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Synthetic compounds from a lexicalist perspective

Abstract: This article investigates the origin and history of the term synthetic compound and sketches its development up to present within a lexicalist framework of grammar as it applies to both denominal and deverbal constructions.

1. Introduction

The complex word-formations under discussion in this article have been of interest to linguists for a very long time. As the subject of study in early descriptive works on the Germanic languages, they were initially referred to as “Zusammenbildungen” (‘together formations’). This descriptive term allowed grammarians to focus on the complexity of their morphological structure, while remaining non-committal with respect to the question of their categorial status. The process of “Zusammenbildung” was variously defined as the interaction, simultaneous occurrence, coincidence or mixture of composition and derivation. Different views were proposed as to the nature of the interaction between these two major word-formation processes. As a result, a clear consensus was never reached on the question of whether “Zusammenbildungen” represent compounds or derivations; or whether they are to be seen as a separate category of complex words. Interestingly, this question persists up to this day and is currently subject to varying interpretations across the different theoretical approaches to word-formation.

This article traces the origin and history of the term synthetic compound in section 2, paying attention to its widening empirical circumference as linguistic theory matures. The question left open by pre-theoretical descriptive studies as to whether these morphological structures are best explained as derivations or as compounds is examined more closely in sections 3 through 5. Section 3 scrutinizes the arguments proposed for analyzing denominal synthetic compounds such as *open-minded* as derivations and then examines a view according to which they represent compounds. Sections 4 and 5 turn attention to deverbal synthetic compounds. Section 4 presents a lexicalist theory proposing a compound structure for formations of the type *book-reader*, accompanied by the assumption of argument inheritance. In section 5, a lexicalist theory is discussed that postulates a derivational structure for the same set of deverbal compounds to explain their verbal interpretation. Its predictions are compared with those of the composition hypothesis and in section 6 a view is sketched of deverbal synthetic compounds as genuine compounds with a relational

interpretation anchored in the semantic/ conceptual content of the underlying verb. Section 7 summarizes the conclusions of the discussion.

The reasons for choosing a lexicalist framework as the basis for this discussion are both practical and theoretical. Practically, the volume contains other articles whose treatment of synthetic compounds is undertaken within a syntactically oriented view of word-formation so that, together, the articles of this volume provide a good sampling of competing theories represented in present-day linguistic discussion. More theoretically, lexicalism is an economical theory of word-formation, restricting itself to minimal assumptions about both the structure and processes that characterize complex linguistic expressions. However, as will be seen, even within this one theoretical framework, differing opinions as to the categorial nature and interpretative process of synthetic compounds exist.

2. The term synthetic compound

The complex words under consideration in this article were first brought to linguists' attention by early grammarians of the Germanic languages as "Zusammenbildungen", cf. Wilmanns (1896), Behaghel (1917), Kluge (1925), Henzen (1965), Erben (2006), among others. The term was at once descriptive and vague. Their formation seemed to be based on several lexemes that formed a word group. But in what sense is a "Zusammenbildung" such as, e.g., *Gesetzgebung* 'legislation; lit. law giving' different from a "Zusammenrückung" ('conversion of a syntagma') like *Tunichtgut* 'ne'erdo-well', a univerbation like *Achtstundentag* 'eight-hour day' or a "Phrasenkompositum" ('phrasal compound') such as *Kopf-an-Kopf-Rennen* 'neck-on-neck race', cf. Fleischer and Barz (2012: 22–23, 87, 131)? Is it correct to assume that they are a linearization of morphemes? Or can they be explained as "Zusammensetzungen" ('compounds') like *Warenlieferung* 'merchandise delivery' or derivations such as *Aufstellung* 'assembly; lit. up+place+ung'?

To give an example of the divergence of opinions, Adelung (1782) considered "Zusammenbildungen" derivations. For him, the nominalizing suffix *-ung* allowed whole expressions to be transformed into a single word: *schadlos halten* 'lit. harmless hold' > *Schadloshaltung* 'indemnification'. For Paul (1920), "Zusammenbildungen" represented an intermediate class in which the processes of composition and derivation worked together to create a complex word from a syntactic group as in *Haussuchung* < *Haus+such+ung* 'house search; lit. house+search+ung'. And, although Wellmann (1975) considers structures like *Geldgeber* 'financial backer; lit. money giver' derivations from a word group (cf. *Geld geben* 'money (to) give'), he also refers to them as pseudo-compounds ('Scheinkomposita'). Cf. Leser (1990) for a detailed summary of these earlier discussions.

According to Leser (1990) and Neef (2015), the term synthetic compound can be traced back to a monograph by Leopold von Schroeder from (1874) dealing with nominal compounds in Greek and Latin. Von Schroeder was studying constructions like German *Machthaber* ‘power holder’ which appear to involve a synthesis of two formation processes: the first and second element form a compound (**macht+hab-* ‘to power-hold’), while the second and third appear to be a derivation (**Haber* ‘holder’). The peculiarity of this class of formations is that neither the first two elements alone nor the final two exist as words – a word arises only when all three elements occur together. For such formations, von Schroeder proposes the designation synthetic compounds (‘*synthetische Composita*’), cf. von Schroeder (1874: 206).

From here, the term synthetic compound was introduced into the English literature on word-formation by Bloomfield (1933). Comparing the independent agent noun [dme:'te:r] ‘tamer’ of Ancient Greek with its bound counterpart [-damo-], used only as a second member of a compound as in [hip'po-damo-s] ‘horse tamer’, Bloomfield drew a parallel to English *blacker* and *sweeper* (as in *blacker of boots* and *sweeper of chimneys*) and *bootblack* and *chimney sweep* where the deverbal forms *-black* and *-sweep* occur as agent-denoting nouns without an overt suffix only as the second member of a compound. Bloomfield’s point was that forms found in complex structures can carry “special features” when compared to their independently occurring counterparts. The denominal constructions *blue-eyed* or *snub-nosed*, for example, are not explainable in terms of *blue+eyed* or *snub+nosed* because **eyed* and **nosed* do not exist independently; rather, they must be analyzed as [[blue eye]+ed] and [[snub nose]+ed]. Due to the existence of this “special feature” in the word-formation, Bloomfield labeled such denominal forms synthetic compounds. Deverbal forms like *meat-eater* and *meat-eating* were considered semi-synthetic compounds because the words *eater* and *eating* exist alongside the compounds. The special (or synthetic) feature in this case is the word order: the object occurs before the verb (i.e. *meat-eat*) only when *-er* or *-ing* is affixed to the verb. Hence, for Bloomfield, the type *blue-eyed* was a synthetic compound, while *meat-eater* was a semi-synthetic compound, cf. Bloomfield (1933: 231–232).

Marchand (1969) incorporated the term synthetic compound into his comprehensive study of English word-formation. In doing so however, he returned to von Schroeder’s original sense of the term as it applied to deverbal cases like von Schroeder’s *Machthaber* and his own leadword *watchmaker* rather than to denominal constructions, as Bloomfield had defined the term. Marchand distinguished between synthetic (or verbal nexus) compounds that contained a deverbal final constituent and primary compounds that consist of two nominal constituents like *steamboat*. This dichotomy became well-established in the literature on compounding. Importantly, Marchand assumed that both types

of compounds, the primary *steamboat* and the synthetic *watchmaker*, display a compound structure at the morphological level, namely sb/ sb (or N+N in modern terminology), cf. Marchand (1969: 17–18). Denominal constructions like *blue-eyed* or his leadword *palefaced* are mentioned only briefly in a short paragraph in which he terms them “bahuvrihi adjectives” (Marchand 1969: 19). These were the formations subsumed under the term synthetic compound by Bloomfield who, paradoxically, did not actually analyze them as compounds. Like Bloomfield, Marchand analyses them as derivations (i.e. [[blue eye]+ed] and [[pale face]+ed]) and drops Bloomfield’s term semi-synthetic from the study of English word-formation as a designation for deverbal constructions, employing von Schroeder’s term synthetic compound in its stead.

Although using von Schroeder’s term synthetic compound, Marchand does not stick to the original limitation of the term. Von Schroeder applied it to constructions that display a “double synthesis” of composition and derivation in the sense of the “Zusammenbildungen” as in *Machthaber*. Marchand (1969: 16) distinguishes these constructions, which he exemplifies with *watchmaker*, from cases like *deer hunter*, *ballet dancer* and *cigar smoker*. In the first group, he terms the final constituent a “functional derivative”, explaining that **maker* is not a lexical item but expresses an underlying subject and predicate relation (*he makes*), while in the second group *hunter*, *dancer* and *smoker* are independent lexical items. Both groups, however, exemplify synthetic compounds for him; the lack of independent occurrence that was essential to the original definition, isn’t deemed important, cf. Marchand (1969: 17):

[...] as the underlying verbal nexus is clear in either type of verbal nexus combination – the one consisting of two independent lexical entities (**deer hunter**, **rope dancing**) and the other consisting of an independent first element plus a functional derivative as second element (**watchmaker**, **housekeeping**) – the lexical independence of the second word is a matter of secondary importance. Consequently all combinations containing as second elements deverbal derivatives whose verbal bases form a direct nexus with the first element of the combination will be called synthetic compounds.

Hence, Marchand, adopting von Schroeder’s term synthetic compound, extends the sense of the original coinage to include both the *watchmaker* and *deer hunter* type. This broader usage of the term has been carried over to current work.

Adopting Marchand’s distinction between primary and synthetic compounds, Allen (1978) also understands the latter as differing from the former in having a deverbal element as a second constituent. Whereas Marchand (1969) considered only compounds containing derived heads ending in *-er* and *-ing*, Allen was instrumental in drawing attention to the fact that the class of synthetic compounds is actually larger than those derived only by these suffixes: it includes ones ending in the less productive suffixes *-age*, *-y*, *-ment*,

-ion, -ure, -ance, -al and -Ø as well, cf. *grain-storage*, *mail delivery*, *wedding announcement*, *cost reduction*, *shop closure*, *price maintenance*, *snow-removal* and *tax cut*, cf. Allen (1978: 157). Here again it is clear that the term synthetic compound is being used more broadly than in the original sense that applied to the “Zusammenbildungen” and that motivated von Schroeder’s term. Whereas Marchand used the notion “functional derivative” to account for the non-occurrence of **maker* vs. *watchmaker*, Allen explains the bound nature of **maker* by appealing to the transitivity of the underlying verb. Since *make* and *tell* are obligatory transitive verbs, their meaning is only complete when the logical object of the verb also accompanies the derived noun. This explains why **maker* and **teller* alone are not possible, whereas *story teller/watchmaker* and *teller of stories/maker of watches* are well-formed. *Read*, on the other hand, is only optionally transitive, so *reader* can occur alone or with an object: *book reader* or *reader of books*, cf. Allen (1978: 164–170).¹

At this point there was a consensus among linguists that, formally, deverbal structures like *watchmaker* and *story-teller* are compounds, and, semantically, their interpretation is based on the grammatical properties of the underlying verb. The ensuing discussion in the literature did not always adhere to Allen’s broader definition of the class of synthetic compounds: Roeper and Siegel (1978), for example, considered only suffixations in *-er*, *-ing* and verbal participles in *-ed/-en*. Although Selkirk (1982) espoused a larger data base similar to that of Allen, many authors like Lieber (1983), DiSciullo and Williams (1987), Fabb (1984) and Sproat (1985) were more concerned with the theoretical ramifications of the verbal meaning than with determining the exact empirical boundaries of the class. The understanding of the verbal nature of the meaning that characterized the class of synthetic compounds varied within the different theoretical approaches. As discussed by Selkirk (1982: 32–33), a compound structure is in principal ambiguous between a synthetic (or verbal) and non-synthetic (or primary) reading: *Tree eater* can have the synthetic interpretation ‘one who eats trees’ or allow a non-synthetic reading such as ‘eater (of sth.) in trees’. In defining the verb-dependent meaning of synthetic interpretations, Marchand (1969) appealed to the notion verbal nexus, Selkirk (1982) made reference to grammatical functions, Lieber (1983) to the theta grid of the underlying verb, Roeper and Siegel (1978) made use of subcategorization frames and Spencer (1991) predicate-argument relations, whereas the syntactically based approaches of Fabb (1984) and Sproat (1985) relied on the theta criterion. Although the definition is occasionally

1 Violations of this generalization occur, e.g., as a result of lexicalization: for instance, the noun *viewer* (cf. **he views*) has become specialized in its meaning ‘one who watches a TV program’. Especially nouns denoting professions allow the defocusing of the object: *announcer*, *builder*, *explorer*, *programmer*, *researcher*.

extended to include semantic relations as well as the thematic relations of the underlying verb (such as locative, manner, instrument, benefactor, cf., e.g., Miller (2014)), the definition of synthetic compounds as compounds whose interpretation is based on the argument structure of the underlying verb has remained stable in the literature. Often the term verbal compound is used and understood in the same sense as synthetic compound.

3. Denominal synthetic compounds

Recall that both Bloomfield and Marchand considered denominal formations like *blue-eyed*, *snub nosed*, *palefaced* and *knock-kneed* derivations, not compounds. Höhle (1982: 96–100) discusses similar patterns of word-formation in German, illustrated briefly in (1), defining them as complex words containing a compound that doesn't occur as a free word but only as part of another word. In (1), for example, the compounds **Dickhaut* and **Fünfachse* do not occur independently. Nevertheless, they serve as bases for nominal derivations in *-er* and the corresponding adjectives in *-ig*. The latter also gives rise to the compound *Fünfachslastzug*.

- | | | | |
|-----|----|-----------------|--|
| (1) | a. | Dickhäuter | ‘pachyderm; lit. thick+skin+er’ |
| | | dickhäutig | ‘having thick skin; lit. thick+skin+y’ |
| | | *Dickhaut | ‘thick skin’ |
| | b. | Fünfachser | ‘lit. five+axle+er’ |
| | | fünfachsig | ‘lit. five+axle+y’ |
| | | Fünfachslastzug | ‘five-axle truck’ |
| | | *Fünfachse | ‘lit. five+axle’ |

The productivity of these patterns poses a problem for a linguistic description. Höhle notes that the class of potential bases cannot be lexically listed, because it is open and the pattern is productive, especially with the suffixes *-ig*, *-lich*, *-isch* and *-er* (cf. *mehrgliedrig* ‘multiple-membered; lit. multiple+member+y’, *vieltimmig* ‘polyphonic; lit. many+voice+y’, *altsprachlich* ‘classical; lit. old+language+ly’, *südländisch* ‘southern; lit. south+country+ish’, *unterseeisch* ‘submarine; lit. under+sea+ish’, *Rechtshänder* ‘right-hander’, *Kurzflügler* ‘short-winger’, among many others). It gives rise productively to compounds as well: *Schönwetterperiode* ‘good weather phase’, *Vielvölkerstaat* ‘multi-cultural state; lit. many+people+state’, *Mehrfamilienhaus* ‘multiple-family house’. Furthermore, similar AN compounds exist freely in the language, cf. *Kleinwagen* ‘small car’, *Trockeneis* ‘dry ice’, *Flachdach* ‘flat roof’. So it is puzzling why these first constituents are restricted in their occurrence to the first position of more complex words. Höhle terms this puzzle “the distributional problem”.

His analysis of the construction as derivational is illustrated in (2) with the example *langhaarig* ‘having long hair; lit. long+hair+y’. Recall that this is also the analysis of Bloomfield (1933) and Marchand (1969); newer proponents of this analysis are, among others, Plag (2003) and ten Hacken (2010). In all cases, the reason for the analysis is that this structure reflects the compositional structure of its meaning.

(2) [[lang haar]+ig]

Leser (1990), on the other hand, rejects this analysis and considers the denominal structures compounds and not derivations, i.e.:

(3) [[lang] [haar+ig]]

His reasoning is the following: First, gapping patterns indicate that (3), and not (2), is the correct constituent structure of *langhaarig*:

- (4) a. lang- oder kurzhaarig/ long or short-haired
 b. *langhaar- oder kurzhaarig/ *longhair or short-haired

Second, according to the regularities captured in the level-ordering hypothesis of Siegel (1974), Allen (1978), Kiparsky (1982), Selkirk (1982) among others, derivational morphology is divided into two levels defined by how the members of each level interact with phonological rules. Affixes of the first level can combine with one another (cf. *count+able+ity*) and affixes of the second level can also occur together (cf. *fear+less+ness*). Furthermore, a level 1 suffix can appear before a level 2 suffix (e.g., *creat(e)+ive+ness*), but a level 2 suffix cannot precede a level 1 suffix (**fear+less+ity*). Compounding belongs to level 2, while the suffixes that participate the synthetic construction mostly belong to level 1. This means that according to level-ordering generalizations, they should occur inside a compound, not outside of it. This speaks for analyzing *three-dimensional* and *langhaarig* not as [[three+dimension]+al] or [[lang+haar]+ig] parallel to (2), but as [three+[dimension+al]] and [lang+[haar+ig]] as in (3).

Third, the second constituents of denominal synthetic compounds easily form series. That is, second constituents such as *-farbig* ‘colored’, *-sprachig* ‘speaking’, *-wertig* ‘with ... quality’, *-mäßig* ‘according to’, *-artig* ‘in a ... manner’, *-förmig* ‘in the form of’ are the basis of very productive, open patterns. To take one example from Reis (1983: 118), *-sprachig* occurs in *englischsprachig* ‘English-speaking’, *einsprachig* ‘monolingual; lit. one+language+y’, *anderssprachig* ‘speaking a different language; lit. different+language+y’, *gemischtsprachig* ‘speaking mixed languages; lit. mixed+language+y’ and many more combinations. This type of series formation is not found with the first constituents, cf. **einsprach+X*, **einsprach+Y*. Finally, the informal

orthographical encoding of denominal synthetic compounds using abbreviations suggests that speakers are aware of their compound structure, cf. *4-lagig* ‘lit. 4+layer+y’, *2-deutig* ‘ambiguous; lit. 2+meaning+y’, *X-beinig* ‘having x-legs, knock-kneed’, cf. Leser (1990: 48–56).

Neither the analysis in (2), nor in (3), however, offers per se a solution to the distributional problem which was the motivating factor for the term “Zusammenbildung” and is central to its understanding. How are *scharfzüngig* ‘sharp-tongued’ and *blue-eyed* created when neither **Scharfzungel* **blue eye*² nor **züngigl* **eyed* exist?

Leser attempts to solve the problem on the basis of his analysis in (3) by drawing on the pragmatic principle of informedness, cf. also Booij (2002) and Olsen (2014). Informedness rules against **züngig* and **eyed*, because having a tongue or eyes are inherent features of the referent which the adjective modifies, and hence uninformative. There is no reason to use such adjectives unless they contain more information. *Scharfzüngig* and *blue-eyed* do this, as do *long-legged*, *snub-nosed*, *left-handed* and the other formations. Often the redundancy-relieving information is provided by an expression of quantity, especially when a part-whole relation is suggested: **seater/ two-seater*, **car garagel three-car garage*; **äugigl einäugig* ‘*eyed/ one-eyed’, **seitigl beidseitig* ‘*sided; lit. side+y’/ ‘both+side+y’, **Familienhaus* ‘family house’/ *Mehrfamilienhaus* ‘multiple-family house; lit. more+family+house’. *Bearded* obeys the principle of informedness because not all men wear beards, so the adjective ascribes a non-redundant property to its referent. And it is precisely forms like *bearded (man)* and *tailed (monkey)* that provide a clue as to the nature of the distribution problem. The morphology will create **legged* and **eyed* if it creates *bearded* and *tailed*. Once created, however, the use of these words is subject to pragmatic principles that apply to conversation, in particular the informedness condition. Thus, the analysis in (3) as compounds, together with the informedness principle restricting the use of denominal constructions produced by *-ed*, *-ig*, and the other suffixes, offers a solution to the distribution problem of the denominal synthetic structures.

2 Perhaps *blue eye* could be construed as a novel exocentric compound (cf. *Madeye* from Harry Potter), but what would it mean? – Someone (or sth.) having a blue eye? The implicit shift in an exocentric compound has an explicit counterpart in the suffix on the head of a denominal synthetic compound. Both processes give rise to a possessive meaning. Consequently, if an exocentric compound like *paleface* ‘someone possessing a paleface’ were to serve as the basis for a denominal synthetic compound, the resulting meaning for, e.g., *palefaced* would have to be, contrary to fact: ‘possessing someone who possesses a pale face’.

4. Deverbal synthetic compounds as compounds

As already mentioned, Allen (1978) explains the distributional problem of deverbal synthetic compounds by appealing to the idea that in non-lexicalized cases the transitive features of the verbal base also determine the distribution of the synthetic compound, cf. *she tells a story* / **she tells*, hence: *storyteller* / *teller of stories* / **teller*. The notion of argument inheritance plays a role in the subsequent discussions of synthetic compounds by Selkirk (1982), Olsen (1986), DiSciullo and Williams (1987), Bierwisch (1989), Leser (1990), Booij (2002), Plag (2003), Jackendoff (2009) and Lieber (2010), among others, as well. These linguists assume that a deverbal noun or adjective can inherit (a modified version of) the argument structure or theta grid of its verbal base and can assign an unsaturated, inherited role to its non-head constituent.

A particularly coherent version of the theory of argument inheritance for complex nominals has been proposed recently by Bierwisch (2015a). Bierwisch's theory is conceived within a lexicalist framework that makes minimal assumptions about syntax and semantics and whose focus is on the combinatorial processes of grammar and how they map meaning onto formal structure. The central idea is that the configurations of complementation and modification found in syntax also apply to lexical structures. More precisely, derivational suffixes enter into head-complement configurations, prefixes result in head-modifier configurations and the non-head constituent of compounds can be interpreted via complementation or modification.

In Bierwisch's Two-Level Theory of semantics, meaning is separated into two levels: a lexical-semantic representation (i.e. semantic form: SF) that captures the grammatically relevant, invariant aspects of meaning and a more highly articulated conceptual structure (CS) that is enriched by contextually relevant aspects of conceptual knowledge. SF, the level that is visible to grammar, is made up of a set of basic predicates with their arguments that combine in a hierarchical sequence:

(5) [protect] [V] $\lambda x \lambda y \lambda e [e : [y \text{ PROTECT } x]]$

Argument structure (AS) is derived from SF by lambda abstracting over the variable positions and prefixing the lambda operators to the SF, creating a hierarchy of assignment from the lowest to the highest argument. The AS of a lexical item (i.e. its theta grid, theta roles) determines how it combines with other linguistic expressions. The highest (i.e. rightmost) argument in the grid of a verb or noun is referential, allowing, e.g., the verb *protect* in (5), to refer to an event. The next highest argument of the verbal AS is the designated (or subject) argument of the verb and the lower arguments are the internal arguments. Nouns don't have a designated argument but only a referential

- (11) *book reader*:
- $$\begin{array}{c}
 \text{N } \lambda y [e' : [y [\text{READ } [x' [\text{BOOK } x']]]]] \\
 \swarrow \quad \searrow \\
 \text{N} \qquad \qquad \text{N} \\
 \text{book } \lambda x [\text{BOOK } x] \qquad \text{reader } \lambda x \lambda y [e' : [y [\text{READ } x]]]
 \end{array}$$

A deverbal event noun such as *protection* in (7), repeated here for convenience,

- (7) [protect-ion] [N] $\lambda x \lambda y \lambda e [e : [y [\text{PROTECT } x]]]$

possesses two unsaturated non-referential roles in its AS: λx corresponding to the internal argument (or object) of the verb and λy corresponding to its designated (or subject) argument. Either can be assigned to the non-head constituent of the compound, depending on semantic or pragmatic conditions involved, cf. the possible meanings of *police protection* ‘protection of the police’ or ‘protection by the police’.

This view of compound interpretation coincides to a large degree with that of Jackendoff (2009) who, working within his Parallel Architecture Framework and adopting his theory of Conceptual Semantics, also assumes two N+N compound schemas – an argument schema and a modifier schema. Jackendoff assumes, as does Bierwisch, that the argument schema has precedence over the modifier schema, cf. Jackendoff (2009: 122–123).

5. Deverbal synthetic compounds as derivations

A completely different view of synthetic compounding is presented in McIntyre (2014) who rejects the general existence of argument inheritance and accounts for the verbal readings of compounds like *record cleaner* by means of a derivational structure. In his theory, the morphological nonhead constraint (MNC) forbids the projection of arguments from a non-head to the derivation (apart from cases captured by the “unless” clause in (12), to be explained below), cf. McIntyre (2014: 130).

- (12) Morphological Nonhead Constraint

In a base-generated complex head $[y^\circ XY]$, X’s arguments cannot be realized outside $[y^\circ XY]$ unless Y realizes an argument of X or is otherwise sensitive to X’s argument structure.

In the compound structure shown in (13), the MNC prohibits the noun *cleaner* from inheriting the internal argument of its verbal base *clean* for assignment to *record*. The only possible interpretation of this structure according to McIntyre is that of a primary N+N compound like *record brush*.

(13) * $[_N [_N \text{ record}] [_N \text{ clean+er}]]$

In order to allow a verbal interpretation, the suffix *-er* must attach to a complex verb with a lexically incorporated noun. In this configuration, *clean* can assign its argument directly to *record*:

(14) $[_N [_V [_N \text{ record}] [_V \text{ clean}]] -er]$

Hence, the derivational structure in (14) is the source of the verbal readings of *record-cleaner*, *paint-scraper*, *lawn-mower*, *can-opener*, *clothes-washer*, *polish-remover* and the like, permitted by the MNC, while the MNC at the same time excludes the realization of the verbal argument outside of the derived noun explaining the impossibility of **cleaner of records*, **scraper of paint*, **mower of lawns*, **opener of cans* and **remover of polish*. The “unless” clause of the MNC pertains to *-er* derivations with an eventive reading, cf. *Mary is a guitar tuner/ tuner of guitars*. McIntyre’s reasoning is the following: in order to get an eventive reading, *-er* must make reference to the initiator (or subject) argument of the verb. Therefore, the verbal argument structure must be active in these cases, although otherwise it is not. Thus, McIntyre assumes two *-er* suffixes, first an *-er^{Ev}* that realizes the initiator argument of the verb and licenses an eventive reading not subject to the MNC and, second, an *-er^{nonEv}* with a functional or dispositional reading that falls under the MNC which prohibits argument inheritance from a non-head.

The problem with the postulation of complex verbs of the form NV on which the analysis in (14) is based is that the free generation of the combination NV is not possible in English, or in Germanic in general, cf. Wunderlich (1986: 243–251). Forms that appear to be NV compounds actually arise via backformation ((*to window-shop* < *window-shopper*), (*to babysit* < *babysitter*) or conversion (*to shortlist* < *shortlist*), (*to handcuff* < *handcuff*), cf. Selkirk (1982: 16–18), Booij (1988: 67), Lieber (1994: 3609), Plag (2003: 154–155) and Olsen (2014: 42), among others. Booij (1988: 67) gives further evidence against the assumption of complex NV verbs: the Dutch prefixal pattern exemplified by *aardappel+gevreet* ‘excessive eating of potatoes; lit. potato+ge+eat’ attests to a NN structure in which the final N is derived from a verb via prefixation, i.e. *ge+vreet*. A similar pattern exists productively in German, also denoting a repetition of the verbal activity, but in German the affix involved is a combination of prefix and suffix *Ge- -e* as in *Kartoffel+gefresse* ‘potato+ge+eat+e’, cf. Olsen (1991). The combination *Ge- -e* attaches to a verb to derive a noun (*frag- ‘(to) question’* → *Gefrage* ‘excessive questioning’). If complex verbs of the form NV are freely created by the word-formation rules, why don’t they undergo *ge-/ Ge- -e* formation, yielding the forms Dutch *ge+aardappelvreet* or German *Ge+kartoffelfress+e*? These forms don’t occur.

The structure for German *Kartoffelgefresse* must be $[_N [_N \text{Kartoffel}] [_N \text{ge} [_V \text{fress}]+e]]$, if *Ge-* *-e* is a circumfix or $[_N [_N \text{Kartoffel}] [_N \text{ge} [_N [_V \text{fress}]+e]]]$ if the *-e* suffix first derives a noun to which *Ge-* is then prefixed. Either way, McIntyre's MNC should prohibit the argument realization from a non-head. However, McIntyre will surely argue that *Ge-* *-e* derivations are eventive and therefore not subject to the MNC.

Closer inspection reveals several other problems with a theory in which argument inheritance is banned in general, but permitted as an exception clause in the MNC. First, McIntyre's theory characterizes "eventive" *-er* derivations like *story teller* as structurally ambiguous. In principle they could arise on the basis of the structure in (15), because the MNC will not prohibit argument inheritance when the derivation is eventive. Or they could arise on the basis of the structure in (16) that gives rise to *record cleaner* and the compounds listed above, which is what McIntyre actually assumes, cf. McIntyre (2014: 135).

(15) $[_N [_N \text{story}][[_N \text{tell-er}]]]$

(16) $[_N [_V [_N \text{story}][[_V \text{tell}]]] -er]$

Allowing the theory to harbor this ambiguity is uneconomical. But the assumption of two distinct *-er* suffixes (*-er^{Ev}* and *-er^{nonEv}*) is not only uneconomical, it more importantly misses the true generalization involved in these patterns. The consequence of the MNC is that other deverbal affixes besides *-er^{Ev}* and *-er^{nonEv}* will also have to be multiplied. Take, for example, derivatives in *-ant* whose agentive readings allow the realization of an object, cf. *the defendant of the claim*, *the inhabitant of the cave*, *the attendant of the cars*, *the contestant of the result*, *the occupant of the house*, but whose instrument readings don't: **the suppressant of appetite*, **the repellent of mosquitoes*, **the dispersant of oil*, **the pollutant of water*, **the irritant of skin*. Looking beyond deverbal derivation, the MNC would also incorrectly ban argument inheritance in deadjectival constructions, cf. *completeness of the report*, *equality of women*, *familiarity with the proposal*, *likelihood of failure*, which are not eventive.

Finally, Reis' (1983) argument concerning series formation by repeating a constituent, discussed with regard to denominal synthetic compounds in section 2, applies equally well here. A whole series of formations occur ending in the constituent *-maker* such as *peacemaker*, *troublemaker*, *homemaker*, *noisemaker*, *matchmaker*, *clockmaker*, *shoemaker*, *glassmaker*, *dressmaker*, *basket maker* and so on or ending in *-killer* in *weed killer*, *bee killer*, *spark-killer*, *man-killer*, *cow killer*, *lady-killer* as well as in *-breaker* in *law-breaker*, *promise-breaker*, *heartbreaker*, *safe-breaker*, *peace-breaker*, *strike-breaker*, *house-breaker*, *leave-breaker* and many others. This shows that speakers treat

argument that carries out the occupational (= occ)⁴ activity of driving a bus. The meaning of the instrumental noun *hair dryer*, on the other hand, is more indirect: the complex N₂ is broken down into the constituents *dry₂* and *-er₃*. *-er₃* is interpreted via the index α as the profiled entity X that serves as the argument of *with* in the proper function (= pf) of the verbal base *dry*, indicating that the denotation of *hair dryer* is an X with which a person dries hair.

- (20) a. bus₁ driver₂ = driver₂^α; [occ (drive (α, bus₁))]
 b. hair₁ dry₂-er₃ = X₃^α; [pf (dry₂(person, hair₁, with α))]

Bierwisch (1989: 42–47) discusses regular meaning shifts observed in deverbal event nouns in which the reference shifts from the event to the result, the instrument, or even the location of the event. For example, *building/ seepage* can refer to the event or to the result of the event, *examination/ transmission* to the event or the means of the event and *perforation/ pavement* to the event, the result or the location of the event. Perhaps in order to attain an instrument reading, the SF of *cleaner* in (18c) can be shifted in reference from the agent to the instrument with which the agent carries out the activity. Bierwisch’s (1989) solution was to use templates to effect such shifts. The templates were prefixed to the SF representation of the derived noun and added a new variable in a result, instrument or location relation to the event expressed by the underlying verb thereby absorbing the verb’s own event variable. Bierwisch refrained from an exact formulation of such templates, giving only hints at their possible representation. Perhaps such a shift could be accomplished by expanding the representation in (18c) by means of the prefix underlined in (21) that adds a new referential entity *z* to the SF of *cleaner* as the instrument of the event. The problem with the template solution is that the template would have to block all the arguments of the verb (notated in (21) as “e’, y’ and x’” indicating the “neutralization” of the variables):

- (21) [clean-er] [N] λz [[z INSTR e’] : [e’ : [ACT y’ [CAUSE [BECOME [CLEAN x’]]]]]]]

In Jackendoff’s representation (20b), one could argue that the instrument is too deeply embedded to allow access to the verbal argument structure – in

4 Occ(upation) is one of the action modalities that differentiates possible readings of an agentive nominal according to Jackendoff (2009: 119–120). *Violin player* can refer to the activity as an occupation or a habit. Or it can denote an ability or refer to a specific instantiation. The action modality is formalized as an operator on a “profiled action”, i.e. in (21a) that of driving.

fact it is an argument of the predicate *with* and not the verb. Perhaps the arguments of *clean* then are inaccessible to the instrument noun *cleaner* because the instrument isn't part of the verbal meaning but is imposed on it or integrated into it as an external entity.

However, a more attractive solution is proposed in Bierwisch (2015b). Bierwisch (1983) recognized that words are powerful symbols in that they don't just pick out a single concept, but often refer to a family of related concepts. The alternation between different concepts was termed "conceptual shifts". For instance, *book* (as well as other related words like *novel*, *letter*, *newspaper*, *map*, etc.) can refer to a physical object (= (22a)) or to the information structure (= (22b)). These different ontological concepts are mutually incompatible; they arise by means of coercion when a meaning must be adjusted to fit a particular context; i.e. *book* in the sense of an information structure cannot lie on a table, cf. Bierwisch (2015b: 1110):

- (22) a. The book is on the table.
 b. The book was heavily criticized in the press.

Drawing on Pustejovsky's (1995) and Jackendoff's (2002) "dot" notation, Bierwisch (2015b: 1110) subsumes these different types under a single SF. The dot notation indicates that the different senses are alternatives that occur under different contextual conditions:

- (23) [physical object • information structure]

For instance, the word *player* might be ambiguous in this sense between an agent and an instrument meaning (which Bierwisch terms personal and non-personal agent), cf. (24). Hence, *player* could have the dot object structure of (25), listing its ontologically distinct possibilities of reference, cf. Bierwisch (2015b: 1120).

- (24) a. The piano player was late/ ??out of order.
 b. The record player is out of order/ ??late.

- (25) [personal agent • non-personal agent]

If in a context like (24a) the reading is fixed to a personal agent, it refers to a different concept from the non-personal agent in (24b) and is incompatible with it. This conceptual difference manifests itself in that the different conceptual objects are subject to different conditions and behave in different ways. In readings fixed to a personal agent, for example, the action can be

construed as a habit (*gambler*), a profession (*preacher*) or a single instance (*onlooker*), cf. Rainer (2015: 1310). These readings are not possible when the meaning is fixed to a non-personal agent. Instrument (or non-personal agent) nouns are much simpler conceptually; they denote entities created for the purpose of potentially carrying out an action but, in contrast to personal agent nouns, don't presuppose that the action is actually carried out, cf. Rappaport Hovav and Levin (1992) and McIntyre (2014).

What is relevant to the present discussion is that, when such a coercion takes place, and *player* is fixed to non-personal agent, the regular inheritance of arguments is blocked that accompanies personal agents (*player of the piano* / **the player of the record*). Fanselow (1988) and Rappaport Hovav and Levin (1992) have also discussed the opacity of arguments with instrument nouns. Fanselow (1988: 106) notes that even in the case of simplex (i.e. underived) nouns, those denoting agents allow the construal of an activity that will support the inference of an affected object, cf. (26). However, simple nouns denoting instruments prohibit such an inference, as the examples in (27) show.

- (26) a. the pilot of the 747
 b. the author of the novel
 c. the poet of the verse
 d. the tailor of the suit
 e. the thief of the diamonds
- (27) a. *the airplane of the letters
 b. *the pen of the article
 c. *the chisel of the statue
 d. *the filter of the coffee
 e. *the brush of the clothes

Consequently, the correct generalization is that argument inheritance is the default case, but is blocked under certain conditions, i.e. when a noun is coerced to an instrument reading. This was also seen with the alternate meanings of nouns in *-ant* in section 3. When their meaning expresses a (chemical) instrument, argument realization is no longer possible, cf. *an attendant of cars* / **a suppressant of appetite*.

McIntyre reverses this generalization using the MNC to block argument inheritance in general: instrument nouns like *record cleaner*, not agent nouns like *book-reader*, are the default case in his framework. In order to get the argument interpretation in a compound (cf. *record cleaner*), McIntyre assumes

that exceptional NV verbs, that do not occur freely, form the base of the *-er*^{nonEv} suffix: [N [V [N record][V clean]] -er].⁵

Under the assumptions underlying Bierwisch's lexicalist theory, argument inheritance is a central feature of derivational morphology. A regular deverbal agent noun like *reader* inherits the modified AS of the verb *read* and can assign its unsaturated internal argument to *book* in the noun phrase *reader of the book*. Instrument nouns, not agentive nouns, are the exceptional case. Apparently their conceptual make-up entails a concrete entity with a specific purpose but lacks the presupposition of the implementation of an activity. Hence, argument inheritance is blocked with instrument nouns so that the arguments of the underlying verb cannot be realized syntactically. Note that a similar blocking of arguments is found with other types of transferred or lexicalized (i.e. non-compositional) meanings as well, cf. *game-changer* / **changer of games*, *skyscraper* / **scraper of skies* or the clear shift in meaning from a person who discloses a scandal to the regular agentive meaning in *whistle-blower* / *blower of whistles*.

Upon this background, a question remains: if such derivations can't realize their arguments in syntax, why can they realize their arguments in a compound? Obviously, they can't; their arguments are blocked. However, there is another mode of interpretation for compounds. All researchers have acknowledged a class of non-verbal or primary compounds. Rather than falling back on Jackendoff's (2009: 122) modifier schema or Bierwisch's (2015a: 1093) compound template to explain this class, the following discussion will assume the version of the modification template for compounds proposed in Olsen (2004, 2012) and Bücking (2010), cf. also Dowty (1979). This template, shown in (28), is an extended version of the template for intersective modification in syntax as proposed by Higginbotham (1985) in that it includes an underspecified relation R that mediates between the external variables of the conjoined predicates P and Q. The relation R is an open parameter at the level of SF that mediates between the two predicates on which the compound is based, thus capturing the principled variability of compound meaning. By leaving the relation between the two predicates open at the level of grammar, the template allows the relation to be spelled

5 Other linguists who have assumed a complex NV as the derivational base of *-er* are Lieber (1983), Booij (2005, 2010) and Gaeta (2006, 2010). Lieber (1994, 2004), however, has since rejected her original analysis, arguing that complex NV verbs are not productive and therefore shouldn't serve as the basis of a productive word-formation pattern. Booij, on the other hand, who originally rejected this analysis in his (1988, 2002) works using the same argument as Lieber, has recently found it compatible with his framework of construction morphology, cf. Booij (2009: 212–214).

out in accordance with contextual or conceptual factors that become relevant at the level of conceptual structure.

(28) Modification template

$$\lambda Q \lambda P \lambda x [P(x) \ \& \ R(v, x) \ \& \ Q(v)]$$

For example, the SF representation of the compound *snowman* in (29) will contain the underspecified relation R, capturing the ambiguity typical of primary compounds: a snowman could in principle refer to a ‘man made of snow/ who shovels snow/ who sculpts snow/ who delivers artificial snow’, etc. At the level of CS, the relation R that connects *man* with *snow* can be fixed to the relevant specification, perhaps as MADE_OF, i.e. [y MADE_OF x]. The external variable of the predicate SNOW (= v) in the template can be identified with the internal variable of the MADE_OF relation in CS:

(29) *snowman*

- a. SF: $\lambda x [\text{MAN}(x) \ \& \ R(v, x) \ \& \ \text{SNOW}(v)]$
- b. CS: $R = \text{MADE_OF} ([x \ \text{MADE_OF} \ y])$
- c. CS: $v = y$

As the previous discussion has shown, the interpretation of the instrumental compound *oven cleaner* cannot be based on the inactive AS of the head, but its meaning constitution can be accommodated by the modification template. The relation between the instrumental *cleaner* and *oven* that becomes semantically prominent upon use of the compound is the semantic/ conceptual relation CLEAN that is inherent to *cleaner*. Recall that SF forms an interface between the conceptual and linguistic systems in that it reduces the information contained in the more highly articulated conceptual structure to the aspects that are relevant to grammar. Hence the CLEAN relation (i.e. [x CLEAN y]) is shared by both CS and SF, and the most plausible interpretation of the external variable of OVEN is to identify it with the internal variable of the CLEAN relation that is conceptually prominent in *cleaner*. Since the internal arguments of a noun are optional and can be dropped, *cleaner* will enter the modification template as a one-place predicate substituting for the predicate variable P:

(30) *oven cleaner*

- a. SF: $\lambda x [\text{CLEANER}(x) \ \& \ R(v, x) \ \& \ \text{OVEN}(v)]$
- b. CS: $R = \text{CLEAN} ([x \ \text{CLEAN} \ y])$
- c. CS: $v = y$

Hence, *snow* and *oven* are modifiers, and not arguments, of the head. (More discussion of this idea will follow in section 6.) Hence, instrument compounds like *oven cleaner* pattern with primary compounds in being interpreted via the modification template because they lack a basis for theta assignment. The AS of the agentive derivative *reader*, on the other hand, is not blocked, but inherited, so *reader* can assign its internal argument to either the first constituent of a compound or to its complement in a noun phrase that it heads in syntax, i.e. *book reader/ reader of books*. With argument inheritance blocked in the case of an instrumental head, **cleaner of ovens* is not possible.

The defining feature of derivation in Bierwisch's lexicalist theory is argument inheritance: in all regular cases of deverbal (and deadjectival) derivation the complex word will inherit (a modified version of) the AS of its base. The discussion here has argued that argument inheritance is blocked when the derived AS subsequently is coerced into a reading that distances it from an activity. Hence, deverbal instrument nouns cannot realize arguments of their parent verb in syntax, nor can nouns that have been shifted in other ways, cf. *this thriller is a real nail-biter/ *biter of nails*. The compounds *oven cleaner* and *nail biter* are possible, however, under the assumption that the modification template in (28) applies to them. Hence, their interpretation will arise on the basis of an extended concept of modification in which a salient relation mediates between the external arguments of the combining predicates in the same manner as for other non-verbal (or primary) compounds.

6. A single class of compounds?

The distinction between synthetic (or verbal) and primary (or root) compounds has been central to the study of compounds since Marchand (1969). However, there are indications that the two classes can and, perhaps, should be reduced to a single class whose interpretation is accomplished via the modification template in (28). Fanselow (1985) and Jackendoff (1999, 2002, 2009) have provided arguments that compounds are different in nature from derivations in that the latter, but not the former belong to grammar. In the history of language evolution, their argument goes, compounds originated outside of grammar in a protolanguage that was a precursor to modern grammar. Compounds contain combinations of words that are conceptually motivated and are similar in this sense to other non-grammatical phenomena like the two-word combinations of children in an early stage of language acquisition, the combinations of symbols by chimpanzees, the speech of Broca agrammatics or of adults like Genie who were not exposed to linguistic input in their childhood years as well as "home sign" by deaf children of non-signing parents and the steady state of second language acquisition by immigrant learners. Hence, rather than assuming that two classes of compounds exist,

differentiated by the possibility/ impossibility of assigning a theta role to the non-head, Olsen (2012) postulates that compound interpretation is generally the result of modification. Bierwisch (2015a) was aware of this possibility and attempted to rule it out by stipulating that argument assignment has preference over modification: the modification template comes into play only when argument assignment isn't possible, either because the head doesn't have an AS or because contextual or conceptual information renders its use implausible. This stipulation is necessary in order to keep the two classes of verbal and primary compounds distinct, cf. Bierwisch (2015a: 1093):

It is an interesting, and in a way natural, consequence of the compound template that its unrestricted application would allow for the complete elimination of the systematic difference between the different types of compounds, turning all complements into modifiers. [...] By means of appropriate interpretative values for R, each complement in an argument-structure compound can be interpreted as a modifier. Intuitively, wine drinker is a type of drinker, hence the object modifies the head. More explicitly, the semantic relation of an argument to its head can by definition be taken as a possible value for R, relating the complement to the designated position in the head's AS.

Bierwisch therefore postulates a minimal effort principle that gives argument satisfaction precedence over modification: "Deviate from the simplest, most direct value for an open variable only on explicit demand", cf. Bierwisch (2015a: 1093).

However, other evidence in addition to the facts surrounding instrument nouns as heads of compounds suggests that modification rather than theta assignment is the key to compound interpretation. For instance, many event nouns derived from obligatorily transitive verbs can assign either their internal or external argument to their first constituent in a compound. *Police protection*, for example, can mean 'protection of the police' or 'protection by the police'. The fact that the latter is actually preferred in this case demonstrates that theta assignment cannot proceed as it does in syntax, i.e. strictly from lowest to highest argument in the AS hierarchy, otherwise only the former meaning should be possible. This clearly shows that the interpretation of compounds can't depend on theta assignment as defined in syntax. Rather, it appears to be guided by considerations of contextual or conceptual plausibility and, hence, falls into the more liberal domain of modification.

A further piece of evidence in favor of modification over theta assignment pertains to suffixes like *-ee*, *-able* and *-en* that absorb not only the event variable of the verbal base to which they attach, but also its external variable. In a compound like *Reagan appointee*, for instance, the first constituent must be a modifier; it cannot be a complement because the only argument in the AS of the derivative is the referential argument. The derivation of *appointee* is shown in (31):

foregoing discussion. This conclusion is strengthened when considering the default interpretation of compounds that arises when the underspecified variable R in the compound template is assigned the identity relation. The identity relation is characteristic of the coordinative interpretation found in coordinative-appositive compounds like *artist-poet*. If R is assigned the value “=” in (34b), the CS representation identifies the external variables of the two predicates (cf. (34c)) yielding the meaning in (34d), i.e. ‘artist and poet’.

- (34) a. SF: $\lambda x [\text{POET}(x) \ \& \ R(v, x) \ \& \ \text{ARTIST}(v)]$
 b. CS: $R = =$
 c. CS: $v = x$
 d. CS: $\lambda x [\text{POET}(x) \ \& \ \text{ARTIST}(x)]$

This representation is similar to that assigned to intersective modification in syntax: a *blue book* is something that is a book and blue:

- (35) $\lambda x [\text{BOOK } x] \ \& \ [\text{BLUE } x]$

Hence, coordinative-appositional compounds are the most syntax-like of all compound structures. Nevertheless, coordinative-appositional compounds are subject to conceptual restrictions that don’t apply to coordinative appositions in syntax as the difference between (36a) and (36b) documents.

- (36) a. NP: Henry Kissinger, diplomat and lightning rod, returns to the corridors of power.
 b. N: *The diplomat-lightning rod returns to the corridors of power.

In the coordinative-appositional NP in (36a), the second predicate is understood metaphorically. A metaphor shifts an object from a source domain onto a target domain, i.e. from the domain of animate beings into the domain of inanimate objects. This is possible for a second conjunct in a conjoined syntactic NP. But a complex concept as the denotation of a word is subject to the restriction that it pick out a coherent individual from a single domain, cf. Olsen (2004). The compound N in (36b) violates this conceptual restriction and consequently is ruled out as a possible word. So, even in default cases of modification, compounds are subject to conceptual restrictions that do not apply to phrasal syntax. Hence, there is a principled divide between compound structures and syntactic phrases. Consequently, the lexical system encompasses two different domains: derivation belongs to grammar in that it makes crucial use of the grammatical notions argument structure, argument inheritance, head and complement, whereas the simple adjunction structures

of compounds rely for their interpretation on modification alone, supplemented by conceptual inferences.

7. Summary

This article has shown that the original mystique surrounding the very productive pattern of formations that became known as synthetic compounds has not diminished in the least up to the present day. Once linguists attempted to go beyond a description of the phenomenon and aim at an explanation for synthetic compounds in terms of a comprehensive theory of grammar, it immediately became evident that these formations sit at the interface between the core principles of grammar and conceptual reasoning. The arguments presented in this article have suggested that both denominal and deverbal synthetic compounds exemplify genuine compound structures. Furthermore, compounding differs from derivation in that it is not subject to strict grammatical principles as derivation is, but reflects semantic, pragmatic and conceptual factors. No stipulations were appealed to in this discussion; the relevant structures and interpretations arise on the basis of the lexical properties of lexemes and affixes, their modes of combination as well as on general principles of pragmatic use such as the informedness condition, salient relations between concepts and the need for a word structures to be interpretable as coherent concepts.

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