Transitives with inchoative semantics

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Contents

Abstract In a transitive change-of-state statement, the VP describes an event yielding to some new state. The way we identify this event very much depends on argument structure, as well as the ontological and agentive properties of the external argument if present. We argue that only in the presence of a normal, in-control and intentional agent, the VP-event is 'bigger' than the change proper: it also contains the action performed by the subject. As a result, with normal, in-control agent, the VP-event can in principle then start before the change itself starts. But with all other types of external arguments — be it an inanimate agent, an inadvertent (animate) agent, a causer (denoting an eventuality or a fact) or the simple possessor of the dimension denoted by the object (*The room changed its temperature*), the VP-event is identified as a mere change. The rest of the causation event is either overtly denoted by the subject, or (softly) presupposed by the causative statement. Whether the VP-event contains more material than just the change proper or not has significant consequences on the interpretation of change-of-state statements built with an aspectual morphology with partitive semantics, such as the progressive in English.

1   Introduction

The English verb *change* is an example of a verb undergoing the causative alternation, illustrated in (1).

(1) a. The shapes of mankind will change.   intransitive anticausative
     b. Geneticists will change the shapes of mankind.   agentive causative

A standard view on the causative alternation is that the complexification of the syntax characteristic of the (agentive) causative use in (1b) goes along with a complexification of the VP semantics: the semantics of the two-place predicate is richer, more complex than the semantics of the one-place predicate, in that, among others, the causative VP has a more complex event structure than the inchoative VP. On this view, causative transitive VPs are roughly analyzed as 'cause to V-intransitive' (Levin & Rappaport Hovav 1995), projecting two event variables, one for the CAUSE event, and the other for the BECOME (inchoative) event leading to a state (Dowty 1979, Parsons 1990). Change-of-state verbs are in this perspective analyzed following the pattern in (2).

(2) a. $\text{verb}_{incho} \rightsquigarrow ...\lambda e.\exists s(...\text{become}(e,s)...)$
     b. $\text{verb}_{caus} \rightsquigarrow ...\lambda e \lambda e'.\exists s(...\text{cause}(e,e') \wedge \text{become}(e',s)...)$

For instance, Parsons (1990) attributes to sentences built with *break* in its intransitive (inchoative) vs. (agentive) causative variants the semantic representations in (3).

(3) a. $x\ \text{break}_{incho} \rightsquigarrow \exists e[\text{theme}(e,x) \wedge \exists s[\text{be-broken}(s) \wedge \text{theme}(s,x) \wedge \text{become}(e,s)]]$
     b. $x\ \text{break}_{caus} y \rightsquigarrow \exists e[\text{agent}(e,x) \wedge \exists e'[\text{cause}(e,e') \wedge \text{theme}(e',y) \wedge$
         $\exists s[\text{be-broken}(s) \wedge \text{theme}(s,x) \wedge \text{become}(e,s)]]]$

   In this paper, we break with the habit of contrasting the anticausative with the agentive causative only and take into consideration a broader range of uses of alternating verbs, illustrated in (4).

(4) a. Geneticists will change the shapes of mankind.   agentive causative
    b. Today's consumption of fossil fuels will change the shapes of mankind tomorrow.
                                                    non-agentive causative
    c. The shapes of mankind will change tomorrow.   intransitive anticausative
    d. Mankind will change its shapes tomorrow.   transitive anticausative

Only a subset of change-of-state verbs enter what we call after Schäfer (2021) transitive anti-causative construals as in (4d). Differently from *change*, *break* does not allow it. (5d) is in principle acceptable as a lexical causative statement in a conceptually deviant context but is not a well-formed transitive anticausative.

(5) a. The vandals broke the roof of the house.   agentive causative
    b. The storm broke the roof of the house.   non-agentive causative
    c. The roof of the house broke.   intransitive causative
    d. #The house broke its roof.   transitive causative only

In line with Rapp & von Stechow (1999), Kratzer (2005), Alexiadou et al. (2015) and Schäfer (2021), we argue that in all the uses illustrated in (4a-d) and (5a-c), change-of-state verbs have the same event structure. We propose that they denote a set of events e such that e temporally abuts a state s, as shown in (6), where $\bowtie$ stands for 'temporally abut'. We take the nature of the relation taking place between e and s to be left unspecified in the semantics (Schäfer 2008), see e.g. (6).

(6) break $\leadsto \lambda e.\exists s(e \bowtie s \wedge \mathsf{broken}(s))$

While this common core is shared across uses, the events falling in the extension of the VP are not identified the same way across all uses—that is, they are mapped with different portions of the world depending on the argument structure of the verb, and consequently the number of participants to the VP-event. Relatedly, depending on the context and the argument structure, the relation between e and s is understood as cause or become. In the agentive causative use as in (4a) or (5a), the events in the extension of the VP have two participants and are identified with causing events that are mereological sums of an action performed by the subject's referent and a change-of-state undergone by the object's referent. For instance, the event described by the VP in (4a) has two participants (geneticists and mankind), and is understood as a causing event corresponding to the sum of an action performed by geneticists and an ensuing change-of-state of mankind.
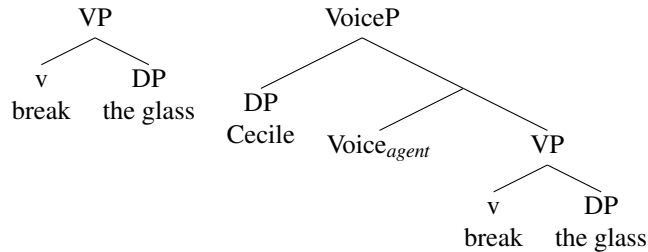
As for the non-agentive causative use illustrated in (4b) and (5b), we do not consider the event denoted by the subject (e.g., the consumption of fossil fuels in (4b) or the storm in (5b)) to *participate* in the VP-event; rather, the event denoted by the subject in (4b) and (5b) is causally responsible for the VP-event. Thus, the events in the extension of the VP only have *one* participant (the mankind or the roof of the house), not two, and are consequently interpreted as mere changes, just as in intransitive anticausative VPs illustrated in (4c) and (5c) (see section 3). Finally, transitive anticausatives are truth-conditionally equivalent to intransitive anticausatives (Schäfer 2021): consequently, the VP is understood as a mere change-of-state in transitive anticausatives such as (4d), too.

Since, in this perspective, the VP-event is interpreted under the non-agentive causative use and the transitive anticausative use just as in an intransitive anticausative sentence (i.e., as a mere change), sentences such as (4b/d) or (5b) exhibit a syntax/semantics mismatch: they are syntactically transitive, but the VP receives the same interpretation as in intransitive or inchoative construals illustrated in (4c) and (5c). That is, they form *transitive VPs with inchoative semantics*.

We couch the analysis in the Voice framework developed in Kratzer (1996); Schäfer (2008); Bruening (2013); Alexiadou et al. (2015); Schäfer (2017); Schäfer (2021) among others. In this framework, the causative alternation is essentially a Voice alternation: Voice–the syntactic

head responsible for introducing external arguments–is projected in transitive construals such as (4a/b/d) and (5a/b), but is absent from intransitive anticausatives such as (4c) and (5c), see (7).

(7)   *The glass broke/Cecile broke the glass*
    (a) intransitive   (b) agentive transitive

```
         VP                        VoiceP
        /  \                      /      \
       v    DP                  DP        \
     break  the glass         Cecile   Voice_agent      VP
                                                       /    \
                                                      v      DP
                                                    break   the glass
```

After these authors, we distinguish three different types of Voice heads. Agent subjects are introduced by *agent Voice* (henceforth Voice$_{ag}$), which associates the thematic role 'agent' to the DP in its specifier. Causer subjects are introduced by *causer Voice* (henceforth Voice$_c$). We take causer Voice to introduce an eventuality (or a fact) that is causally responsible for the VP-event (see section 3.2).

Following Schäfer (2021), we assume that *expletive Voice* is projected in the transitive anti-causative construal (4d). In contrast with agent or causer Voice, expletive Voice has no truth-conditional semantic effect; its role is purely syntactic in that it only introduces an external argument slot, but does not associate any semantics to this argument (Schäfer 2008; Alexiadou et al. 2015, Schäfer 2021). In (4d) for instance, no relation is semantically encoded between the entity denoted by the DP in the specifier of expletive Voice and the VP-event. Since the difference between intransitive and transitive anticausatives is then reduced to the presence of expletive Voice, and expletive Voice has no semantic impact on the sentence, both types of anticausatives have the same truth-conditional semantics.

This paper is organized as follows. Section 2 provides a brief background on the causative alternation. Section 3 is dedicated to the differences between lexical causative statements built with (i) an in-control and intentional agent subject, (ii) an inadvertent agent subject, (iii) an inanimate agent subject, and (iv) a causer subject. Section 4 turns to transitive anticausatives, and section 5 concludes.

2   Background: the causative alternation

We analyze Voice$_{ag}$ as taking a function of type $\langle s,t \rangle$ (s being the type for eventualities, facts and state-of-affairs) and adds an external argument to it (see Bruening 2013), as shown in (8) and (9). This is the Voice head active in (4a) and (5a).

(8)   Voice$_{ag}$ $\rightsquigarrow$
    $\lambda P_{\langle s,t \rangle} \lambda x \lambda e.\mathsf{agent}(e,x) \wedge P(e)$ $\langle \langle s,t \rangle, \langle e, \langle s,t \rangle \rangle \rangle$

(9) *Sascha broke the glass*

$$\text{VoiceP}$$
$$\langle s,t \rangle$$
$$\lambda e \exists s.(e \bowtie s \wedge \mathbf{broken}(s) \wedge$$
$$\mathbf{agent}(e,\mathbf{tom}) \wedge \mathbf{theme}(s,\mathbf{the\ glass}))$$
Sascha broke the glass

- DP_{nom}
  e
  sascha
  Sascha

- Voice'
  - Voice_{ag}
    $\langle \langle s,t \rangle, \langle e, \langle s,t \rangle \rangle \rangle$
    $\lambda P_{\langle s,t \rangle} \lambda x \lambda e.\mathbf{agent}(e,x) \wedge P(e)$
  - VP
    $\langle s,t \rangle$
    $\lambda e \exists s.(e \bowtie s \wedge \mathbf{broken}(s) \wedge$
    $\mathbf{theme}(s,\mathbf{the\ glass}))$
    break the glass
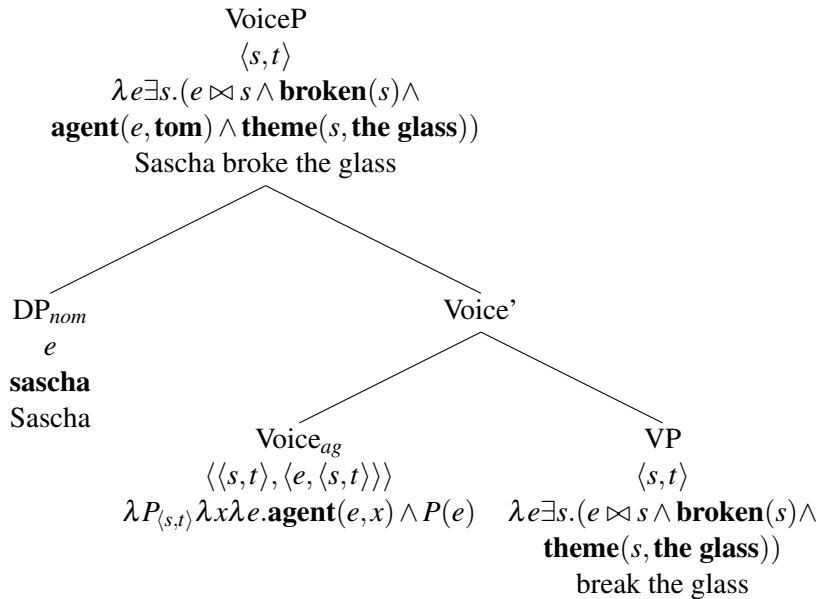
Without entering into the details, one of the main arguments to refrain from assuming an additional subevent for the agentive transitive variant is that this assumption predicts separate modification for the agentive subevent and the inchoative subevent to be possible. But it is not (Fodor 1970, Pylkkänen 2008, Alexiadou et al. 2015 a.o), as also illustrated in the contrast (10) (see Fodor 1970: 433 for similar examples). Sentences (10b/c) are not felicitous under the relevant reading where Aldous did not do anything else to her poor dog than stabbing it on Saturday. Under this reading, the agentive *kill*-subevent (the stabbing) takes place on Saturday, and the inchoative *kill*-subevent (the dying) takes place on Sunday.

(10) a. Aldous **stabbed** Fido on Saturday, and he eventually **died** on Sunday.
      b. #Aldous **stabbed**$_i$ Fido on Saturday and she eventually **killed**$_i$ him on Sunday.
      c. #Aldous **killed**$_i$ Fido on Saturday and he eventually **died**$_i$ on Sunday.

The problem of (10b) results from the attempt of modifying the two subevents separately. This requires the verb *kill* to have two different event arguments; which it does not have. The problem of (10b) is *not* due to the inability of lexical causatives to express indirect causation, that is, causation between two spatiotemporally disjoint events. As noted for instance by Danlos (2000), as long as there is no attempt to modify the action and change sub-events separately, a lexical causative like *kill* is perfectly fine as a description of a causation event such that the agentive component and the inchoative component are completely spatiotemporally disjoint, as shown in example (11), inspired from a similar example by Danlos (2000) (see also Neeleman & Van de Koot 2012 for arguments against the idea that lexical causative verbs cannot convey indirect causation).

(11) Aldous killed Fido. She stabbed him on Saturday and he died on Sunday.

Furthermore, as detailed later, separate modification for the causing event and the inchoative event is possible when the causing event is denoted by the causer subject, as in (12). This is unproblematic because one modifier applies to the event projected by the causer subject, and the other applied to the (*single*) event projected by the verb.

(12) Aldous **stabbed**$_i$ Fido on Saturday. This$_i$ eventually **kill** him on Sunday.

We thus take change-of-state verbs to denote the same type of events in their transitive and intransitive uses, namely, events temporally abutting to some state satisfying the state predicate encoded by the verb. However, as we will see later, these events may vary in size, depending on how many participants are involved, and whether the agent (if there is one) is animate or not, and is a full or a reduced (inadvertent) agent.

3 A first type of transitives with inchoative semantics: non-agentive causative VPs

We now turn to the difference between lexical causatives combined with an agent subject vs. causer subject. Our goal is to show that in the presence of a causer subject, the VP is interpreted exactly in the same way as in anticausative construals: events in the extension of such VPs are understood as changes-of-state—i.e. the VP has what we call inchoative semantics.

Causer subjects are either eventualities-denoting DPs, as in (4b) or (5b), or fact-denoting DPs, as in (13).

(13)   The fact that we are over-consuming fossil fuels will change the shapes of mankind tomorrow.

Fact-denoting DPs are virtually never addressed in the Voice framework, but are regularly found in the subject position of some change-of-state verbs such as *cause* (Vendler 1967), *kill*, or *change* (Martin et al. 2023), see section 3.1.1).

Together with Davis & Demirdache (2000), Doron (2003), Levin & Rappaport Hovav (2005), Alexiadou et al. (2006), Kallulli (2006b), Folli & Harley (2008) and Alexiadou et al. (2015), we assume that external arguments of transitive causative predicates necessarily are either agents or causers (see Kratzer 1996 on Holder Voice with stative transitives). They cannot be associated with the role Theme. Also, there are no additional flavors of Voice for instruments or accidental agents. Reduced agents are still agents; we thus need a semantics for the agent role which is flexible enough so as to cover any type of non-canonical agents (see e.g. Folli & Harley 2008, Joo et al. 2023 and the authors cited therein). Most nominative instrumental subjects can be subsumed under agents, others under causers (Alexiadou & Schäfer 2006).

3.1 Agent vs. causer subjects

Previous research is not always very clear about the exact differences between agent vs. causer subjects. While there is a general agreement that animacy is not presupposed by agentivity (see, e.g., Cruse 1973, Delancey 1985; 1990 Folli & Harley 2008 and Alexiadou et al. 2015), non-instrumental inanimate subjects are often automatically classified as causer subjects. This suggests in turn that the distinction between agents and causers maps in practice the distinction between animate vs. inanimate subjects.

We propose that the key difference between agent and causer subjects lies in the *semantic type*. While agent subject DPs are individual-denoting (of type *e*), causer subjects are eventuality- or fact-denoting (of type *s*). Inanimate DPs are therefore either causer or agent subjects, depending on their semantic type (section 3.1.1). By contrast, animate DPs are preferentially associated with the role agent, because there is no clear evidence that they can be reinterpreted as event- or fact-descriptions in the context of *non-psychological* causative verbs (section 3.1.2).

3.1.1 Inanimate subjects are causers or agents

We give in (14)-(16) examples of subjects of eventive predicates classified as causer subjects in Kallulli (2007), Folli & Harley (2008) and Alexiadou et al. (2015) respectively.

(14) Folli & Harley (2008)

    a.   The branch (broke the window).
    b.   The gust of wind (broke the window).
    c.   The sea (ate the beach away).
    d.   The storm (broke the window).

(15) Kallulli (2007)

    a.   The earthquake (broke the window).
    b.   The pressure (cracked the window).

(16) Alexiadou et al. (2015)

    a.   The lightning (*cut the clothesline).
    b.   The rocks/the storm (broke the window).
    c.   The wind (broke the vase).
    d.   The hurricane (broke the vase).
    e.   The heat (*wilted the gardener).
    f.   The earthquake (broke the vase).
    g.   A stone (broke the window).
    h.   The smoking of cigarettes (worsened the air quality in the room).
    i.   The storm/the disease (*murdered the president).
    j.   Early summer heat (wilted the petunias).
    k.   The sea air (rusted the fence).
    l.   A lot of sugar (rots the teeth).
    m. The fire (destroyed the package).
    n.   The earthquake (killed Mary).
    o.   The storm (destroyed the painting).
    p.   The sun (dried my hair).

As this list makes clear (and as also noticed by Heidinger & Huyghe 2023), natural forces such as storms, earthquakes, etc. are over-represented in linguistic examples of causer subjects. For us, this is a direct consequence of the fact that verbs of destruction such as *break* or *destroy* are themselves over-represented in such examples.[1] To have a more accurate picture of the variety of inanimate subjects found with a broader range of lexical causatives, we looked at the most common DPs appearing in [DET N V DET V] strings in the ententen20 corpus of Sketchengine (Jakubíček et al. 2013) for some very common lexical causatives. We looked at five of the most frequent change-of-state verbs in this corpus (as listed in Martin et al. 2023), namely *start, put, change* and *open*, as well as *destroy*. We give below for each verb the 20 most frequent inanimate nouns which possibly form causer subjects at the left of the verb used transitively. We ignore agentive and instrumental

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[1] In corpora, natural causes are typically marginal as causer subjects of lexical causatives. For instance, Heidinger & Huyghe 2023 annotated a sample of 400 causer subjects in French corpora and found that natural elements were marginal (with less than 6% of the annotated causer subjects). But a search on Sketchengine on non-animate subjects of VPs formed with the verbs *break, damage, destroy* or *burn* and the theme *house, vase, glass* or *building* shows that DPs such as *fire* are extremely frequent in the context of these specific verbs (see also the list of frequent DPs in (17e)).

DPs (e.g., we exclude nouns of corporations or institutions like 'government', 'company', 'Internet', or 'bomb', 'program'). As (17e) shows, with a verb like *destroy*, non-instrumental, inanimate nouns in the subject position very often denote natural forces.

(17) a. *put*: time, estimate, report, game, job, year, study, book, law, state, decision, problem, source, move, pandemic, case, result, event, war, loss
      b. *change*: process, event, game, world, state, option, version, function, method, experience, act, case, thing, war, situation, revolution, climate, pandemic, decision, problem
      c. *increase*: turn, process, factor, approach, feature, condition, project, rule, expansion, effect, action, modification, treatment, practice, design, situation, step, move, measure, level
      d. *open*: decision, finding, command, result, link, track, discovery, work, ruling, study, function, move, method, event, option, change, process, research, approach, development, course
      e. *destroy*: fire, explosion, earthquake, storm, tornado, flood, process, hurricane, time, blast, strike, war, attack, forces, blaze, airstrike, heat, state, disease, eruption

Many nouns in (14)-(17) such as *action, effect, explosion, earthquake, tornado, process* are (or can be) eventuality-denoting. Eventuality-denoting nouns are compatible with Vendler's (1967) *narrow* containers such as *occur, take place, begin, end, take up (time)*, etc., see (18).

(18)   The game/case/war/explosion took place/began/ended at twelve o'clock.

Some nouns in the same lists, such as *pressure* or *option*, are not very compatible with narrow containers (see (19)) but are completely acceptable with Vendler's (1967) *loose* containers such as predicates like *be informed of* or *deny*, see (20). For Zucchi (1998: 176, 202, 204 a.o), these predicates select for propositional entities.

(19) a. ?The high pressure took place/occurred at 12. o' clock.
      b. ?The option happened/occurred at 12. o' clock.

(20) a. I am informed of the high pressure.
      b. He denied the option.

Following Martin et al. (2023), we take causer DPs built with nouns of the latter type to be concealed fact descriptions; for instance, we take (21a)-(22a) to have the same meaning as (21b)-(22b).

(21) a. The high pressure destroyed the window.
      b. That the pressure was high destroyed the window.

(22) a. The nuclear option changed the world.
      b. That the nuclear option arose changed the world.

Again after Martin et al. (2023), we analyze nouns as *the high pressure* as facts, states-of-affairs, or possibilities rather than propositions because of their selectional properties: those nouns pattern with facts/possibilities rather than propositions with regard to the tests listed in Zucchi (1998: 207) and Moulton et al. (2020). In particular, while DPs like *the high pressure/the option* are acceptable with other loose containers such as *expect* listed in (23), they are not acceptable with proposition-selecting predicates such as *believe* listed in (24):

(23)   a.   I am surprised by this fact/ the option/ the high pressure.
          b.   I didn't expect this fact/ the option/ the high pressure.
          c.   This fact/ the option/ the pressure is crazy.
          d.   This possibility/ the option/ the pressure was unlikely given the heat yesterday.

(24)   a. #This fact/ the option/ the high pressure is true.
          b. #You didn't say this fact/ the option/ the high pressure before.
          c. #I didn't think this fact/ the option/ the high pressure.
          d. #I believed this fact/ the option/ the high pressure.
          e. #When you claimed this fact/ the option/ the high pressure, I thought you were crazy!

Virtually all event-denoting nouns (e.g., *game*) are also compatible with loose containers, see (25). This is because loose containers such as *be informed of* can coerce by themselves an event-denoting expression into an expression denoting a more abstract entity (for Zucchi 1998 a propositional entity, for us a fact or state-of-affairs), see Zucchi (1998).

(25)   We informed him of the game/war/explosion.

A third type of DPs listed in (14)-(17), namely those formed with *branch, sea, sun, rock, sea, air* and *stone*,[2] are also incompatible with narrow containers, which we take to indicate that they do not form felicitous event descriptions on their own (and this even with modifiers like *moving* or *flying*), see (26).

(26)   a.   #The (flying) stone took place at 12. o' clock.
          b.   #The (falling) branch started at 12. o' clock.
          c.   #The branch/sea/pressure/sun/rock/sea air/stone ended at twelve o'clock.

The same nouns are also not very compatible with loose containers, which indicates that they do not form felicitous concealed fact descriptions on their own, see (27).[3]

(27)   a. ??We informed him of the branch.
          b. ??We informed them of the tennis ball.

In summary, DPs such as *the game* denote either an event or a fact, DPs such as *the high pressure* can only denote abstract entities such as facts, possibilities or states-of-affairs, and DPs such as *the branch* are individual-denoting only.

Since we take agent subject DPs to be individual-denoting and causer subjects to be eventuality- or fact-denoting, it means that DPs such as *the branch* or *the ball* used in the subject position of causative verbs are automatically associated with the role agent. They cannot be causer subject (for to be a causer subject, they should be eventuality- or fact-denoting, what they cannot be). More generally, any individual-denoting inanimate subject of a transitive clause that cannot be reinterpreted as an event or fact description is associated with the role of agent, no matter how reduced the degree of agentivity is exhibited by the referent. The key property to be satisfied to qualify as an agent subject is effectivity, i.e., the inanimate referent must 'do' something in the broad sense of the term (Cruse 1973, Joo et al. 2023).

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[2] We take example (16l) to be a concealing event description, with *a lot of sugar* standing for *eating a lot of sugar*.

[3] There seems to be a difference between *inform of* and *inform about*: both select for propositional entities, but while *inform of* is not able to coerce an individual-denoting DP (like *the branch*) into a fact-denoting one, *inform about* seems to be able to. For instance, *I'm informed about the branch* can easily convey the idea that I'm informed about the existence of any other salient fact involving the branch.

The distinction between agents and causers is not just a terminological issue: it is key to the understanding of the difference between manner (or *hit-*) verbs and result (or *break-*) verbs (Levin & Rappaport Hovav 2005, Alexiadou et al. 2015). While result verbs are compatible with causer subjects, manner verbs are not. Thus for instance as a manner verb, *hit* does not welcome an event description in subject position, see (28a) vs. (28b).

(28)   a.   The stone hit the window.
       b.   #The falling of the stone hit the window.

For us like for Cruse (1973), *the stone* is, therefore, an inanimate agent in (28a), not a causer.

3.1.2   The subject-related event presupposition triggered by inanimate agents

While DPs like *the stone* cannot be reinterpreted as event descriptions, it has been shown that when used in the subject position of some transitive verbs, the inanimate entity they denote is typically understood as the participant of some implicit event, different from and potentially yielding a VP-event (Vecchiato 2004, Martin 2006: section 8.4). For instance, sentences like (28a) are typically interpreted as meaning something like *The falling stone hit the window*.[4] But such DPs denote *an entity involved in an event*, *not* an event (they are of type e, not s).

The event the referent of the inanimate subject takes part in (henceforth *subject-related event*, e.g., the falling event in the case of (28a)) is *presupposed* rather than asserted by the causative statement (Vecchiato 2004: 345, Martin 2006).[5] For instance, the event involving the ladder that could have resulted in the breaking of the vase (e.g. its falling in the direction of the vase) outscopes the adverbial *quasi* 'almost' in (29a), and the event involving the iceberg that could have resulted in the sinking of the Bismarck (e.g. a collision with the boat) outscopes negation in (29b). The counterfactual reading (that Jacobs 2011 in another context calls the 'nothing happened' reading) where the ladder or the iceberg was *about* to be involved in an event that would have resulted in the theme's change-of-state is not available in a default context.

(29)   a.   La scala ha quasi rotto un vaso.   *Italian*
            The ladder almost broke the vase.
            ⇝ An event involving the ladder that could have yielded a breaking of the vase oc-
            curred.   (Vecchiato 2004: 344)
       b.   L'iceberg n'a pas coulé le Bismarck.   *French*
            The iceberg didn't sink the Bismarck.
            ⇝ An event involving the iceberg that could have yielded a sinking of the Bismarck
            occurred.   (Martin 2006: 355)

Causative statements built with an intentional, in-control animate agent subject, by contrast, are completely compatible with the 'nothing happened' reading, under which the agent was about doing something that could have yielded a VP-event (Vecchiato 2004, Martin 2006):

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[4] And in fact, it has been claimed that the addition of event modifiers like *falling* or *flying* sometimes increases the acceptability of inanimate subjects of clauses involving lexical-causative verbs (Alexiadou & Schäfer 2006).

[5] The subject-related event implication is a *soft* presupposition. Soft presuppositions, named probabilistic presuppositions in Merin (2004), can be canceled in embedded environments (Abusch 2010), or even unembedded ones (Gyarmathy 2015). They arise from pragmatic reasoning (see Martin 2006: section 8.4.3), while hard presuppositions (e.g. triggered by definite determiner) are hard to cancel, because they are lexically triggered (see Abusch 2010, Abrusan 2022 for discussion). The subject-related event presupposition of causative statements with an individual-denoting inanimate subject is stronger when the subject DP is definite than indefinite, compare for instance *It is possible that the stone hit the window* with *It is possible that a stone hit the window*. This is not surprising, since when the entity described by the subject is discourse-familiar, it is more likely that an event involving this entity is discourse-familiar, too.

(30) a. Chiara ha quasi rotto un vaso. *Italian*
Chiara almost broke the vase.
↛ An event involving Chiara that could have yielded a breaking of the vase occurred.
([Vecchiato 2004](): 344)

b. La Marine n'a pas coulé le Bismarck. *French*
The Navy didn't sink the Bismarck.
↛ An event involving the Navy that could have yielded a sinking of the Bismarck occurred. ([Martin 2006](): 355)

On this point, individual-denoting inanimate subjects resemble definite event-denoting subjects, for the latter also yield causal statements that presuppose an event that has or could have caused the VP-event, see (31).

(31) a. The gust of wind didn't break the case.
⤳ A gust of wind occurred.
b. The collision with the iceberg didn't sink the Bismarck.
⤳ A collision with the iceberg occurred.

In summary, inanimate DPs like *the stone*, which cannot be reinterpreted as event or fact descriptions in subject position of causative verbs, are inanimate *agents*, not causers. Causal statements built with individual-denoting inanimate DPs presuppose the occurrence of a subject-related event, which is different from and causes the VP-event. In section 4, we will show that causative VPs built with such individual-denoting inanimate subjects are another type of transitive VPs with inchoative semantics, substantiating what we call the inchoative hypothesis (32):

(32) INCHOATIVE HYPOTHESIS. When a lexical causative statement presupposes the occurrence of a subject-related event e or when the subject denotes either an event e or a fact f such that e or f is causally responsible for the VP-event e', the VP-event e' is interpreted as a mere change, i.e., the VP has inchoative semantics.

3.1.3 Animate subjects preferably are agents

We now turn to animate subjects of causative verbs. We argue that they are agents (of type e), even when not showing more agency than inanimate entities (for instance because they are acting inadvertently). As far as we know, there is no positive piece of evidence for the hypothesis that animate DPs can also be causers (of type s), that is, for the hypothesis that *Mary* can stand elliptically for the description of an event or a fact involving Mary when used as the subject of a (physical, non-psychological) causative verb. Firstly, animate DPs are not felicitous with Vendler's narrow containers:

(33) a. #Angelika happened in the kitchen.
b. #The cat occurred at midnight.

Also, animate DPs are not very felicitous in [Vendler]()'s ([1967]()) loose containers, suggesting that these DPs are not easily reinterpreted as fact descriptions in these contexts (see (34)):

(34) a. ??We informed Abigail of Chiara.
b. ??We denied Tom.

It is not the case, however, that animate DPs can never be interpreted as concealed event descriptions (of type *s*). In so-called pancake sentences (Wechsler 2013) for instance, an individual-denoting subject is reinterpreted as an event description involving the individual denoted by the DP in its literal reading (Greenberg 2008):

(35)   a.   Assistant professors is the way.
             ≈ Hiring, ... assistant professors is the way.
       b.   Angelika is the way.
             ≈ Inviting, hiring, calling...Angelika is the way.

Previous work also explicitly defended the idea that the human subject of a subset of causative verbs, namely, causative *psych*-verbs (such as *surprise, worry*) can also stand for a covert description. For instance, Bott & Solstad (2014: section 3.2.1) observe that in the non-agentive reading of the following example, the proper name is 'merely a placeholder, as it were, for something which is semantically more complex'.

(36)   Peter annoyed Mary.

Even for physical, non-psych causative verbs, some authors assimilate *accidental* agents to overtly event-denoting causer subjects, such as *the wind* (see, e.g., Kallulli 2006a; b). However, we do not see arguments in favor of the idea that animate DPs can be reinterpreted as event descriptions in the subject position of causative *non-psychological* verbs.[6] Furthermore, as long as the semantics of the role of agent is flexible enough to be satisfied by very reduced agents (see e.g. Joo et al. 2023), there is in fact no need to posit a reinterpretation mechanism of animate subjects such as proper nouns for which we lack positive evidence. Therefore, we conclude that animate DPs used as subjects of causative verbs are preferably understood as referring to an individual, which makes them automatically agentive subjects under our assumption that external arguments of causative verbs of type *e* necessarily are agents, while those of type *s* necessarily are causers. Figure 2 summarizes our proposal (instruments excluded, as they can be either agents or causers).

3.1.4   The subject-related event presupposition triggered by inadvertent animate agents

Whereas inadvertent agent DPs are semantically different from causer DPs, since the former are of type *e* while the latter are of type *s*, we agree with Kallulli (2006a; b) that they are nevertheless closer to causer DPs than 'normal' agents are. We propose that accidental agents resemble causer subjects in that they yield statements that (softly, cf. fn. 5) presuppose some event involving the subject's referent, which is distinct from and causes the VP-event. Thus for instance, if Gianni is an inadvertent agent, (38a) presupposes that Gianni did something that could have led to the breaking of the vase. The 'nothing happened' reading, where Gianni was about to do something that almost broke the vase, is not available (Vecchiato 2004: 345). Similarly, (38b) presupposes

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[6] While such arguments do exist in the case of causative psych-verbs. In particular, with many causative psych-verbs, the literal referent of an animate DP does not need to exist at the time of the VP-event; i.e. these verbs are not existence-entailing with regard to their subject, just as some subject-experiencer psych-verbs (e.g., *admire*) do not entail the existence of their object (see d'Ambrosio & Stoljar 2023 for experimental work on some of subject experiencer psych-verbs). For instance, (37) below is something one can say, while the literal referent of the subject cannot plausibly exist at the reference time.

(37)   My great great great grand-mother surprised me again this morning.

This indicates that the human DP stands there for something more abstract, as Bott & Solstad (2014) among others suggest.

Figure 1: Types of external arguments for causative verbs.
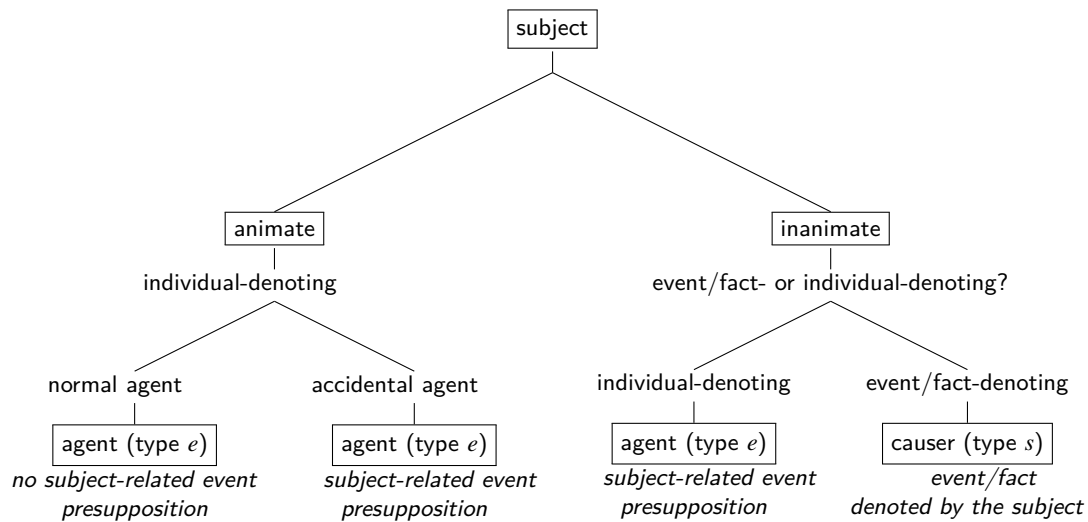
that I did something that could have resulted in my shoes being untied (Martin 2005: 468); for instance, I stumbled. By contrast, in a context that makes clear that the animate subject is behaving intentionally and in control of their actions, the nothing-happened reading is available, i.e., the causal statement does not presuppose the occurrence of a subject-related event.

(38) a. Gianni ha quasi rotto un vaso.   *Italian*
          Gianni almost broke a vase.
      b. J'ai failli délacer mes chaussures.   *French*
          I almost untied my shoes.

Similar observations have been made for unrelated languages. For Salish languages, where so-called limited/non-control transitivizers are used in contexts where human agents act inadvertently, data gathered by Bar-el (2005), Jacobs (2011) among others suggest that in presence of the Salish limited/non-control morphology, some event involving the subject's referent that could have developed into a VP-event outscopes the negation and *almost*-adverbials. What Jacobs (2011) calls the 'nothing happened' reading is possible only with the control morphology; see Jacobs (2011: 122 & 128). In Tagalog, *maka* is another out-of-control morphology, conveying inadvertent agency. Dell's (1983) description of Tagalog suggests that *maka-* statements embedded under attitude reports like *be surprised to* presuppose some discourse-familiar event involving the subject's referent that could develop into a VP-event, by contrast with statements with the neutral form (see Dell's (1983) examples (21/22), p. 183).

In summary, animate DPs are preferentially interpreted as agentive, individual-denoting DPs. However, when the animate DP is an accidental agent, the ensuing causal statement tends to softly presuppose the occurrence of a subject-related event, different from the VP-event and causing the latter. We will show in section 4 that because of this property, causative VPs built with an accidental agent are another type of transitive VPs with inchoative semantics (that is, the VP-event e is identified just with the change, while the rest of the causation event is presupposed and not part of e).

3.2 The semantics for causer voice

We now turn to the semantics of causer Voice, i.e. Voice$_c$. For Pylkkänen (2008) and Alexiadou et al. (2015), Voice$_c$ has an eventuality-denoting DP in its specifier. This eventuality e is for them

identified with the VP-event e', see (39) (Voice is combined with a VP via Event Identification, see Kratzer 1996).

(39) $Voice_c \rightsquigarrow \lambda e \lambda e'.e = e'$

Our first modification concerns the ontological type of causer subjects. As mentioned before, causer subjects can either be eventuality-denoting, or fact-denoting (Vendler 1967, Rose et al. 2021, Martin et al. 2023), as in (40). With Martin et al. (2023), we assume that DPs such as *the high pressure* in (40a) are concealed fact descriptions, semantically identical to overtly fact-denoting DPs as in (40b). We take eventualities and facts to be of type s, and use the variable i as ranging in the domain of situations, which is the union of the set of eventualities e, facts f and other states-of-affairs.

(40) a. The high pressure destroyed the window.
     b. The fact that the pressure was high destroyed the window. (Martin et al. 2023)

Secondly, we depart from Pylkkänen's (2008) and Alexiadou et al.'s (2015) view according to which the eventuality e (or, we add, fact f) introduced in the specifier of $Voice_c$ is identified with the VP-event (what can anyway only make sense when the causer subject is event-denoting, since a fact cannot be identified with an event). A problem for such a view is that it predicts separate temporal modification for the event denoted by the subject and the VP-event not to be possible, *contra* the facts, as shown in (41) (Martin 2020):

(41) a. Aldous stabbed$_i$ Fido **yesterday** and this stabbing$_i$ eventually killed Fido **this morning.**
     b. The snow melt **on Sunday** eventually flooded the valley **on Thursday**. (M. Rappaport Hovav, p.c.)
     c. **Today**'s consumption of fossil fuels will change the shapes of mankind **tomorrow**.

We assume the $Voice_c$ head (of type $\langle\langle s,t\rangle, \langle s, \langle s,t\rangle\rangle\rangle$) to introduce an eventuality or fact causally responsible for the VP-event. In line with Rose et al.'s (2021) proposal on the meaning of *cause*, we take the operator cause encoded by $Voice_c$ and overtly spelled out by the verb *cause* to be able to convey both the *dependence* notion of causation, which just conveys a dependence relation between cause and effect (and can also have abstract entities such as facts or propositions as relata), and the *production* notion of causation, under which causation involves a (typically physical) transfer of forces between events or physical objects (see Copley & Harley 2015 for discussion on these two notions of causation in a linguistic context). When the causally responsible entity is an event, this event can temporally precede the VP-event, which explains why separate modification as in (41) is possible.

(42) $Voice_c \rightsquigarrow$
    $\lambda P_{\langle s,t\rangle} \lambda i \lambda e.P(e) \wedge \mathsf{cause}(i,e)$ $\hspace{3cm} \langle\langle s,t\rangle, \langle s, \langle s,t\rangle\rangle\rangle$

On this view, $Voice_c$ does not carry *thematic* information proper, in that it does not introduce a participant to the VP-event. Rather, it introduces the situation causally responsible for it (or what Neeleman & Van de Koot 2012 call the crucial contributing factor). We give in (43b) the semantic derivation for (43a).

(43) a. The stabbing killed Fido.

b.

VoiceP
$\langle s,t \rangle$
$\lambda e \exists s.(e \bowtie s \wedge \mathbf{dead}(s) \wedge$
$\mathbf{cause}(\text{the stabbing}, e) \wedge \mathbf{theme}(s, \mathbf{fido}))$
The stabbing killed Fido

DP
s
the stabbing
the stabbing

VoiceP
$\langle s, \langle s,t \rangle \rangle$
$\lambda i \lambda e \exists s.(e \bowtie s \wedge \mathbf{dead}(s) \wedge \mathbf{theme}(s, \mathbf{fido}) \wedge \mathbf{cause}(i,e))$

Voice$_c$
$\langle \langle s,t \rangle, \langle s, \langle s,t \rangle \rangle \rangle$
$\lambda P \lambda i \lambda e.P(e) \wedge \mathbf{cause}(i,e)$

VP
$\langle s,t \rangle$
$\lambda e \exists s.(e \bowtie s \wedge \mathbf{dead}(s) \wedge \mathbf{theme}(s, \mathbf{fido}))$
kill
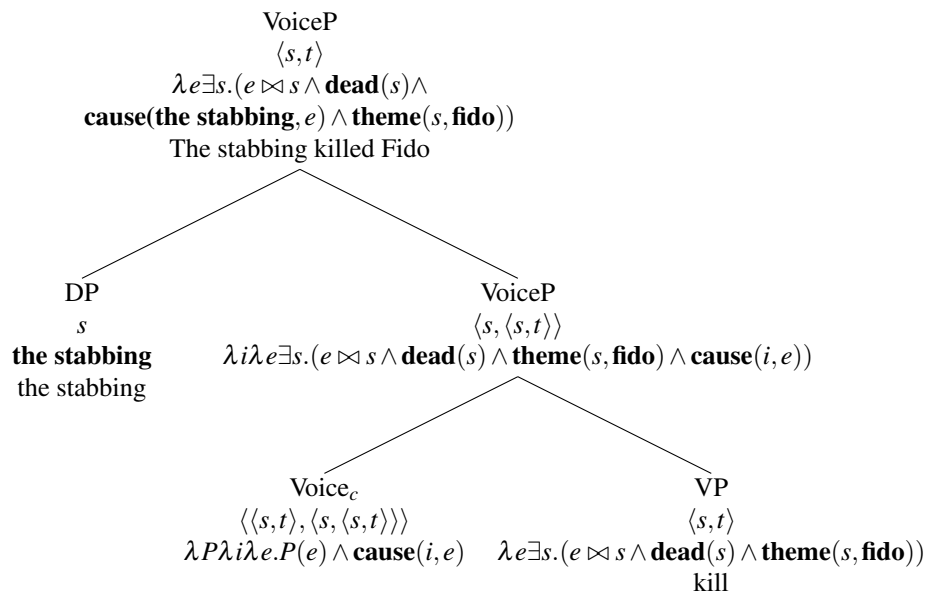
We want to emphasize that under the reasonable assumption that event-denoting and fact-denoting subjects are introduced by the same Voice head as we propose here, it becomes impossible to assume as Pylkkänen (2008) or Alexiadou et al. (2015) do that the entity denoted by the causer subject is identified with the VP-event. Indeed, a fact cannot be identified with an event; e.g., the fact that the pressure is high is a different entity than the destroying event. Furthermore, a fact cannot be a *participant* of an event. The next section argues that 'causer' is not a thematic role in that it does not determine how the causer participates in the event, no matter whether the subject denotes an eventuality or a fact.

3.3 How subjects affect the interpretation of the VP-event

Events and states are ontologically dependent on their participants. It is their participants that determine the spatiotemporal extent of events (Parsons 1990, Asher 2000 among many others). This also means that the more participants an event hosts, the bigger the event is. For instance, an event of the window breaking is spatiotemporally bigger when it involves an agent than when it only involves the window. Also, the addition of an agent to a breaking event does not only change the size but also the quality of the event. When the breaking event just hosts a theme participant, it is a pure inchoative, change-of-state event. But when an agent is added to it, the breaking event is not identified as a mere change anymore; rather, it is then a hybrid event with an agentive and an inchoative component.

3.3.1 Agentive causing events can start before the targeted change starts

This has consequences on the way we identify the beginning of events. A one-participant breaking-the-window event starts as soon as the change-of-state starts. But an agentive two-participants breaking-the-window event may start before this, because the action performed by the agent in order to break the window may start before the intended change-of-state starts (Truswell 2011, Martin 2015). Indeed, as Dowty (1977: 67) already observed, an agentive accomplishment in the progressive can be used while the related change has not started yet: 'An imperfective [standard progressive] sentence such as *John is drawing a circle* may be truly uttered on certain occasions when no portion of a circle exists yet on paper, but when John is merely observed to be making

preparations to draw (assembling compass and paper, etc.) and his intention are known.' Given that the progressive returns a part of an event denoted by the VP, this suggests in turn that an agentive VP-event can start before the change starts. Similarly, Truswell (2011: 101) observes that (44b) is judged true in the context (44a), while the food has not been affected at all yet.

(44) a. It had been a disastrous picnic, one which was really best forgotten. Tom clearly agreed, as he had picked up a nearby can of petrol and a box of matches, and was now approaching the leftovers with a look of steely intent on this face. Dick frowned. 'What's wrong?', asked Harry.
       b. 'Tom's destroying what's left of food', said Dick.   (Truswell 2011: 101)

Martin (2020) offers two further pieces of evidence showing that an agentive causing event can in principle start earlier than the change itself. The first concerns *in*-adverbials. Time span *in*-adverbials measure the time span between the onset and the telos of events in the extension of the predicate it applies to. The telos of causing events corresponds with the onset of the result state. When causative verbs are used agentively, one can have 'separate' *in*-modification for the causing event and the change of state such that it is entailed that the former starts before the latter. Imagine for instance that Silvia takes part in a game where a glass must be broken by shooting arrows with a bow. She tries 10 minutes long and then manages to break the glass. In that context, (45) is fine, although the glass itself is only affected at the very end of the 10 minutes span. This clearly shows that the agentive component of the event in the extension of the causative verb starts before the inchoative component.

(45) Silvia broke the glass in 10 minutes (this being said, the glass broke in less than 10 seconds).

The third piece of evidence concerns *begin*-statements. The aspectual verb *begin* embedding an agentive causative VP may felicitously describe a situation where the action started while the targeted change did not yet. For instance, the *begin*-statements in (46) entail that an agentive breaking by the workers has started, because the onset of the action is also the onset of the causing event. But in an appropriate context, this action, performed with the goal of triggering a specific change in the theme, may start although the change itself hasn't been initiated yet, which explains why (46a/b) are not contradictory.

(46) a. The workers started to break the wall (but the wall only started to break after some time, because it was very hard).
       b. Nina started to open the bottle of wine, but the corkscrew broke inside the cork before it started moving out, and the bottle had to sadly remain closed.

3.3.2 Non-agentive causing events cannot start before the change starts

This section substantiates what we called the 'inchoative hypothesis', repeated below for convenience.

(47) INCHOATIVE HYPOTHESIS. When a lexical causative statement presupposes the occurrence of a subject-related event e or when the subject denotes either an event e or a fact f such that e or f is causally responsible for the VP-event e', the VP-event e' is interpreted as a mere change, i.e., the VP has inchoative semantics.

That is, except in the context of an intentional, in-control agent subject, the causation event reported by a causative statement is described by the VP only partly: the event causing the change

is either denoted by the subject, or presupposed by the causative statement, and the VP ends up just describing the change. As a result, the change must take place at least partly as soon as the causative statement is built with an aspectual morphology or an aspectual verb entailing the existence of some part of a VP-event, like the progressive or the aspectual verb *start*.

We showed in previous sections that a lexical causative statement tends to convey the occurrence of an event or the existence of a fact causally responsible for the VP-event in three cases: (i) the subject is a causer (it denotes an eventuality or a fact), (ii) the subject is an inanimate agent and (iii) the subject is an inadvertent animate agent. Thus, what we just observed before with statements describing causing events starting before the change itself starts is therefore expected not to be possible in these three cases. We show first that these predictions are correct for causal statements with a causer subject or with an agentive inanimate subject, applying the three tests presented in the previous section, starting with the interpretation of progressive sentences.

As noticed by Bonomi (1999), Truswell (2011) and Martin (2015), progressive causative statements built with an inanimate subject require the theme to start getting affected, differently from what we just observed through Dowty's (1977) and Truswell's (2011) examples when the statement is built with an in-control and intentional agent. For instance, (48b), built with an inanimate agent subject, is not acceptable in the context of (48a) (Truswell 2011: 102). This is because (48a) entails that the food is not affected yet, while the progressive returns a part of a VP-event, which is for us identified as a mere change in the context of an inanimate subject.

(48)   a.   It had been a gorgeous picnic on the beach, but now it was time to leave. The picnickers had arrived at low tide, and placed their blanket near the shore, but the tide had turned, and now each wave came a little closer to the leftovers. Tom surveyed the scene and frowned. 'What's wrong?' asked Bill.

       b.   #'The sea's destroying what's left of food', said Tom.   (Truswell 2011: 102)

Example (49b) from Martin (2015), built with a causer subject, illustrates the same point. Example (49a) shows again that in the context of an in-control, intentional agent subject, a causative-VP denotes an event that can in principle start before the targeted change starts.

(49)   a.   I'm waking up Ana (I've already shaken her two times!), but she drank a lot; there is a good chance that it will take long before she starts to make a little step out of her sleep.

       b.   The dishwasher's noise is waking up Ana, but she drank a lot; #there is a good chance that it will take long before she starts to make a little step out of her sleep.

The *in*-adverbial test similarly indicates that in the context of a causer subject (see (50b) and (51b)), the VP-event cannot start before the theme starts being affected, differently from what we observed in the context of an animate agentive subject (see (50a) and (51a)).

(50)   a.   Rachida opened the door in two minutes (that being said, the door opened in less than 10 seconds).

       b.   The wind opened the door (#that being said, the door opened in less than 10 seconds).

(51)   a.   Despina is such a skillful mosquito-killer. She killed the mosquito in a couple of minutes (that being said, it didn't suffer much as it died in less than 5 seconds).

       b.   The mosquito ended up enclosed in a glass. The lack of oxygen killed it in a couple of minutes (#that being said, it didn't suffer much as it died in less than 5 seconds).

Begin-statements in (52)-(53) illustrate the same point (the contrast in (53) is built after a contrast between agentive vs. non-agentive progressive causative statements in Martin 2015: 250).

(52)   a.   The workers started to break the wall (but the wall didn't start to break before some time, because the stone was super hard).   (=(46a))
       b.   The heat started to break the wall (#but the wall didn't start to break before some time, because the stone was super hard).

(53)   a.   Ana started to open the door. But it is so well stuck in the frame that there is a good chance that it will take long before it starts moving a little bit.
       b.   The wind started to open the door (#but it is so well stuck in the frame that there is a good chance that it will take long before it starts moving a little bit).

We now turn to inadvertent (animate) agents. The three tests we have been using previously indicate that in the context of an inadvertent agent, events in the extension of a causative-VP cannot easily be asserted to start without the change to start, too. Take for instance (54):

(54)   a.   Oh look, Abi is opening the door!
       b.   Oh look, Tom is destroying what's left of the food!

Such sentences are felicitous in a context where the theme is not affected yet if Abi and Tom ostensibly have the intention to open the door or destroy the food, and are only in the process of carrying out the preparatory phase before becoming causally efficacious (e.g., Abi is searching for the keys in her bag or Tom is gathering things to set the picnic on fire). But if they are uttered in a context where Abi or Tom neither have the intention to open the door/destroy the food nor in control of their behavior (e.g., they are falling or stumbling around), such sentences are undertood as describing the non-intentional *actual* outcome of their uncontrolled behavior, and the theme is understood as at least partially affected.

Truswell (2011) makes a related point through his example (55). As he observes, in the context of an inadvertent agent, a progressive causative statement tends to entail that the theme starts getting affected; as the context of (55a) makes clear that the theme still is intact, the progressive sentence (55b) turns out infelicitous.

(55)   a.   It had been a gorgeous picnic, but with one drawback. Far too much alcohol had been involved. most of the picnickers were now sleeping it off in the shade, with three exceptions, Tom, Dick and Harry. Tom was amusing himself with a wayward, uncoordinated dance that was bringing him inexorable closer to the leftovers. Harry, who had stayed sober, surveyed the scene and frowned. 'What's wrong?' asked Dick.
       b. # 'Tom is destroying what's left of the food', said Harry.   (Truswell 2011: 102)

Also, if you accidentally kill a mosquito by crushing it unintentionally, you can't really say you killed it in ten minutes anymore. Again, this is because the VP-event tends to be interpreted as inchoatively in the context of an inadvertent agent, and such an inchoative event typically takes a couple of seconds.

We turn next to our a last type of transitive construals for change-of-state verbs with inchoative semantics, namely transitive anticausatives, and provide the first detailed semantic analysis for this type of statements.

4 A second type of transitives with inchoative semantics: transitive anticausative VPs

4.1 Properties of transitive anticausatives

Recall the three-way contrast between the non-agentive uses of *change* illustrated again with the following examples:

(56) a. The chemical process changed the gas's temperature.   non-agentive causative
        b. The gas's temperature changed.   intransitive anticausative
        c. The gas$_i$ changed its$_i$ temperature.   transitive anticausative

The pair in (56a) and (56b) exemplifies the canonical causative alternation between a transitive lexical causative verb and the corresponding intransitive anticausative verb. Example (56a) asymmetrically entails example (56b). As shown in details in Schäfer (2023), the alternation between (56b) and (56c) is different from the causative alternation. Despite the fact that (56c) is syntactically a transitive structure involving a nominative external argument DP triggering verbal agreement and an internal accusative DP, it expresses a simple inchoative event undergone by the internal argument DP, and pairs like (56b) and (56c) are truth-conditionally equivalent (though they differ in their informational structuring because their nominative DPs are different): in both cases, the VP has inchoative semantics (it is understood as the description of a mere change). Therefore, transitive anticausatives illustrate another type of transitive VPs with inchoative semantics. Natural occurrences of transitive anticausatives taken from the web are given below.

(57) a. The sun increased its mass and radius.
        b. The sea changed its cultural meaning.

Transitive anticausatives also welcome event-denoting subjects, see the natural occurrences in (58) (as discussed in section 4.3, transitive anticausatives with human subjects are, in principle, possible, too, albeit the agent bias makes this reading less accessible). The event-denoting subjects in (58) are *not* causer subjects; as detailed below, the subject of transitive anticausatives is neither an agent nor a causer.

(58) a. The storm changed its direction.
        b. The game increased its speed.
        c. The explosion changed its shape.
        d. The earthquake increased its speed.

The central aspect of the alternation in (56b/c) is that it involves a possessive structure. The sole argument DP of the anticausative verb in (56b) is a possessee modified by a prenominal genitive possessor DP. In (56c), (as in (57a, b) and (58a-d)), this possessive relation is dissociated in that the possessor DP appears as the nominative subject and the possessee DP appears as the accusative object. Furthermore, the latter is modified by a possessive pronoun which is obligatorily bound by the nominative subject for the transitive anticausative construal to obtain (see more discussion below).

The next observation is that, across languages, only a small set of verbs undergoing the causative alternation allow the alternation illustrated in (56b/c). The majority of verbs undergoing the causative alternation do not enter the transitive anticausative construal even if the subject binds a possessive pronoun inside the object. This was shown for the verb *break* in (5) in the introduction and it is further exemplified below in (59)-(61). In each pair, the a-sentences provides a canonical anticausative structure where the verb's internal argument is modified with a prenominal genitive.

If these prenominal genitives are turned into subjects as in the b-examples, the result is semantically deviant in a default context (such sentences are fine in a fairy tale context).

(59) a.   The roof of the house burnt.   intransitive anticausative
      b. #The house burnt its roof.   agentive causative only

(60) a.   The left wing of the gate opened.   intransitive anticausative
      b. #The gate opened its left wing.   agentive causative only

(61) a.   The glaze of the cake melted.   intransitive anticausative
      b. #The cake melted its glaze.   agentive causative only

The above b-examples are not acceptable as transitive anticausatives because their nominative subjects necessarily receive an external argument θ-role (for us, the role of agent, as these DPs cannot be used as event- or fact descriptions, and therefore cannot be causers). These sentences are canonical causative statements, entailing that the DP$_{nom}$ did something that affected the object DP$_{acc}$ along the dimension encoded by the verb.

The list in (62) from Schäfer (2023) provides further verbs that, like the verb *change* in (56c), allow the construal as a transitive anticausative (pending the right choice of theme DP).

(62)   accelerate, alter, change, decrease, diminish, double, drop, enlarge, expand, halve, increase, modify, multiply, narrow, r(a)ise, reduce, stabilize, slow down, widen

The verbs in this list are all verbs of change undergoing the causative alternation which, however, do not lexicalize any particular dimension of change. Instead, it is their internal argument DP which specifies the actual dimension of change, and the possessor of the internal argument DP denotes the theme that changes along this dimension. Consequently, the nature of the change expressed by these verbs varies along the particular dimensional noun they combine with. In the VP *increase the temperature of the soup*, change is measured along the dimension *temperature*, but many other dimensional nouns are possible with this verb.[7] By contrast, like the majority of verbs undergoing the causative alternation, a verb like *warm* lexically specifies that temperature is the dimension of change. We call verbs in (62) like *change* or *increase a-dimensional verbs*, and nouns like *temperature dimensional nouns*.

Schäfer (2023) substantiates the view that in transitive anticausatives, the verb only takes the internal argument DP$_{ACC}$ but not the external argument DP$_{NOM}$ as its semantic argument. Thus, the latter is not assigned any θ-role by the verb. Instead, the external argument DP$_{NOM}$ is just interpreted as the possessor of the internal argument DP$_{ACC}$, as the former binds the possessive pronoun inside the latter. Thereby, the external argument is interpreted as the entity that undergoes a change along the dimension denoted by the internal argument. Consequently, transitive anticausatives express the same truth-conditional meaning as the sentences headed by their corresponding canonical anticausative; transitive and intransitive anticausatives symmetrically entail each other. We provide here two tests to show this with English examples (see Schäfer 2023 for additional tests and examples from other languages than English).

The first test relies on paraphrases using a causative verb such as *cause* or a light agentive verb like *do*. Causative statements built with a lexical causative can be paraphrased with such a verb and the inchoative variant of the lexical causative without critical change of meaning; for instance, (63b) expresses roughly the same meaning as (63a), and (64b) expresses roughly the same meaning as (64a).

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[7] For example, *increase the price/the thickness/the flavor/the quantity/the volume/the taste /the nutritional value of the soup*.

(63)   a.   The temperature rise increased the volume of the gas.
       b.   ≈ The temperature rise caused the volume of the gas to increase.

(64)   a.   Zsofia increased the volume of the gas.
       b.   ≈ Zsofia did something such that the volume of the gas increased.

By contrast, transitive anticausatives and the corresponding periphrastic causative paraphrases do not have the same meaning and, thus, are not paraphrases of each other. For instance, (65b/c) enforce the unnatural interpretation that the gas is a cause or an agent of its volume increase, while in its most natural, transitive anticausative reading, (65a) does not have this interpretation. For this paraphrase to work, one has to reinterpret (65a) as a (conceptually deviant) transitive causative statement.

(65)   a.   The gas increased its volume.   transitive anticausative
       b.   ≉ The gas caused its volume to increase.
       c.   ≉ The gas did something such that its volume increased.

A second test concerns negation. It is possible to negate a causative statement and subsequently assert the truth of the corresponding anticausative, as in (66). This is because in the first clause, sentential negation can associate just with the (focused) subject, such that the content of TP is presupposed, at the exclusion of the information that Zsofia is the agent of the VP-event (thus, what is presupposed is that there was a change of Zsofia's appearance caused or performed by some entity). That is, (66) is felicitous because in the first clause, the content of the assertion (targeted by negation) is just that Zsofia is the entity performing the change. As the occurrence of the change itself is therefore not denied in the first clause, the subsequent clause is not contradictory.

(66)   [Zsofia]$_{FOC}$ did not change her appearance, but her appearance *did* change.

By contrast, it is not possible to negate a transitive anticausative statement and subsequently assert the corresponding intransitive anticausative, as illustrated in (67b). This is precisely because transitive and intransitive anticausatives exactly have the same truth-conditional meaning (namely, there was a change in the room's appearance, see next section for a detailed semantic analysis). Therefore, focusing the subject does not allow to presuppose the occurrence of a change in the room's appearance and keep a distinct assertive content for the sentence that could be the exclusive target of negation. This is only possible at the cost of reinterpreting the first clause of (67b) as a (conceptually deviant) causative statement.

(67)   a.   The room changed its appearance.   transitive anticausative
       b.   [The room]$_{FOC}$ did not change its appearance, #but its appearance *did* change.

Before proceeding to the semantic analysis of transitive anticausatives in the next section, we summarize the three necessary conditions for their formation:

(68)   a.   A *dimensional noun* in object position (in (56c), the noun *temperature*)
       b.   An *a-dimensional verb of change*, which leaves the dimension of change unspecified (in (56c), the verb *change*)
       c.   A relation of possessor/possessed between the subject and the object (in (56c), between *the gas* and *its temperature*)

Of these three conditions, the first two are presumably semantic, whereas the third is arguably syntactic. If the third condition is syntactic, then it would be more accurate to display (56c) as follows:

(69)   [The gas]$_i$ changed its$_{i/*j}$ temperature.   transitive anticausative

(69) makes explicit that if this sentence is to be construed as a transitive anticausative, *the gas* and the possessive pronoun *its* must be co-indexed, otherwise this sentence cannot be construed as a transitive anticausative. In this case, a lack of co-indexation results in an *ungrammatical* string of words with respect to the intended interpretation. If *the gas* and *its* are not co-indexed in (69), then the same string of words must be understood as a transitive causative (which would mean that the gas caused a change in the temperature of something else):

(70)   [The gas]$_i$ changed its$_j$ temperature.   agentive causative

   Strictly speaking, co-indexation is also possible with the transitive causative reading in a pragmatically deviant fairy tale context as the one mentioned above (The DP *the gas* is then associated with the role of agent, as this DP is of type *e*).

(71)   [The gas]$_i$ changed its$_i$ temperature.   agentive causative or transitive anticausative

On the agentive causative reading of (71), the gas caused its own temperature to change, which is pragmatically unnatural even if semantically acceptable, which is why the pragmatically natural reading of (71) is as a transitive anticausative.

4.2   An analysis of transitive anticausatives

Our analysis of transitive anticausatives will be presented in three major steps, beginning with dimensional nouns (e.g., *temperature, color, shape, flavour*, see Löbner 2020 and literature cited therein on these nouns).

4.2.1   Dimensional nouns

Taking *temperature* as a canonical example of a dimensional noun, a straightforward idea is that *temperature* denotes a function that applies to an ordinary object *x* (its possessor) and then to a time *t*, yielding the temperature of *x* at *t*, as formalized in (72), where ιd is the description operator and *d* is an individual variable for temperatures.[8]

(72)   temperature $\rightsquigarrow \lambda x \lambda t . \iota d(\text{temperature}(t,x) = d)$ (the temperature *d* of *x* at *t*)

If (for simplicity) *the gas* is represented as the individual constant g, as in (73a), then the temperature *d* of g at an implicit time t' is represented in (73b).

(73)   a.   the gas $\rightsquigarrow$ g
       b.   the gas's temperature (at t') $\rightsquigarrow$
            $[[\lambda x \lambda t . \iota d(\text{temperature}(t,x) = d)](\text{g})](t') =$ (by application)
            $\iota d(\text{temperature}(t',\text{g}) = d)$ (for a value of t')

If the function represented in (72) is applied only to g, then the result is the following function on times:

(74)   the gas's temperature $\rightsquigarrow \lambda t . \iota d(\text{temperature}(t,\text{g}) = d)$

   By the way, note that *the temperature of the gas* would receive the same treatment as *the gas's temperature*:

---

[8] For simplicity, we keep to an extensional semantics here.

(75) the temperature of the gas (at t') $\rightsquigarrow \iota d(\mathsf{temperature}(t',\mathrm{g})=d)$ (for a value of t')

Returning to *the gas's temperature*, we adopt a DP approach and treat it syntactically as a DP with *the gas* as a DP in its specifier position and with a syntactic feature $[+\textsc{poss}(\textsc{essive})]$ contributed by the possessive clitic *'s*, which is its head, as shown in (76).

(76)
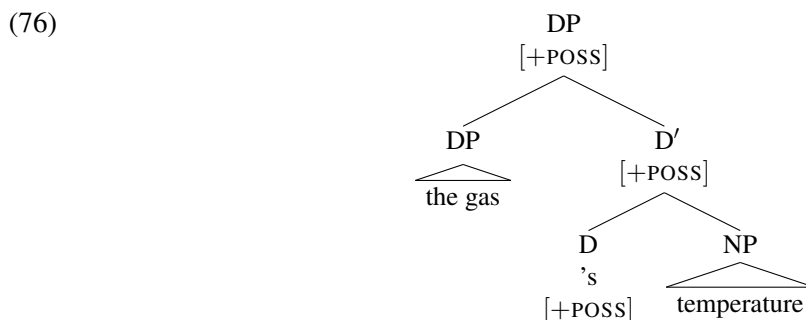
For convenience, we treat the possessive clitic *'s* as semantically inert: normally, it would contribute a two-place possessive relation (e.g., in *Hongyuan's book*), but since the dimensional noun *temperature* already denotes a relation (indeed, a function), we can (again, for convenience) treat *'s* as semantically inert here. Even so, *'s* does contribute the syntactic feature $[+\textsc{poss}]$.

This concludes our basic treatment of dimensional nouns, which was one of the three necessary conditions for transitive anticausatives (recall (68a)).

4.2.2 A-dimensional verbs of change

Taking *change* as a – if not *the* – canonical example of an a-dimensional verb of change, another straightforward idea is that *change* denotes a change-of-state relation that applies to a function δ on times (of logical type $\langle e,e \rangle$) and an event e such that e temporally abuts a state s and the value of δ at the beginning of e is not identical to the value of δ during s (which follows e), as shown in (77), where $\bowtie$ stands again for 'temporally abut' and τ, for a function that gives the time of an event or state.

(77) change $\rightsquigarrow$
$\lambda \delta \lambda e. \exists s(e \bowtie s \wedge \delta(\mathsf{beg}(\tau(e))) \neq \delta(\tau(s)))$

On the intransitive use, *change* is unaccusative, and the syntactic argument corresponding to δ in (77) is an internal DP-argument (which moves to SpecTP for nominative case):

(78)
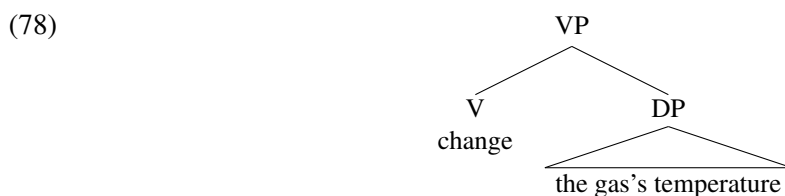
Bringing together the analysis of *the gas's temperature* as a function on times in (74) and the analysis of change in (77), the derivation of the event predicate corresponding to *The gas's temperature changed* (= (56b)), ignoring tense, is given in (79).

(79)   a. $[_{\mathrm{DP}}$ the gas's temperature$] \rightsquigarrow \lambda t. \iota d(\mathsf{temperature}(t,\mathrm{g})=d)$ (type $\langle e,e \rangle$)
       b. $[_{\mathrm{VP}} [_{\mathrm{V}}$ change$] [_{\mathrm{DP}}$ the gas's temperature$]] \rightsquigarrow$
            $[\lambda \delta \lambda e. \exists s(e \bowtie s \wedge \delta(\mathsf{beg}(\tau(e))) \neq \delta(\tau(s)))]$

$$(\lambda t.\iota d(\text{temperature}(t,\text{g})=d)) = \qquad\qquad\text{(by application)}$$
$$\lambda e.\exists s(e \bowtie s \wedge$$
$$\iota d(\text{temperature}(\text{beg}(\tau(e)),\text{g})=d) \neq \iota d'(\text{temperature}(\tau(s),\text{g})=d'))$$

This concludes our basic treatment of dimensional verbs of change, which was another one of the three necessary conditions for transitive anticausatives (recall (68b)).

4.2.3 Transitive anticausatives

In this section, we show how transitive anticausatives are semantically equivalent to intransitive anticausatives but syntactically transitive, which is the challenge set out in section 4.1.
    Recall (69), repeated in (80).

(80)   [The gas]$_i$ changed its$_{i/*j}$ temperature.   (= (69); transitive anticausative)
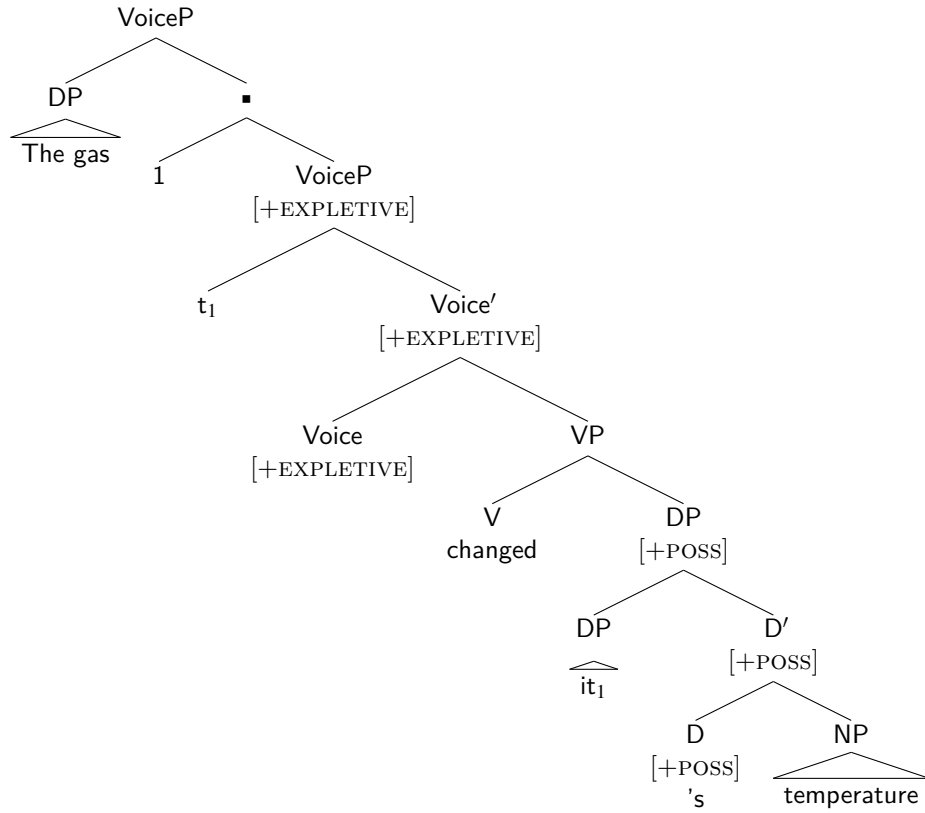
The structure of transitive anticausatives is given below. Since transitive anticausatives are formally transitive, their structure must involve VoiceP hosting the external argument NP in its specifier. Furthermore, the internal argument DP involves a dimensional noun phrase and a possessive pronoun in it specifier.

(81)
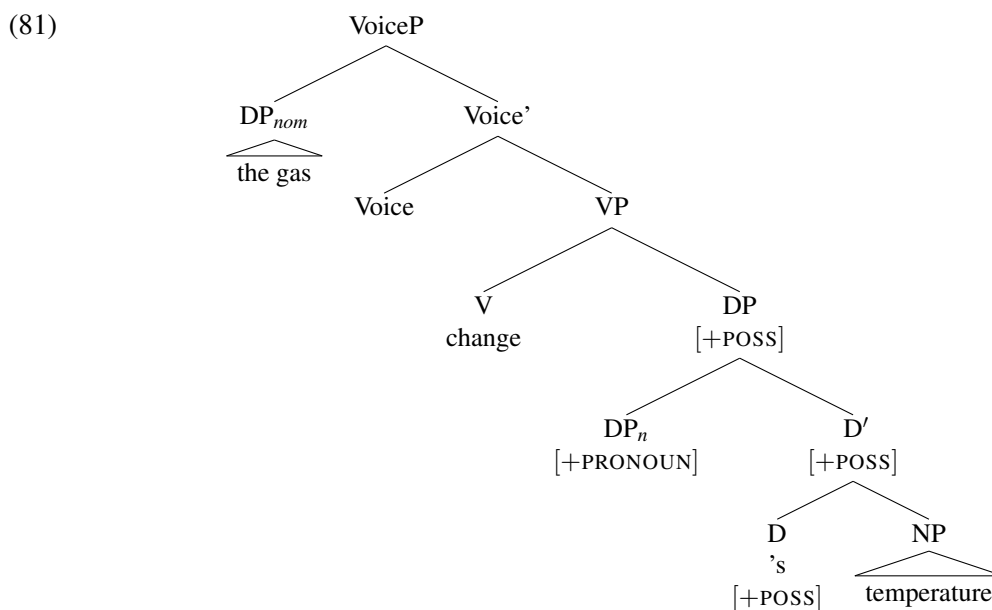
Turning to the interpretation of this structure, we need to explain why the DP located in the canonical external argument position Spec,VoiceP is not interpreted as an agent or causer of the verbal event (as it would be in canonical lexical-causative uses), and why the external argument DP obligatorily binds the possessive pronoun inside the internal argument DP.
    Schäfer (2023) argues that these two aspects are related. First, Voice is here neither agent Voice, nor causer Voice but *expletive* Voice (proposed for other purposes in Schäfer 2008; Alexiadou et al. 2015). This functional head in Figure 2 provides a specifier for an external argument DP to be merged, but does not enter any semantic relation with this DP. In particular, it does not assign any θ-role to it. Since Voice in (81) is expletive/semantically inert, this has the consequence that both the meaning of expletive Voice' and that of expletive VoiceP is identical to the meaning of the VP.
    We now proceed step by step to the semantic derivation of transitive anticausative statements, starting with meaning the verb *change*. The semantic representation of *change* as a transitive anticausative is the same as the semantic representation of *change* in (77).

Figure 2: Syntactic structure of transitive anticausatives

```
                        VoiceP
                       /      \
                     DP        ▪
                    /  \      /  \
                The gas  1    VoiceP
                            [+EXPLETIVE]
                             /      \
                           t₁       Voice′
                                 [+EXPLETIVE]
                                  /       \
                              Voice        VP
                          [+EXPLETIVE]    /  \
                                         V    DP
                                     changed [+POSS]
                                             /    \
                                           DP      D′
                                           |    [+POSS]
                                          it₁    /    \
                                                D      NP
                                            [+POSS]  temperature
                                              's
```

(82) change $\rightsquigarrow$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (= (77))

$\lambda\delta\lambda e.\exists s(e\bowtie s\wedge\delta(\text{beg}(\tau(e)))\neq\delta(\tau(s)))$

Turning to the internal argument DP, the dimensional noun *temperature* comes with a possessive pronoun *its*, which later must be co-indexed with the external argument DP *the gas* (i.e. bound by it) in order for the transitive anticausative to be available. The index n carried by the possessive pronoun in (81) is a natural number. The meaning of *its₁ temperature* is composed as follows (cf. (79a)):

(83) a. $[_{\text{DP}}\text{ it(s)}_1] \rightsquigarrow x_1$

 b. $[_{\text{DP}}\ [_{\text{DP}}\text{ it(s)}_1]\ [_{\text{NP}}\text{ temperature}]] \rightsquigarrow$
   $[\lambda x\lambda t.\iota d(\text{temperature}(t,x)=d)](x_1) =$ $\qquad\qquad$ (by application)
   $\lambda t.\iota d(\text{temperature}(t,x_1)=d)$

Note that the index of the free variable representing the pronoun in (83a) is the same as the index of the pronoun (here: 1).

Applying the meaning of *change* to the meaning in (83b), we obtain the following meaning for the VP, ignoring tense (cf. (79b)):

(84) $[_{\text{VP}}\ [_{\text{V}}\text{ change}]\ [_{\text{DP}}\text{ its}_1\text{ temperature}]] \rightsquigarrow$
  $[\lambda\delta\lambda e.\exists s(e\bowtie s\wedge\delta(\text{beg}(\tau(e)))\neq\delta(\tau(s)))]$
   $(\lambda t.\iota d(\text{temperature}(t,x_1)=d)) =$ $\qquad\qquad\qquad$ (by application)
  $\lambda e.\exists s(e\bowtie s\wedge$
  $\iota d(\text{temperature}(\text{beg}(\tau(e)),x_1)=d)\neq\iota d'(\text{temperature}(\tau(s),x_1)=d'))$

The semantic composition of the top part of the LF in figure 2 – from expletive VoiceP upwards – is shown in (85). Recall that since expletive Voice is semantically inert, both expletive Voice′ and expletive VoiceP have the interpretation of the VP (which was given in (84)).

(85)   a.   VoiceP[+EXPLETIVE] $\rightsquigarrow$ (= (84))
            $\lambda e.\exists s(e \bowtie s \wedge$
                $\iota d(\text{temperature}(\text{beg}(\tau(e)), x_1) = d) \neq \iota d'(\text{temperature}(\tau(s), x_1) = d'))$
       b. $1 \rightsquigarrow \lambda x_1$
       c. $\bullet \rightsquigarrow$
            $\lambda x_1 \lambda e.\exists s(e \bowtie s \wedge$
                $\iota d(\text{temperature}(\text{beg}(\tau(e)), x_1) = d) \neq \iota d'(\text{temperature}(\tau(s), x_1) = d'))$
       d.   the gas $\rightsquigarrow$ g
       e.   VoiceP $\rightsquigarrow$
            $\lambda e.\exists s(e \bowtie s \wedge$
                $\iota d(\text{temperature}(\text{beg}(\tau(e)), g) = d) \neq \iota d'(\text{temperature}(\tau(s), g) = d'))$

Despite the significant syntactic difference between transitive anticausatives and intransitive anticausatives, they are semantically equivalent, which is illustrated by the fact that the event predicate in (85e) and the event predicate in (79b) (representing *The gas's temperature changed*) are identical.

Note that if the subject DP does not bind the pronoun in the derivation in (81), the string *The gas changed its temperature* is ungrammatical, as the subject DP falls victim to the θ-criterion. The only way to rescue the string in the absence of binding is to resort to agent or causer Voice, which assigns an external argument role to the subject. This leads to a (pragmatically odd) causative interpretation of the sentence.

4.3   Transitive anticausative VPs have inchoative semantics

We just have established that transitive anticausatives have the same truth-conditions as intransitive anticausatives. In the following, we show that the tests we used previously (progressive or *begin*-statements) confirm that the VP has inchoative semantics (is interpreted as describing a mere change) in transitive anticausatives, too. We do so by contrasting the transitive anticausative reading with the causative construal built with an in-control, intentional agent, which is, by hypothesis, the single reading allowing the VP-event of change-of-state statements to start without the targeted change to take place, event partly.

It is difficult, however, to find sentences that can have both a transitive anticausative reading *and* a transitive causative reading with a 'normal' agent. The reason for this is that in the presence of an animate agent, the transitive anticausative reading tends to be difficult to obtain because of the *agent bias* (or *agent preference*): we tend to preferentially interpret semantic role-ambiguous DPs such as human DPs as agents (Bickel et al. 2015, Sauppe et al. 2022). Thus, for instance, the preferred interpretation for (86) certainly is the agentive causative reading under which Ana is the agent of her appearance change.

(86)   Ana is changing her appearance.

Even with the help of contextual support, it seems difficult to enforce the transitive anticausative reading in the presence of the progressive morphology (needed for our first test). Thus for instance, in (87), the subject seems inexorably associated with the role of agent, despite the presence of the adjunct in principle favoring the anticausative construal.

(87)   Under the influence of a very aggressive cancer Ana is changing her appearance.

It seems somewhat easier to obtain the transitive anticausative reading in the absence of a progressive (N.N, p.c.):

(88)   a.   Remember Ana right, all boys and girls had crushes on her in high school! Mind you...
              She changed her appearance over the last 70 years.
        b.   As humans age, they change their appearance.

But we need the progressive for our first key test. To solve this problem, we turn to inanimate instrumental agents. Inanimate DPs which are semantic role-ambiguous (agent or something else) are not automatically interpreted as agents like animates are.

Take (89b). The context in (89a) enforces the reading of the subject as an instrument in control of its behavior and fulfilling the intention of the agent using this instrument. In this context, sentence (89b)-(89c) are felicitous, although the targeted change (a decrease in temperature) has not been initiated yet. This shows that, as observed before, agentive causative statements allow the reading where the VP-event starts before the change itself starts.

(89)   a.   Cassiel bought a new phone able to regulate its own temperature. When the temperature reaches a certain level, the telephone launches a cooling program, which typically starts being effective after 60 seconds. A second ago, Cassiel received the notification informing him that the telephone just started the cooling program, and says:
        b.   My phone is decreasing its temperature.
        c.   My phone started to decrease its temperature.

By contrast, when the inanimate instrumental DP is used in a context that invites the transitive anticausative interpretation, the same progressive or *begin-* statements entail that the change starts, in accordance with the hypothesis that the VP just denotes a mere change. For instance, (90b) and (90c) are not felicitous in the context (90a), making clear that the phone is not an (agentive) instrument (it cannot be a causer, as it is individual-denoting). The problem is due to the fact that it is not possible that the temperature of the phone changed so quickly, while such a change is required to be initiated for the sentence to be true, as the VP has inchoative semantics.

(90)   a.   Pauline has a very primitive pre-2000 phone. Her phone was very hot because of the sun exposure, so she put it in the shadow a couple of seconds ago and uttered:
        b.   #My phone is decreasing its temperature.
        c.   #My phone started to decrease its temperature.

5   Conclusions

In a transitive change-of-state statement, the VP describes an event yielding to some new state. The way we identify this event very much depends on the number of arguments, as well as the ontological and agentive properties of the external argument if there is one. Only in the presence of a normal, in-control and intentional agent, the VP-event is 'bigger' than the change proper: it also contains the action performed by the subject. The idea that the action is a subpart of the VP-event advocated here contrasts with the '*metonymic clipping* hypothesis' proposed for instance in van Valin & Wilkins (1996: 301), according to which an agentive animate DP "stands in for the whole causing-event sequence" — i.e., the idea that in *Gareth broke the vase*, the subject DP is underlyingly a description of the causing event. For us, in-control and intentional agents

of causative verbs keep their literal, individual-denoting interpretation, but have the effect of increasing the size of the VP-event, by forcing an interpretation under which this event is identified as a sum of an action and a change. As a result, the VP-event can in principle then start before the change itself starts. But in all other configurations — when the subject is an inanimate agent, an animate inadvertent agent, a causer (denoting an eventuality or a fact) or the simple possessor of the dimension denoted by the object (*The room changed its temperature*), the VP-event is *just* the change; the rest of the causation event is either overtly denoted by the subject, or (softly) presupposed by the causative statement (the INCHOATIVE HYPOTHESIS). Whether the VP-event contains more material than just the change proper has significant consequences on the interpretation of change-of-state statements built with an aspectual morphology with partitive semantics, such as the progressive in English as demonstrated in this paper. The same contrasts are expected to arise in change-of-state statements built with a perfective morphology with partitive semantics (*weak* perfectives), like those characterizing South Asian languages like Thai, Hindi or Mandarin (Koenig & Muansuwan 2000, Altshuler 2014).

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