

Event-Structure Constraints on Nominalization

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1. Deficiency in Nominalization

Nominalization structures are in some sense 'deficient' when compared with their verbal counterparts. One particularly well-known difference found in languages like English, where external arguments are obligatorily realized in clauses, is that the overt realization of the external argument is not necessary (Abney 1987, Dowty 1989, Kratzer 1996, Alexiadou 2001, among others). Nominalizations also appear to lack the OBJ grammatical function or the structural space often attributed to an extended VP (Rappaport 1983, Kayne 1984, Abney 1987): ECM, double objects, object control, and particle shift have been claimed to require VP shell-structure or Agr-o (Larson 1988, 1990; Den Dikken 1995; Collins & Thrainsson 1996, Svenonius 1996). These constructions are all lacking in derived nominals and in ING-OF gerunds, though available in the POSS-ING variety:¹

- | | | | |
|-----|----|---|----------------|
| (1) | a. | *John's belief / believing of [Bill to be Caesar] | ECM |
| | b. | John's believing [Bill to be Caesar] | |
| (2) | a. | *John's gift /rental /giving (of) Mary of a fiat | Double objects |
| | b. | John's giving/renting Mary a fiat | |
| (3) | a. | *John's persuasion / persuading of Mary [PRO to stay] | Object Control |
| | b. | John's persuading Mary [PRO to stay] | |
| (4) | a. | *John's explanation (away) of the problem (away) | Particle-Shift |
| | b. | John's explaining (away) of the problem (*away) | |
| | c. | John's explaining (away) the problem (away) | |

The goal of the paper is to provide a preliminary delineation of the particular sense or senses in which nominalization and derived nominals are deficient. It is feasible, of course, that more than one sort of deficiency is involved. Depending on the ultimate analysis of the optionality of the

¹ The term Nominalization, in what follows, refers to both derived nominals (nominalizations with unpredictable affixes, such as -ation/-ment/-ance/-al) and ING-OF gerunds.

external argument, as a syntactic, EPP-related, effect, or as related to argument structure and the non-argument status of external arguments in nominalization, optionality may be independent, or partially independent, of the deficiency observed in (1-4). On an EPP approach to external argument optionality, this property may be related to cross-categorial differences in the relatively high functional structure associated with clauses, whereas (1-4) might be related to the lower functional domain often associated with direct object licensing. Similarly, the deficiency in (1-4) may have more than one source. The literature on VP-structure has attributed these constructions to functional structure, suggesting that there are no nominal counterparts to the morpho-syntax introduced by Agr-o, vP, or VP-shells. On an earlier, LFG proposal, nominalizations lack the OBJ grammatical function (Rappaport 1983). More recently, however, the class of direct objects has been divided into those associated with activities and those associated with accomplishments (Levin 1999; Rapoport 1999; Folli & Harley 2007; Ramchand 2007), raising the possibility that not all types of direct objects are missing in nominalization but only a subset, as defined by the structure of events. If so, at least part of the deficiency observed in nominalization may ultimately reduce to deficiency in the kinds of events compatible with nominalization. To the extent, though, that event-structure is encoded syntactically (Borer 2005, Ramchand 2007), a morpho-syntactic analysis and an event-related analysis are not incompatible.

Here I will argue that in addition to pure morpho-syntactic deficiency, derived nominals in English are also deficient in the sort of events they can host and are restricted to simple, single events. They contrast, in this respect, with ING-OF nominalizations, which are similarly deficient in their range of purely morpho-syntactic projections, but are not constrained in terms of the kinds of events they can host. A glimpse of the difference can be seen in (4): while both derived nominals and ING-OF gerunds exclude particle-shift, the particle is possible without shifting in ING-OF gerunds but not in derived nominals (Harley & Noyer 1998, Harley 2008). Taking particles to add an endpoint or result component to an activity (Ramchand & Svenonius 2002 among others), this suggests that ING-OF gerunds may denote complex events while derived nominals may not. Particle shift, from this perspective, would require additional morpho-syntactic structure, necessary also for (1)-(3) and equally lacking in both forms.

In what follows, I will assume a shared, purely morpho-syntactic deficiency for both nominalization types and focus on the differences between them. More specifically, I will argue that English derived nominals are restricted to single, simple, events, while ING-OF gerunds can also host complex events, in particular, lexical causatives and augmented events of various types. To the extent that event-structure constraints are active in nominalization, we gain new ground for the study of the event-syntax interface. If the above hypothesis is on the right track, it might move us closer to understanding what licenses complex events. Since both ING-OF gerunds and derived

nominals are syntactically deficient and only the former can host complex events, the comparison of the two nominalizations is likely to define the theoretical space within which the ingredients licensing complex events are located.

The central argument for event simplicity proceeds from the observation that certain kinds of external arguments are impossible in the derived nominal counterparts to lexical causatives (Pesetsky 1995, Marantz 1997, Harley & Noyer 2000, Alexiadou & Schäffer 2007). For expository purposes and somewhat misleadingly, I call the restriction 'Agent exclusivity', and show that the interpretive effect is present with both overt and covert external arguments. It is argued that the effect is to be attributed to a general restriction against event complexity rather than to a restriction against particular non-agentive thematic roles. On thematic-based accounts (Marantz 1997, Harley & Noyer 2000, Alexiadou & Schäffer 2007) the restriction to agentivity is encoded at the level of the root, and I discuss some difficulties for root-level representation of agentivity for all potentially transitive roots. Event complexity is defined in terms of temporality and not agentivity per se: in a simple event, the participation of the instigating agent must be co-temporal with the beginning of the unfolding event. Since the class of co-temporal instigators can include a variety of non-animates, it cannot be restricted to agents if 'agent' is understood solely in terms of the properties associated with humans (intentionality and volition). Furthermore, the constraint against non-co-temporal instigators is shown to be just one instantiation of the restriction to simple events. Restrictions in nominal passive may also be understood in terms of event simplicity, though in this case it is the result sub-event which is realized. The restriction to a particular event size should be neutral with respect to event type, and indeed any kind of event is allowed, activity-like or achievement-like, as long as it is simple. The paper is organized as follows. Section 2 introduces agent exclusivity in English and Hebrew. Section 3 defines the relevant notion of agency in temporal terms leading to event-identification and the restriction to single, simple, events. Section 4 suggests that restrictions on nominal passive in English be similarly understood as just another case of event simplicity in derived nominals. Section 5 turns to *ING-OF* gerunds and shows that here no such event restrictions are observed. Section 6 concludes with some preliminary speculations on the relationship between the temporal properties of *ING-OF* gerunds and the licensing of an additional event variable, necessary for complex events.

2. Agent Exclusivity

Preliminary indication of a systematic exclusion of a class of *CAUSE* arguments in the pre-nominal genitive is provided by a correlation between grammatical and ungrammatical transitive nominalizations and alternating and non-alternating verbal causatives. Pesetsky (1995) observes

that in English, causatives that don't alternate produce grammatical transitive derived nominals, but verbs which occur in the inchoative/causative alternation don't produce transitive derived nominals, in (7).

- (6)
- a. Bill's cultivation of the tomatoes
Bill cultivated the tomatoes / *The tomatoes cultivated
 - b. The bomb's destruction of the town
The bomb destroyed the town / *The town destroyed
 - c. The volcano's fortuitous burial of Herculaneum
The volcano buried Herculaneum / *Herculaneum buried
 - d. The emperor's restoration of the monarchy
The emperor restored the monarchy / *The monarchy restored
 - e. the proposal's creation of controversy
The proposal created controversy / *Controversy created
 - f. the sun's illumination of the room
The sun illuminated the room / *The room illuminated
 - g. Bill's discontinuation / suspension of the activity
Bill discontinued the activity / *The activity discontinued
- (7)
- a. *Bill's growth of tomatoes
Bill grew tomatoes / Tomatoes grew
 - b. *The mechanism's drop of the curtain
The mechanism dropped the curtain / The curtain dropped
 - c. *The thief's return of the money
The thief returned the money / The money returned
 - d. *inflation's shrinkage of his salary
Inflation shrunk his salary / His salary shrunk
 - e. *inflation's diminishment of his salary
Inflation diminished his salary / His salary diminished
 - f. *gravity's swing of the pendulum
Gravity swung the pendulum / The pendulum swung
 - g. *the bow's vibration of the string
The bow vibrated the string / The string vibrated
 - h. *Bill's cessation / stoppage of the activity
Bill stopped the activity / The activity stopped

Pesetsky (1995) argues that the problem in (7) is related to the morphology of the verbal alternation and suggests that zero-derived forms cannot nominalize. In the spirit of Chomsky (1970), Marantz (1997) capitalizes on the correlation between alternating and non-alternating causatives and the roots they are derived from, and arrives at the conclusion that (6-7) support the direct derivation of nominalizations from a category-neutral root. Following the typology developed in Levin & Rappaport (1995), Marantz (1997) argues that non-alternating verbs are based on roots which imply external causation, and alternating verbs imply internal causation. The external argument associated with the latter must be introduced by a separate head in an extended vP. But since the external argument in the former class is implied by the root, it may also be expressed by a pre-nominal genitive. The absence of derived nominals based on alternating causatives shows, from this perspective, that nominalization proceeds directly from a category-neutral root and that vP does not nominalize. This analysis of the restriction on transitive derived nominals can be characterized as lexical since it draws the division at the level of the root, between those that imply external causation and those which do not.

The morphological account in Pesetsky (1995) and the lexical account in Marantz (1997) share the intuition that the restriction in nominalization directly correlates with the causative typology in verbs. This generalization is disputed in Harley & Noyer (2000), where alternating verbs are presented which *do* produce transitive derived nominals. They claim that transitive nominals derived from alternating verbs are possible as long as the external argument can be construed as a direct cause, in the (b) examples:

- | | | | | |
|------|----|--|---|---|
| (8) | a. | the balloon exploded | / | the balloon's explosion |
| | b. | the army exploded the bridge | / | the army's explosion of the bridge |
| (9) | a. | Wealth accumulated | / | the wealth's accumulation |
| | b. | John accumulated wealth | / | John's accumulation of wealth |
| (10) | a. | Jim and Tammy Faye separated | / | Jim and Tammy Faye's separation |
| | b. | The teacher separated the children | / | The teacher's separation of the children |
| (11) | a. | The German principalities unified | / | the principalities' unification |
| | b. | Bismarck unified the German principalities | / | Bismarck's unification of the German principalities |

The possibility of transitive derived nominals based on alternating verbs highlights the significance of the construal of the external argument. Since non-alternating causatives are based on roots of external causation to begin with, they are expected to produce transitive derived nominals, whereas nominalization of alternating causatives depends on the possibility for external causation (available

for 'unify', 'separate', but not 'grow') and the perception of a particular token event as externally caused (Harley & Noyer 2000). The direct cause construal may be affected by particular choices of THEMES and CAUSES. In the impossible nominalizations below, the pre-nominal genitive cannot be so construed. 'John' in (12c) would typically be construed as a possessor, and not as the agent of accumulation, as it could in (9b). 'Adultery', 'the cold war', and 'the 19th century' in (13) are typically construed as facilitators, on a par with the subject of 'growth' (from Harley & Noyer 2000).

- (12) a. Dust accumulated on the table
 b. the accumulation of dust on the table
 c. #John's accumulation of dust on the table
- (13) a. Adultery separated Jim and Tammy Faye
 b. #Adultery's separation of Jim and Tammy Faye
 c. The cold war separated E. and W. Germany
 d. #The cold war's separation of E. and W. Germany
 e. The 19th century unified the principalities
 f. #the 19th century's unification of the principalities

Harley & Noyer leave open the nature of the division between external causes and the facilitators in (13). Wolff (2003) defines 'direct cause' in terms of event proximity. A direct cause is the most proximate event in the causal chain leading to the event denoted by the head of the phrase, and this seems sufficient to rule out the bad cases in (13). 'Adultery', 'the cold war' and 'the 19th century' denote macro-events or time spans which are too broad to qualify as direct causes of the events denoted by these derived nominals. Since the acceptability of transitive derived nominals does not align with the typology of causative verbs, the possibility of external causation, according to Harley & Noyer (2000), must be part of our encyclopedic knowledge about all roots and the events they potentially denote. In addition, the pre-nominal genitive must be construed as a direct cause. Encyclopedic knowledge, on this account, is distinct from the grammatical division which separates alternating and non-alternating verbs, and all that is required is that the meaning of the root be compatible with external causation. The requirement for external causation, however, is neutral with respect to the kind of causation, so it appears that a further requirement for *direct* causation is imposed by specDP. This is especially surprising in nominals derived from alternating verbs, where the verbal form is not so restricted (in (13)). More generally, Levin & Rappaport (1995) and Reinhart (2002) have shown that the subject of alternating verbs is less restricted than the subject of

non-alternating verbs. Non-alternating causatives have necessarily agentive subjects, in (14), but where the inchoative is available, the transitive subject need not be agentive, in (15).

- (14) a. Carla humidified her apartment
b. *The weather humidified her apartment
c. *Her apartment humidified

- (15) a. The cook caramelized the sugar
b. The intense heat caramelized the sugar
c. The sugar caramelized

The question regarding the source of the restriction to direct causes does not arise as acutely for nominals derived from non-alternating verbs, since here the external argument is a direct cause to begin with (in (14)).

Alexiadou & Schäfer (2006) relate the requirement for direct causation to agentivity. They argue that agents are privileged when it comes to encyclopedic knowledge, and that agentivity is given by encyclopedic knowledge associated with the root. Having agentivity associated with the root accounts more directly for the restriction to direct causation. Beyond that, it and shares with Harley & Noyer (2000) the idea that meaning ingredients associated with the external argument (external causation, direct causation, agentivity) are part of the conceptual structure of all potentially transitive roots, including alternating verbs such as 'explode', 'separate', 'unify'. The empirical price is that on their verbal inchoative use there is no implication of a CAUSE at all. But if external causation or agentivity are associated with all potentially transitive roots, it is no longer clear how to preserve the distinction between alternating and non-alternating verbs and how it is represented. If the nominal paradigm is to be accounted for without compromising the verbal paradigm it seems that the restriction to agentivity should be encoded above the level of the root, at a level which is specific to nominals, possibly as a selectional restriction associated with nominalizing affixes.

These proposals raise a number of important issues which the present analysis attempts to resolve. What is the notion of agency or direct causation relevant for derived nominals? Agency has sometimes been defined solely in terms of the properties associated with the participant: rational, intentional, volitional. It has also been claimed to arise as an implicature, never linguistically encoded as such (Van Valin & Wilkins (1993)). Harley & Noyer's insight that whether the pre-nominal genitive qualifies as a direct cause is a function of the denotation of the root combined with the denotation of the participants appears to go against the spirit of a lexical, root-based, analysis, and hinges on the nature of the event as a whole, the root and the participants. The relation to event-

structure is developed and made explicit in section 3, where it is claimed that the empirical generalization involves event co-temporality, and not agentivity *per se* (if agentivity is defined solely in terms of properties of the participant). As discussed in more detail in section 3, derived nominals are limited to simple, single, events and the external argument must be interpreted as a direct participant, a class which includes agents and a variety of inanimate forces, contingent on the denotations of the root and its complement. Agentivity is simply the sub-class of [intentional, rational] direct participants and is never individuated or encoded as such. A second question which arises is why derived nominals should impose this restriction, absent in verbs. How is the requirement for a direct cause or agent represented? A possible reply, of course, is that verbs are associated with an extended vP / VoiceP; only an extended vP / VoiceP introduces external arguments which are not agents or direct causes; agents and direct causes are represented within root meaning; derived nominals lack the equivalent of an extended vP / VoiceP. One of the problems alluded to above, and discussed in more detail below, is that having agentivity or direct causation associated with roots of alternating verbs leads to over-generation when the argument is not expressed. In the verbal domain it neutralizes the distinction between inchoative anti-causatives and passive, as well as similar distinctions in the nominal domain, as discussed shortly below. It appears therefore that the restriction should be encoded at a level which is above the category-neutral root. For example, as a selection restriction associated with nominalizing affixes. After showing, in the remainder of this section, that the constraint has some generality beyond English, it is proposed in section 3 that the requirement imposed by derived nominals is for a particular event size, a single, simple, event. This explains the restriction to direct participants, since only direct participants can combine with a root and its complement within a simple event. If correct, nominalizing affixes of the idiosyncratic variety will be constrained to combine with single simple events.

As mentioned above, the claim that agentivity or direct causation are associated with the root of all potentially transitive roots neutralizes the division between non-alternating and alternating verbs which, on their inchoative uses, carry no implication of a CAUSE at all. The absence of a CAUSE in inchoatives is in sharp contrast with the salient agentive interpretation implicated in Hebrew nominalized causatives when the agent is omitted, presented immediately below. To the extent that the proposal in terms of event-structure is on the right track, the implication of agentivity is triggered by a general constraint on the structure of events. Since it need not be encoded within the root, the division between alternating and non-alternating verbs is preserved, and so are differences between inchoatives and causatives with implicit agents and their nominal counterparts.

Independent evidence for the claim in Harley and Noyer (2000) that the restriction to agentivity / direct causation cuts across the causative typology is presented by Hebrew. Hebrew has two alternating causative constructions which pattern differently from English, causatives based on unergatives and object-experiencer psych verbs (henceforth, Obj-Exp). Nevertheless, they show a similar restriction to agentivity, suggesting that the phenomenon has some generality and is not just an English quirk.² Derived nominals based on Obj-Exp verbs also illustrate, in the nominal domain, a problem for generalized root-based accounts of agent exclusivity. Similar to the difference between inchoatives and passives, one class of derived nominals completely lacks an external cause, and in the other class it is present and exclusively agentive. To the extent that the proposal in terms of event-structure is on the right track, the implication of agentivity is triggered by a general constraint on the structure of events.

Unlike English, causatives built from unergatives are not necessarily agentive. The corresponding derived nominals, however, are. Unergative 'run' and 'jump', for example, produce morphological causatives with either agentive or CAUSE subjects, in (16). When nominalized, the agent can optionally be expressed as a by-phrase, in (17a/c), and a CAUSE cannot be expressed at all, in (17b/d), unless it is understood to denote the cause of the agent's behavior (see further below).

- (16) a. ha-me'amen heric et ha-pluga be-meSex xaci Sa'a
the-trainer ran.CAUS ACC the-battalion for half hour
'The trainer ran the battalion for half an hour'
- b. ha-kin'a merica oto
the-jealousy run.CAUS him
'Jealousy makes him run (=motivates him)'
- c. ha-joki hikpic et ha-sus
the-jockey jumped.CAUS ACC the-horse
'The jockey jumped the horse'
- d. ha-de'aga hikpica oto me-ha-mita
the-worry jumped.CAUS him from-the-bed
'His worries caused him to jump out of bed'

- (17) a. ha-haraca Sel ha-pluga (al yedey ha-me'amen)
the-running.CAUS of the-battalion (by the trainer)
'The running of the battalion by the trainer'

² See Alexiadou & Schäfer (2006) and Alexiadou, Anagnostopoulou & Schäfer (2009) for cross-linguistic variation in this domain, and for a class of German nominalizations which share the restriction.

- b. *ha-haraca Selo al yedey / biglal ha-kin'a
 the-running.CAUS of.him by because the-jealousy
- c. hakpacato me-ha-mita (al yedey ha-magad)
 jumping.CAUS.his from-the-bed (by the commander)
 'His being made to jump from bed by the commander'
- d. *hakpacato me-ha-mita al yedey / biglal ha-de'aga
 jumping.CAUS.his from-the-bed by because the worry

The agent may also be completely omitted, as in the versions of (17a/c) without a by-phrase. Nevertheless, the interpretation is necessarily agentive in the intended sense: the event of running or jumping was directly instigated by something or someone. The implication of an instigator, whether explicitly realized or not, explains why (17b/d) are odd. In fact, they are fine if the 'because phrase' can be understood to designate the cause of the instigator: x got y to run because of x's jealousy; x got y to jump because of x's worries. Because-phrases are no different in this respect from other modifiers, which can, in fact, must, modify the instigator:

- (18) a. ha-haraca ha-txufa Selahem
 the-running.CAUS the-frequent of.them
 'the frequent causing them to run'
- b. ha-haraca Sel ha-pluga kedey le-hatiS otam
 the-running.CAUS of the-battalion in order to-exhaust them
 'the causing of them to run in order to exhaust them'

Hebrew derived nominals based on causatives of unergative verbs pattern exactly like English nominals derived from alternating verbs. The verbal form in both allows both agents and causes, whereas the nominalization is restricted to an agentive interpretation.

Another example of agent exclusive transitive nominalization where the corresponding verb is not necessarily agentive comes from derived nominals based on Obj-Exp verbs, which I will call psych-nominalizations. The landscape of psych-nominalizations is more complex than in English due to special morphology associated with both causatives and anti-causatives in the Obj-Exp verbal domain. Corresponding to the causative typology, there are two classes of Obj-Exp verbs in Hebrew, and both produce derived nominals. Class I has simple morphology on the causative and complex morphology on the anti-causative, and nominalization of the causative form produces a stative, or result noun, on a par with English ('The children's amusement' vs. *'Mary's / the film's amusement of the children). Class II, however, has complex morphology on the causative, in (19a-

- 'the frightening of Rina'
- c. Ha-pxadim Sel rina
the-fears of rina
'Rina's fears'
- d. ha-hafxada Sel rina al yedey dani only agentive
the-frightening of rina by dani
'the frightening of Rina by Dani'
- e. * ha-hafxada Sel rina al yedey / biglal ha-seret
the-frightening of rina by because the-film
- (22) a. *ha-hax'asa Sel ha-xadaSot / ha-yeladim et rina
the-angering of the-news / the-kids ACC rina
- b. ha-hax'asa Sel rina only agentive
the-angering of rina
'Rina's angering'
- c. ha-ke'asim Sel dina
the-angers of dina
'Dina's bouts of anger'
- d. ha-hax'asa Sel rina al yedey ha-yeladim only agentive
the-angering of rina by the-kids
'the angering of Rina by the kids'
- e. *ha-hax'asa Sel rina al yedey / biglal ha-xadaSot
the-angering of rina by because the-news

Hebrew causativization of unergatives and nominalization of Obj-Exp psych verbs both differ from their English counterparts. Nevertheless, the effect of nominalization is identical: where the corresponding verbal form may include CAUSE subjects, the derived nominal is restricted to agentivity. As such, they strengthen the conclusion based on Harley and Noyer (2000) that agent exclusivity characterizes all transitive derived nominals (at least in English and Hebrew) and cuts across the causative typology. At the same time, they also show that a solution at the level of the root, in which all potentially transitive roots encode agentivity or direct causation, is probably too strong. It couldn't easily account for systematic differences between the two classes of Obj-Exp nominalizations in Hebrew, or between inchoatives, which clearly lack an external argument, and derived nominals with an implicit external argument.

The division between anti-causative inchoatives and derived nominals with an implicit argument appears to be preserved in the nominal domain in English as well. When the external argument is not expressed, derived nominals based on obligatory transitives continue to imply agentivity, whereas derived nominals based on alternating verbs do not necessarily imply agentivity. The examples in (23) are all interpreted as transitive and agentive, whereas (24) seem to be ambiguous between transitive and intransitive readings:

- (23) a. the destruction of the city
b. the creation of controversy
c. the burial of John
- (24) a. the separation of Jim and Tammy Faye
b. the explosion of the balloon
c. the solidification of our agreement

In what follows I argue that the generalization regarding restrictions on transitive derived nominals, rather than being captured at the level of the root, revolves around temporality, the structure of events, and a restriction to single, simple, events.

3. Agent as Co-temporal Cause

The preference for an agent is clearly not a general property of pre-nominal genitives. Pre-nominal genitives need not host an external argument, let alone an agent:

- (25) a. Mary's team (owns the team, is a fan / member of the team, etc.)
b. the camp's demolition (theme interpretation)
c. yesterday's demolition (adjunct interpretation)

The restriction applies only to derived nominals, transitive and intransitive, whose corresponding verbal forms have an external argument as subject.⁴ But even within this domain, it is not absolute. It is only apparent in the choice between agents and CAUSES: Goals, Sources, and various kinds of Experiencers are fine, with a variety of affixes, in (26).

⁴In English, however, the restriction effectively applies almost exclusively to transitive derived nominals. For reasons which may or may not be related, the majority of derived nominals based on unergatives have either only ING-OF counterparts, or zero-derived counterparts, which in general do not produce eventive nominalizations (Alexiadou (2001), Harley (1999)).

- (26) a. John's receipt of the package
 b. The navy's transmission of the message
 c. Mary's realization of the source of her problems
 d. Dina's adherence to our manifesto

The compatibility of Goals, Sources, and Experiencers suggests that the constraint in derived nominals is probably not akin to the varieties of passive which appear to restrict the suppression of the external argument to Agent (Zaenen 1993, Doron 2003, Doron & Alexiadou 2007; see also Alexiadou, Anagnostopoulou & Schäfer (2009) for arguments against an analysis in terms of verbal passive). Neither does the constraint appear to involve a restriction to humans. The pre-nominal genitive in nominalizations of non-alternating causatives need not be human, partially repeated from (6) (from Pesetsky (1995)).

- (27) a. The bomb's destruction of the camp
 b. The sun's illumination of the room
 c. The volcano's fortuitous burial of Herculaneum
 d. the proposal's creation of controversy

The examples in (27) all include genitives which are not 'agentive' if that notion is defined only in terms of the properties of the participant. I will refer to inanimate entities of this sort as 'natural forces'. Harley & Noyer (2000) have shown that transitive derived nominals based on alternating verbs depend on the combination of the denotations of the participants and the root. Here I show that the distribution of forces in the pre-nominal genitive position is similar across nominals based on alternating and non-alternating verbs. It is sensitive in a similar way to the combination of the denotations of the participants and the root in a way which suggests that the relevant notion involves direct participation. Whereas 'the sun' is compatible with 'illumination', it isn't compatible with 'postponement', at least not on our normal understanding of the properties of the sun; 'the volcano' is compatible with 'burial' but not generally, and 'the wind' is compatible with 'dispersal' but not with 'cancellation':⁵

- (28) a. #The sun's postponement of the hike
 b. #The volcano's creation of panic

⁵ Given that what seems to be stake in all these cases is semantic incompatibility, the pound sign is used from now on to note semantic anomaly or incompatibility.

- (29) a. The soldiers counted on the wind's quick dispersal of the tear gas
 b. #They counted on the wind's cancellation of the outdoor show

In these particular cases derived nominals are not necessarily different from the corresponding clauses:

- (30) a. The sun illuminated the room / #The sun postponed the hike
 b. The wind dispersed the tear gas / #The wind cancelled the outdoor show

I will assume that the subject in English lexical causatives has to be a direct cause of the event denoted by the verb. Verbs such as 'postpone' and 'cancel' name a result which is not directly caused by the natural force; typically, it is human agents who cancel or postpone events. In contrast, 'illuminate' is directly brought about by the sun and 'disperse' is directly brought about by the wind, by virtue of the inherent properties associated with these forces. Derived nominals are no different in this respect from the corresponding verbal forms and indirect causes are similarly excluded.

Continuing to restrict attention to non-human natural forces and CAUSES in non-alternating causatives, the following examples show that the restriction in derived nominals is in fact tighter, and that the options for the pre-nominal genitive form a subset of the options available to clausal subjects. 'The hurricane' is a possible clausal subject of 'destroy' and 'devastate' and it is also compatible with derived nominals such as 'devastation' and 'destruction', in (31). It is possible as the clausal subject of 'justify', but not with 'justification', where a human agent is possible, perhaps necessary, in (32e-f):

- (31) a. The hurricane destroyed all the crops
 b. The hurricane's destruction of our crops
 c. The destruction of our crops by the hurricane
 d. The hurricane devastated ten coastal communities in Nicaragua
 e. The hurricane's devastation of ten coastal communities in Nicaragua
 f. the devastation of ten coastal communities by the hurricane

- (32) a. The approaching hurricane justified the abrupt evacuation of the inhabitants
 b. #The approaching hurricane's justification of the abrupt evacuation of the inhabitants
 c. #the justification of the abrupt evacuation of the inhabitants by the hurricane
 d. The authorities justified the rapid evacuation of the inhabitants

- e. The authorities' justification of the rapid evacuation of the inhabitants
- f. the justification of the rapid evacuation of the inhabitants by the authorities

A verb such as 'justify' can have a CAUSE as its subject or an agent who performs the act of justifying. A natural force such as 'hurricane' can only be interpreted as a causing event, whereas with 'illuminate' or 'disperse' it can be interpreted as the force which brings about these results directly. The fact that 'illumination' and 'dispersal' are compatible with 'the hurricane', whereas 'justification' is not, suggests that direct causation is not sufficient without direct participation in the denoted event. A similar pattern is observed with 'verification'. The subject of the verb can be human and agentive or a causing event such as 'the results', and the derived nominal requires an agent:⁶

- (33)
- a. The results verified the initial diagnosis
 - b. #the result's verification of the initial diagnosis
 - c. #the verification of the initial diagnosis by the results
 - d. The expert's verification of the initial diagnosis
 - e. the verification of the initial diagnosis by the expert

Inanimates are thus compatible with derived nominals only when they can be construed as forces which directly bring about the event, and impossible when construed as causing events, even if causation is direct, as it certainly may be in (32b/c) and (33b/c). This suggests that the requirement imposed by derived nominals is tighter than the requirement imposed by verbs, and that it involves direct participation above and beyond direct causation. In all of the good cases, in (27), (29a), (31b/c), (32e/f), (33d/e), the entity denoted by the genitive is a direct participant in the denoted event. Direct participation may be guaranteed by the relationship between the event denoted by the nominal and some property which is inherent to the entity denoted by the genitive: the property of the sun which causes it to emit light, the property of wind which causes it to scatter light objects, the brute force associated with hurricanes which often leads to destruction of human artifacts. With humans, on the other hand, their inherent properties, including intentionality, volition and mobility will often be sufficient to allow for direct participation regardless of the choice of nominal.

Therefore, the particular denotation of the root and other participants appears not to play the same

⁶ It is certainly debatable whether 'justify' and 'verify' on their non-agentive uses are true causatives or statives which denote relations between events or propositions (Edit Doron, Malka Rappaport-Hovav p.c.). Here I assume that they are causatives, since a stative analysis, to the extent that statives are simple, would lead to the expectation that they should easily nominalize, on a par with 'destruction'. Note that a stative analysis has an advantage in explaining the possibility for anti-causative interpretation when the external argument is not expressed, as in (i), placing them on the side of alternating verbs (see (23) and (24) above).

- (i)
- a. the verification of the diagnosis
 - b. the justification of/for our actions

role. Since mobility, volition, or intentionality cannot be attributed to inanimates, the typical route to direct participation in an event is by virtue of an inherent property directly related to the denoted event.

The requirement for direct participation is also observed in derived nominals based on alternating verbs. These too allow inanimates just in case they can be construed as direct participants. 'The war' and 'the separation of Jim and Tammy Faye' differ in their granularity and so the former cannot be construed as a direct participant in the latter, though it can be construed as the direct instigator of 'the destabilization of the economy', in (34c).

- (34) a. The economy de-stabilized
b. The war destabilized the economy
c. The war's destabilization of the economy brought more people to the poles
d. the war separated Jim and Tammy Faye
e. #the war's separation of Jim and Tammy Faye
- (35) a. Her skills developed
b. The exercise developed her analytic skills
c. The exercise's development of her analytic skills surprised Mary
d. The exercise expanded her interest in syntax
e. #the exercise's expansion of her interest in syntax surprised Mary

The following paradigm shows a three-way contrast. 'The weather' is compatible with 'improvement' but not with 'alteration', where it is not a direct participant, since with a theme such as 'plans', it is typically human agents rather than natural forces who bring about changes in plans. That is not to say, however, that 'alteration' is never compatible with a natural force. When the theme denotes an entity which undergoes a change which is necessarily externally caused, the natural force becomes possible as a direct participant:⁷

- (36) a. Mary's mood improved
b. The weather gradually improved her mood
c. John was amazed by the weather's gradual improvement of Mary's mood
d. The weather altered their plans
e. #The weather's alteration of their plans disappointed Jim and Tammy Faye
f. The wind altered the position of the rocks

⁷ Thanks to Malka Rappaport-Hovav for bringing (36f-g) to my attention.

- g. the wind's alteration of the position of the rocks

Examples (31)-(36) point to a difference between causative verbs and their derived nominal counterparts. Whereas direct causes may be sufficient with verbs, direct participation is required in derived nominals.⁸ The relations are close but they are not identical. Direct causes, according to Wolff (2003), are the most proximate CAUSES in a causal chain leading up to the event denoted by the predicate. Crucially, however, a direct cause may be temporally or spatially removed from the main event. Direct participants, on the other hand, must be co-temporal and in some sense co-spatial with the unfolding event.⁹ Whereas co-temporality may hold of the relation between 'the exercise' and 'development', it does not hold of 'the exercise' and 'expansion', since the expansion of Mary's interest in syntax will typically take effect after the completion of the exercise. Similarly, whereas 'the improvement of her mood' may easily be construed as co-temporal with 'the weather', 'the alteration' is punctual.

I propose, therefore, to derive the restriction on the external argument from the distinction between co-temporal and non-co-temporal complex events (Levin & Rappaport-Hovav 1999, 2002; Parsons 1990). Non-co-temporal complex events have the event-structure of an accomplishment. A co-temporal complex event, in which the sub-eventualities overlap, is represented as a single, simple event. The representation as a single event is produced by event identification, subject to the following conditions (Levin & Rappaport-Hovav 1999, 2002; Rappaport-Hovav & Levin 2001):

(37) Conditions on event identification

- I. The sub-events must have the same location and are necessarily temporally dependent. To be identical, two events must have the same spatial and temporal properties.
- II. One sub-event must have a property that serves to measure out that sub-event in time; this property is predicated of an entity that is necessarily a participant in both sub-events. This ensures temporal dependence, i.e. that the two sub-events unfold at the same rate.

Bare XP resultatives, for example, denote single events in this sense. The activity described by the verb is co-temporal with progress towards the achievement of the result, in (38). English lexical

⁸ An anonymous reviewer points out that the subjects in the verbal constructions in (32)-(36) are thematically distinct, and raises an important question about the generalization behind verbal subjects in English. Basic contrasts such as those in (30) suggest that the notion of direct causation may be relevant, but (32a) and (33a) suggest that this might not be sufficient, since 'the hurricane' or 'the results' do not seem to denote causes in the relevant sense. I leave this question open to future research.

⁹ The caveat with respect to spatial identity is intended so as to apply to somewhat abstract relations between forces and events and our conceptualization of these relationships, as in (34) where 'the war' may be waged overseas and 'destabilization' may apply to the homefront economy.

causatives, on the other hand, denote complex events, since the two sub-eventualities can be temporally distinct, in (39).

- (38) a. Carey ran / waltzed out of the room
b. The clothes steamed dry
c. The kettle boiled dry
d. Carey rustled out of the room
- (39) a. Casey's piano playing woke the baby
b. Terry shocked Sandy by deciding to run for office
c. The widow murdered the old man by putting poison in his soup

We have seen above that derived nominals differ from verbal lexical causatives in a way which is related to the difference between (38) and (39). Like bare XP resultatives, derived nominals denote simple events. Unlike bare XP resultatives, however, event identification does not apply to separately lexicalized activities and results, and the shared participant is not an internal argument. To extend event identification to transitive derived nominals, it must be allowed to apply to the relationship between the CAUSE and the event denoted by the derived nominal: the participation of the CAUSE is co-temporal with the unfolding of the event denoted by the derived nominal. Having event identification apply to the relation between the causer and the caused event implies that the shared participant is the external argument. To recall, the generalization should distinguish, for example, between (40a) and (40b):

- (40) a. The teacher's separation of Jim and Tammy Fay
b. #The war's separation of Jim and Tammy Fay
c. The war's de-stabilization of the economy

'The teacher' in (40a) can be construed as a participant in the causing sub-event and in the event of separation, ensuring event co-temporality between the two sub-events and leading to event identification. 'The war', however, is construed as a non-co-temporal CAUSE in (40b), whereas in (40c) it may be construed as a force, i.e. an instigating participant.¹⁰ This relation is to be kept distinct from agentivity, which requires, in addition, volition and intentionality, and is just one particular instantiation of direct participation. We have seen that the participant need not be human,

¹⁰ It seems though that full temporal overlap is not necessary, and that the unfolding of the war and of de-stabilization need not be co-extensive; all that is required is that the force be active at the point at which the event begins to unfold.

and that more generally, the properties which qualify a potential external argument are related to the denotation of the entire event, above and beyond the properties associated with the external argument. The relation between the *external argument* and the *unfolding event* in derived nominals is subject to the condition in (41a) and its corollary in (41b).

- (41) a. If a simple event includes an external argument, the participation of the argument is co-temporal with the initiation of the event
 b. Corollary: When the participation of the external argument is not co-temporal the event is a complex event

The requirement for co-temporality of the external argument directly suggests that derived nominals are restricted to simple, single, events. Indirect causes are impossible as external arguments, but so are direct causes excluded if their participation is not co-temporal with the initiation of the event (examples (28)-(36)). Since human agents can easily be construed as direct participants, they are typically possible; indirect causes are always impossible. Inanimate forces are possible only as direct participants.

A prediction made by this analysis is that manner verbs whose external argument is non-animate and non-agentive should produce good derived nominals, since manner verbs denote simple events and the external argument is a direct participant. Verbs falling under this description are emission verbs, i.e. 'flicker', 'bubble', 'ring', 'stink', 'ooze'; and contact verbs such as 'rub' and 'scrub'. It is difficult to test this in English unfortunately, because the majority of 'manner/activity' denoting verbs of this type either only have ING-OF or zero-derived counterparts, and the latter do not produce event nominals (Alexiadou (2001), Harley (1999)). Hebrew nominalization is fully productive within this class. Verbs of emission produce good event derived nominals:

- (42) a. ha-cilcul ha-xozer Sel ha-Sa'on he'ir ba-sof et rina
 the-ring the-repeated of the-clock awoke finally ACC rina
 'The clock's repeated ringing finally woke Rina up'
- b. ha-bi'abu'a Sel ha-marak be-meSex Sa'atayim hafax oto le-daysa
 the-bubble of the-soup for two hours turned it to-porridge
 'The soup's bubbling for two hours turned it into porridge'
- c. ha-hivhuv Sel ha-televizia kol ha-layla lo hifri'a le-rina
 the-flickering of the-tv all night neg bother to-rina
 'The TV's flickering all night long didn't bother Rina'

Similarly, verbs of contact allow inanimates and an additional complement:

- (43) a. ha-SifSuf Sel ha-kise ba-ricpa
the-rub of the chair in.the-floor
'the rubbing of the chair against the floor'
- b. ha-xikux Sel ha-galgal ba-midraxa
the-friction of the-wheel in.the-sidewalk
'the friction of the wheel against the sidewalk'

Summarizing, the restriction of derived nominals to simple events has the effect of requiring that the external argument be a direct participant. With human participants, their inherent properties will usually be sufficient to guarantee a co-temporal construal, regardless of choice of nominal, whereas with inanimates, direct participation and event co-temporality will depend on the denotations of the event and other participants combined with our knowledge and conceptualizations of possible simple events. Agent exclusivity, from this perspective, is simply a misnomer.

We have seen that root-based approaches run into difficulties when it comes to expressing the difference between intransitives which have an implicit agent and those that do not (inchoatives vs. passives in the verbal domain; nominals derived from alternating and non-alternating verbs; class I and class II psych-nominalizations in Hebrew). The generalization in terms of event simplicity provides independent motivation for expressing these restrictions above the level of the root, within a domain which is specific to nominals. A natural implementation is in terms of the selectional restrictions imposed by nominalizing affixes (-ation, -ence, -ity, etc. but not -ing) such that these affixes can combine only with simple events. In principle, this could be either a syntactic constraint or a semantic constraint and a more comprehensive discussion and conclusive choice between the two will have to await further study. To the extent that complex events and simple events have the same denotation, it is unlikely that the restriction is related to semantic composition. To the extent that event identification creates simple events which are telic but are not achievements ('destroy', 'separate', 'amuse', and 'disperse' on their agentive construals), event identification would imply an extension of the basic aktionsart typology if produced at a non-syntactic level of representation. The analysis of nominal passive and the by-phrase, and in particular their sensitivity to event-structure boundaries, further favor a syntactic treatment of these constraints.

4. Nominal Passive

The constraint on derived nominals sanctions any sort of event as long as it is simple. Section 2 focused on the instigation of the event and restrictions on the external argument in transitive derived

nominals. Another option, consistent with the generalization, is that only the lower portion of a complex event is included, an option which appears to be realized in nominal passive in English.

A number of well known differences between nominal and verbal passive in English suggest that nominal passive is confined to a reduced structure. The idea is not new, and has been developed in at least three different ways. Grimshaw (1990) has argued, from a lexical perspective on derived nominals, that nominal passives do not denote events, which, in the system developed in Grimshaw (1990), implies that they lack argument-structure. Doron and Rappaport (1991) argue for a similarity between nominal passive and middles in English and propose an analysis in terms of event-structure, to be discussed in more detail below. From a syntactic perspective according to which derived nominals contain a vP (Hazout 1991; Borer 1993; Fu, Roeper and Borer 2001), Den Dikken & Sybesma (1998) and Alexiadou (2001) have argued that nominal passive is restricted to the lower VP. Continuing to remain neutral regarding the syntactic correlates of event structure in nominals, the purpose of this section is to show that the restrictions on English nominal passive can be understood to fall under the broader generalization that derived nominals are confined to simple events.

Unlike verbal passive, nominal passive is subject to an affectedness constraint. Only affected objects can surface in the pre-nominal genitive position (Anderson (1984)), in (44).

- (44) a. the tomatoes' growth
b. the bow's vibration
c. his salary's diminishment
d. *the cliff's avoidance
e. *that car's pursuit
f. *the mistake's realization

Nominal passives also fail standard diagnostics for an implicit external argument, implying that in nominal passive the external argument is completely absent (Roeper 1987, Safir 1989, Grimshaw 1990). Depictive modification of the implicit agent is possible in the active version (45a), but not in the passive (45b), and the implicit agent fails to control the subject of a purpose clause in the passive, in (46):

- (45) a. The dispersal of the crowd nude gave the officer a bad reputation
b. *The crowd's dispersal nude gave the officer a bad reputation

- (46) a. the translation of the book [in order PRO to make it available to a wider audience]

- b. *the book's translation [in order PRO to make it available to a wider audience]

Doron & Rappaport (1991) link the affectedness constraint to the absence of the external argument associated with the counterpart verb, and argue that nominal passive involves lexical externalization of the internal argument. Affectedness, on this analysis, is defined structurally, in terms of events: an affected object is contained within a sub-event distinct from the sub-event containing the external argument. In other words, the subset of derived nominals which allow passive are those in which the object is contained within a distinct and lower sub-event. In more recent work, and fully consistent with the proposal that affected objects are individuated by the structure of events, direct objects in complex accomplishment structures have been independently claimed to be subjects of the lower, embedded sub-event (Tenny 1994, Rapoport 1999, Levin 1999). This suggests that the process of lexical externalization may not be a necessary ingredient, since affected objects are, to begin with, subjects of the lower event.¹¹ The observation that the external argument is radically absent, combined with the assumption that the external argument in complex events is introduced by a separate predicative head, suggests that the entire causing sub-event is absent in nominal passive and that passive derived nominals are confined to the lower sub-event.

The event-structure analysis of affectedness and nominal passive in Doron & Rappaport (1991) meshes well with the generalization proposed in section 3 and provides independent support for the link between event-structure and the shape of derived nominals. Accomplishments and lexical causatives have complex event-structure which cannot fit into the event size allotted to derived nominals. One way to fit them in is via co-temporality of the CAUSE and event identification. This is the route to English transitive derived nominals and nominal passive in Hebrew.¹² Another route, leading to nominal passive in English, is via suppression of the causing sub-event.¹³

¹¹ Doron & Rappaport (1991) claim, contra Grimshaw (1990), that the fronted NP in nominal passive must be an argument of N^o (See also Borer 1993 and Alexiadou 2001 for the claim that passive nominals are eventive). The head noun cannot pluralize without semantic drift, in (ia) vs. (ib), a hallmark of event-denoting derived nominals. (ib) can only mean 'housing complexes', with 'city' as possessor.

- (i) a. the city's development
b. the city's developments

¹² The Hebrew examples above with the external argument implicit ((17-18) and (21-22)) are all instances of nominal passive, in which the internal argument surfaces with the genitive Case reserved for external arguments when present (Hazout 1991, Borer 1993). Regarding the status of the external argument, Hebrew nominal passive is equivalent to English active nominals with the external argument implicit and restricted to agentivity and co-temporality.

¹³ Languages thus differ in the formation of nominal passive. Hebrew nominal passive more closely resembles verbal passive, whereas in English, it more closely resembles middles and anti-causatives. Both configurations satisfy the single-event requirement, though in different ways. How exactly to account for the source of variation is an important question which can only be touched upon briefly. On one possible approach, the difference may reduce to syntactic

The confinement to a simple event may also explain another peculiarity in English nominal passive, observed in restrictions imposed by the *by*-phrase compared with the *by*-phrase in verbal passive. Section 2 mentioned Hebrew nominal passive, which has the implicit external argument restricted to agentivity (in (17), (18), (21), (22) above), whereas English has the entire causing sub-event suppressed. Beyond this difference, however, a related agent-exclusivity effect may be behind the restriction on English *by*-phrases. Fox & Grodzinsky (1998) show that unlike its verbal counterpart, the nominal *by*-phrase is limited to effectors. It allows agents, instruments, and creators, and excludes goals and experiencers:

- | | | | |
|------|----|--|-------------------|
| (47) | a. | the imprisonment of refugees by the government | agent |
| | b. | the destruction of the city by lightning | instrument |
| | c. | CK1 by Calvin Klein | creator/possessor |
| | d. | the receipt of the package (*by John) | goal |
| | e. | the realization of the mistake (*by John) | experiencer |

Fox & Grodzinsky (1998) argue that the 'by' of nominal passive is lexically restricted to select effectors, a thematic class which includes agents, instruments or forces, and creators, whereas verbal 'by' is lexically underspecified, allowing any kind of external argument suppressed by passive.¹⁴ The postulation of lexical ambiguity for a functional morpheme such as 'by', though, is less than optimal, and the correlation with syntactic category seems to point to systematic differences across categories and potentially to the event complexity constraint. Given that the *by*-phrase allows inanimate forces (47b), the relation to event complexity can be tested by closer examination of the distribution of inanimates in the *by*-phrase. If the *by*-phrase is like the inanimate pre-nominal genitive in active derived nominals, whose participation must be co-temporal with the instigation of the event, the *by*-phrase is expected to favor co-temporal over non co-temporal inanimate forces. The following show that non co-temporal CAUSES or forces do appear to be degraded:

- | | | |
|------|----|---|
| (48) | a. | The devastation of ten coastal communities by the hurricane |
| | b. | The destruction of our crops by the tornado |

resources, such that Hebrew nominals allow A-movement in DP (see Sichel (2007) for Raising in Hebrew DP). Since English DP does not allow A-movement, it satisfies the single-event constraint by severing the causing sub-event. On another approach, languages with complex anti-causative or middle morphology such as Hebrew cannot sever the causing sub-event without a change in morphology, and must resort to the verbal A-movement strategy. The interaction of syntactic and morpho-semantic resources in passive nominalization awaits further study in a broader cross-linguistic context.

¹⁴ See also Alexiadou, Anagnostopoulou & Schäfer (2009) for cross-linguistic similarities and differences in the restriction to agents in various sorts of derived nominals.

- c. the verification of the initial diagnosis (by the expert / #by the results)
- d. the justification of the evacuation (by the authorities / #by the hurricane/tornado)
- e. the separation of Jim and Tammy Faye (by the teacher / #by the war)
- f. the destabilization of the economy by the ongoing war

The similarity of by-phrases to pre-nominal genitives suggests that here too, what appear to be thematic restrictions are better understood in terms of event-structure and the restriction to a simple event. The difference in the compatibility of hurricanes and tornadoes across (48a-b) and (48d), and wars across (48e) and (48f) shows that a formulation in terms of 'effector', or any role defined only in terms of the properties of the participant, cannot quite be correct. Conversely, the fact that the by-phrase patterns with the pre-nominal genitive in this respect suggests that by-phrases cannot augment a simple event into a complex event and cannot exceed the limits on event complexity.

There remains, nevertheless, a residual difference between pre-nominal genitives and nominal by-phrases: the former allow goals and experiencers and the latter do not. Given that by-phrases share with pre-nominal genitives the restriction to simple event-structure, the difference seems to point to the status of goals and experiencers vs. agents and forces. A better understanding of the composition of genitives and by-phrases with thematic material may help resolve a longstanding question regarding the status of external arguments in derived nominals (as adjuncts, see Rappaport 1983, Dowty 1989, Grimshaw 1990, Kratzer 1996, Fox & Grodzinsky 1998, Alexiadou 2001; as arguments, see Roeper 1987, 1993, 2004, Longobardi 2001, Sichel 2009).¹⁵ If the following is on the right track, it appears that goals and experiencers are not arguments in derived nominals, while agents and forces are.

The examples in (48), and in particular the observation that the compatibility of inanimate forces varies with choice of nominal, show that 'by' cannot be lexically specified to select a particular role. Restrictions imposed by nominal 'by' must therefore reduce to general nominal properties in conjunction with the general nature of 'by'. The fact that 'by' is excluded in middles and in adjectival passive may suggest that 'by' can only express implicit arguments, since, on standard assumptions, middles and adjectival passives do not have implicit external arguments. Since only arguments can be implicitly present, the incompatibility of 'by' with experiencers and goals would imply that in nominals, experiencers and goals are not arguments, but that agents and certain kinds of forces are. If goals and experiencers are not arguments, yet can appear in the pre-

¹⁵ Here I will assume, possibly too simplistically, that goal and experiencer subjects are external arguments. For Experiencers in clauses as internal arguments, see Doron (2003) and Landau (2005). It is not immediately clear how an analysis of Experiencers as internal would account for their non-argument status in nominals. See also Pyllkänen (2008) and Cuervo (2003) for goals and experiencers as introduced by an applicative head, in between internal and external arguments.

nominal position, the pre-nominal genitive must be an adjunct, along the lines suggested by Rappaport (1983), Dowty (1989), Grimshaw (1990), Kratzer (1996), Fox & Grodzinsky (1998) Alexiadou (2001).¹⁶

This, however, cannot be entirely correct because the initial premise, that the by-phrase can only realize suppressed arguments, is possibly true for verbs and adjectives, but probably not for nominals. In nominals, the by-phrase can occur with transitive derived nominals, such as 'the bombardment of the strip', where the external argument is implicit, but also with passive nominals, where it is completely absent (recall the discussion of (45)-(46)). When it occurs with a passive nominal, 'by' must therefore be adding an argument, rather than expressing an argument which is present yet implicit. The possibility of adding an argument appears to be unique to nominal 'by'. If, however, adding material is in principle possible, it is no longer clear why goals and experiencers are excluded; even if they are adjuncts, it should be possible to introduce them with 'by'. On the assumption that 'by' can introduce new material, the characterization of experiencers and goals as adjuncts is not sufficient for explaining the limitations on nominal 'by'. Why can 'by' introduce agents and forces but not goals and experiencers?

It appears that nominal 'by' is sensitive to event-boundaries in the same way that nominal passive is. As discussed above, nominal passive cannot apply when the external argument is an experiencer or goal (the affectedness paradigm in (44)), the same roles which cannot be introduced by nominal 'by'. It is unlikely that this similarity is accidental. To recall, nominal passive is impossible when the external argument is an experiencer or goal because the configuration is confined to the lower sub-event, and that sub-event excludes agents and forces but not experiencers and goals.¹⁷ Extending this analysis to restrictions on nominal 'by' implies that nominal 'by' can

¹⁶ The claim leads to the expectation that when not expressed as pre-nominal genitives they are not available as implicit arguments. Unfortunately, this is difficult to test, since the diagnostics impose restrictions which often exclude experiencers and goals. Purpose clauses, for example, require an agentive implicit argument and are not useful for implicit experiencers and goals. Depictive modification is good with direct objects in accomplishments but not in activities, in (i) (Rapoport 1999). It also appears to be degraded with experiencer and goal subjects, in (ii), so the incompatibility with un-expressed experiencers and goals in (iii) doesn't tell us much about their argument status in nominals. Other diagnostics, such as the compatibility of 'by oneself' also seem to require action and agentivity.

- (i) a. Jones fried the potatoes raw
- b. Jones phoned Smith sad (can only modify the subject)
- (ii) a. *Jones loved / feared Smith sad
- b. *Jones received the news sad
- (iii) a. *the love / fear of Smith sad
- b. *the receipt of the package sad

¹⁷ Doron & Rappaport (1991) call this 'the separability property' and attribute it to morphological relatedness between active and passive in nominals:

- (i) The Principle of Morphological Relatedness:
For two predicators with distinct e-structure to be morphologically related, they must contain a sub-eventuality in common

An understanding of why morphological identity across active and passive has the effect of allowing separability only at event boundaries cannot be answered without a detailed specification of the syntax underlying morphological identity in nominals. Nevertheless, it seems reasonable to assume that separation of the causing sub-event in nominal passive, and

only add material associated with a sub-event distinct from the sub-event expressed by the passive nominal. Since agents and forces can be associated with a distinct causing sub-event they are possible, while goals and experiencers are not.¹⁸ On this account, the suppression of external arguments, as in nominal passive, and the addition of external arguments, as in nominal 'by', show the same restricted distribution because they are sensitive to event boundaries in the same way. If so, the restrictions on nominal 'by' follow from the general pattern of argument introduction and suppression in nominals generally, not from any special property of 'by' itself.

If the generalization across nominal passive and by-phrase restrictions is correct, it follows that verbal and nominal 'by' are no different, and that neither of them makes a semantic contribution. Nominal 'by' is constrained to express material at event boundaries, by either introducing material, or by realizing implicit agents or forces. If correct, another conclusion may follow. Given the sensitivity of nominals to event boundaries, it might be possible to attribute the implicit agent in active derived nominals (see (45)-(46)) to the suppression of the entire causing sub-event, rather than to the suppression of an individual argument. Whereas individual arguments can be manipulated (introduced, suppressed, or left out) in the verbal domain, only event constituents can be manipulated in the nominal domain.¹⁹ If so, the view that external arguments are adjuncts may be correct, and the view that agents (and sometimes forces) are arguments may also be correct, and the division correlates with event-boundaries.

5. Complex Events in ING-OF nominalizations

The major and most well known division within the class of nominalizations is between those in which accusative case is not assigned and modification is adjectival and those in which accusative case is assigned and modification is adverbial, as in ACC-ING and POSS-ING gerunds. In the latter group, the morpho-syntactic restrictions observed in derived nominals (see 1-4 above) are neutralized and the full gamut of verbal constructions is observed, including ECM, double objects, object control and particle shift. Here I focus on a more subtle division within the first class, the division between derived nominals and ING-OF gerunds, and argue that differences between these types can be understood in terms of event complexity: ING-OF nominalization appears to license complex events. If correct, there are two kinds of deficiency in nominals, a morpho-syntactic deficiency and a temporal deficiency (which may have additional morpho-syntactic effects). ING-OF

its addition, within the by-phrase, are governed by the same principle, and that the principle is indeed related to the syntax-morphology of Voice and its absence.

¹⁸ Subject to event co-temporality and event identification along the lines proposed for pre-nominal genitives and producing the distribution of inanimates in (48).

¹⁹ Recalling, to some extent, the view in Dowty (1989) that argument association in the verbal domain reflects the ordered-argument strategy and in nominals it is Davidsonian.

nominalizations share morpho-syntactic deficiency with derived nominals, and also share with other gerunds a larger event size which allows them to host complex events, including lexical causatives and resultatives with adjectives and particles.

Many of the examples considered to have (indirect) CAUSE subjects given in Pesetsky (1995) and Harley and Noyer (2000) improve substantially in ING-OF nominalizations (noted in passing in Harley 2008):

- (49) a. #Bill's growth of tomatoes
b. Bill's growing of tomatoes
c. #inflation's shrinkage of his salary
d. ?inflation's shrinking of his salary
- (50) a. #Adultery's separation of Jim and Tammy Faye
b. ?Adultery's separating of Jim and Tammy Faye
c. ?The cold war's separating of East and West Germany
d. #The 19th century's unification of the principalities
e. ?The 19th century's unifying of the principalities

The examples in (50) have been analyzed in section 3 as containing non co-temporal causes. A similar improvement is observed for the derived nominals with non-co-temporal causes introduced in section 3:

- (51) a. #the exercise's expansion of her interest in syntax
b. ?the exercise's expanding of her interest in syntax
c. #the weather's alteration of their plans
d. ?the weather's altering of their plans

The improved status of non-co-temporal CAUSES in ING-OF nominalizations suggests that the requirement for a simple event is neutralized in ING-OF, and that these types of nominalization differ in terms of the event-structures they can host. Since there is no requirement for reduction to a simple event via event-identification, the main event may be construed as triggered by a non co-temporal causing event. Further support for a temporal treatment of the improvement in ING-OF is provided by lexical causatives in which non co-temporality is made explicit. The following examples are presented in Levin & Rappaport Hovav (2002) to illustrate temporal independence in

lexical causatives. The act of putting arsenic in the coffee, in (52a), does not extend to the point of death, and in (52b) the banging may have been protracted but the breaking is punctual:

- (52) a. The widow murdered the old man by putting arsenic in his coffee
b. Casey's persistent banging broke the window

Lexical causatives in which the CAUSE is explicitly not co-temporal with the result state produce good ING-OF nominalizations:²⁰

- (53) a. the waking of the baby by playing the piano
b. the shocking of Sandy by deciding to run for office
c. the murdering of the old man by putting poison in his soup
d. the wind's eventual shutting of the door

Thematic approaches to agent exclusivity, in which the restriction in derived nominals is attributed to the absence of Voice^o (the head which introduces external arguments), could certainly claim that ING-OF nominalization does include a Voice^o projection. The cost of this approach is not so much a loss of Burzio's generalization (since adjectives too take external arguments and fail to assign accusative), as a blurring of the content of Voice^o. This is because the status of implicit arguments in ING-OF nominalizations is no different from their status in active derived nominals, however analyzed (see for example the different views presented in Kratzer 1996 and Kratzer 2002). But if the presence vs. absence of Voice^o doesn't lead to a contrast in the syntactic presence of implicit external arguments, it is no longer clear what else to expect from the presence or absence of Voice^o.

An analysis in terms of event complexity predicts additional effects not expected on a thematic analysis which focuses exclusively on the external argument. In particular, it is expected that ING-OF nominalizations should be better than derived nominals when it comes to complex events created by the addition of an endpoint or result. Activity verbs augmented by the addition of adjectival predicates or particles produce complex events and in these cases the shift from a simple

²⁰ Simple DPs which denote causing events cannot be easily expressed within a by-phrase. The by-phrase counterparts to (49) and (50) in (ia) and (iia) are substantially worse, compared to a gerund within the by-phrase, as in (52) and (ib), (iib).

- (i) a. #the separating of Jim and Tammy Faye by adultery
b. the separating of Jim and Tammy Faye by committing adultery
(ii) a. #the justifying of the evacuation by the hurricane
b. the justifying of the evacuation by describing the hurricane

In the good cases the subject of the gerund is controlled by the implicit external argument, showing that when the external argument is implicit, it must be agentive, in ING-OF nominalizations as in derived nominals. This suggests that event complexity in ING-OF nominalizations is produced by syntactic augmentation, and is subject to a syntactic constraint: results and non co-temporal causes may be added in the course of the derivation to the simple event-structure characteristic of derived nominals, but only within the basic structure of DP and not within a by-phrase.

event to a complex event has no effect on the external argument. To the extent that ING-OF nominalizations license complex events, these are expected to be possible.

More specifically, temporal independence and event complexity distinguish between adjectival resultative constructions with and without selected direct objects (Levin & Rappaport Hovav (1999), (2002)). Resultatives with a single selected argument entail co-temporality of the activity denoted by the verb and progression towards the result denoted by adjective, whereas resultatives with non-selected direct objects allow temporal independence between the two sub-events. The steaming and the boiling in the bare XP resultatives in (54a) and (54b) must be co-extensive with the becoming dry. In (54c) and (54d), which include a non-selected direct object, the screaming and the walking do not have to be co-extensive with the becoming hoarse or tired.

- (54) a. The clothes steamed dry on the radiator
b. The kettle boiled dry
c. The fans screamed themselves hoarse
d. The tourists walked themselves tired

Resultatives with non-selected direct objects provide an example of a complex event in which the sub-events are temporally independent, and choice of external argument plays no particular role. Resultatives with non-subcategorized direct objects should be possible in ING-OF nominalizations, and they are:

- (55) a. The joggers ran the pavement thin
b. the running of the pavement thin
c. The dog barked the neighbor awake
d. the barking of the neighbor awake
e. the rubbing of the tiredness out of their eyes
f. the scrubbing of her hands raw
g. the singing of us all to sleep

These examples illustrate quite clearly that ING-OF nominalizations can host complex events in which the sub-events are temporally independent. It is also quite clear that the acceptability of resultatives with non-selected objects could not be due to a purely morpho-syntactic property which would allow resultatives on an ECM-type analysis (Hoekstra 1984), since ECM and the gamut of constructions associated with structural accusative Case are generally impossible in ING-OF as in derived nominals (recall 1-4 above). The acceptability of these resultatives in ING-OF actually

militates against an ECM / Raising to Object syntactic treatment of resultatives with non-selected objects.

Consider finally the particle construction. Since particles add a result ingredient to an activity, they give rise to complex events, a natural candidate for acceptability in ING-OF nominalization. Harley and Noyer (1998) and Harley (2008) have shown that ING-OF nominalizations, unlike ACC-ING and POSS-ING gerunds, do not allow particle shift. From the perspective of this study, it is of immediate interest that ING-OF allows particles at all since derived nominals do not. In the particle landscape in (56), ING-OF patterns with other gerunds in allowing a particle, and it patterns with derived nominals in its deficient syntax:

- (56) a. *John's explanation (away) of the problem (away)
b. John's explaining (away) of the problem *(away)
c. John's explaining (away) the problem (away)

The difference between the shifted structure in (56c) and its non-shiftability in (56b) can be attributed to the presence of purely syntactically functional material in (56c), but the difference between (56b) and (56a) must have a distinct source since both constructions are equally deficient when it comes to pure morpho-syntax. Given that particles produce complex events, it is likely to be related to the constraint on event complexity. The role of temporality in determining event complexity in the sense developed in section 3 is illustrated in the following examples with non-selected objects. In (57a) the alleviation of their sorrows need not be coextensive with the laughing or drinking, and similarly in (57b), where the entrance of the guests typically follows the winking or buzzing. They all produce good ing-of nominalizations, in (58):

- (57) a. They laughed / drank away their sorrows
b. She winked / buzzed in the guests
- (58) a. The drinking / laughing away of their sorrows
b. The winking / buzzing in of the guests

The three-way division observed in nominalizations with particles illustrates most succinctly the division of labor argued for here, where pure syntactic factors distinguish between the two major classes, and event complexity distinguishes ING-OF nominalizations from derived nominals.

6. Conclusions

Close examination of the distribution of pre-nominal inanimates in transitive derived nominals leads to the conclusion that restrictions in this domain cannot be defined thematically, only in terms of the properties of participants, and hinge on the significance of the entire event. It has been proposed that above and beyond well-known syntactic limitations in derived nominals, derived nominals are also constrained to host simple, single events. The constraint on event complexity allows any sort of event as long as it is simple. When an instigator is present, its participation must coincide with the beginning of the unfolding event, leading to event identification and the reduction of causatives and accomplishments to single events; this explains why agents and direct causes appear to be privileged in derived nominals. English nominal passive illustrates another option, where only the result component is included. An analysis in these terms has the advantage of eliminating the need to attribute agentivity to the root, including roots which produce inchoatives where no syntactic activity of an external argument is ever detected. It was proposed that the effect in nominals is better captured above the level of the root, as a selection restriction on nominalizing affixes.

Whether the restriction is semantic or syntactic remains open to further study, but further constraints on nominal passive and on nominal by-phrases appear to provide preliminary support for a syntactic treatment. Nominal by-phrases are much more restrictive than their verbal counterparts, and these restrictions have been shown to combine two kinds of restrictions. On the one hand, by-phrases are just like the pre-nominal genitive in excluding causes and forces which cannot be construed as direct participants. This suggests that nominal by-phrases are merged within the minimal event sanctioned in derived nominals, on a par with the pre-nominal genitive. On the other hand, by-phrases show a restriction which seems to be related to the restrictions in nominal passive: nominal passive is impossible when the external argument is an experiencer or goal, and nominal by-phrases cannot host experiencers or goals. If nominal passive is sensitive to event-structure in the ways discussed in section 4, such that severing the external argument can only occur at an event boundary, it would appear that introducing an argument via a by-phrase must also occur at an event boundary. How these two restrictions can be reconciled, and what they suggest regarding the syntax of the event complexity constraint awaits further study.

The claim that there exist event-related constraints on derived nominals, in addition to pure morpho-syntactic ones, explains why there can exist 'mixed nominalizations'. ING-OF nominalizations are similar to derived nominals in morpho-syntactic deficiency, and similar to verbal gerunds in licensing complex events. To the extent that the typology is on the right track, we gain new ground for the study of the syntax-event structure interface and in particular the ingredients which underlie the representation of complex events. The patterns examined above

suggest that these ingredients reduce to the minimal difference between ING-OF and derived nominals and point specifically to the contribution of ING. Independently, it has been claimed that ING-OF nominalizations are necessarily restricted to atelic events, much like the verbal progressive, (Snyder (1998), Alexiadou (2001), Borer 1999, 2007), suggesting perhaps an additional event variable and additional structure. How exactly obligatory atelicity and the licensing of temporally complex events are related, how the correlation might be represented, and how event simplicity in derived nominals is represented syntactically await further study.

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