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ON THE RELATIONSHIP BETWEEN PRODUCTIVITY AND SYNTACTIC COMPLEXITY – INSIGHTS FROM NOMINAL COMPOUNDING IN ENGLISH AND POLISH

Research within Distributed Morphology has pointed to a strong correlation between the productivity of a word formation process and the structural complexity of its derivatives. This study sets to shed new light on this issue, analyzing nominal compounds in English and Polish from the point of view of how their productivity translates into the ability of the elements within the compound to undergo modification, with particular focus placed on non-heads. It is shown that the link between productivity and syntactic complexity is weaker than what has been assumed, with semantic compositionality being of greater importance to whether elements in compounds can be further modified. Non-head modification is common in synthetic and endocentric nominal compounds in English and the study reveals that non-heads in English exocentric compounds can also be complex (as long as they are semantically transparent), even though exocentric compounding is not a productive pattern in English. It is also shown that non-heads in Polish compounds can also be complex as long as they are semantically transparent (irrespective of whether the pattern is productive).

Keywords: synthetic compound, nominal compounds, productivity, phrase structure, Distributed Morphology

1. Introduction

Compounding has been long recognized as an operation transgressing morphology and syntax, and as such has received a great deal of attention from linguists employing both lexicalist and syntactic approaches. The latter have primarily focused on synthetic compounds, with the intention of determining the extent to which they inherit the syntactic features of their verbal bases; relatively

little attention has been devoted to non-head elements in a compound. This research wishes to bridge this gap, aiming to cast more light on the internal syntax of these constituents. In particular, the goal of this study is to establish whether the left-most element in these compounds can be composed of more than one constituent or whether any adjectives licensed by the compound originate as modifiers of the non-head. The analysis will focus on synthetic and nominal compounds in English (both endo- and exocentric) as well as nominal compounds in Polish.

The study is couched within the framework of Distributed Morphology (henceforth DM – Marantz 1997; Harley and Noyer 1999; Embick 2010), which assumes that compounding and affixation are syntactic processes. Research employing the DM model has noted that productive word formation processes are much more likely to give rise to derivatives that project complex structure, as opposed to unproductive processes, which produce structures consisting of just a lexical root and a categorizing head. This study sets out to determine whether this generalization also holds for compounding.

We proceed as follows. Section 2 offers a theoretical background on what has been assumed by DM as concerns the relationship between productivity and the presence of complex syntactic structure. Sections 3 and 4 answer the question of whether non-head elements in English and Polish compounds, respectively, can be further modified with nouns and what restrictions apply to such modification. Section 5 concludes.


2. A word formation process can produce complex structures, even if not highly productive

Under the DM framework, complex words formed by affixation have either the structure in (1a), where the affix attaches above the head that categorizes the root, or the structure in (1b), where the affix spells out the head that categorizes the root. In the DM literature, these two types of derivation are referred to as outer and inner affixation, respectively (Marantz 2001, 2007; Arad 2003, 2005; Embick 2003, 2010).
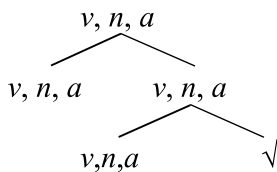
(1)   a. outer affixation   b. inner affixation
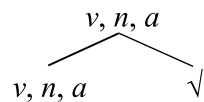
Much of research within DM has been centred on the assumption that words derived by outer affixation are productive and semantically regular, while root attachment derivatives are unproductive and can have a non-compositional meaning. This generalization has been shown to apply for deverbal participles (Anagnostopoulou 2003), passive potential adjectives (Oltra-Massuet 2013) and deverbal *-er* nominals in English (Alexiadou and Schäfer 2010), among other types of structures. The latter study argues that agentive and instrumental *-er* nominals in English (e.g. *consumer*, *dancer*, *calculator*, *opener*) are derived via outer affixation on the grounds that they are fully productive (*-er* can be added to virtually every unergative verb to form the agent noun). On the other hand, *-er* nominals that do not name agents are derived by root attachment. The second group includes nouns with the corresponding middle construction, e.g. *scratcher* (a lottery ticket that is scratched), *bestseller* (something that sells well) or *reader* (a compilation of literature which reads easily), as well as nouns naming complements of prepositions that modify the verb, such as *diner*, *sleeper* (a sleeper car) or *kneeler* (Alexiadou and Schäfer 2010: 15).

The claim that the structure of nouns such as *bestseller* or *reader* does not contain a verbal layer is controversial as they can be modified by adjectives describing the event underlying the verb (e.g. *a quick seller*, *an easy reader*); in the same study, Alexiadou and Schäfer claim that such modification is indeed indicative of the presence of *v*P. It is also not entirely accurate to say that non-agent *-er* nominals are very unproductive as they can be derived from a number of middle and unaccusative verbs, as shown in (2) and (3) below.[1]

(2) a. With 32 degrees of rake and a 21-inch front wheel, one would reasonably expect that the Honda Fury is not **an easy handler**.
[https://ultimatemotorcycling.com/2020/01/09/2020-honda-fury-buyers-guide-price- specs/]

  b. What would be my best food option with which to take that 6 am med? **A quick digester**, like an apple or even applesauce, or a more complex carb like a piece of Ezekiel toast with maybe nut butter (...)?
[https://www.3fatchicks.com/forum/general-diet-plans-questions/308073-intermittent-fasting-2016-a.html?styleid=1]

  c. It is a large knife, maybe a bit too large. The size makes one handed opening a bit awkward and certainly not **a quick opener**.
[https://www.amazon.com/gp/customer-reviews/R3DMVSB549SLCT]

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[1] The majority of linguistic examples used by this research come from internet websites, with the exact source provided below each example. All links to websites provided in this paper were last accessed on May 12, 2025. Some English sentences have also been extracted from texts stored in the Google Books database.

  d. On large beaches it's easy for kids (and parents) to lose track of the family plot. For **an easy spotter**, make a family flag. [Google Books]

(3) a. Some colours dry much slower than others. Black is especially **a slow drier**, and wants a little gold-size to hasten it. [Google Books]

  b. If you want the salad to hold on a buffet table, use romaine instead of arugula, **a quick wilter**.
[https://eu.statesman.com/story/news/2017/01/03/in-cooking-for-jeffrey-ina/6722208007/]

  c. **A quick grower**, Cerinthe comes in handy when you need something to fill in the space in a greenhouse (...). [Google Books]

  d. In the far corner of the room, a tiny candle burnt on a stone slab. It was **a slow burner**, something that would make a little flame all through the night. [Google Books]

While productivity of patient -*er* nominals is indeed limited (for example, they cannot be built on verbs involving overt verbalizers such as -*ate*, -*ize* or -*ify*, and this is also a point raised by Alexiadou and Schäfer), their ability to accept event-related modification seems to stem from the fact that they are semantically predictable (they clearly refer to the event expressed by the verb), with productivity playing little role. It is noteworthy that event adjectives such as *quick* or *easy* are possible with non-agent -*er* nouns on the condition that the adjective contributes to the definition of the noun. This explain why nouns such as *handler* or *digester* can appear with them, while *scratcher* cannot (the manner or performing the action is irrelevant to the meaning of the noun).[2] In what follows, we will see that these two requirements for licensing complex structure are also relevant for nominal compounds.

3. Non-head modification in English nominal compounds

Synthetic compounding in English is recognized as a highly productive process. Indeed, virtually every (non-idiomatic) combination of a verb and its internal argument can potentially be rephrased as a synthetic compound. This is confirmed by the fact that many of synthetic compounds are single-use occasionalisms: in the Corpus of Contemporary American English (COCA: Davies 2008-), for example, the compounds *gel remover*, *log breaker* or *sunglasses cleaner* occur only once. Synthetic -*ing* compounds are known to inherit argument structure of the verbs they are derived from; in particular,

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[2] A similar concept has been used by research into adjectival passives (McIntyre 2015; Embick 2023); it has been claimed that event-related modification is possible for stative participles as long as it contributes to the description of the state.

they have been shown to license *by*-phrases, indicating the presence of the external argument (Di Sciullo 1992; Alexiadou 2017). Nevertheless, the head is not the only element in a synthetic compound that can undergo modification. The left-most element can itself be complex, as shown in (4) and (5), where *-er* and *-ing* compounds have their left-most elements combined with nouns or adjectives.

(4) [N-N]-V-er/ing combinations:
   income tax payer
   Apple computer user
   love letter writing
   export revenue sharing

(5) [A-N]-V-er/ing combinations:
   daily newspaper vendor
   classical music composer
   latest news broadcasting
   organized crime fighting

   What the left-most elements in the compounds above have in common is that they form strongly lexicalized units with their head nouns (i.e. the middle constituents), and this effect is facilitated by the fact that the modifiers in question are nouns or relational adjectives. However, non-head constituents in synthetic nominal compounds can also be modified with more generic, qualitative adjectives, as again shown in (6) for synthetic *-er* compounds, and in (7) for synthetic *-ing* compounds.[3]

(6) a. Of all the **small car manufacturers** today, MINI has probably succeeded the most brilliantly at making this a big part of their marketing. [https://www.cnbc.com/2011/04/28/Coolest-Small-Cars.html]
   b. Being a **small business owner** may be one of the toughest jobs, but it's also one of the most rewarding.
   [https://www.businessnewsdaily.com/7957-good-bad-owning-business.html]
   c. This technology has a long time history of being a **difficult problem solver** since 1950. [Google Books]

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[3] Left elements in highly lexicalized compounds (e.g. *decision-maker*) are less likely, though not impossible, to be modified with a qualitative adjective.
(i) Healthcare is becoming the commodity of our time, and will no doubt be the scene for many a power struggle yet. But if the mismatch between control and responsibility continues to grow, a point is reached when the role of **"difficult decision maker"** in this arena looks very unattractive.
[https://blogs.bmj.com/bmj/2017/12/11/robin-baddeley-the-hadiza-bawa-garba-case-highlights-an-uncomfortable-mismatch/]

d. Caggiano (...) became a **modern furniture designer** by necessity when he couldn't find a carbon fiber chair to his liking.
[https://www.forbes.com/sites/keithflamer/2016/08/31/philip-caggiano-designs-high-octane-modern-furniture-inspired-by-exotic-supercars/]

e. Neighborhood shopping districts, particularly in African American sections of cities, are dominated by pawn shops, check cashing agencies, local and beer stores, and **cheap clothing sellers**. [Google Books]

f. The E3350 is perfect for the casual **light music listener** who does not want to spend the money on a better system or is on a tight budget.
[https://www.audioholics.com/computer-speaker-reviews/edifier-e3350]

(7) a. But even amidst the chaos of **small child-rearing**,[4] something that frequently makes me feel as if I never have a single second of peace to myself, these four things invariably make me feel just that little bit more relaxed. [https://wolvesinlondon.com/2015/09/14/share-your-serenity-4-things-that-keep-me-calm/]

b. On Kauai two particular areas are standouts for **rare bird watching** among many others. [Google Books]

c. Through dialog, inquiry, and **wide perspective-taking**, we bring to light subtle patterns and drivers that form the hidden decision architecture of our lives.
[https://www.resilientexec.com/services]

d. Each nation will form its own central representative democratic government and right its own Declaration of Independence, declaring peaceful independence from the current world community United Nations military dictatorship, from poor world community, government, leadership and structure, from global air pollution and global warming, (...) from international **addictive drug trafficking** (...). [Google Books]

e. Because of **popular myth-making**, Native Americans are seen as vanished. [https://www.theguardian.com/artanddesign/2020/jul/29/jaune-quick-to-see-smith-native-american-art]

f. The NWP uses a modeling system (...) incorporating the physical processes through parameterization methods, solved applying numerical methods and carrying out **large number-crunching** calculations on high speed computers.
[https://blackwells.co.uk/bookshop/product/Numerical-Weather-Predic-tion-by-Venkata-Bhaskar-Rao-Dodla/9781032406251]

Endocentric noun-noun compounds constitute another highly productive class of compounds in English. As is well-known, nominal compounds in English are recursive, which means that they are not restricted to only two nouns.

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[4] The fact that some compounds are hyphenated has no bearing on their interpretation.

This accounts for structures such as those in (8), where the left-most element is combined with another noun; the non-head element can also be modified with relational, as shown in (9)[5] and qualitative adjectives, as shown by numerous corpus examples in (10).[6]

(8) [N-N]-N combinations:
government policy change
television camera lens
police dog show
data access password

(9) [A-N]-N combinations:
black market research
vintage car enthusiast
presidential election year
parental support group

(10) a. Schools often close during extreme cold or **heavy snow conditions** to protect the safety of children and bus drivers. [https://linncounty-ema. org/winter]

b. But if you are indeed a **loud-music person**, just listen to whatever suits your mood.
[https://arungeorge13.wordpress.com/2018/06/10/the-power-of-music-saving-lives-since-forever/]

c. (...) New York had experimented with city-sponsored vendors to bring mobile shops in vans or small trucks that provide a full range of fresh food products. These vehicles would come to neighbourhoods facing **healthy food shortages** on a schedule, ensuring a reliable source for purchasing local healthy food.
[https://mspace.lib.umanitoba.ca/server/api/core/bitstreams/f73fcc60-6601-487c-8f2e-783729a29312/content]

d. On Sunday evening, a group of youths reportedly set fire to a **dry grass area** on a field near Singleton Avenue, Laffak.

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[5] Adjectives such as *presidential*, *parental* and *classical* feature the suffix *-al*, which commonly derives relational adjectives in English. Relational adjectives differ from regular adjectives in that they are impossible (or at least unlikely) to occur in the predicative position after a copular verb. *Black* and *daily* as used in (9) and (5) do behave in this fashion since they cannot be used predicatively. *Vintage* is also typically used in the attributive position, although it can be occasionally found following a copular verb (e.g. *This looks very vintage*), in which case it is essentially a qualitative adjective. According to some accounts (notably Levi 1978), combinations of a relational adjective and a noun should indeed be treated as compounds (see also ten Hacken 2019).

[6] Non-heads in nominal compounds can also incorporate prepositional phrases, as shown by examples such as *bachelor of science degree* or *Individuals with Disabilities Education Act*. These compounds have been found in the COCA corpus.

[https://www.sthelensstar.co.uk/news/20027036.youths-obstruct-fire-fighters-large-fire-laffak/]

e. **"Sensitive information repositories"** are defined as those collections of sensitive data that could be expected to be shared among some applications, users, or user roles, but to which not all of these would ordinarily require access.
[https://commoncriteria.github.io/application/master/application-release.html]

f. In the other rooms, the party was still going on as everyone now was in a great **big party mood**. [Google Books]

g. Given the regulated economy of most developing nations, unplanned diffusion is unlikely to be the preferred amount of **sophisticated technology transfer**. [Google Books]

h. Is the concrete paving sealant recommended for use in a **heavy traffic area** such as a public lot, or is it more suited to home use only?
[https://www.advancedsealingsolutions.co.uk/sealant-info/is-the-concrete-paving-sealant-recommended-for-use-in-a-heavy-traffic-area-such-as-a-public-lot-or-is-it-more-suited-to-home-use-only/]

i. **New house prices** are rising rapidly despite a flat market.
[https://theconversation.com/new-house-prices-are-rising-rapidly-despite-a-flat-market-we-need-to-diversify-what-we-build-and-who-builds-it-226417]

j. These opportunities exist today for Ivy League and **prestigious university students** through on-campus detachments or robust cross-town affiliations.
[https://www.airuniversity.af.edu/News/Display/Article/421538/rotc-is-about-opportunity/

As is the case with -*er* nominals, non-head modification in compounds is sensitive to whether adjectives or nouns combining with the left-most element contribute to the meaning of the compound. In each of the examples above, the modifier of the non-head is necessary to convey the desired meaning of the compound. On the other hand, non-head modification is hardly possible for compounds such as *screwdriver* or *fortune teller*[7] as these compounds have a strict meaning, which does not have to be made more precise.[8]

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[7] As noted by a reviewer, *fortune teller* can occasionally be used with adjectives that modify the compound's verb (e.g. *quick fortune teller*), although such cases are very rare.

[8] This can also account for why the elements in appositional compounds (e.g. *fighter-bomber*, *student-worker*) are not normally modified (except for cases such as *He is a good actor-bad singer*), despite the fact that they are semantically regular.

English also has exocentric compounds, which are not productive. Exocentric compounds can incorporate verbs or adjectives as non-head elements. As illustrated in (11), their left-most elements often reject modification.

(11) a. *very loudmouth (cf. very cold-weather gear)[9]
    b. *quick breakwater
    c. *quick scarecrow

If we contrast the data in (4–10) with (11), we can arrive at the conclusion that a direct link does indeed exist between productivity and the ability of constituents in a compound to be modified. Synthetic and endocentric nominal compounds are highly productive, with their non-head elements frequently accompanied by adjectival modifiers. Conversely, non-heads in exocentric compounds cannot undergo modification. This, combined with the unproductivity of exocentric compounds, seems to make it viable to propose that they are derived via root-attachment, with the left-most element embedded under the root:

(12)

nP
  n √P
    √LOUD √MOUTH
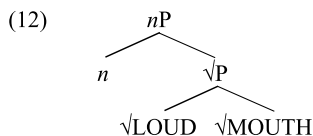
Note that the structure in (12) is impossible under categorization assumption (Embick and Marantz 2008), according to which roots must be categorized in a syntactic structure (in the representation above, √LOUD is left without a category). Also, there in fact exist data indicating that in some exocentric compounds (e.g. *killjoy*, *pickpocket, redhead*), the left-most element can be subject to modification.[10]

(13) a. The look she gave out reminded him of the one from the beginning slope a few days previously. As though he was being a **deliberate killjoy**. [Google Books]
    b. I like the feel of a free-spinning engine; a lugging engine is a **quick killjoy** for me.
    [https://bobistheoilguy.com/forums/threads/2014-nissan-altima-rental-review.215740/]

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[9] Down rated 500–650 is warm enough and light enough for most conditions, and 800–900 fill is used for very lightweight and **very cold-weather gear**. [https://coremountaineering.com/what-is-the-best-fill-for-a-sleeping-bag/].

[10] It should be noted that such intersective modification is not very common for exocentric compounds. The COCA corpus returns no examples where compounds such as *killjoy* or *pickpocket* are used with adjectives that access their underlying verbs. Nevertheless, intersective modification is generally rare in English compounding, especially as regards non-heads; the structure *difficult decision maker* is also absent from the COCA.

    c. All are welcome here, just be wary of more troublesome looking occupants and keep a hand on your purse lest you lose it ***to a quick pickpocket***.[11]
[https://other-atmospheres.ambient-mixer.com/a-night-in-a-fantasy-tavern]

    d. **A dark redhead** with fair skin and a smattering of light freckles across her cheeks, Rachel was the epitome of beautiful sophistication. [Google Books]

Compounds such as those in (13) differ from compounds such as *loudmouth, breakwater or scarecrow* in that the former are much more semantically transparent than the latter, at least as far as the meaning of the left-most element is concerned. A *pickpocket* is someone who literally picks people's pockets, a *killjoy* kills (i.e. spoils) fun for others, while a *redhead* has the top of their head coloured red. On the other hand, a *loudmouth* does not necessarily have to be loud, a *breakwater* does not literally break sea waves, while the function of a *scarecrow* is to repel all birds (not just crows). The conclusion is that it is not productivity but semantic regularity that the most significantly figures in whether a given structure is syntactically complex or not.[12]

4. Non-head modification in Polish nominal compounds

Polish is recognized not to have endocentric noun-noun compounds similar to those found in English, with the exception of those modelled after English compounds (e.g. *automyjnia* 'car wash'), or structures such as *światłowstręt*,

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[11] The adjective *quick* can also modify agent nouns without an identifiable verbal source (e.g. *a quick thief*). However, a *quick thief* can refer not only to someone who steals quickly but also to someone who, for example, escapes quickly after committing the theft (as implied by the example below). By contrast, *a quick pickpocket* is unlikely to describe anyone else other than a person who swiftly steals from pockets or bags.
(i) A quick thief can grab your gear and run. Keep your bag under your table while you eat, with the strap around your leg. [Google Books]

[12] If we assume that exocentric compounds have a structure where at least the left-most element is categorized prior to merging with the layer that heads the compound, we must also propose that such categorization applies also for non-heads in compounds such as *breakwater*, even though there is no syntactic evidence for the presence of *v* in their structure. One solution to this conundrum is to propose that √BREAK in *breakwater* is categorized as *v* on the basis that *break* is a lexical verb, although such lexical considerations are not supposed to be of great relevance to DM or other syntactic accounts. Embick (2023) postulates that stative passives in English project what is labelled 'small *v*', whose presence is justified syntactically despite not introducing event implications (apart from naming the actual event). More research is needed to determine if an analysis along these lines can be extended to exocentric compounds.

'photophobia' (cf. *światło* 'light, *wstręt* 'disgust').[13] Instead, Polish uses noun phrases involving an inflected complement, a prepositional phrase or a relational adjective (Szymanek 2010: 218).

(14) a. numer   telefon-u
       number.NOM   telephone.GEN
       'telephone number'
    b. papier   do   komputer-a
       paper.NOM   to   computer.GEN
       'computer paper'
    c. papier   komputer-owy
       paper.NOM   computer.ADJ
       'computer paper'

Polish also does not have productive synthetic compounding corresponding to structures such as *risk taking* (**ryzykopodejmowanie*; cf. *podejmowanie ryzyka*); exceptions include formations such as *grzybobranie* 'mushroom picking'[14] or *świniobicie* 'pig slaughter', where non-head modification is likely restricted for 'relevance' reasons. *Grzybobranie* and *świniobicie* involve the suffixes *-nie* and *-cie*, which regularly derive deverbal nominals in Polish (e.g. *czytanie* 'reading', cf. *czytać* 'read'; *szycie* 'sewing', (cf. *szyć* 'sew'). Nevertheless, deverbal compounds in Polish can also be derived by the suffix *-stwo* (Kolbusz-Buda 2014), with *wodolejstwo* 'idle talk, waffling' (cf. *woda* 'water', *lać* 'pour'), *słowotwórstwo* 'word formation' or *prawodawstwo* legislation (cf. *prawo* 'law', *dawać* 'give') serving as examples.[15] The first of these is clearly idiosyncratic and as such not open to modification. *Słowotwórstwo* is seldom used outside of academic contexts.[16] *Prawodawstwo*, however, does accept modifiers that are motivated by the non-head.

(15) Strony uzgadniają, że ich odnośne **prawodawstwo handlowe i celne** musi być, co do zasady, stabilne i wszechstronne (...).

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[13] Grzegorczykowa and Puzynina (1999) consider compounds such as *jadłospis* 'menu' or *księgozbiór* 'book collection' to be noun-noun compounds. Cetnarowska (2023) notes that these compounds have deverbal heads and are semantically related to the verbs they are built on. Non head modification is therefore possible in both cases (e.g. *wegański jadłospis* 'vegan menu'; *kryminalny księgozbiór* 'collection of crime books').

[14] A number of compounds incorporating the head *-branie* is modelled on *grzybobranie*, e.g. *miodobranie* 'honey harvest', *spadkobranie* 'inheritance of property' or *kredytobranie* 'loan taking' (Cetnarowska 2019a: 172).

[15] Compounds of this type can also include semantic agents, e.g. *gminowładztwo* 'people rule', or instruments, e.g. *ziołolecznictwo* 'herbal medicine, lit. treatment with herbs' (Kolbusz-Buda 2014: 126).

[16] The Google search engine retrieves *techniczne słowotwórstwo* 'technical word formation', which can be interpreted as 'the formation of technical words'.

The Parties agree that their respective **trade and customs legislation** must, in principle, be stable and comprehensive (...).
[https://sip.lex.pl/akty-prawne/dzienniki-UE/moldowa-unia-europejska-uk-lad-o- stowarzyszeniu-bruksela-2014-06-27-68452132/art-193]
(cf. *prawo handlowe* 'trade law'; *prawo celne* 'customs law')

Synthetic compounds in Polish can also be headed by a deverbal agent noun (e.g. *lodołamacz* 'ice breaker'; cf. *lód* 'ice', *łamać* 'break'). The bulk of such structures incorporate heads such as *znawca* 'expert' (derived from the reflexive verb *znać się* 'be knowledgeable about', e.g. *kulturoznawca* 'culture expert'), *dawca* 'giver'[17] (e.g. *kredytodawca* 'lit. loan giver, lender'), *pisarz* 'writer' (e.g. *powieściopisarz* 'novel writer' novelist) or -*żerca* 'eater' (e.g. *mięsożerca* 'lit. meat eater, carnivore'), the latter of which is a bound form. These compounds do allow modification sourced in their left-most elements.

(16) a. Marek Kalmus, podróżnik, geolog i **kulturoznawca orientalny**, kilka razy w roku jeździ do Azji.
Marek Kalmus, a traveler, geologist and **oriental culture expert**, goes to Asia several times a year.
[example from the National Corpus of Polish (NKJP – Przepiórkowski et al. 2012)]

   b. Znany **germański językoznawca** Hans Bahlow zauważył kiedyś, że nazwiska takie jak Pankow lub jego odmiany, takie jak Penkow, wywodzą się z korzeni w pojęciu „Sumpforte", co oznacza „brama bagienna".
Renowned **Germanic linguist** Hans Bahlow once noted that surnames such as Pankow or its variants such as Penkow have roots in the term "Sumpforte", which means "marsh gate".
[https://pochodzenienazwiska.com/pankow]

   c. W drugiej połowie lat 90-tych NIB był znany jako główny **długoterminowy kredytodawca** przy modernizacji Elektrowni Turów (...).
In the second half of the 1990s, NIB was known as the main **long-term lender** for the modernization of the Turów Power Plant (...).
[https://www.cire.pl/artykuly/centrum-prasowe/30060-kredyt-dla-elektrowni-belchatow]
(cf. kredyt długoterminowy 'long-term loan')

   d. **Powieściopisarz kryminalny** jest laureatem wielu nagród literackich i wyróżnień.
'The crime novelist is the winner of many literary awards and distinctions.'
[https://skupszop.pl/autor/robert-malecki]

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[17] Typically, compounds headed by *dawca* have also a corresponding form involving the nominal *biorca*, derived from the verb *brać* 'take' (e.g. *kredytobiorca* 'loan taker').

  e. Po tych stalinowskich doświadczeniach **dziecięcy bajkopisarz** wybrał łagodną emigrację wewnętrzną, dystansując się od bieżącej polityki.
  After these Stalinist experiences, the **child fairy tale writer** chose gentle internal emigration, distancing himself from current politics.
  [https://i.pl/jan-brzechwa-bajkopisarz-z-problemem/ar/483985]

  f. W programie festiwalu wszystko o czym może marzyć „**wieprzowy mięsożerca**".
  The festival program includes everything that a "**pork carnivore**" could dream of.
  [https://gospodarkapodkarpacka.pl/news/view/46843/festiwal-polskiej-wieprzowiny-juz-28-sierpnia-w-skoloszowie-agro-targi-wschod]

Out of the compounding patterns indicated above, noun-*żerca* is the only highly productive one; virtually every noun naming a food item can be combined with -*żerca* (e.g. *kanapkożerca* 'sandwich eater', *masłożerca* 'butter eater', *zupożerca* 'soup eater', *pizzożerca* 'pizza eater', *cebulożerca* 'onion eater', etc.).[18] Conversely, structures headed by -*znawca* and -*dawca* and hardly productive. The former are limited to naming academic professions (cf. *samochodoznawca 'car expert').[19] Compounds ending in -*dawca* typically imply a formal agreement between the giver and the recipient; hence, forms such as *prezentodawca 'gift giver' or *radodawca 'advice giver' are impossible. Structures headed by *pisarz* are productive provided that the compound names a profession (cf. *komediopisarz* 'comedy writer' vs. *esejopisarz 'essay writer'; see also Cetnarowska 2019a: 162); they also cannot name instruments, unlike English compounds headed by *writer* (*mailopisarz 'e-mail writer'). As a whole, synthetic agentive compounding is not productive in Polish (while *lodołamacz* 'ice breaker' is possible, *zasadołamacz 'rule breaker' is not; other impossible formations include *krajobrazomalarz 'landscape painter', *owocozrywacz 'fruit picker'; *okazjołowca 'bargain hunter').

The possibility of non-head modification in Polish synthetic nominal compounds is owing to their semantic compositionality and the fact that the modifier contributes to the meaning of the compound. However, the modifiers that accompany the compounds in (16) are all relational adjectives.[20] Polish

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[18] Note that these words are typically found in colloquial language, unlike *mięsożerca* 'carnivore' or *roślinożerca* 'herbivore', which are used in formal contexts as well.

[19] All compounds terminating in -*znawca* have a corresponding form ending in -*znawstwo* (e.g. *kulturoznawstwo* orientalne 'orient culture studies'). This is not the case with all the compounds headed by -*dawca* (e.g. *franczyzodawca* vs. *franczyzodawstwo). *Ustawodawstwo* (involving the noun *ustawa* 'law act'), whose meaning is identical to prawodawstwo 'legislation', and *krwiodawstwo* 'blood donation') are the only institutionalized examples based on the verb *dawać* 'give'.

[20] This also explains why they sometimes occur in post-nominal position, which is a feature of relational adjectives in Polish.

compounds disallow combining the left-most element in a compound with a qualitative adjective, unlike English compounds, where such modification is common, as shown by data in (6), (7) and (10) (*krótki powieściopisarz 'a writer of short novels', cf. *a short novel writer*). The indication of this is that a high degree of productivity does facilitate the licensing of modifiers, even though it is not impossible for structures derived by an unproductive process to be complex as well.

Polish also has an inventory of compounds corresponding to exocentric verb-noun compounds in English. These include constructs such as *łamistrajk* 'strike breaker' (cf. *łamać* 'break', *strajk* 'strike'), *moczymorda* 'drunkard' (cf. *moczyć* 'soak', *morda* 'gob'), *nosiwoda* 'water carrier, a person who carries water' (cf. *nosić* 'carry' *woda* 'water') or *golibroda* 'barber' (cf. *golić* 'shave', *broda* 'beard'; see Kolbusz-Buda 2014 for a more complete list). These compounds do not allow modification of their left-most elements on account of the fact that their meaning is either not compositional (as is the case with *łamistrajk* or *moczymorda*) or they are fairly obsolete in contemporary Polish (*nosiwoda*, *golibroda*). It is noteworthy that argument structure is highly restricted also in compounds headed by deverbal nouns. A compound such as *krwiodawstwo* 'blood donor' does not accept modification with *by*-phrases, unlike its English counterpart (*krwiodawstwo przez ochotników* 'blood donation by volunteers'). This can be attributed to the fact that when the verb *dawać* 'give' takes *krew* 'blood' as its argument, it must be inflected for the perfective aspect (*dawanie krwi* vs. *oddawanie krwi* 'blood donation').[21] Nevertheless, *krwiodawstwo* can license event-related modifiers, e.g. *regularne krwiodawstwo* 'frequent blood donation', owing to its eventive nature.

As far as instrumental synthetic compounds are concerned, they involve such (bound) heads as *-ciąg* (derived from *ciągnąć* 'pull', e.g. *gazociąg* 'gas pipeline, korkociąg* 'corkscrew') or *-mierz* (derived from *mierzyć* 'measure', e.g. *wodomierz* 'water meter', *stężeniomierz* 'concentration meter').[22] As is typical with instrument-denoting compounds, non-head modification is impossible with

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[21] No overt morphology is also present in *grzybobranie* 'mushroom picking' and *świoniobicie* 'pig slaughter', although only in the former case the phrasal counterpart requires inflection (*branie grzybów* vs. *zbieranie grzybów*; *bicie świni*). Nevertheless, the plural forms of these compounds can license the adjective *częsty* 'frequent' on the grounds that they denote events (*częste grzybobrania/świniobicia*); specifically, they fall into the class of simple event nominals (Grimshaw 1990). Nouns belonging to this group are known not to appear with *by*-phrases, and the same is true for *grzybobranie* and *świniobicie* (*grzybobranie/świniobicie przez rolników* 'mushroom picking/pig slaughter by farmers').

[22] A number of instrumental compounds are headed by *-metr* (e.g. *termometr* 'thermometer'), whose meaning is identical to that of *-mierz* but which do not have a lexical, verbal source. They can be classified as neoclassical compounds (Szymanek 2010), as their left-most elements are often bound as well.

these as it does not contribute to the meaning of the noun. At the same time, compounds such as *gazociąg* or *wodomierz* can license the internal argument of the verb (*gazociąg gazu ziemnego* 'natural gas pipeline', *wodomierz wody ciepłej* 'warm water meter'). Lastly, Polish appositional compoundssuch as *mebloś-cianka* 'wall unit' (cf. *mebel* 'furniture piece', *ścianka* 'little wall'), *kuchniosalon* 'kitchen-living room' or *kobieta-król* 'queen' (cf. *kobieta* 'woman', *król* 'king, ruler') are equivalent to compounds of the *student-worker* type. These compounds are used to name a function of the referent of the noun and hence any possible modifiers are not relevant to their definitions.[23]

5. Conclusion

The data presented in this study have revealed that compounds such as *pickpocket*, *killjoy* or *redhead* allow modification of their non-head elements, which has been attributed to the semantic predictability of these compounds. Likewise, it has been shown that left-most elements in nominal compounds in Polish can be modified even if they are not very productive, as long as the compound is transparent, with compounds such as *powieściopisarz* 'novelist' or *kulturoznawca* 'culture expert' serving as examples. Therefore, the main conclusion emerging from this research is that, at least as far compounding in English and Polish is concerned, semantic compositionality is the main factor that motivates the degree to which syntactic structures can be complex, with productivity being of secondary importance. Nevertheless, the high productivity of a compounding pattern appears to correspond to the ability of non-heads in a compound to license a wider range of modifiers. It has specifically been shown that left-most elements in English endocentric noun-noun compounds (including deverbal compounds) can be modified with qualitative adjectives, which is facilitated by their virtually unlimited productivity. This operation is impossible for Polish nominal compounds, which are much less productive.

The modification of non-heads in English and Polish compounds has also been shown to be subject to the relevance constraint, which makes it possible to combine the non-head with a noun or adjective only if this is necessary for the interpretation of the compound. A similar phenomenon has been reported to account for modificational restrictions in adjectival participles, which further suggests that compounding and affixation are driven by the same mechanisms, as indeed predicted by DM and other modern word formation theories.

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[23] Cetnarowska (2019b) differentiates between coordinate compounds, such as *kierowca-cham* 'a lout of a driver', and attributive-appositive compounds, such as *praca-marzenie* 'dream job'.

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