments where an anticausative sentence does not entail an unaccusative sentence, which turns out to be a decisive piece of evidence that the anticausative is irreducible to the unaccusative or vice versa. Besides, we will see that the entailment pattern raises a number of further questions about the relation between uninflected AIU predicates and aspectual operators.

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[2] Note that minimal morphological marking on verbs is typically different for English and Russian. In English, most verbs do not bear any verbalizing morphology. In Russian, in contrast, the vast majority of verbs contain an overt "thematic element", which, following Marantz (1997) and much further work, can naturally be analyzed as phonological exponents of the verbalizing head that takes a category-neutral root as a complement (see, e.g., Jablonska 2007 for an analysis of "thematic elements" in Slavic).

2.2   Unaccusatives and Anticausatives are Alike

Grammatical behavior of AIUs has a number of prominent properties clearly separating them from passives, middles and other intransitive configurations. The list of characteristics discussed in the literature includes inability to license *by*-phrases and agent-oriented adverbials and to control into purpose adjuncts, compatibility with *from*-phrases and being positive with respect to the so called *da se* test, discussed by Chierchia (2004) and taken up in Koontz-Garboden (2009). The crucial observation about AIUs in Russian is: with respect to all of these characteristics, anticausatives and unaccusatives pattern together.

Both disallow *by*-phrases, (10), and do not pass diagnostics for implicit agents in general, including (11) with an agent-oriented adverbial:

(10) *Bel'je   vy-sox-l-o || vy-suṧi-l-o-s'   Vas-ej.

       linen   PRF-dry.PFV-PST-N   PRF-dry.PFV-PST-N-REFL V.-INSTR
       'The linen dried (unacc.) || dried (anticaus.) by Vasja."

(11) *Bel'je   namerenno vy-sox-l-o || vy-suṧi-l-o-s'.

       linen   on.purpose PRF-dry.PFV-PST-N   PRF-dry.PFV-PST-N-REFL
       'The linen dried (unacc.) || dried (anticaus.) on purpose."

Both license *from*-phrases; the lexical equivalent of *from* in Russian is *ot-*, illustrated in (12). As was pointed out in the literature (Paduceva 2001, Guhl 2010), Russian *ot*-phrases combined with anticausatives only introduce causing events and natural forces as implicit causers. *Ot*-phrases referring to instruments and other names of artifacts lead to serious decrease in grammaticality, (13). Again, whatever factor lies behind the contrast between events/natural forces and intstruments/artifacts, anticausatives and unaccusatives pattern together.

(12) Ot   z̊ary   bel'je   bystro
       from   heat.GEN   linen   quickly

       vy-sox-l-o || vy-suṧi-l-o-s'.
       PRF-dry.PFV-PST-N   PRF-dry.PFV-PST-N-REFL
       'The linen dried (unacc.) || dried (anticaus.) quickly from the heat."

(13) ??Ot   nagrevatel-ja   bel'je   bystro
       from   heater-GEN   linen   quickly

       vy-sox-l-o || vy-suṧi-l-o-s'.
       PRF-dry.PFV-PST-N   PRF-dry.PFV-PST-N-REFL
       'The linen dried (unacc.) || dried (anticaus.) quickly from the heater."

Finally, (14) illustrates Chierchia's (2004) *da se* 'by itself' test, which is considered crucial for answering the question if an eventuality description is associated with a causative structure. 'By itself' adjuncts indicate that the subject is the sole causer of a change of state described by the verb, hence can be taken as a reliable diagnostic for the presence of the causer in the semantic representation of a predicate. (14) indicates that unaccusatives and anticausatives are both positive with respect to this diagnostic:

(14) Bel'je   samo   vy-sox-l-o || vy-sus˙i-l-o-s'.

    linen   by.itself   PRF-dry.PFV-PST-N   PRF-dry.PFV-PST-N-REFL

    'The linen dried (unacc.) || dried (anticaus.) by itself.''

The above examples suggest that the meaning and distribution of unaccusatives and anticausatives is similar enough for concluding that both reduce to the same semantic configuration. This conclusion turns out to be premature, however, in light of the evidence from unaccusative and anticausative imperfective sentences, to which we turn in the next section.

2.3   Unaccusatives and Anticausatives are Different

However close resemblance unaccusatives bear to anticausatives, in this section we will see that eventualities they describe are distinct. The central observation that points towards this generalization is: "Anticausative" eventualities can be happening in the actual world without corresponding "unaccusative" eventualities happening as well. Consider (15):

(15) Bel'je uz˙e   celyj   c˙as   sus˙-it-sja,

    linen   already whole   hour   dry.IPFV-PRS.3SG-REFL

    no   sovers˙enno   ne   soxn-et.

    but   at.all   NEG   dry.IPFV-PRS.3SG

    Lit. "The linen has been drying (anticaus.) for an hour, but it is not drying (unacc.) at all."

The first part of the sentence is an imperfective anticausative clause. It says that an ongoing "anticausative" eventuality is part of the actual world. The proposition expressed by the second part, a negated imperfective unaccusative clause, says that no "unaccusative" eventuality is occurring in the actual world. No subinterval of the one-hour interval filled up with the anticausative drying is a running time for any unaccusative drying. In (15), the anticausative does not entail the unaccusative[3].

The same lack of entailment is illustrated in (16) with the unaccusative verb *ostyvat'* 'cool down' and anticausative *ostuz˙at'sja* 'cool down'.

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[3] It should be pointed out that unlike in the English translation, in the Russian sentence both verbs appear in the same morphological form: they are present and imperfective. The Russian Imperfective differs from the English Progressive in that it is readily modifiable by the durative adverbials like 'for two hours'. Some authors, e.g., Paslawska, von Stechow 2003, suggest that Russian imperfective is in fact ambiguous between the progressive and extended now readings. For them, *soxnut'* in the second clause would be an instance of the former, and *sus˙it'sja* in the first clause — a special case of the latter.

(16) Sup   uz̆e   celyj   c̆as   o-stuz̆-a-et-sja,
     soup   already whole hour   PRF-cool-IPFV-PRS.3SG-REFL

     no daz̆e   ne duma-et   o-sty-va-t'.
     but even   not think-PRS.3SG PRF-cool-IPFV-INF
     'The soup has been cooling down (anticaus.) for an hour, but is not cooling down (unacc.) (lit.: is not even thinking about cooling) at all."

Exactly as in (15), the sentence asserts the anticausative part and denies the unaccusative part without yielding a contradiction.

The data in (15)-(16) make it immediately obvious that anticausatives like *sus̈ït'sja* and unaccusatives *soxnut'* cannot be different morphological realizations of the same semantic structure, whatever this structure is. Had this been the case, the sentences in (15)-(16) would have made no sense in exactly the same way as their English equivalents do not. However, the lack of entailment from anticausatives to unaccusatives may have more than one explanation compatible with what we see in (15) and (16).

For one, it can be the case that the verb phrases based on *sus̈ït'sja* and *ostuz̈ät'sja* denote event predicates that stand in a superset relation to the predicates corresponding to *soxnut'/ostyvat'*:

(17) $\| [_{vP} ... dry_{UNACC} ...] \| = \lambda e... [... \alpha(e) \wedge \| dry_{ANTICAUS}\|(e)...]$
     where α is some property of events that restricts the denotation of the anticausative and makes it a superset with respect to the set of events in the denotation of unaccusatives.

Since there is no entailment from supersets to subsets, unless we are dealing with a downward entailing environment, which is not the case in (15)-(16), anticausatives do not entail unaccusatives for the same reason as (18a) does not entail (18b) or (18c).

(18) a. The linen is drying.
     b. The linen is drying quickly.
     c. The linen is drying in the kitchen.

Plausibility of this line of explanation seems to be supported by the fact that in much the same way as both (18b) and (18c) entail (18a), unaccusatives do entail anticausatives.

(19) *Bel'je   soxn-et,
      linen   dry.IPFV-PRS.3SG

      no   sovers̆enno   ne   sus̆-it-sja.
      but   at.all   NEG   dry.IPFV-PRS.3SG-REFL
      Lit. "The linen has been drying (unacc.) for an hour, but is not drying (anticaus.) at all."

(20) *Sup   uże   celyj   ċas   osty-va-et,
     soup   already whole   hour   cool-IPFV-PRS.3SG

     no   daże   ne duma-et   o-stuż-at'-sja.
     but   even   not think-PRS.3SG cool-IPFV-PRS.3SG-REFL
     'The soup has been cooling down (unacc.) for an hour, but is not cooling at all (lit. does not even think of cooling down) (anticaus.)."

The reason to doubt that the (17) is a right explanation for the lack of entailment in (15)-(16) has to do with the straightforward prediction derivable from (17). If one event predicate is a subset of another event predicate, it is not difficult to see that the entailment pattern is to be identical for perfective and imperfective/progressive clauses based on those predicates. (18b) and (18c) entail (18a), but not the other way around. Exactly the same pattern obtains with their perfective counterparts in (21):

(21) a. The linen dried.
     b. The linen dried quickly.
     c. The linen dried in the kitchen.

Assume, with Klein (1994) and much further literature, that the perfective operator maps an event predicate to a predicate of times that include the running time of some event from the predicate's original extension, (22). The imperfective/progressive operator, if analyzed in extensional terms, can be assigned the semantics in (23), whereby the topic time is included in the running time of an event.

(22) Perfective aspect
     $\lambda P_{<v,t>}.\lambda t.\exists e[P(e) \wedge \tau(e) \subseteq t]$
     where v is the type of events
(23) Imperfective aspect
     $\lambda P_{<v,t>}.\lambda t.\exists e[P(e) \wedge t \subset \tau(e)]$

Suppose that the operators apply to event predicates that stand in the subset-superet relation, for example, $P=\lambda e.the\_linen\_dry(e)$ and $Q=\lambda e.the\_linen\_dry\_quickly(e)$, $Q \subseteq P$. The application of (23) will result in properties of times in (24a-b), which represent part of the meaning of (18a-b) above:

(24) a. $\lambda t.\exists e[the\_linen\_dry(e) \wedge t \subset \tau(e)]$
     b. $\lambda t.\exists e[the\_linen\_dry\_quickly(e) \wedge t \subset \tau(e)]$

The predicate in (24b) will be true of any time *t* included into the running time of some event in which the linen dries quickly. Since an event in which the linen dries quickly is an event in which the linen dries, the predicate in (24a) will also be true of *t*. As we have already seen, the imperfective sentence in (18b) entails (18a), as expected. The opposite does not hold: a time at which the linen dries need not be a time at which it dries quickly.

But exactly the same reasoning applies to the perfective counterparts of (18a-b) in (21a-b), represented in (25a-b):

(25) a. λt.∃e[the_linen_dry(e) ∧ τ(e) ⊆ t]
     b. λt.∃e[the_linen_dry_quickly(e) ∧ τ(e) ⊆ t]

If a time *t* contains an event in which the linen dries quickly, it necessarily contains an event in which the linen dries: the entailment from the perfective 'dry quickly' to the perfective 'dry' is entirely valid. Hence, if (17) is correct, perfective unaccusatives must entail perfective anticausatives. This prediction is borne out, as (26) shows:

(26) *Bel'je   vy-sox-l-o,   no
      linen   dry.PFV-PST-N   but

      sovers˙enno   ne   vy-sus˙i-l-o-s'.
      at.all   NEG   PRF-dry.PFV-PST-N-REFL
      Lit. "The linen dried (unacc.), but did not dry (anticaus.) at all".

However, we expect that the entailment in the opposite direction does not go through. A time that includes a complete event of drying in (25a) need not be a time that includes an event of drying quickly in (25b). From (17), it follows that for the same reason, a time that includes a complete anticausative event need not include a complete unaccusative event. However, the prediction is wrong: unlike what happens in imperfective sentences, perfective anticausatives do entail perfective unaccusatives: (27)-(28) are contradictions.

(27) *Bel'je   vy-sus˙i-l-o-s',   no
      linen   PRF-dry.PFV-PST-N-REFL but

      sovers˙enno   ne   vy-sox-l-o.
      at.all   NEG   PRF-dry.PFV-PST-N
      Lit. "The linen dried (anticaus.), but did not dry (unacc.) at all".
(28) *Sup   o-studi-l-sja,
      soup   PRF-cool.PFV-PST.M-REFL

      no daz˙e ne poduma-l   o-sty-t'.
      but even   not think.PFV-PST.M   PRF-cool.PFV-INF
      'The soup cooled down (anticaus.), but did not cooled down (unacc.) (lit. did not even think of cooling down) at all."

I do not see a way of explaining the difference in entailment between imperfective sentences (15)-(16) and (19)-(20) and perfective sentences (26)-(28) compatible with the subset-superset view in (17). Therefore, an analysis along the lines of (17) is not to be considered a reasonable account for the lack of entailment from imperfective anticausatives to imperfective anticausatives.

To recapitulate, the result of this section is two-fold. Empirically, we have seen intricate entailment relations between unaccusatives and anticausatives summarized in (29):

(29)   Perfective   Imperfective

    Anticausative → Unaccusative   ☑   ☒
    Unaccusative → Anticausative   ☑   ☑

We have concluded that a theory that aims at explaining the pattern in (29) by suggesting that unaccusative predicates denote a subset of events in the denotation of anticausative predicates runs into serious complications and is to be rejected if we can make a better alternative work. The aim of the next section is to work out such an alternative.

3   Event Structure of Unaccusatives and Anticausatives

3.1   Subevental Content

We have seen that an attempt to build up an explanation for (15), repeated as (30), by reducing the difference between unaccusatives and anticausatives to the subset-superset relation does not look like a promising way to go. To develop a better alternative, let us take a closer look at the meaning of (30).

(30)   Bel'je   uzˑe   celyj   cˑas   susˑ-it-sja,
       linen   already   whole   hour   dry.IPFV-PRS.3SG-REFL
       no   soversˑenno   ne   soxn-et.
       but   at.all   NEG   dry.IPFV-PRS.3SG
       Lit. "The linen has been drying (anticaus.) for an hour, but it is not drying (unacc.) at all."

The second clause says that the linen does not undergo any change along the dryness scale. The degree to which the linen is dry remains the same throughout the reference time. What does the first clause describe?

Since (30) is not a contradiction, this cannot be the process of the linen is getting drier. Rather, (30) says that the linen is exposed to the factors that should bring about a change in the linen's dryness. What these factors are is entirely underspecified. (30) can be felicitous if the linen is hanging in a sunny spot, if the heater is placed under it, as well as under lots of other scenarios. Whatever natural forces or environmental phenomena may be relevant for changing a degree of dryness, some of them are at work in (30). Similarly, the soup in (16) is exposed to some factors that favor change along the temperature scale. The change itself, however, has not (yet) occurred.

Here is a way of making this intuitive characterization more precise. I argue that unaccusatives and anticausatives describe distinct but causally related processes. In both (15)/(30) and (16), the first clause refers to the "anticausative" process, which, if nothing happens out of the ordinary, eventually ends up bringing about an "unaccusative" process described by the second clause. At the reference time, however, the latter has not yet started. The first approximation to formalizing this intuition is (31), which represents the general format for anticausative and unaccusative predicates. In (31), the components not immediately relevant for

identifying the subevental content of a complex event description are left out; they will be elaborated in Section 4.

(31) a. ‖ [$_{vP}$ ... dry(unacc.) ...] ‖ = λe ... ∃e′ [... cause(e)(e′) ∧ dry(e) …]
　　 b. ‖ [$_{vP}$ ... dry(anticaus.) ...] ‖ = λe ... ∃e′[... cause(e′)(e) ∧ dry(e′) ...]

Both (31a) and (31b) are based on a complex event structure consisting of two eventive components. One subevent is a change of state process where an individual becomes dry. This subevent falls under the extension of the event predicate *dry* in both (31a) and (31b). The other component is a causing subevent that brings becoming dry about. This subevent is not associated with an event predicate, which captures the intuition that it has no specific descriptive properties. The components are connected by the relation of immediate causation.

Therefore, anticausatives and unaccusatives are associated with the same event structure. However, event predicates they denote are distinct. The unaccusative denotes change of state subevents (brought about by a causing subevent); the anticausative has causing subevents in its extension (which bring about some change of state subevent).

(31a-b) are instances of a decompositional analysis of complex event predicates. A similar subevental architecture can be found in Rothstein (2004) (cf. her activity and become subevents) and Ramchand (2008), who separates initiating subevents and process subevents. I am not addressing the question if a complete decompositional structure also includes a result state component, which is not directly relevant to the present discussion.

Consider again the summary of the entailment pattern:

(32)　　　　　　　　　　　　　　　Perfective　Imperfective

　　　Anticausative → Unaccusative　　　☑　　　　　☒
　　　Unaccusative → Anticausative　　　☑　　　　　☑

If eventualities in the denotation of unaccusatives and anticausatives are distinct, this pattern translates naturally into event-semantic talk as follows. To say that a perfective anticausative sentence entails a perfective unaccusative sentence equals to saying that a complete anticausative eventuality cannot occur in a world without a complete unaccusative eventuality occurring as well. In contrast, an incomplete anticausative eventuality can be part of a world without a corresponding unaccusative eventuality being part of that world, and this is why the entailment from imperfective anticausatives to imperfective unaccusatives does not go through. Finally, unaccusative eventualities, be they complete or incomplete, cannot exist if there is no anticausative eventuality that bring them about, hence unaccusatives entail anticausatives no matter what their grammatical aspect is.

My goal is thus to show that the analysis along the lines of (31) predicts exactly this pattern. In the next two sections I will try to convince the reader that the pattern derives from (31) coupled with independently motivated characteristics of the causal relation in combination with standard assumptions about the semantics of the perfective and imperfective aspects.

3.2   The Causal Relation

Let us start with a few reflections on the meaning of the causal relation on events. (31a-b) represent semantics of uninflected unaccusative and anticausative verb phrases, of which the causal relation is an essential component. Characteristics of the causal element of the meaning of verbs in natural languages have been subject to thorough examination in the semantic literature at least since late 60s, most notably, in Dowty 1979; see recent discussions in Kratzer 2005, Levin, Rappaport Hovav 2005, Thomason 2014. Many treatments of causation involve some or other version of the following constraint on temporal construal of a causally related events in (33):

(33) Temporal construal of causally related events
$\forall e \forall e'[\text{cause}(e')(e) \rightarrow \neg \exists e''[e'' \le e \rightarrow e' \ll_T e'']$
where "$\le$" is the part-of relation on events and "$\ll_T$" is the temporal precedence relation

(33) says that if two eventualities are causally related, neither the cause not any of its proper parts can temporally follow the effect. This leaves us with a variety of other options: the two events run at the same time; the effect obtains at the minimal final part of the cause, the effect temporally follows the cause, and so on. However, when it comes to the meaning of lexical verbs in natural languages associated with a causative event structure, it turns out that the spectrum of temporal relations between the causing and caused subevents can be further restricted.

For instance, lexical verbs do not license the interpretation where the effect temporally follows that cause without temporally overlapping with it at least at the culmination point, cf. Fodor's (1970:433) example in (34) (cf. Rappaport Hovav & Levin 2012; see, however, Neeleman & van de Koot 2012 for significant qualifications)[4]:

(34) *John killed Bill on Sunday by stabbing him on Saturday.

In the lexical semantic literature, two fundamental temporal relations are identified that can be part of the meaning of individual lexical items. Rothstein (2004) argues that for predicates like 'read a novel', 'write a letter', 'eat an apple' the activity subevent, where the agent performs a certain action, is temporally coextensive with the become subevent, in which the theme undergoes change. Moreover, every (contextually relevant) temporal part of the activity contributes to the progression of the become subevent.[5] This is the *incremental relation*.

Tatevosov and Ivanov (2006) isolate another class of predicates (e.g., 'tear a thread', 'chop down a tree' or 'wake up a sleeping beauty') based on what they call *mapping to a minimal final part relation* (MMFP), where the whole change of state must occur at the very end of the activity.

Finally, for many other verbs, the temporal structure of the relation is more flexible: the lexical meaning is vague as to whether every part of the change of state requires some input of the activity or the whole change is free to occur at its final part. Such verbs are compatible with both incremental and MMFP construals. For instance, verbs like 'destroy the city' are felicitous

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[4] The temporal construal where causing and caused events do not temporally overlap is characteristic of indirect causatives, which are typically derived from transitive and unergative verb phrases. Indirect causation, however, is only found in derived environments and is not attested as part of the meaning of a lexical verb.
[5] Rothstein herself assumes, though, that the relation between the two subevents is not causal.

with two types of scenario. One type are 'gradual destruction scenarios', whereby the destroying activity falls into a number of separate acts in which buildings in the city are destroyed one after another. The other type comprises activities that bring about a single act of destruction at the very end. As an example one can think of mining every building in the city and activating the mines all at once. On this scenario, mining is part of the activity to which the change of state is causally related. It does not bring about any destruction by itself, however.

Therefore, the causal relation, only restricted by (33), is compatible with a wide range of temporal relations that can, but do not have to be narrowed down by the meaning of individual lexical items. This means that the following generalization generally holds:

(35) Temporal properties of verbs based on the causal relation
For verbs that denote a complex event structure based on the causal relation, non-final temporal parts of the causing subevent do not have to be mapped to temporally coextensive parts of the caused change, unless the opposite is entailed by the lexical meaning of the verb.

If (35) is correct, the full potential for deriving the right semantics for (30) is already implicit in (31), since the key assumption behind (31) is that the anticausative and unaccusative processes are causally related.

There can be a part of the causing event not mapped to a temporally coextensive part of a change of state. If the imperfective extracts this part from the denotation of a complex predicate, we will have a partial causing eventuality in the evaluation world, but not any part of the change of state. This is how the lack of entailment comes about in (30). In the remaining three cases (☑'s in (32)) the two eventualities must both be part of the evaluation world for the reasons I will make clearer towards the end of Section 3.3.

At this point, we have, therefore, to accomplish the following two tasks. First, we need a reasonable semantics for the imperfective that would guarantee that imperfective sentences describe non-final temporal parts of an eventuality. Secondly, we need to make sure that the lexical meaning of 'dry' or 'cool down' do not entail temporal co-extensiveness of two causally related subevents. It will follow, then, that imperfective anticausative sentences can describe a causing activity that has not (yet) brought about a change of state, hence can be true without corresponding unaccusative sentences being true.

3.3 Aspect and Non-Final Stages

Supplementing the analysis in (31) with an appropriate imperfective operator is not very difficult, since the vast majority of current theories of the imperfective possess the desired property. We need a progressive/imperfective operator that takes an event predicate and extracts non-final temporal parts of some event from its extension. To be specific, let us assume a version of Landman's (1992) operator that maps events to their stages, as in (36).

(36) a. $\|PROG(P)(e)\|^{w,g} = 1$ iff $\exists f \exists v: \langle f, v \rangle \in CON(g(e), w)$ and $\|P\|^{v,g}(f)=1$
where $CON(g(e), w)$ is the continuation branch of $g(e)$ in *w*.

      b. The continuation branch for an event *e* in a world *w* is the (smallest) set of pairs of events *f* and worlds *v* such that *f* goes on in *v*, *e* is a non-final stage of *f* in *v*, and *v* is a reasonable option for *e* in *w*.

      c. A world *v* is a reasonable option for the pair <e, w> if *e* can continue in *w* as far as it does in *v*.

One departure from Landman is: (36b) requires an eventuality *e* going on in the base world be a non-final stage of an eventuality *f* that culminates in some (reasonable) world *v*. The original Landman's formulation did not contain a non-finality condition and allowed an eventuality to attain a culmination in the base world. It should be emphasized that nothing in what follows hinges on the specifics of Landman's theory of the progressive. Major alternatives suggested in the literature, namely, Dowty 1979, Klein 1994, Portner 1998, differing as much as they are, are all compatible with treating the progressive, in some way or other, as a function that extracts non-final parts of an eventuality from the extension of a predicate.

The application of the progressive to the anticausative predicate in (31b) results in an event predicate in (37):

(37) $\parallel$ *prog* [$_{vP}$ ... dry(anticaus) ...] $\parallel$ = $\lambda e.\text{PROG}(\lambda e'...\exists e''[... \wedge \text{cause}(e'')(e') \wedge \text{dry}(e'')$
    …])(e)

The predicate in (37) denotes the set of non-final stages of an event that causes (some individual) to become dry. Ignoring tense, irrelevant for the discussion, and assuming existential closure of the event variable, (30) will be represented as a proposition in (38):

(38) $\exists e[\text{PROG}(\lambda e'...\exists e''[... \wedge \text{cause}(e'')(e') \wedge \text{dry}(e'') …])(e)]$

(38) says that the evaluation world contains a stage *e* of an event that causes another event, one where (a relevant individual) gets dry. Due to the properties of the cause relation summarized in (35), if the opposite is not a lexical entailment of a verb, non-final stages of an event need not bring about a change of state, which means that the drying event need not be part of the base world. I believe that it is in this way that the lack of entailment in (30) obtains.

For the analysis to work, therefore, it is crucial to take a closer look at the lexical meaning of 'dry', 'cool down' and similar verbs and ask what kind of temporal relations between subevents it licenses. Are they temporally coextensive, like for 'read a novel', or does the caused subevent occur at the final part of the causing subevent, as in 'chop down a tree', or is the temporal relation not constrained in either way, as with 'destroy the city'?

The most readily available class of scenarios for 'dry (the linen)' or 'cool down (the soup)' implies that both subevents run at the same time. Under normal conditions, the causing event, in which natural forces and environmental phenomena affect the theme, immediately initiates a caused subevent of getting dry/cold. If the linen is hung to dry outside, the linen is affected by the natural forces like wind and sun, by the temperature of the air, its humidity, etc., and the more the causing subevent advances, the more the theme acquires the property of being dry. Rothstein's incremental relation is thus a preferred and, in a sense, default interpretative options for these verbs.

It seems, however, that, even being a preferred option, it is not the only one. It is not difficult to come up with scenarios where a causing process does not have immediate effects. Depending

again on the temperature, humidity, and many other factors, sensible changes in the degree of dryness can appear with a significant delay. The causing event will have a temporal part not mapped to any part of the change of state running at the same time. This means that 'dry' and 'cool down' fall within the same class of lexical verbs as 'destroy' discussed above, which do not rigidly fix the temporal relation between two causally related subevents that form their event structure. We have good reasons to assume, then, that verbs stems like 'dry' come out from the lexicon endowed with the following meaning postulate[6]:

(39) $\forall e \forall e'$ [cause(e)(e') $\wedge$ dry(e)] $\leftrightarrow \tau(e) \leq \tau(e')$

If this line of reasoning is correct, the lack of entailment from the anticausative to the unaccusative is successfully accounted for. Let us sum up the main ingredients of the explanation. First, anticausatives denote causing events that bring about a change in the theme as to the degree to which it possesses a relevant property like dryness and coldness. Secondly, imperfective/progressive sentences denote non-final parts of an eventuality from the original extension of a predicate. Thirdly, the lexical meaning of 'dry' and 'cool down' does not require a causing and caused subevents be temporally coextensive. Denotations of these verbs contain complex events where non-final temporal parts of the causing processes do occur, but corresponding caused events do not. Imperfective anticausative sentences like (30) describe exactly those temporal parts.

Now that we have an answer to the question why imperfective anticausatives do not entail imperfective unaccusatives, we can address the rest of the data summarized in (32) and see why for the three remaining logical possibilities the entailment must hold.

Consider perfective anticausatives and unaccusatives first. In Landman's and similar systems, where the application of the imperfective operators creates a set of stages of an event from the original extension of the predicate, perfectivity is to be treated the identify function (see the extensive discussion in Zucchi 1999). Perfective predicates contain complete events in their extension. Putting irrelevant details aside again and assuming the existential closure of the event variable, from (31a-b) we get (40) as a semantic representation of for both perfective unaccusatives and anticausatives.

(40) $\| \; pfv \; [_{vP} \; ... \; $ dry(unacc.) $\; ...] \; \| \; = \; \| \; pfv \; [_{vP} \; ... \; $ dry(anticaus.) $\; ...] \; \| \; =$
$\quad \exists e \exists e' ... \; [... \wedge$ cause(e)(e') $\wedge$ dry(e) $...]$

From (40), it is obvious that both subevents must occur and culminate in the base world. The causing event is only complete when the caused event is and vice versa. It is impossible to assert that a complete anticausative event exists in the base world without being committed to asserting the same about a corresponding unaccusative event, and the other way around. (40) makes this entirely explicit, so the analysis correctly predicts that perfective unaccusatives and anticausatives entail each other.[7]

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[6] Note that (39) together with the general constraint on the causal relation in (33) effectively makes $\tau(e)$ in (39) not just a part of $\tau(e')$, but a final part of $\tau(e')$.

[7] Note that if the perfective operator is analyzed along the lines of Klein 1994, as a function that maps event predicates to temporal predicates, $\lambda P.\lambda t.\exists e[\tau(e) \subseteq t \wedge P(e)]$, perfective anticausative and unaccusative sentences will not be logically equivalent.

The fourth case from (32), exemplified in (16) repeated as (41), shows that one cannot assert an imperfective unaccusative sentence and deny an imperfective anticausative sentence at the same time.

(41) *Bel'je   soxn-et,
     linen   dry-PRS.3SG

     no   sovers˙enno   ne   sus˙-it-sja.
     but   at.all   NEG   dry-PRS.3SG-REFL
     Lit. "The linen has been drying (unacc.) for an hour, but is not drying (anticaus.) at all."

I argue that the analysis developed so far explains this without any additional stipulations: lexical semantics of the verbs like 'dry', properties of the causal relation as well as properties of the imperfective operator derive exactly this result. Application of the imperfective operator to (31a) creates a property of events in (42):

(42) $\| prog \, [_{vP} ... \, dry(unacc.) \, ...] \| = \lambda e.PROG(\lambda e'...\exists e''[... \wedge cause(e')(e'') \wedge dry(e') \, ...])(e)$

According to (42), the imperfective unaccusative is a set of non-final stages of an event in which (some individual) is getting dry; these events are brought about by some causing event. According to (33) and (39), for verbs like 'dry', the temporal projection of the caused subevent must be a final part of the temporal projection of the causing subevent. This means that no world can contain a stage of a change of state event from the extension of the unaccusative 'dry' without a corresponding fragment of the causing process going on at the same time as well. This yields a principled explanation for the inappropriateness of (41) and completes the outline of the explanation for the entailment pattern in (32).

In the remaining section I will complete the analysis by laying out assumptions about the compositional derivation of AIUs and corresponding transitive verbs in Russian.

4 Deriving a Triple

So far we have seen that the semantics for unaccusative and anticausative predicates in (31a-b) in combination with independently motivated assumptions about the meaning of aspectual operators, properties of the causal relation and lexical entailments of verbs like 'dry' or 'cool down' successfully accounts for the entailment pattern in (32). However, I have not shown yet how the predicates are derived compositionally.

If the difference between unaccusatives and anticausatives boils down to the fact that they are associated with the same event structure but denote different subevents, it is natural to suggest

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(i)   a. $\| pfv \, [_{vP} ... \, dry(anticaus.) \, ...] \| = \exists t \exists e \exists e'... \, [... \wedge \tau(e') \subseteq t \wedge cause(e)(e') \wedge dry(e) \, ...]$
       b. $\| pfv \, [_{vP} ... \, dry(unacc.) \, ...] \| = \exists t \exists e \exists e'... \, [... \wedge \tau(e) \subseteq t \wedge cause(e)(e') \wedge dry(e) \, ...]$

However, both (i-a) and (i-b) entail that the causing and caused subevents occur in the base world, hence it is impossible to assert the perfective anticausative proposition and deny perfective unaccusative proposition at the same time, and vice versa.

that both originate from the same common source. At some stage of derivation 'dry', 'cool down' and similar verb stems project a relation between two (sub)events, on which unaccusatives, anticausatives and their transitive counterparts are all based. Here is one specific way of implementing this idea.

Let us assume that a complex even structure consisting of two subevents comes as part of the denotation of a verb stem:

(43) $\| [_V \text{ dry }] \| = \lambda x.\lambda e'.\lambda e. [\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(x)(e)]$

Saturating the internal argument position yields a relation between two events in (44):

(44) $\| [_{VP} \text{ dry linen }] \| = \lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$

Following the ideas from Alexiadou et al. 2006 and Schäfer 2008, one can assume that *from-* and *by itself* phrases adjoin to the minimal configuration where the causing subevent is represented. Both can be thought of as introducing an effector thematic relation, to coin Van Valin's (2005) term, where the effector, is, roughly, an inanimate causer associated with a causing subevent:

(45) $\| \text{ from the heat } \| = \lambda R.\lambda e'.\lambda e.[R(e)(e') \wedge \text{effector}(\text{heat})(e')]$
(46) $\| \text{ by itself } \| = \lambda S.\lambda x.\lambda e'.\lambda e.[S(x)(e)(e') \wedge \text{effector}(x)(e')]$

From-PPs take a relation between subevents as its argument like the one in (44). 'By itself', which identifies the effector with the entity undergoing change. should rather combine with a relation in (43) where the individual argument position is not yet saturated. I leave it open for future research to determine the exact syntactic position of 'by itself'.

At the next stage of derivation, VP merges with *v* that comes in various flavors (e.g., Folli, Harley 2005, 2007) including the unaccusative and anticausative variants in (47)-(48):

(47) $\| v_{\text{UNACC}} \| = \lambda R_{<v,<v,t>>}.\lambda e.\exists e'[R(e)(e')]$

(48) $\| v_{\text{ANTICAUS}} \| = \lambda R_{<v,<v,t>>}.\lambda e.\exists e'[R(e')(e)]$

The two subevents are treated by the unaccusative and anticausative *v* in different ways. Unaccusatives 'externalize' the caused change of state subevent, existentially binding the causing one, and yield a property of caused subevents where an individual is becoming dry. The anticausative, the other way around, externalizes causing subevents that bring about a change of state subevent that falls under *dry*. (47)-(48) is this a radical depature from the Koontz-Garboden 2009, where it is assumed that AIUs invariably denote the change of state. After v_{UNACC} and v_{ANTICAUS} merge with the VP, properties of events in (49)-(50) are created.

(49) $\| v_{\text{ANTICAUS}} [_{VP} \text{ dry linen }] \| = \lambda e'.\exists e[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$
(50) $\| v_{\text{UNACC}} [_{VP} \text{ dry linen }] \| = \lambda e.\exists e'[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$

A transitive *v*P, then, is derived by v_{TR}, which turns a relation between two events into a relation between causing events and individuals:

(51) $\| v_{TR} \| = \lambda R_{<v,<v,t>>}.\lambda x.\lambda e.\exists e'[R(e')(e) \wedge causer(x)(e)]$

Merging a subject DP in the spec, *v*P position saturates the external argument position and yields a property of events in (52):

(52) $\| [_{vP} \text{ Vasja sus˙i- belje}] \| = \lambda e'.\exists e.[cause(e)(e') \wedge dry(e) \wedge causer(Vasja)(e') \wedge theme(linen)(e)]$

    I believe that this system successfully derives all the properties of unaccusatives and anticausatives we have discussed so far. The most essential ingredient, the idea that the two intransitive members of the triple denote distinct subevents connected by the causal relation is, as I have argued in the preceding section, critical for accounting for the lack of entailment from imperfective anticausatives to imperfective unaccusatives. Syntactic and event-structural identity of both types of AIUs discussed in Section 2.2 follows from the fact that at earlier stages of derivation unaccusatives and anticausatives are literally identical.

    An advantage of this analysis is that it captures one parameter in which anticausatives pattern together with transitive verbs based on the same stem. In (49) and (52), both denote causing subevents, hence are correctly predicted to exhibit the same behavior with respect to the entailment in the imperfective. Just like the anticausative, a transitive verb in the imperfective does not entail that internal argument undergoes change in the course of the event:

(53) Vasja   uz˙e   dva   c˙asa   sus˙-it   belje,
       V.   already two   hour-GEN dry.IPFV-PRS.3SG linen.ACC

    no ono absolutno   ne   soxn-et.
    but it absolutely NEG   dry.IPFV-PRS.3SG
    'Vasja has been drying the linen for two hours, but it does not dry at all.'

    Under the above analysis, this result falls out for free, since both transitives and anticausatives, unlike unaccusatives, denote causing subevents. The reasoning that accounts for the lack of entailment from anticausatives to unaccusatives thus fully extends to cases like (53). The complete derivations for anticausatives, unaccusatives, and transitives are summarized in the Appendix.

5 Summary, Conclusions, and Prospects

In this paper, I established that unaccusatives and anticausatives in Russian and possibly in languages like Russian, despite their superficial similarity, denote disjoint sets of events. The denotation of unaccusatives is a predicate of events in which the theme undergoes change. Anticausatives are associated with events that bring the change about. Main evidence supporting this conclusion comes from the entailment pattern two types of AIUs show in perfective and imperfective sentences. The crucial observation is: imperfective anticausatives do not entail imperfective unaccusatives, while every other AIU entails every other AIU no matter what its grammatical aspect is. The account for this pattern crucially relies on the assumption that AIUs are internally complex, and their event structure minimally consists of a causing process and

caused change of state. The entailment relationships between AIUs derive from this assumption supplemented with independently motivated generalizations about the temporal properties of the causal relation and meaning of the (im)perfective. In this way, the data from Russian provide a strong argument in favor the analysis developed in this paper. From a wider perspective, the above results argue against the binarity view of AIUs, and more specifically, against the claim that unaccusatives and anticausatives are semantically identical, the conclusion Martin & Schäfer (2013) have recently reached.

To conclude, I would like to offer a brief outline of the problems that remained beyond the scope of this study. One of them is a problem of derivational relations between unaccusatives, anticausatives and transitives. The assumption I have made without arguing for it is that the members of the triple are derived in parallel from the same source. An implication of this assumption is that AIU morphology is not to be taken at its face value, and higher morphological complexity of anticausatives do not reflect higher syntactic and semantic complexity. In Tatevosov 2014 I present idiomatic evidence that seems to support the view advanced in Section 4 of this paper. A related problem is to reject on empirical grounds a major semantic alternative to the above analysis: unaccusatives are based on a simplex, non-causative event structure, which only contains a change of state event (e.g., $\lambda e.\text{dry}(e) \wedge \text{theme}(\text{linen})(e)$). Transitives and anticausatives would then be derivatives based on this structure. This alternative provides a better match between semantics and morphology, but runs into serious empirical difficulties discussed in Tatevosov 2014. The third problem is cross-linguistic variation. I do not know at the moment if the entailment pattern found in Russian replicates in other languages that allow both unaccusatives and anticausatives to be derived from the same verb stem. On the other hand, as shown in Tatevosov 2014, the differences as to the eventuality type of unaccusatives and anticausatives found in Romance languages (Folli 2002 and Labelle, Doron 2010) is not attested in Russian. The sources and parameters of cross-linguistic variation, as well as constrains on it, are still poorly understood, and we can only hope that future research will yield new insights into what a possible AIU system looks like cross-linguistically. If this paper has contributed to this larger enterprise, I believe that its goal has been successfully accomplished.
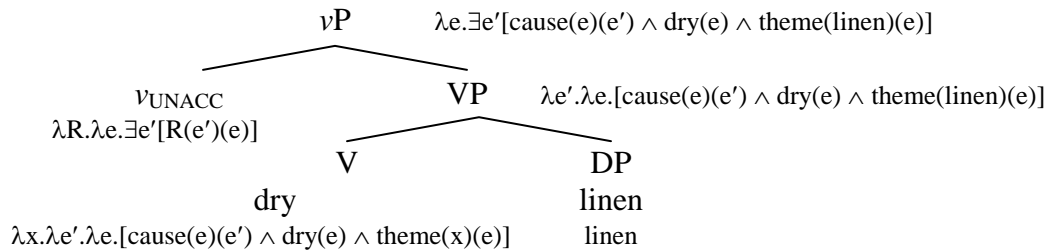
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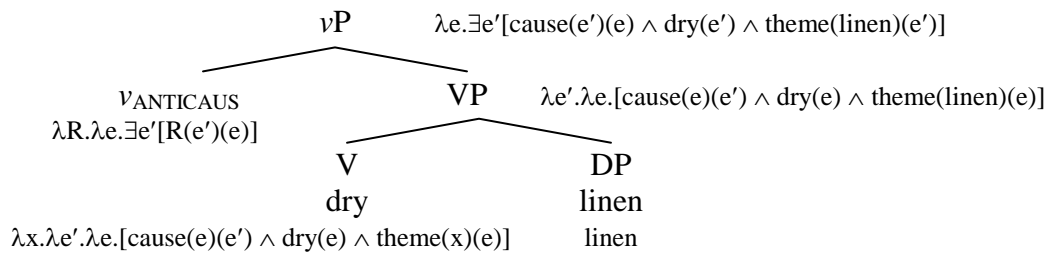
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Appendix

(i)   Unaccusative configuration

vP $\lambda e.\exists e'[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$

v_{UNACC} VP $\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$
$\lambda R.\lambda e.\exists e'[R(e')(e)]$

V   DP
dry   linen
$\lambda x.\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(x)(e)]$ linen

(ii)   Anticausative configuration

vP $\lambda e.\exists e'[\text{cause}(e')(e) \wedge \text{dry}(e') \wedge \text{theme}(\text{linen})(e')]$

v_{ANTICAUS} VP $\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$
$\lambda R.\lambda e.\exists e'[R(e')(e)]$

V   DP
dry   linen
$\lambda x.\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(x)(e)]$ linen

(ii)   Transitive configuration

vP $\lambda e.\exists e'[\text{cause}(e')(e) \wedge \text{dry}(e') \wedge \text{theme}(\text{linen})(e') \wedge \text{causer}(\text{Vasja})(e)]$

DP v' $\lambda x.\lambda e.\exists e'[\text{cause}(e')(e) \wedge \text{dry}(e') \wedge \text{theme}(\text{linen})(e') \wedge \text{causer}(x)(e)]$
Vasja

Vasja v_{TR} VP $\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(\text{linen})(e)]$
$\lambda R.\lambda x.\lambda e.\exists e'[R(e')(e) \wedge$
$\text{causer}(x)(e)]$ V   DP
dry   linen
$\lambda x.\lambda e'.\lambda e.[\text{cause}(e)(e') \wedge \text{dry}(e) \wedge \text{theme}(x)(e)]$ linen