A Diachronic Account of English Deverbal Nominals

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1. Lexical predicate argument structure

Speakers of English can be fairly confident that the object of the active verb *eat* represents the food or other thing that gets eaten, while the subject of *eat* represents the eater. This type of regularity, which is important for efficient communication, is immediately explained if the lexical representation of the verb includes a *predicate argument structure* specifying the allowable associations between participant roles and dependent phrases.

Despite the success of the concept of predicate argument structures, it has its skeptics. One influential argument *against* lexical predicate argument structure, or at least the inclusion of agent arguments in such a structure (the 'Little v Hypothesis'), is based on English deverbal nominals such as *arrival, destruction*, and *growth* (Chomsky, 1970; Harley and Noyer, 2000; Marantz, 1997). But as shown long ago by Carlota Smith (1972), the purported empirical generalization underlying this argument is incorrect. The actual generalization, and the lexical exceptions to that generalization, are explained below by a combination of diachronic and synchronic factors, crucially assuming a lexical predicate argument structure that includes, where appropriate, the agent role.

2. An argument against predicate argument structure

Certain English causative alternation verbs allow optional omission of the agent argument (1), while the cognate nominal disallows expression of the agent (2):

1. a. that John grows tomatoes
    b. that tomatoes grow
2. a. *John's growth of tomatoes
    b. the tomatoes' growth, the growth of the tomatoes

In contrast with causative alternation verbs like *grow*, the nominal cognates of obligatorily transitive verbs such as *destroy* allow expression of the agent, as shown in 4a:

3. a. that the army destroyed the city
    b. *that the city destroyed
4. a. the army's destruction of the city
    b. the city's destruction

The challenge is to explain the contrast between 2a and 4a.

This puzzle has played a key role in syntactic theorizing. Following a suggestion in Chomsky's classic (1970) paper, Marantz (1997) and others have argued that the agent role is lacking from lexical entries. In verbal projections like examples 1 and 3 the agent role is assigned in the syntax by the silent 'light verb' *little v* (the Little v Hypothesis). Nominal projections like 2 and 4 lack little v so there is there is no structural source for the agent role.

As for the puzzle in 2a versus 4a, Marantz (1997) suggests that the possessive can express a range of roles, including 'the sort of agent implied by an event with an external rather than an internal cause' (from Marantz 1997; see also Harley and Noyer (2000)). The destruction of a city has a cause external to the city, while the growth of tomatoes is internally caused by the tomatoes themselves (Haspelmath, 1993; Smith, 1970). Marantz suggests that the 'sort of agent implied by' growing cannot be 'easily reconstructed' (since the cause of growing is not that 'cultivator' agent but rather internal to the tomatoes) while the one implied by destruction can be (since the cause of destruction is the 'destroyer' agent). The English possessive can express only the 'easily reconstructed' sort of agent roles, thus explaining the contrast.

On that view, neither of the roots √DESTROY and √GROW specifies an agent argument. They differ however in the encyclopedic information (world knowledge) associated with destruction and growth: crucially, the former involves (theme-) external causation while the latter involves (theme-) internal causation.

Marantz attacks the notion of a *generative lexicon* that systematically relates words to one another, positing that all such systematic relationships should be captured in the syntax. Syntactic structure is built from syncategorial roots, with apparent part-of-speech categories like N and V determined by the presence of functional heads such as v or D(eterminer). This effectively connects (traditional) 'Verb' properties such as transitivity to agent-role assignment in the syntax, via little v.[1]

Marantz makes the case against the generative lexicon by asking this rhetorical question: What would prevent the agent of *grow* from being inherited by the derived noun *growth*, if indeed (i) the agent is an argument of the verb *grow* and (ii) the verb and noun are grammatically related in the lexicon (e.g. the noun is lexically derived from the verb)? Contra Marantz, I believe that there is a generative lexicon, that (i) is correct and that (ii) is almost right. But I agree with him that the lack of transitive *growth* poses a puzzle for those assumptions. I solve that puzzle in Section 4 below.

3. Nominalization preserves argument structure

According to the lexicalist view (Rappaport, 1983), a process noun normally inherits the cognate verb's argument structure (**destroy**⟨agent, theme⟩ ~ **destruction**⟨agent, theme⟩), but there are some exceptions such as **grow**⟨(agent,) theme⟩ ~ **growth**⟨theme⟩.[2] We first establish the general pattern, and then turn to explaining the exceptions.

The first step is to isolate the true process nominals that intuitively express the same predicate as the cognate verb, putting aside the various idiosyncratic, extended senses such as result nominals (Grimshaw, 1990). E.g. the word *assignment* has a process reading ('process of assigning') and a result reading ('a task assigned to one'). Experiencer nominals like *Deborah's amusement* are usually stative (Rappaport 1983, Dowty 1989). The stativity of experiencer nominals is a separate issue from expression of the agent (Dowty, 1989; 1991). So we put these statives aside, as they are not true process nominals.

Before turning to causative alternation verbs, let us consider non-alternating verbs:

5. a. A letter arrived.   (cp. *The mailman arrived a letter.)
    b. the arrival of the letter   (cp. *the mailman's arrival of the letter)

6. a. Berlin has fallen.   (cp. *The Red Army has fallen Berlin.)
    b. the fall of Berlin   (cp. *the Red Army's fall of Berlin)

7. a. The rabbit disappeared.   (cp. *The magician disappeared the rabbit.)
    b. the disappearance of the rabbit (cp. *the magician's disappearance of the rabbit)

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[1] As we will see later, the *ing-of* nominals pose a problem for this part of the argument.

[2] Though I use mnemonics like 'agent' and 'theme', for the purpose of this paper it does not matter whether we adopt a particular theory of thematic role types, lexical decomposition, or an ordered argument system in the sense of Dowty (1989).

8. a. The army destroyed the city.
    b. the army's destruction of the city

9. a. Mary constructed the spaceship.
    b. Mary's construction of the spaceship

10. a. The artist created a masterpiece.
    b. the artist's creation of a masterpiece

As far as I have been able to determine, the noun preserves the arguments of the verb, whether in strict intransitives (5-7) or transitives (8-10). The noun allows an agent if and only if its cognate verb does. Causative alternation verbs are treated in Section 5.

4. The *grow/growth* pattern

Why does *growth* fail to inherit the optional agent of *grow*? Consider the history of these words. The earliest attestation of *grow* in the Oxford English Dictionary (OED) dates from c725. That word was intransitive, meaning 'Of a plant: To manifest vigorous life; to put forth foliage, flourish, be green. Also of land: To be verdant, produce vegetation' (OED). This later generalized to the (still intransitive) general sense of 'increase in size or extent'.

Transitive *grow*, in the specialized sense of 'produce (plants) by cultivation', is not attested until 1774— *over a thousand years later!* But in 1587, almost 200 years before the innovation of transitive *grow* in the specialized 'cultivate' sense, the noun *growth* entered the language. This noun preserved the intransitive meaning and argument structure of the cognate verb from which it derived, hence 'The action, process or manner of growing; both in material and immaterial senses; vegetative development; increase' (OED). To summarize this history:

intransitive *grow*:   c725   'be verdant' … 'increase'
the noun *growth*:   1587   'increase'
transitive *grow*:   1774   'cultivate crops'

We now have a simple diachronic explanation for the absence of transitive *growth*: *growth* entered the language at a time when only the inchoative variant of the verb existed. The argument structure and meaning inherited by the noun from its source verb were simply preserved into present-day English.

This makes perfect sense from the lexicalist perspective in which words have predicate argument structures. A productive synchronic word-formation rule, such as the formation of *ing-of* nominals, can be expected to preserve the argument structure of the input over time, ceteris paribus; if the verb changes, the noun will too (see Section 7 below). But nominalization by *-th* suffixation is not productive in English. So *growth* is listed in the lexicon. We need only one further premise in order to predict that *growth* lacks the agent: that a lexical entry includes a predicate argument structure dictating whether it has an agent argument or not.

5. Causative alternation verbs and Chomsky's Conjecture

The claim that the *growth* pattern is typical will be dubbed Chomsky's Conjecture:

11. *Chomsky's Conjecture:* Noun cognates of causative alternation verbs lack the agent argument.

To what extent is Chomsky's Conjecture true? Smith's (1972) survey of Webster's dictionary revealed that 'There are many counterexamples to this [Chomsky's] claim: *explode, divide, accelerate, expand, repeat, neutralize, conclude, unify*, and so on at length' (1972:137). Smith further noted that the exceptions tend to have Latin nominalizing suffixes such as *-tion* or *-ment,* while the agentless nouns are zero-derived. More recently, Harley and Noyer (2000), while sympathetic to Marantz's analysis,

note some counter-examples to Chomsky's Conjecture: *explode*, *accumulate*, *separate*, *unify*, *disperse*, *transform*, *dissolve/dissolution*, *detach(ment)*, *disengage(ment)*. They give these examples (their ex. 12):

12. a. The balloon exploded. / The army exploded the bridge. / the army's explosion of the bridge
    b. Wealth accumulated. / John accumulated wealth. / John's accumulation of wealth
    c. Jim and Tammy Faye separated. / The teacher separated the children. / The teacher's separation of the children
    d. The German principalities unified in the 19th century. / Bismarck unified the German principalities. / Bismarck's unification of the German principalities

My own incomplete survey supports Smith (1972): nouns with suffixes like *-tion, -al* and *-ment* based on alternating verbs allow expression of the agent, in violation of Chomsky's Conjecture. This contradicts some reports in the literature. For example, Pesetsky (1995) supports Chomsky's Conjecture with example 13b. But 13c is web-attested and sounds acceptable to me:

13. a. The activity ceased. / Bill ceased the activity.
    b. *Bill's cessation of the activity   (judgment in Pesetsky 1995:80, ex. 236c)
    c. **His cessation of the use of leaded glass** did not indicate a lessening of his interest in ornamental patterns in glass.   (www)

Some *-tion* and *-ment* nominals are shown in Tables 1 and 2. As shown there, none of these forms has the *Intransitive verb < Noun < Transitive causative verb* (I<N<T) historical order found with *growth*. All of these nominals allow the agent.

verb	TV	IV	N	order	N.agt
accelerate	1601	1646	1531	N<I<T	OK
separate	1432	1684	1413	N<I<T	OK
conclude	1430	1592	1382	N<T<I	OK
convert	1382	1413	1540	T<I<N	OK
expand	1432	1560	1646	T<I<N	OK
unify	1502	1817	1851	T<I<N	OK
accumulate	1529	1759	1606	T<N<I	OK
continue	1340	1400	1374	T<N<I	OK
dissolve	1382	1420	1398	T<N<I	OK
explode	1621	1790	1623	T<N<I	OK
repeat	1375	1714	1526	T<N<I	OK
transform	1340	1597	1432	T<N<I	OK
disperse	1450	1665	1450	T=N<I	OK
divide	1374	1526	1374	T=N<I	OK

Table 1. Earliest OED entries for selected causative alternation verbs with cognate nouns in *-tion* (TV = transitive verb; IV = intransitive verb; N = noun; order = chronological order; N.agt = whether the possessive or by-phrase agent is permitted in the nominal)

verb	TV	IV	N	order	N. agt
commence	1314	1380	1250	N<T<I	OK
detach	1477	1842	1669	T<N<I	OK
disengage	1611	1646	1650	T<I<N	OK
move	1382	1275	1393	I<T<N	OK

Table 2. Earliest OED entries for selected causative alternation verbs with cognate nouns in *-ment*

With zero-derived nouns as well, I found very few cases with the *growth* type of history, but one example is *collapse* (Table 3).

verb	TV	IV	Noun	order	N. agent
collapse	1883	1732	1833	I<N<T	?
increase	1386	1380	1374	N<I<T	?
decrease	1470	1393	1383	N<I<T	?
capsize	1788	1805	1807	T<I<N	?
change	1230	1275	1297	T<I<N	?
crash	1400	1535	1580	T<I<N	?
turn	1000	1000	1250	T=I<N	?

Table 3. Earliest OED entries for selected causative alternation verbs with zero-derived cognate nouns.

Judgments of the agent in zero-derived nominals are rather subtle, as notated by the question marks in the righthand column of Table 3. Pesetsky (1995:79, ex. 231) assigns a star to *the thief's return of the money*. But the transitive noun *return* (not shown in Table 3; instead see below) seem to be fine and are easy to find in corpora, such as examples 14 from the web.[3]

14. a. Mrs. Gereth is made to believe that **her return of the spoils** will tempt Fleda to make a play for Owen.

b. However, rather than issuing the writ immediately and waiting for **the return of the writ by the custodian**, modern practice in England is for….

c. This is fun...well not as much fun as Mike and **his constant return of products**, but fun nonetheless.

The OED gives a transitive sense for the noun *return* (definition 11a): 'The act of giving, or (more usually) that which is given or received, by way of recompense, acknowledgement, or reciprocity.' The order of attestation for *return* is interesting, in light of the diachronic story for *grow/growth*: intransitive V (1366); intransitive N (1390); transitive V (1459); transitive N (1542). This can be understood as showing that each variant of the noun entering the language inherited the argument structure of the then-extant verb.

Other zero-derived nominalizations of causative alternation verbs are also found in transitive use, as in these examples from the web (n.b. *collapse* in 15d, despite the *growth*-type I<N<T history):[4]

15. a. The second baseman makes up for **his drop of the fly ball** by fielding it cleanly, trying to tag the runner going by, then turning to throw to first with plenty of time left.

b. This opposition has been fueled by Aristide's refusal to privatize Haiti's public enterprises, and **his increase of the minimum wage**.

c. That Thursday, Bush announced **his change of the structure of the Homeland Security Agency and lines of authority and reporting**.

d. Much of the progress and insight with which Quine is accredited rests on **his collapse of the distinction between analytic and synthetic truths** in the essay "Two Dogmas of Empiricism."

Borer (2003, fn. 13) provides the following examples, noting however that some speakers reject them:

16. a. My constant change of mentors from 1992-1997
b. The frequent release of the prisoners by the governor
c. The frequent use of sharp tools by underage children

While these sound perfect to me, judgments of some zero-derived nominals are indeed variable (see Section 6). Summarizing so far:

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[3] The possessives are all pronouns because I used search strings like *her return of* and *his return of* on Google. Full NP possessives are harder to search for since Google does not recognize the possessive apostrophe.

[4] The noun *collapse* could be like *return*, with the transitive noun historically derived from the transitive verb.

17. a. *growth* lacks the special 'cultivate' sense that *grow* acquired <u>after</u> *growth* entered the language.
    b. Strict intransitives <u>preserve argument structure</u> (*arrive/arrival*).
    c. Strict transitives <u>preserve argument structure</u> (*destroy/destruction*).
    d. Causative alternation verbs:
        (i) Nouns in *-tion, -ment*: <u>preserve argument structure</u> (*separate/separation*).
        (ii) zero-derived nouns:
                A. many <u>preserve argument structure</u> (*return*).
                B. for some, the judgments are <u>variable</u>, but they are often web-attested (*drop*).

6. Grammar and gradience

Some zero-derived nominalizations of causative alternation verbs, while attested in naturally occurring corpora, sound worse than the corresponding verb:

18. a. He returned / dropped the ball.
    b. his return / %drop of the ball   (degraded acceptability)

By manipulating factors such as the animacy of the subject, we can sharpen the noun/verb contrast, as in Pesetsky's (1995:79, ex. 230) contrast *The mechanism dropped the curtain. ~ *the mechanism's drop of the curtain*. How are we to explain these gradient judgments?

While introspective judgments are notoriously unreliable, the same can be said for my 'cherry-picking' of examples from unbalanced corpora like the web. Pending a more rigorous multivariable statistical analysis (Wasow and Arnold, 2005, i.a.), we can already reach some conclusions. Assuming that judgments reflect both grammatical and extragrammatical factors, a reasonable hypothesis, given the facts in 17, is that the grammar itself permits inheritance of the agent but that extragrammatical factors downgrade the introspective judgments of acceptability.

Agrammatical factors that unevenly downgrade nominals from *alternating* verbs may include the one identified by Marantz (1995). As is well-known, the Saxon genitive has a range of functions, not only the presently relevant function of expressing an argument of a relational noun (*John's sister*), but also various forms of 'extrinsic possession' (in the sense of Barker, 1995).[5] To interpret the possessive as an agent, it helps if the agent can be easily reconstructed from the semantics and pragmatics. A strict transitive (*destruction*) names an event that *must* include an agent, so it is easily reconstructed. But an alternating word (*drop*) *can* name an agentless event, hence the agent interpretation is harder, though not impossible.[6] Such factors are amplified in introspective judgment assays that lack pragmatic context.

Why would *zero-derived* causative nominals sound worse than others? Consider that causative or inchoative event structures are normally lexicalized as verbs, not nouns (see Koontz-Garboden, 2005 for a recent discussion). Now verb-to-noun derivational morphology *(-tion, -ment, -al,* etc.) signals the *contrast* between Noun category and embedded Verb-type semantics. Zero-derived nouns lack this morphological marking, making it even harder to perceive the contrast. At the same time zero-derivation is common in English. So, particular zero-derived deverbal nouns have gone in and out of fashion; cp. *destroy* qua noun in *the sweete boy, wailinge most rufullie his frendes distroie* (1616; cited in OED). My hypothesis is that when such a noun enters the lexicon, it inherits the verb's argument structure, but that judgments can be degraded by factors such as the (admittedly speculative) one just described.

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[5] Kratzer (1996) argues that the possessive does not express the agent argument of the deverbal noun since certain rich contexts allow other interpretations: *Maria's reading of Pride and Prejudice* could be the reading that Maria attended, not the one she gave (ex. from Kratzer 1996:128). This argument is not convincing, however, because this flexibility is a general property of relational nouns like *sister* (see Barker 1995, ch. 2, esp. 55ff).

[6] This predicts that *the drop of the curtain by the mechanism* should sound better than *the mechanism's drop of the curtain*. Of course, for informants rejecting *the drop of the curtain* altogether (I find it awkward), both should be bad.

Lexical exceptions are possible. Derived nouns that are not produced by current fully productive rules must be listed in the lexicon (though perhaps mentally connected to the verb). Hence specialized sense innovations in the verb or the noun will weaken the argument structure parallellism for specific words (cp. *grow/growth*).

Under the predicate argument structure hypothesis, agrammatical factors can downgrade an agent that the grammar otherwise allows, as in Harley and Noyer's (2000) ex. 13: *John's accumulation of {wealth / #dust on the table}*. But agrammatical factors cannot *add* an agent to an argument structure lacking one. Hence strict intransitive verbs (*fall, arrive, disappear*, etc.) lead to strict intransitive nouns (recall 5-7 above), regardless of pragmatic bias:

19. a. *Susan's growth of her list of publications (was stunning).
     b. *the bellboy's arrival of the suitcases

Even if *grow* is conceptualized as 'internal causation', some instances of growing must be externally caused: no one but Susan can make her CV grow. But even in those heavily biased contexts, *growth* lacks the transitive use. This follows from the simple assumption that expression of the possessive agent requires that the noun select the agent role.

Can the anti-lexicalist hypothesis be saved? 'Constructionalist' approaches denying lexical predicate argument structures (for some or all arguments) still require lexical features dictating which words are allowed in which putatively syntactic structures, as pointed out by Kiparsky (1997). For example, Harley and Noyer's (2000) 'licensing requirements' for the Vocabulary Items that are inserted post-syntactically effectively determine whether an agent can be expressed as an dependent of the verb.

20. Licensing requirements for some Vocabulary Items (Harley and Noyer 2000)
     destroy   [+cause]   'insert in the v environment'
     arrive   [−cause]   'insert in the non-v environment'
     grow   [±cause]   'insert with or without v'

Meanwhile the nouns (*destruction, arrival, growth*) lack the corresponding [cause] features. Instead the possessive agent is determined by 'encyclopedic knowledge' associated with events of destroying, arriving, and growing.

That sort of approach fails to explain why examples like 19 cannot be saved by pragmatic context. Such nouns are exactly the ones that lack agents in the cognate verb (recall 5-7), making it suspicious to posit two separate explanations for the badness of, e.g., *The bellboy arrived the suitcase* and *the bellboy's arrival of the suitcase*: supposedly the former is explained by the [−cause] feature while the latter is explained by the fact that encyclopedic knowledge associated with *arrival* precludes external causation. Given the observed parallels between cognates, essentially the same system would have to be duplicated in the grammar proper and the encyclopedia.

7. *ing-of* nominals: more evidence for lexicalism

Chomsky (1970) discussed three English nominal constructions:

21. a. derived nominal: his destruction of their home
     b. *ing-of* nouns (mixed nominals):   his destroying$_N$ of their home
     c. gerundive construction: [his [destroying$_V$ their home]$_{VP}$]$_{DP}$

Derived nominals have all the syntactic properties of nominal phrases (DPs): modification by adjectives (not adverbs), negatives formed with *no* (rather than *not*), complementation patterns of nouns (PPs, no DP objects), and so on. Gerundive constructions are internally verbal, apart from the possessive: modified by adverbs (not adjectives), full aspectual auxiliary system, negatives formed with *not* (rather than *no*), complementation pattern of verbs (Abney, 1987). The *ing-of* nominals

morphosyntactically pattern with other nouns in all respects. But unlike the other derived nominals, the *ing-of* nouns (i) are highly productive (*my googling/*googlation of word strings; my cherry-picking/*cherry-pick of examples from unbalanced corpora*); and (ii) always allow the full argument structure of the verb: *John's growing/*growth of tomatoes, John's raising/*raise of the flag*. An ideal account would connect facts (i) and (ii).

The *ing-of* nominals show that *verb-type syntax* (transitivity, etc.) and *agent thematic role assignment* are <u>not</u> always connected, a problem for Marantz's 'agent-projecting v-1, which serves to "verbalize" roots in its environment'. Chomsky himself (1970:214ff) notes that these are problematic for the syntactic analysis of causatives. An obvious solution is to jettison the assumption that little v is responsible for both functions (see Alexiadou, 2001), thus weakening that theory.

But for the lexicalist the *ing-of* nominal's agent role assignment is inherently connected not to *verb*-type syntax but to *noun*-type syntax. We need only posit that *ing*-nominalization is a current lexical rule (Zucchi, 1993). (The *-ing* suffix historically originated as a nominalizer, and remains one to this day, though *ing*-forms have also been reanalyzed as present participle verbs.) This explains fact (i) above. It also explains fact (ii): since it is a rule of the modern competence grammar, the history of particular words (such as *grow*) plays no role. All that matters is the current argument structure of the verb: if the verb has an agent then so does the noun.

On the present view *ing*-nouns like *growing* and other derived nouns like *destruction* differ only in whether they are formed by lexical rule or not. Once they leave the lexicon, both are simply nouns and the syntax makes no general distinction between them. But for the little v analysis, the syntactic structures differ: with and without little v, respectively (or with different functional heads). The lexicalist view is favored. Derived and *ing-of* nouns can coordinate and share dependents:

22. a. With nothing left after **the soldier's [destruction$_N$ and looting$_N$]$_N$ of their home**, they re-boarded their coach and set out for the port of Calais. (www)

    b. Anyone with information in relation to **the [growing$_N$ or distribution$_N$]$_N$ of cannabis** is urged to contact Crime Stoppers on 1 800 333 0000. (www)

On the lexicalist analysis *destruction* and *looting* are both nouns and this is simple N^0 coordination, as shown by the bracketing in 22. But the anti-lexicalists posit different syntactic environments:
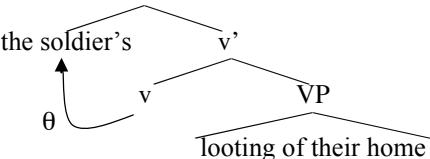
23. a.   b.
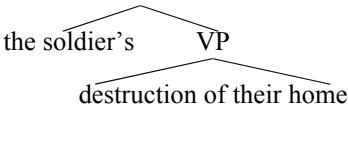
It is unclear, to say the least, just what sort of structure 22 would have on that theory. This cannot be analyzed as right node raising (RNR) of the PP out of a structure such as:

24. the soldier's [destruction <u>of their home</u>] and [v looting <u>of their home</u>]

This would still be unbalanced coordination (of VP and vP), and the analysis is implausible anyway. True RNR favors one consituent (25a), but there is no decline in acceptability in 25b.

25. a. ??They hire __ but they don't promote __ [faculty members] [into tenured positions]
    b. the hiring and promotion [of faculty members] [into tenured positions]

This coordination issue illustrates the more general problem with doing 'lexical decomposition' in the syntax with abstract light verbs: the syntax behaves exactly as if these light verbs did not exist. This general point was made in a different setting by Dowty (1979:271ff), and remains valid today.

8. Conclusion

English verb-to-noun conversion provides support for the notion that words have predicate argument structures that include, where appropriate, specification of an agent argument. (Regarding Kratzer's (1996) version of Marantz's (1984) idiom asymmetry argument, see Wechsler (2005).) The causative alternation and conversion rules like nominalization are lexical. A further consequence is that inflectional processes like passivization are also lexical, since such processes *feed* conversion (Bresnan, 1980; 1995).

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