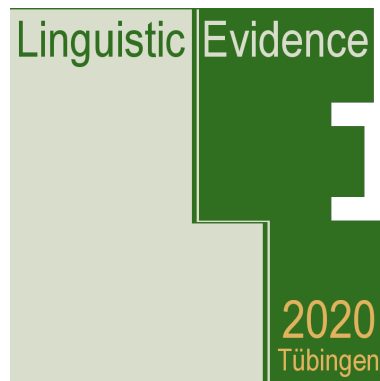


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Wie bio sind die Biowaffen? – When the Meaning of Free Morphemes Diverges from the Meaning of their Bound Counterparts

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1 General Phenomenon

The presented work is motivated by the observation of the increasingly frequent free occurrences of *bio* in examples like (1) in German:

- (1) a. *Ist bio wirklich besser?* (WEB₁)¹
Is bio real better
'Is organic really better?'
- b. *Lediglich das Fleisch ist bio. Alle anderen Zutaten sind es nicht.* (WEB₂)
Only the meat is bio. All other ingredients are it not
'Only the meat is organic, all the other ingredients are not.'

*Bio(-)*², originally bound in foreign words such as *Biologie* ('biology') on the one hand and hybrid compounds such as *Biobanane* ('organic banana') on the other, seems to break free from its boundedness and develop into a free lexeme. In this article, I will present corpus linguistic as well as experimental data, which strongly suggest that the morphological change in question goes hand in hand with a semantic change, more concretely, semantic narrowing in two senses: First, the bound morpheme *bio-* can be used in various semantic contexts, whereas the free morpheme *bio* is restricted to very specific contexts. Second, the bound morpheme can express abstract to concrete meanings depending on the context, whereas the free morpheme is restricted to a concrete meaning. At the end of the article, I will additionally show in a short outlook that *bio* is not the only morpheme that is going through this change. Instead, semantic narrowing seems to be a productive mechanism in German to generate new evaluative or expressive lexemes, since there are several other candidates like *super*, *mega*, *anti* and others that have undergone a similar development.

2 Morphological Change: Yes or No?

The first question that needs to be asked and answered when looking more closely at evidence such as (1) is: Has there really been a morphological change from bound to free morpheme? If so, how can it be explained? If not, what is an alternative explanation?

Bio- is a very productive bound morpheme in German,³ mostly categorized as a confix, (see Donalies, 2005: 179/191/194, Elsen, 2005: 135–137, Fleischer & Barz, 2012: 111f, Gehlen,

¹ All URLs to Internet sources (identified by *WEB* in the continuous text) are listed in the end of the article.

² In the following, *bio-* refers to bound elements and *bio* to free elements, whereas *bio(-)* comprises both groups.

³ Concrete frequencies of free and bound *bio(-)* are listed in Table 1 in Section 2.3.1.

2016: 27–29, Grimm, 1997: 277, Michel, 2009: 129, Scheller-Boltz, 2008: 243, Schmidt, 1987b: 51). According to Kluge (2011: 125), it goes back to the Greek *bíos* ('life') and was first borrowed into German in words of Greek origin like *Biographie* ('biography') or *Biologie* ('biology'). Later, it found its way into the morphological inventory of German, has since been used in neoclassical formations and is also widely used in contemporary language to describe natural and/or environmentally friendly processes and products, e.g. *Bio-Äpfel* ('organic apples').

The free occurrence of *bio* and other formerly bound elements (e.g. *öko*, *turbo*, *super*, *mega*, *anti*, *top*, etc.) is not an unfamiliar phenomenon. Olt (1983: 64f), who discusses the increasingly frequent hybrid compounds with *bio-*, already mentions first free evidence of *bio*. Elsen (2005: 135) and Donalies (2005: 49) also raise the question if such elements should be regarded as free lexemes. In most detail, Gehlen (2016) and Scheller-Boltz (2008) discuss the free occurrence of *bio*. Both pursue the question of whether it has developed from a bound morpheme into a word. Before I start my own attempt to explain this linguistic phenomenon, I briefly summarise these two papers.

2.1 Scheller-Boltz' Approach

Based on several examples, Scheller-Boltz (2008: 244) shows that compounds with *bio-* as well as free occurrences of *bio* can no longer be classified as occasional. He further argues that, in order to be considered a free lexeme, *bio* must fulfil certain word specifics. Applying those to *bio*, he notes that it does not meet all his word specifics. Without going further into detail about Scheller-Boltz' word specifics and the extent to which *bio* does not meet all of them, it can be summarized that he himself admits that not all words must in principle fulfil all of these specific characteristics in order to be considered words. Instead he focusses on the two main characteristics:⁴ "The assignment of a linguistic unit to the category word is primarily determined by two specific features: its autonomy and its lexical meaning"⁵ (Scheller-Boltz 2008: 249, author's translation).

For him, an exception to this are particle morphemes (e.g. *doch*, *nur*) and interjections (e.g. *Ach!*, *Oh!*, *Ej!*). However, *bio* cannot be compared with such elements simply because of its compositional structure (cf. Scheller-Boltz, 2008: 249). Also in contrast to the above-mentioned morphemes, *bio* could definitely be assigned a "certain lexical, and thus a lexicon-coded meaning"⁶ (Scheller-Boltz, 2008: 250, author's translation). However, according to Scheller-Boltz this meaning cannot be defined independently, but only depending on the context:

The word formation element functions in a synsemantic way and therefore has a more determinant character. As a consequence, *Bio/bio* alone, without context and without speech situation, does not realize a concrete meaning.

(Scheller-Boltz, 2008: 251, author's translation)⁷

Thus, for Scheller-Boltz, one of the central word specifics is not fulfilled. In the course of the discussion of my corpus study as well as the experimental study presented in Sections 2.3 and 3, it will become apparent that this assertion is problematic in that it only applies to the confix *bio-* but not to the free lexeme *bio*. Scheller-Boltz (2008: 54) ultimately comes to the conclusion that *Bio* in nominal use is a short word for *Bioprodukte* ('organic products', cf. (2a) and (2b)),

⁴ For detailed information on his word specifics see Scheller-Boltz (2008: 248).

⁵ „Die Zuordnung einer sprachlichen Einheit zur Kategorie Wort wird primär durch zwei Spezifika bestimmt: ihre Selbstständigkeit und ihre lexikalische Bedeutung.“

⁶ „gewisse lexikalische, somit eine im Lexikon kodifizierte Bedeutung.“

⁷ „Das Wortbildungselement funktioniert vielmehr synsemantisch und hat dementsprechend auch eher determinierenden Charakter. In der Konsequenz realisiert *Bio/bio* allein, ohne Kontext und ohne Sprechsituation, keine konkrete Bedeutung.“

analogous to *Bio* for *Biologieunterricht* ('Biology class'). In the same way, according to him, the adjectival use of *bio* is a short word for the syntagma *aus biologischem Anbau ohne chemische Zusatzstoffe* ('from organic farming without chemical additives', cf. (2c)). For him, the "main meaning" (Scheller-Boltz, 2008: 251f) consists of *Produkt* ('product') or *produziert* ('produced').

- (2) a. *Neu ab Maigibt's hier Bio! (Werbung von BioFrischemarkt)*
 new from maygives.it here bio Advertising of BioFrischemarkt
 'New in May: organic products here! (Advertisement from BioFrischemarkt)'
- b. *Ich kaufe nur noch Bio.*
 I buy only still Bio
 'I only buy organic products.'
- c. *bei teurem Wein sei es egal, ob er ›bio‹ sei oder nicht*
 with costly wine is it no.matter if he bio is or not
 'When it comes to expensive wine it doesn't matter if it's organic or not'

However, Scheller-Boltz' approach is unsystematic in several respects. First, he selects only a few examples to confirm his claim. Most of these examples are taken from problematic text types such as headlines or advertising slogans, which often follow different rules of grammar and semantics (cf. *Wir sind Papst*⁸ (WEB₃), *Wohnst du noch oder lebst du schon?*⁹, (WEB₄)). Moreover, his examples do not represent the wide range of uses of this free lexeme. Accordingly, it is easy to find evidence that cannot be explained by Scheller-Boltz' approach. *Bio* and *bio* do not always represent the full forms he proposes:¹⁰

- (3) a. *Bio also. Ein Megatrend, wie man das nennt. Wir sind ja heute schon ziemlich bio, und wir werden immer bioer. [...] Wirklich bio ist, wer da noch durchsteigt.*
 'Organic it is. A mega-trend, as they call it. We're already quite organic today, and we're getting more and more organic. What's really organic is whoever can keep track of all this.'
 [PRF15/AUG.00209]¹¹
- b. *Warum sollten auch Hartz IV Empfänger Bio leben?* [S10/FEB.00135]
 'Why should Hartz IV [= unemployment benefit] recipients also live organically?'

If one applies Scheller-Boltz' interpretation of *bio* to these examples, you get odd sounding results:

- (4) a. *Bioprodukte also. Ein Megatrend, wie man das nennt. Wir sind ja heute schon ziemlich aus biologischem Anbau ohne chemische Zusätze, und wir werden immer biologisch angebaute ohne chemische Zusätze. [...] Wirklich biologisch angebaut ohne chemische Zusätze ist, wer da noch durchsteigt.*
 'Bioproducts it is. A mega-trend, as they call it. We're already quite organically grown without chemical additives today, and we're getting more and more organically grown without chemical additives. What's really organically grown without chemical additives is whoever can keep track of all this.'

⁸ 'We are Pope'. Headline in the *Bildzeitung* when the German Joseph Ratzinger was elected the new pope in 2005.

⁹ 'Are you still inhabiting or already living?' Advertisement of the furniture company IKEA.

¹⁰ Many of the examples used in this article originate from corpus searches. All search queries were performed on 13.01.2018 with Cosmas II in the Corpus *W-without-Wikipedia-öffentlich* (WEB₅). For all documents, the signature listed in the corpus is given in square brackets.

¹¹ For long examples like these, I refrain from word-for-word translations for the sake of readability and only provide a semantic translation.

b. *Warum sollten auch Hartz-IV-Empfänger biologisch angebaut ohne chemische Zusätze leben?*

‘Why should Hartz IV recipients also live organically grown without chemical additives?’

Evidence such as (3) shows, in comparison to the variants I modified in (4), that *Bio/bio* cannot always be replaced by the full forms according to Scheller-Boltz. Especially the adverbial use of *bio* (3b) as well as the predicative attribution to non-products (3a) show the flaws of the short word hypothesis. It is also puzzling that *bio* in nominal use has no article and no inflection, which is normally quite the case with short words:

- | | | | |
|-----|--|---------------------------------------|---|
| (5) | a. <i>das Auto</i>
the car | <i>die Autos</i>
the cars | <i>(Automobil)</i>
(automobile) |
| | b. <i>der Trafo</i>
the transformer | <i>die Trafos</i>
the transformers | <i>(Transformator)</i>
(transformer) |

Das Bio and *die Bios* should be used in the same way. But there is no evidence for these forms. The short word hypothesis is therefore not satisfactory. This is probably one of the reasons why Scheller-Boltz introduces a third type of *bio*. Especially in advertising, he claims, *bio* can be found in use as a buzzword:¹²

- | | | | |
|-----|--|---|---|
| (6) | a. <i>Alles in Bio.</i>
everything in bio
‘All organic.’ | b. <i>Einfach bio!</i>
simple bio
‘simply organic!’ | c. <i>Gut, besser, bio.</i>
good betterbio
‘good, better, organic.’ |
|-----|--|---|---|

He describes this third usage type of *bio* as follows:

Furthermore, *Bio/bio* functions as a free unit, although it cannot be clearly characterised as a confix and certainly not as a short word, but as a linguistic unit which functions as a buzzword, especially in advertising. Its context-independent use is exclusively pragmatically justified, recipient-oriented and thus often part of a marketing strategy. In my eyes this is still a confix, although *Bio/bio* cannot be considered a prototypical confix in these cases and is rather on the edge of the confix class. However, in my opinion more confix specifics than word properties can be attributed to the word and therefore neither a word nor a short word status can be granted. (Scheller-Boltz, 2008: 256, author’s translation)¹³

This explanation is confusing in several ways. First, Scheller-Boltz denies *Bio/bio* the confix and short word status in contexts such as (6), just to revise this again with regard to the confix status in the next step. Even in a prototype-theoretical approach, as Scheller-Boltz apparently supports it, it is questionable to so lightly abandon the criteria of boundedness and to classify *Bio/bio* here as an untypical confix, especially because boundedness seems to be the most obvious property of all kinds of bound morphemes.

¹² The examples in (6) were taken from Scheller-Boltz (2008: 254f).

¹³ “Ferner fungiert *Bio/bio* als freie Einheit, ist dabei allerdings nicht eindeutig als Konfix und schon gar nicht als Kurzwort zu charakterisieren, sondern als eine sprachliche Einheit, die insbesondere in der Werbung als Modewort fungiert. Ihr kontextunabhängiger Gebrauch ist ausschließlich pragmatisch begründet, empfängerorientiert und somit häufig Teil einer Marketingstrategie. In meinen Augen handelt es sich hierbei dennoch um ein Konfix, wemgleich *Bio/bio* in diesen Fällen nicht als prototypisches Konfix gelten kann und eher am Rande der Konfixklasse anzusiedeln ist. Allerdings können *Bio/bio* meines Erachtens mehr Konfixspezifika als Worteigenschaften zugeschrieben und daher weder ein Wort- noch ein Kurzwortstatus eingeräumt werden.” (Scheller-Boltz 2008, 256).

Instead of this threefold analysis of *bio*, which cannot be applied to all evidence and is based on unsystematically collected examples, the semantic basis and commonality of all free uses of *bio* compared to the use as a confix *bio-* should be worked out in a representative sample.

2.2 Gehlen's Approach

Gehlen (2016) pursues a more systematic approach. In a corpus study based on newspaper texts of the *Mannheimer Morgen* from 1996 to 2012, he examines the frequency of occurrence of different semantic variants of *bio* as a free lexeme with reference to Scheller-Boltz (cf. Gehlen, 2016: 39):

- *bio* in the sense of *labelled with a bio-seal*
- *bio* as an advertising word or buzzword
- *bio* as a short word for *aus biologischem Anbau* ('from organic farming')
- *Bio* as a short word for a) *Bioprodukt* ('organic product'), or b) *Biologie* ('biology') as a school/university subject

In addition, he comparatively records the frequency with which *bio-* occurs as a confix in compounds (cf. Gehlen, 2016: 39). Gehlen also comes to the conclusion that Scheller-Boltz' short word hypothesis is not applicable to all free uses of *bio* (cf. Gehlen 2016: 41). He also states that in his sample the frequency of free variants does not influence the frequency of *bio-* in compounds, since the latter "occur relatively constantly"¹⁴ (Gehlen, 2016: 39, author's translation). In my own corpus study documented below (Section 2.3) I come to a different conclusion in this respect, namely that the frequency of bound morpheme is not constant but increases over time. This is mainly due to the fact that the time frame of my sample is wider than in Gehlen's sample.

Gehlen's comparison of the frequencies for the different semantic variants of *bio* does not provide any clear differences, "no aspect of meaning is dominant"¹⁵ (Gehlen, 2016: 44, author's translation). Unfortunately, Gehlen does not describe the common semantic core of the free variants and thus their core meaning at this point. However, it is interesting to note Gehlen's general observation on how the semantics of *bio-* as a bound element changes towards the free element: from confix-confix-compounds (e.g. *Biotop*, 'biotope') via hybrid compounds (*Biobanane*, 'organic banana') to free use, the meaning narrows more and more (cf. Gehlen 2016: 44f). Thus, it is evident that the free and bound variants can no longer be the same morpheme. Therefore, he sees *bio* established as an independent word (cf. Gehlen 2016: 45). Although it remains open what exactly the semantic constriction and thus the semantic difference is.

This is one of the weak points of Gehlen's corpus analysis. He compares the frequency of different semantic variants of the free lexeme *bio*, but if you are interested in the question if *bio* has developed into a free lexeme and how that development might have taken place, the more interesting and purposeful comparison would have to be made between semantic variants of both free and bound elements. The time frame is also poorly chosen: As Olt (1983: 64f) already shows, the phenomenon can be observed before 1996. In order to be able to represent the development of the morpheme in a comprehensible way, a corpus going back further in time should be chosen as a basis. These remarks were considered in the corpus analysis documented in the following.

2.3 Corpus Study

In this section the results of a corpus study regarding *bio(-)* are presented. First, a short overview of the synchronous and diachronic frequency ratios of free and bound variants of *bio* will be

¹⁴ „relativ konstant vorkomm[en]“ (Gehlen, 2016: 39).

¹⁵ „kein Bedeutungsaspekt ist dominant“ (Gehlen, 2016: 44).

given. However, the focus will be on the subsequent study of qualitative semantic differences between the different variants.

All search queries were carried out on 13.01.2018 using the online tool Cosmas-II of the IDS (Institut für Deutsche Sprache). The underlying corpus is the above-mentioned W-ohneWikipedia-öffentlich (WEB₅).¹⁶ It represents a part (or better: an archive) of the DeReKo (The German Reference Corpus, WEB₆), consisting of fiction, trivial literature, plenary protocols, speeches and interviews, biographical literature, chats, newspaper texts, etc. Articles and discussions from Wikipedia have been deliberately excluded in order to prevent the results from being distorted by too much technical language. The used corpus includes about 24.6 million texts from the years 1772 to 2016 with about 6.8 billion words. For certain studies, a partial corpus of WOW was used as a sample, namely *Der Spiegel* from 1947 to 2016.

2.3.1 Quantitative Data on Frequency and Productivity

The first question that arises when investigating a particular phenomenon is whether it is a relevant phenomenon at all or merely a rare marginal one. *Bio(-)* occurs in three different morphological environments: compounds (7), derivations (8), and as a graphematically independent word (9). The latter group must be divided into genuinely free lexemes (9a) and short words (9b).

- (7) Compounds with
- | | | | |
|--------------------|---------------------|------------------------|------------------|
| a. other confixes: | <i>Biotop</i> , | <i>biolog(-isch)</i> , | <i>Biograph</i> |
| | biotope | biolog(-ical) | biographer |
| b. free lexemes: | <i>Biomedizin</i> , | <i>Biotonne</i> | <i>Biobanane</i> |
| | biomedicine | bio.bin | bio.banana |
| | | ‘organic waste bin’ | ‘organic banana’ |
- (8) (*anti-, pro-, sym-*) *biotisch*
(*anti-, pro-, sym-*) biotic
- (9) a. *Die Banane ist bio.*
the banana is bio
‘The banana is organic.’
- b. *Ich studiere Bio.*
I study bio
‘I study biology.’

A search query in WOW and *Der Spiegel* resulted in the values given in Table 1 in *pmw* (per million words) for the relative frequencies of the different variants. The *pmw* values show that *bio* is productive in German both as a bound and as a free element.

Table 1. Frequency of different variants of *bio(-)* in *pmw* (per million words)

Variant	WOW (total)	<i>Der Spiegel</i> (total)	<i>Der Spiegel</i> (2000-2015)	<i>Der Spiegel</i> (2016)
Bound in compounds	80,2	83	116,7	97,3
Bound in derivations	0,94	1,451	1,54	0,949
Free element	3,7	1,81	4,14	10,44

The different proportions of free elements in the two corpora is probably due to their different composition. Firstly, WOW contains a variety of different text types, whereas *Der Spiegel* consists only of different types of newspaper texts. It is possible that *bio* is more productive in other text types than in newspaper texts. Secondly, the number of texts in WOW grows from year to

¹⁶ From now on referred to as WOW.

year. In the subcorpus *Der Spiegel*, however, the amount of text does not increase to the same extent but remains relatively constant over time. This suggests that the lower value for free lexemes in *Der Spiegel* can be explained by the fact that *bio* developed as a free lexeme only later. The latter explains why the proportion is naturally higher in a corpus like WOW, which contains more text from recent years than previous ones. This assumption is confirmed when looking at the average pmw values of more recent years in *Der Spiegel*. It is evident that both the compounds and free lexemes in *Der Spiegel* appear in greater numbers in later years. Already in the sample from the years 2000 to 2015, the proportion of free lexemes is at 4.14 pmw, noticeably higher than in the entire subcorpus. In 2016, the value is even 10.44 pmw. The compounds reach their highest value with 116.7 pmw in the sample from 2010 to 2015, before the value for the year 2016 decreases again slightly.

2.3.2 Diachronic Data on Frequency Development

The increase in the frequency of certain variants of *bio(-)* raises the question of whether all variants have always existed and since when which variant is represented in German. *Bio-* occurs in two types of compounds, on the one hand in confix-confix compounds according to the pattern *confix+confix(+affix)*, as in (10), and on the other hand in confix-word-compounds according to the pattern *confix+word(+affix)*, as in (11).

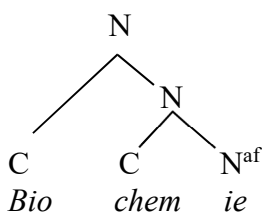
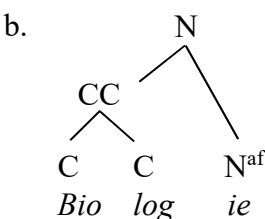
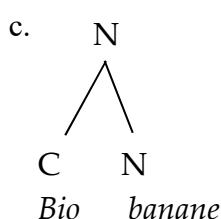
(10) *Bio + log + (ie), Bio + top*
 bio log y bio tope

(11) *Bio + banane, Bio + markt*
 bio banana bio market

Some combinations, such as those in (12), are a category to be treated separately. Both are combinations of the pattern *confix+confix+affix*.

(12) *Bio + chem + ie, Bio + tech + nik*
 bio chem istry bio tech nics

However, the confix-affix compounds that occupy the second element in those compositions, i.e. *chemie* or *technik*, are already established and productive words in German. In contrast, *-logie* or *-top* are not words, which becomes clear in the tree structures in (13).¹⁷ The last immediate step in word formation in the case of *Biochemie* is a composition of a confix and a noun, just as with *Biobanane*. In *Biologie*, the composition takes place one step earlier between two confixes to form a complex confix. Afterwards, this is derived into a word with the noun-forming affix *-ie*. For this reason I have classified cases like (12) or (13a) as confix-word-compounds and not as confix-confix compounds.

(13) a.  b.  c. 

The examples (14) and (15) represent the earliest evidence in WOW for confix-confix combinations and confix-word compounds. (16) is the earliest evidence for *bio-* in a derivation and (17) to (19) contain the earliest hits for *bio* as a free lexeme in its various types of use: as a noun (17), predicatively used adjective (18), and adverbially used adjective (19).

¹⁷ C = confix, CC = complex confix, N = noun, N^{af} = noun-forming affix

- (14) *Biografisch* [1772] (GOE/AGF.02286)
biographical
- (15) *Biochemie* [1947] (S47/SEP.00299)
biochemistry
- (16) *orthobiotisch* [1950] (S50/NOV.00141)
orthobiotic
- (17) *das große Selbstversorger-Leben mit Makro und Bio* [1980] (S80/DEZ.00371)
the big self.provider.life with macro and bio
'the big self supporting life with macrotechnologies and organic products'
- (18) *Alles ist „bio“ oder „öko“.* [1987] (S80/DEZ.00371)
Everything is bio or eco
'Everything is organic or ecologically fair'
- (19) *Sie leben „immer schon bio“* [1996] (O96/MAR.32295)
They live always already bio
'They have always lived an organic life-style'

It is therefore evident that *bio-* in confix-confix combinations has been established the longest in German. Confix-word combinations as well as derivations with *bio-* do not appear in WOW until the middle of the 20th century. *Bio* as a free lexeme is the most recent variant. The earliest evidence can be found for the nominal use. Subsequently it also appears as an adjective, first in predicative, later in adverbial use.

But how has the frequency of different bound or free variants of *bio* changed over time? *Bio(-)* occurs more and more frequently both in compounds and as an independent word. The frequency of derivations remains approximately the same (see Figure 1).¹⁸

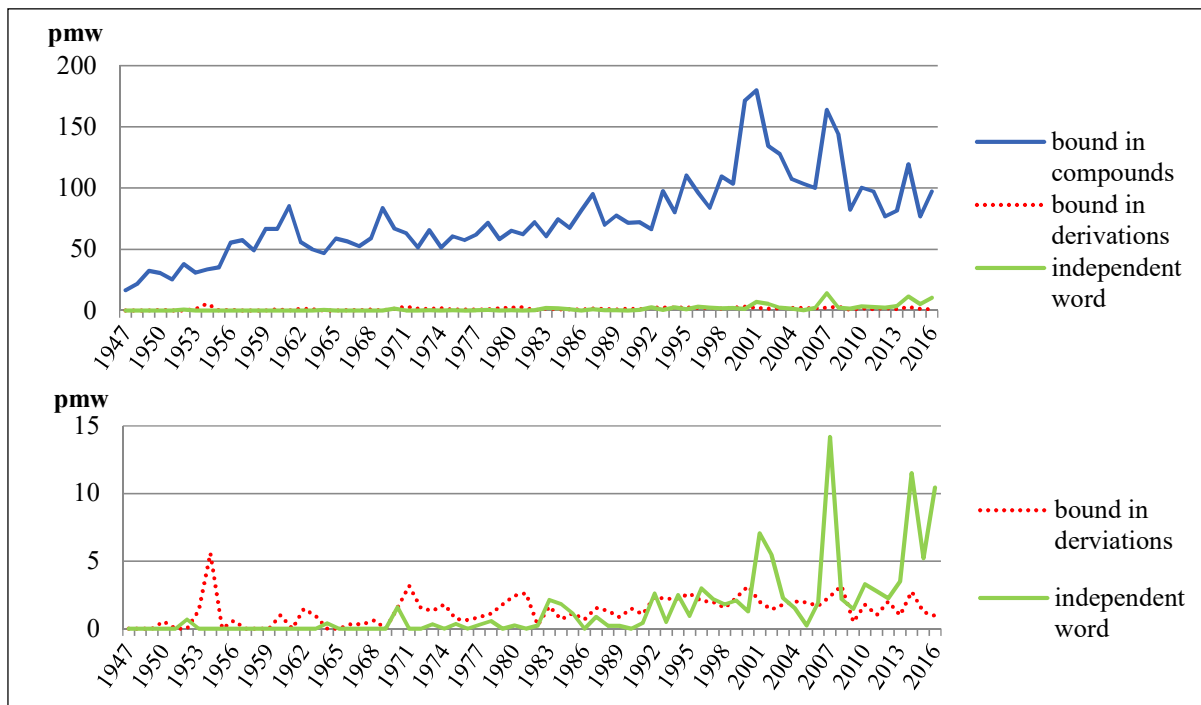


Figure 1. Frequency development of *bio(-)* in *Der Spiegel*

¹⁸ The lower graph in Figure 1 is an enlargement of the bottom part of the upper graph to show the development of the less frequently occurring free variants and derivations.

It may appear inconsistent here at first sight that there is evidence of independent words before 1980, although it has been asserted above in commenting on (17) that free lexemes only appear from 1980 onwards. *Bio* as a graphematically independent word occurs in different variants, some of which are short words or proper names. Such evidence can also be found before 1980. Since both compounds with *bio* and *bio* as an independent word occur in different types, the different development of these individual types over time is also of interest.

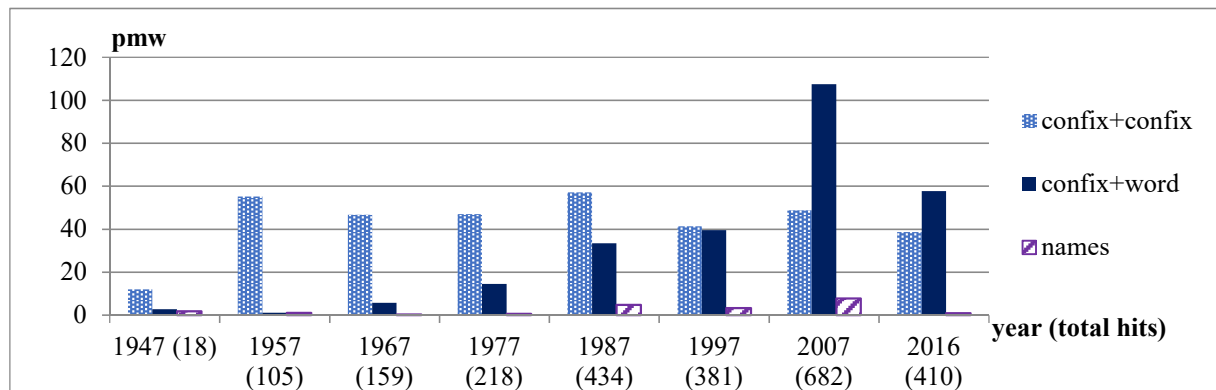


Figure 2. Samples of confix compounds in *Der Spiegel*

Compounds with *bio-* can be divided into two types, as described above: confix-confix combinations and confix-word combinations. In addition, there is a small, but noteworthy number of product or company names. Due to the great number of hits for the different types in WOW, I have analyzed samples from *Der Spiegel* at intervals of 10 years to determine any trends. Figure 2 shows a clear increase in composites of the second type. Confix-confix composites also show an increase in frequency until the 1980s. There, however, the development stopped and the frequency decreased slightly in the next samples. The situation is different with the composites of confix and word. These continue to rise steadily.¹⁹ An interesting side observation is that product or company names are also increasing in parallel with the confix compounds. This suggests a connection between the increased presence of *bio-* and advertising and marketing strategies.

Bio/bio as a graphematically independent word occurs in five variants (Figure 3):

- as a short word for the school or university subject *Biologie* ('biology')
- as a short word for *Biographie* ('biography')
- in product or company names
- surprisingly often as nickname for the German TV cook Alfred Biolek
- as free lexeme

Short words are not autonomous free lexemes, because *Bio*(graphie) and *Bio*(logie) are so to speak hidden bound occurrences of *bio-*. Although product and company names are independent words, their meaning and function must be clearly distinguished from other evidence for free *bio*. Furthermore, Alfred Biolek has certainly cooked organic products from time to time, but his nickname has very little to do with the investigated phenomenon. Only the remaining hits are actual occurrences of *bio* as a free lexeme that derived from the confix *bio-*.

As an interim conclusion for the underlying corpora, it can be stated that the frequency of the morpheme *bio* generally increases. While derivations with *bio* remain at a relatively constant, low frequency level, compounds with confixes and words as well as free lexemes show

¹⁹ The extremely high value in 2007 can be attributed above all to the two large articles "Erntedank im Autotank" (S07/FEB.00300) and "Alles bio, oder was?" (S07/SEP.00028) which, among other things, deal in detail with *bio* in its function as a political and economic seal of quality.

an increase in frequency. For the latter category, nominal, adjectival and ambivalent uses can be found.

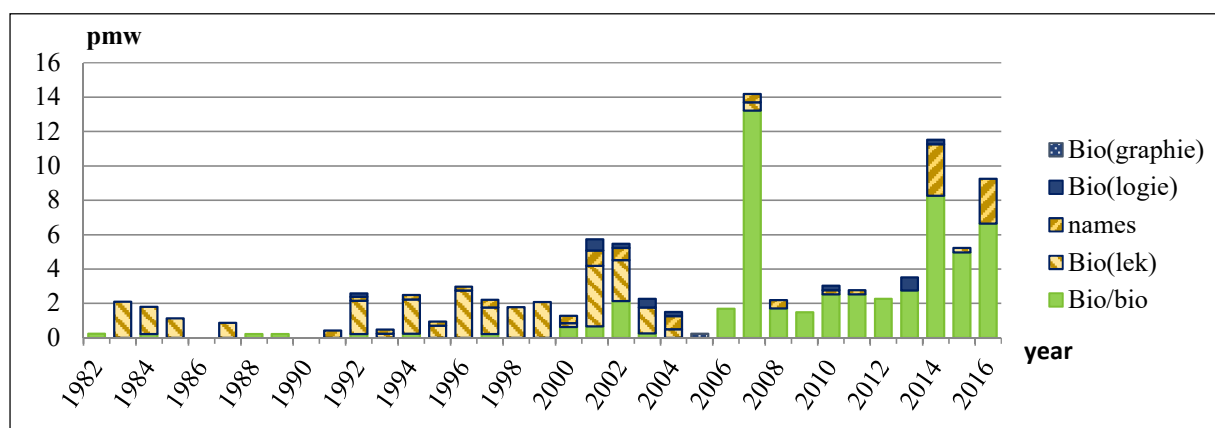


Figure 3. Frequency development of free variants of *bio* in *Der Spiegel*

2.3.3 Qualitative Data on the Semantics of *bio(-)*

At the beginning of an investigation of *bio(-)* and other bound elements that seem to develop into free elements, one must first clarify what types of bound morphemes exist at all and what criteria can be used to distinguish them from each other and especially from free lexemes. However, this is a discussion which, in order to be adequately presented, would have deserved its own article. Therefore, it will be limited here to the reference of a selection of articles that provide a reasonable amount of detail in this discussion.²⁰ There is greater agreement on the criteria that can be used to distinguish the different groups than on the question of which criteria apply to which class of morphemes. At this point I cannot and do not wish to give any definitive classification of the German morphological system, which, fortunately, is not necessary for the essential finding concerning the morphological change of *bio(-)*. It is sufficient to show the two essential differences between *bio-* and *bio*.

Table 2. *bio* vs. *bio-*

	Affix	Confix	free lexeme	<i>bio-</i>	<i>bio</i>
Boundedness	+	+	-	+	-
Derivationability (to be derivable by an affix)	-	+	±	+	+
Lexical meaning	±	+	+	+	+
Compositionality (ability to be part of a compound)	-	±	±	+	+

Table 2 lists the most important usually discussed criteria and applies them to the individual morpheme classes affix, confix, and free morpheme.²¹ According to my classification, *bio-* must be classified as a confix (on which there is a relatively large consensus, as mentioned above). *Bio* on the other hand must be classified as a free lexeme.

²⁰ See among others: Donalies (1999, 2005, 2009), Eins (2008, 2009), Elsen (2005), Fleischer (1995), Gehlen (2016), Grimm (1997), Michel (2009), Scheller-Boltz (2008, 2010), Schmidt (1987b), Schu (2005).

²¹ Other criteria are being discussed in the literature which, however, are negligible for the question at hand: 1. *Fixed position* (cf. Eisenberg, 2004: 244–246, Grimm, 1997: 277, Donalies, 2005: 194, 2009: 52f, Elsen, 2005: 137, Fleischer & Barz, 2012: 108, Müller, 2000: 125, Scheller-Boltz, 2010: 15, Schmidt, 1987b: 50), 2. *Productivity* (cf. Donalies, 2005: 192f, Eins, 2009: 66f, Elsen, 2005: 138, Fleischer, 1995: 62–67, Grimm, 1997: 277), 3. *Serialization* (Elsen, 2005: 134, Fleischer, 1995: 64, Fleischer & Barz, 2012: 172, Grimm, 1997: 277). 4. *Free pendant in another language (epoch)* (cf. Donalies, 2009: 43, Elsen, 2005: 134, Eins, 2009: 66, 2016: 325, Kirkness, 1987: 16, Munske, 1988:63).

The obvious difference between *bio-* and *bio* is of course the property of boundedness: the confix *bio-* is bound, the free lexeme *bio* is not. Unfortunately, this seems to be the only difference between these two elements. The change of the morpheme class is, however, exactly what is supposed to be explained here. Accordingly, the difference in this criterion cannot provide the hoped-for explanation. Fortunately, another more hidden distinction between the elements can be made: the lexical meaning. For even if two elements both have lexical meaning, they may still differ in the quality of their meaning. In other words: *bio-* and *bio* both carry lexical meaning, but it might not be the same lexical meaning. The assumption that the biggest difference between the two morphemes lies in their lexical meaning and that the morphological change was conditionally made possible by this difference is to be discussed in the following.

For all variants of *bio* and *bio-* samples from *Der Spiegel* were analysed and classified into different semantic categories. I opened a new category for each hit that did not fit into a previously opened category. In total, there resulted six such categories, which can be summarized in three superordinate categories:

- A1** concerning life in general (in a scientific sense)
e.g.: *Biologie* ('biology'), *Biotop* ('biotope'), *Biochemie* ('biochemistry')
- A2** concerning life in general (in a biographical context)
e.g. *Biographie* ('biography'), *Biodeutscher* ('born and raised in Germany')
- B** concerning living organisms
e.g. *Biomasse* ('biomass'), *Biomüll* ('organic waste'), *Biowaffe* ('bioweapon')
- C1** from agriculture based on specific health and/or environmental-ethical criteria
e.g. *Biobanane* ('organic banana'), *Biofleisch* ('organic meat')
- C2** from production based on specific health and/or environmental-ethical criteria
e.g. *Biokosmetik* ('organic cosmetics'), *Biostrom* ('organic electricity')
- C3** acting/operating/living according to specific health and/or environmental-ethical criteria
e.g. *Biocafé* ('organic café'), *Bioladen* ('organic store'), *Biomarkt* ('organic market')

The parts of the category names printed in spaced font illustrate the common features of the subcategories in their respective upper categories A, B, and C:

- A** concerning life in general
- B** concerning living organisms
- C** concerning health and/or environmental-ethical criteria

It is noticeable that the categories in their semantics represent a descending level of abstraction of meaning: In Category A, *bio-* means something abstract like 'concerning the Living respectively life'. In Category B, it means more concretely something like existing of or originating from living respectively organic things. In Category C, finally, the meaning is further specified, namely with regard to certain health or environmental-ethical criteria in cultivation, production, or operation.

For compounds with *bio-* as a confix, the decision in which category the respective word is to be assigned, was made based on the compound partner. If it was a scientific term like *Medizin* ('medicine') or *Physik* ('physics') or a confix like *-log* or *-top*, which itself carries scientific meaning or is used exclusively in scientific contexts, it was assigned to Category A1. If it was the confix *-graf* or a lexeme that referred to biographical aspects, such as *deutsch* ('German') in *Biodeutscher* ('person born and raised in Germany'), the document was assigned to Category A2. For all combinations in which the composition partner is identified by *bio(-)* as an entity that originates from, or consists of, or is descended from living organisms, the evidence was

assigned to Category B. To be classified in Category C, a document had to have one of the following as composition partner: a clearly agricultural product (C1), a product not directly attributable to agriculture (C2), or an institution, a holding, a business, etc. (C3), which is managed or carried out by the above-mentioned health or environmental-ethical criteria.

In the case of derivations with *bio-*, several dictionaries (Duden, 2007, 2010, 2011) were used to determine the specific meaning. For the free evidence of *bio*, the classification of the hits was somewhat more difficult, since these, in contrast to the bound documents, often do not have a clear reference word but have to be interpreted contextually. In predicative use, the respective reference word, i.e. the subject of the sentence, was decisive for the classification. If the word denoted an agricultural product, the document was assigned to Category C1, in the case of non-directly agricultural products to Category C2, and in the case of institutions, companies, shops, commissions, etc. to Category C3. In adverbial use, the context was analysed in terms of whether it concerned agriculture, production in general, or practices based on specific criteria. In theory, free uses with reference words or in reference contexts in which *bio* can be understood in the sense of Category A would have been possible as well. However, I could not find such evidence. In four cases *bio* as a free lexeme also appeared in ambiguous contexts that allowed both a Category B reading and a Category C reading. These hits were assigned to Category B. Figure 4 shows the results of my classification.²²

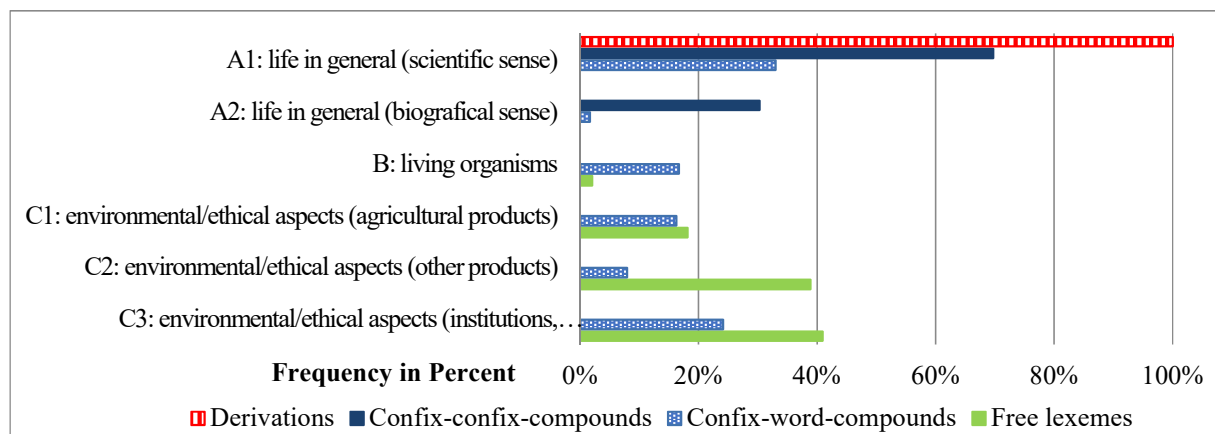


Figure 4. Semantic categorization of different variants of *bio(-)*

Derivations are found exclusively in Category A1. *Bio-* always has an abstract, scientific meaning there. Evidence such as *biotisch* ('biotic'), *antibiotisch* ('antibiotic'), *probiotisch* ('probiotic'), or *symbiotisch* ('symbiotic') always refers to life or living things in the general scientific sense. Confix-confix compounds are found in A1 (e.g. *Biolog(ie)* ('biology'), *Biotop* ('biotope')) and A2 (*Biograph* ('biographer')). *Bio-* also has a rather abstract meaning in these words.

Confix-word combinations also occur in Categories A1 (e.g., *Biophysik* 'biophysics') and A2 (e.g., *biodeutsch* 'born and raised in Germany'). In addition, they are found in all other (Sub-)Categories: in B (e.g., *Biomasse* 'biomass'), C1 (e.g., *Biomilch* 'organic milk'), C2 (e.g., *Biodiesel* 'organic Diesel') and C3 (e.g., *Bioladen* 'organic store'). *Bio-* in combination with words can thus also take on more specific meanings (in type B and C contexts). In total, it is most variable in terms of the possible contexts of use (A, B, and C).

²² Total number of hits: 944; by contexts: A1: 541, A2: 54, B: 44, C1:74, C2: 94, C3:137; by morphology: confix-confix compounds: 165, confix-word compounds: 240, derivations: 346, free lexemes: 193. For each morphological category, samples were taken from *Der Spiegel*.

Free lexemes only occur in Category C (with the four above-mentioned ambiguous exceptions in Category B). Their meaning is therefore the narrowest of all four variants. If one considers the chronological order of first occurrences of the different variants, it becomes clear that the semantics have become more and more concrete or narrow from the older variants to the younger ones. This coincides with the above-described observations by Gehlen (2016: 44f) and can be summarized in the following conclusions:

- i. The morphological change of *bio(-)* from a bound to a free element went hand in hand with a semantic change.
- ii. This semantic change consists in a stepwise concretization and narrowing of meaning and use.

This is to be understood as follows: From the originally very abstract *bio*₋₁ in confix-compounds and derivations (mostly borrowed from other languages) like *Biologie* ('biology'), *Biotop* ('biotope') or *biotisch* ('biotic') first the still bound *bio*₋₂ developed. This reanalyzed morpheme can now enter hybrid compounds with free German lexemes, which is a first morphological development. In certain contexts (Categories B and C), *bio*₋₂ also has a more concrete meaning than *bio*₋₁, which in turn represents a first semantic development. The subsequent development towards the free morpheme *bio* was then accompanied by a further semantic narrowing, as it is only used in those contexts where *bio*₋₂ already has a more concrete meaning (Categories B and C). This is demonstrated in the examples in (20):

- (20) a. **Die Medizin ist bio.* (A1)
 the medicine is bio
 'The medicine is organic.'
- b. **Dieser Deutsche ist bio.* (A2)
 this German is bio
 'This German is organic.'
- c. ?*Die Masse ist bio.* (B) *Der Müll ist bio.*
 the mass is bio the trash is bio
 'the mass is organic' 'the trash is organic'
- d. *Das Fleisch ist bio.* (C1)
 the meat is bio
 'the meat is organic'
- e. *Die Windeln sind bio.* (C2)
 the diapers are bio
 'the diapers are organic'
- f. *Das Café ist bio.* (C3) *Er lebt bio.*
 the café is bio he lives bio
 'the café is organic' 'he lives an organic lifestyle'

Bio₋₁ is restricted to type A contexts and *bio* to type C contexts. This means that they never occur in the same type of context. There is a dichotomy in distribution. This becomes particularly clear in Figure 5, where the distribution is no longer broken down into sub-categories, but only shown for the superordinate categories.

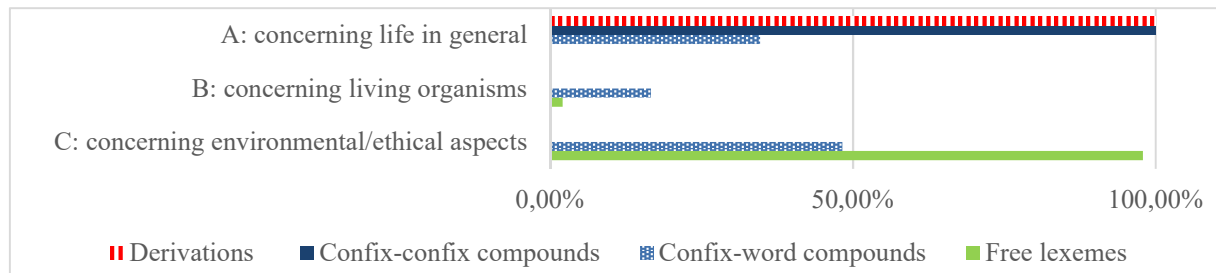


Figure 5. Semantic categorization of different variants of *bio(-)* — superordinate categories

From this I derive the following hypothesis:

H1: *Bio-* as a confix is used synchronously in all six semantic categories (A, B, and C), whereas *bio* as a free lexeme is only productive in Category C contexts and not usable or at least strongly marked in Categories A and B.

A further observation is that *bio* also always has an evaluative function. Certain environmental-ethical or health criteria are linked to *bio*, which can be used to evaluate a product, a company, or even a way of life. This subjective, mostly moral evaluation is due to the fact that, especially in agricultural production, a discussion has been going on for several decades about morally or health-related good and bad practices. Certain procedures are evaluated positively, others negatively. The morpheme *bio* has emerged as one way of making this distinction in the language. Already as a confix it has a positive connotation in Category C contexts. *Biobanane* ('organic banana') is evaluated more positively in terms of health or environmental criteria than a banana that does not deserve this linguistic seal of approval. The difference to the free lexeme *bio*, however, is that the latter always has this meaning and it is no longer just a connotation that occurs in certain contexts. *Bio* is not only an economic or political seal of quality for products, it is also a linguistic one:

- (21) *Wie bio ist das Biomüsli?* (O94/MAI.45871)
 how bio is the bio.cereal
 'How organic is the organic cereal?'
- (22) *Bio-Gurken reisen von Spanien, Deutschland nach Österreich. Wie bio ist das?*
 bio-cucumbers travel from Spain Germany to Austria how bio is that
 'Organic cucumbers travel from Spain, Germany to Austria. How organic is that?'
 (NEW11/JUN.00099)

(21) and (22) show that *bio* is sometimes linguistically instrumentalized to question the environmental-ethical quality of products bearing the *Bio* seal. *Bio* does not only stand for products that have this seal but is a linguistic expression independent of it.

Unfortunately, this article cannot go into detail about the quite interesting discussion regarding another special group of morphological units called affixoids. There is a lively debate about the existence and usefulness of this category. Some linguists reject it (cf. Schmidt, 1987a: 100, Donalies, 2005: 188f, 2009: 55-57), others support it (cf. Ascoop, 2005: 18/26f, Motsch, 1996: 168, Engel, 1991: 578–580, Elsen, 2005: 134f, Michel, 2009: 99). Affixoids like *-papst* ('-pope') in *Literaturpapst* ('literature pope', 'expert of literature par excellence') are interesting for the study presented here because their morphological development is the exact opposite of the genesis of *bio(-)*: free lexemes develop into bound affix-like units. Semantically, the meaning becomes more abstract or broader: *Papst* denotes a specific human individuum or clerical position whereas *-papst* means something less concrete like 'expert par excellence'. This is again the exact opposite of the semantical development of *bio(-)*. The change of the morphological status seems to be regularly connected with a narrowing or widening of the semantic content in both directions.

3 Rating Study

Assuming that the occurrence or non-occurrence of certain variants in certain contexts is related to their respective acceptability or naturalness in those contexts, a rating study was conducted to confirm the distributional results of the corpus study and to test H1.

3.1 Method

3.1.1 Design and Materials

Since free *bio* is excluded from both contexts A and B, those have been combined into one Category AB. This leads to a 2×2 design with the factors MORPHOLOGY (bound/free) and CONTEXT (AB/C). The factor MORPHOLOGY was thereby realized by the variant of *bio*: bound in a compound or free. To ensure that the test items differ from each other in as few properties as possible, the study was limited to the predicative use of *bio*(-) and consistent lower case writing for free variants. In the bound version, *bio*- forms a compound with a reference word (23a, 24a) whereas in the free version, *bio* is predicated on the same reference word (23b, 24b) with the verb *sein* (to be). The factor CONTEXT was determined by a context sentence preceding the actual test sentence and by the reference word for *bio* which together form a semantic environment according to the above differentiated contexts AB (23) and C (24).²³

- (23) *Jim erforscht die Bewegungsabläufe von Lebewesen.*
 Jim researches the movement.processes of living.entities
 ‘Jim researches the movement sequences of living beings.’
 a. *Das ist Biophysik.*
 this is biophysics
 b. *Diese Physik ist bio.*
 this physics is bio
- (24) *Der Imker in meiner Nachbarschaft produziert auf rein natürliche Weise.*
 the beekeeper in my neighborhood produces on pure natural way
 ‘The beekeeper in my neighborhood produces in a purely natural way’
 a. *Das ist Biohonig.*
 this is bio.honey
 b. *Dieser Honig ist bio.*
 this honey is bio

Thereby the reference word was only used in the second sentence and never in the preceding context sentence itself, so that repetition as a possible disturbing factor was avoided. In addition, the second sentence was printed in bold and the instructions indicated that only this second sentence should be evaluated in terms of its naturalness. (23) and (24) represent one token-set including both levels of each factor. Operationalized for this study, H1 can also be phrased in this way:

H1.1: The difference in the rated naturalness of sentences with the bound confix *bio*- compared to the free lexeme *bio* is larger in contexts of type AB than in contexts of type C, i.e., the factor MORPHOLOGY interacts with the factor CONTEXT: ((23a) – (23b)) > ((24a) – (24b)).

H1.2: The ratings of sentences with the free lexeme *bio* in contexts of type C (24b) are higher than in contexts of type AB (23b).

²³ I do not provide idiomatic translations of the examples in this section, since these are precisely what is at issue. For example it is just questionable whether (23b) is understood as ‘This physics is organic’ or ‘This physics is bio’ or just as something semantically strange.

3.1.2 Procedure

Since the variation of the factor CONTEXT already is a lexical variation itself, both variants of this factor could be tested in the same questionnaire. Therefore, the items were divided into two questionnaires according to the different conditions of the factor BOUNDEDNESS. In other words: Each subject saw all conditions for CONTEXT, i.e. all sentences from Category AB and all sentences from Category C, but only in one of the two conditions of MORPHOLOGY (bound or free). The ratio of the semantic subcategories of AB and C was evenly balanced ($6 \times A$, $6 \times B$, $4 \times C1$, $4 \times C2$, $4 \times C3$). The subjects rated 24 items and 48 fillers by their naturalness on a 7-point Likert scale ($7 = \textit{completely natural}$).

The survey was conducted online using the LimeSurvey online survey portal (WEB₇). For the survey, the different groups of items and fillers were pseudorandomized in such a way that the random sequence of the groups ensured that no two sets from the same type of group ever followed each other.

3.1.3 Participants

A total of 83 participants took part in the survey. Ten of these had to be sorted out due to incomplete data. All test persons were native speakers of German, who took part voluntarily and had been recruited by email or social media.

3.2 Results

3.2.1 Main Categories

Using the *lme4* package (Bates et al., 2015) in R (R Core Team, 2017), a linear mixed-effects model with the dependent variable *Rating* was fitted to the data (see Figure 6, left panel). The full model contained INDEX, i.e. the sequence in that the items have been shown, CONTEXT and MORPHOLOGY (including interaction term) as fixed effects, as well as random intercepts for both *subject* and *item*.²⁴ Subsequently, according to the principle of backwards model selection, all non-significant effects and interactions were gradually removed from the model. A new model was calculated in each case by eliminating the effect or interaction estimated as non-significant. Both models were then compared for the significance of their difference using likelihood ratio tests (see Winter 2013: 31-34) with the *anova* function. If the difference between the models was not significant, the effect was excluded. The final model only contained significant effects and interactions, which in turn were tested for significance using a likelihood ratio test (see Table 3).²⁵

Table 3. Final model main categories

Effect	Estimate	<i>se</i>	χ^2	<i>df</i>	<i>p</i> -value
Index	3.005e+00	3.742e-01	5.04	1	< .05
Context	2.227e+00	9.989e-02	181.69	1	< .001
Morphology	-3.894e-03	1.733e-03	446.21	2	< .001
Context:Morphology	-1.838e+00	1.412e-01	161.34	2	< .001

For the superordinate categories the analysis shows that the semantic context has a significant main effect on the rating of items ($\chi^2(2) = 181.69$, $p < .001$) in such a way that items are rated significantly worse in type AB contexts than in type C contexts. For the superordinate categories the analysis shows that the semantic context has a significant main effect on the rating of

²⁴ Full model formula: *lmer(rating ~ (context + morphology + index)^2 + (1|item) + (1|subject))*.

²⁵ Final model formula: *lmer(rating ~ (context + morphology)^2 + index + (1|item) + (1|subject), REML=FALSE)*.

items ($\chi^2(2) = 181.69, p < .001$) in such a way that items are rated significantly worse in type AB contexts than in type C contexts.

The effect of the morphological class ($\chi^2(2) = 446.21, p < .001$) is also significant: Bound variants are rated significantly better than free ones. Furthermore, the interaction between semantic context and morphological class is significant as well ($\chi^2(1) = 161.34, p < .001$): The difference in rating between free and bound variants is significantly larger in contexts of type AB than in contexts of type C, which supports H1.1. H1.2 is confirmed by the combination of the main effects and the interaction since free variants in AB are rated significantly worse than any other condition. The order in which the items were presented also had a significant effect on the rating ($\chi^2(1) = 5.04, p < 0.05$): There is a slight habituation effect of $-.004$ points ($\pm .002$ sd) per increase of the index value by 1.

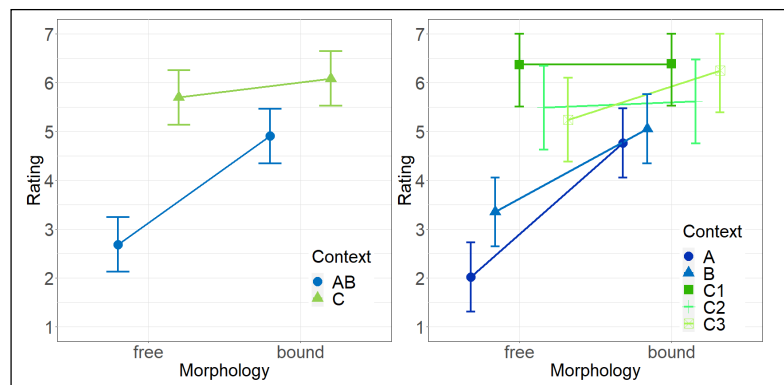


Figure 6. Mean ratings of naturalness sorted by CONTEXT, mean ratings & 95% confidence intervals

3.2.2 Subcategories and Core Meaning of *bio*

Corresponding to the analysis of the main context categories, an additional analysis of the subcategories was performed, firstly to determine how they relate to each other and secondly to understand the semantics of the free morpheme *bio* in more detail. The full model contained the factors INDEX, *C3 vs A*, *C3 vs B*, *C3 vs C1*, *C3 vs C2* and MORPHOLOGY (including interaction term) as fixed effects, as well as random intercepts for both *subject* and *item*.²⁶ The model was dummy coded with *C3:bound* as reference level. *C3* was chosen as the reference level because the pairwise comparisons of the subcategories with *C3* are of particular importance in determining the core meaning of the free lexeme *bio*, as further argumentation will demonstrate. Using the backwards model selection procedure described above, all non-significant effects and interactions were again gradually excluded from the model. The final model only contained significant effects and interactions (see Table 4).²⁷

A significant main effect was found for *C3 vs A*, such that variants were rated worse in contexts of type A. In addition, four significant interactions were found, i.e. between MORPHOLOGY and all four *C3 vs X* factors. The fact that no significant main effects were found for the pairwise comparisons *C3 vs C1*, *C3 vs C2*, and *C3 vs B* indicates that *bio* is perceived as similarly natural in all four contexts. However, the interactions between the factor MORPHOLOGY and the pairwise comparisons differ: The difference in the ratings of free variants is smaller in contexts of type *C1* and *C2* than in contexts of type *C3*, which suggests that free variants are already better established in *C1* and *C2*. However, the interaction of *C3 vs B* and MORPHOLOGY also shows that free variants are already better established in *C3* than in *B*, because here the

²⁶ Full model formula: $lmer(\text{rating} \sim (C3vsA + C3vsB + C3vsC1 + C3vsC2 + morphology + index)^2 + (1|item) + (1|subject))$

²⁷ Final model formula: $lmer(\text{rating} \sim (C3vsA + C3vsB + C3vsC1 + C3vsC2 + morphology + index)^2 - morphology:index - C3vsC1:index - C3vsC2:index - C3vsA:index + (1|item) + (1|subject))$

situation is reversed: the difference in the rating of free variants is smaller in *C3* than in *B*. The same applies to the interaction of *C3* vs *A* and MORPHOLOGY.

Table 4. Final model subcategories.

Effect	Estimate	<i>se</i>	χ^2	<i>df</i>	<i>p</i> -value
Morphology	-1.010e+00	1.706e-01	492.96	4	< .001
<i>C3</i> vs <i>A</i>	-1.480e+00	5.990e-01	75.795	2	< .001
<i>C3</i> vs <i>A</i> : Morphology	-1.738e+00	2.204e-01	61.335	1	< .001
<i>C3</i> vs <i>B</i> : Morphology	-6.839e-01	2.203e-01	9.649	1	< .01
<i>C3</i> vs <i>C1</i> : Morphology	9.919e-01	2.415e-01	16.858	1	< .001
<i>C3</i> vs <i>C2</i> : Morphology	8.798e-01	2.413e-01	13.287	1	< .001
<i>C3</i> vs <i>B</i> : Index	-8.862e-03	4.057e-03	4.7502	1	< .05

This leads to the conclusion that the core meaning of this morpheme does not lie on product or produced, as Scheller-Boltz (2008: 251f) claims since this would only include uses in contexts of types *C1* and *C2*. However, the corpus study and the rating study speak for the fact that there is a change in the way *bio* is used: the free lexeme is also usable and accepted in contexts of type *C3*. In its original use as a predicative of products, it is (still) perceived as more natural, but its use with non-products is not considered unnatural. Therefore, the context-independent, central meaning of the free lexeme *bio* must lie in the common semantic core, which is evident in all uses in contexts *C1* to *C3*: The health and/or environmental-ethical criteria (evaluated as positive) according to which the production, operation or procedure in question is carried out.

3.3 Summary

The experiment corroborated the two hypotheses H1.1 and H1.2: The semantic difference between *bio* and *bio(-)* consists in the fact that the free lexeme *bio* has a more concrete meaning, so that it is only acceptable in certain contexts (*C1-C3*). Although the bound counterpart is used in compounds within these contexts as well, it can also be used in other contexts (*A, B*). In other words, in the case of the confix *bio-*, the context determines the meaning and any connotations; in the case of the free lexeme *bio*, the meaning excludes certain contexts of use. There is no question that *bio* as a free lexeme in predicative use works best with (agricultural) products. However, it is decisive that *bio* can also be predicated on non-products and can be found in adverbial use such as (3b) or (19). *Bio* as a free lexeme is thus used to ascribe certain health and/or environmental-ethical qualities to specific objects, processes, activities etc.

4 Outlook

Bio is used to evaluate products and non-products by certain health or environmental-ethical criteria and is therefore not just a political or economic quality seal but also a linguistic quality seal. Furthermore, both the thesis of morphological change caused by semantic change and the thesis of a subjectively evaluating aspect of *bio* are supported by a comparative look at other formerly bound elements that apparently have developed into free lexemes: *super*, *mega*, *anti*, *öko*, etc. All these elements not only show an analogous change in meaning compared to their bound counterparts, just like *bio*, but, as free lexemes, they also always seem to express some kind of subjective and expressive evaluation:

- (25) a. Supermarkt
supermarket
- b. Megaexplosion
mega explosion
- c. antiallergisch
anti allergic
- (26) a. Auch das Essen ist super. (A97/SEP.24786)

Also the food is super
'The food is great, too.'

b. Die Party war mega. (A00/JUL.45107)
the party was mega
'The party was great.'

c. Ich bin anders geworden. Nicht mehr so zickig, so anti. (BRZ12/OKT.03468)
I am different become not anymore so bitchy so anti
'I've changed. Not so bitchy anymore, so destructive/against everything.'

Super- in (25a) means approximately the same as *large*. The same applies to *mega-* in (25b). In (26), however, both are rather synonymous with *great*, *good*, or *excellent*. Speakers use these terms to express a positive evaluation. The speaker evaluation is not necessarily positive for all free, formerly bound elements: Instead, *anti* always seems to transport a negative evaluation in the sense of *destructive* or *negative*, as in (26c), which is already evident from the fact that it is mentioned in a row with *zickig* (bitchy), which is also negatively occupied. Bound in (25c) it has a rather neutral meaning in the sense of *against* or *opposed*.

Analogous examples can be found for all lexemes mentioned above. Thus, both the thesis that the movement from the bound morpheme to the free morpheme is caused by semantic change and the thesis that the semantic change usually results in an evaluative term that have been found for *bio(-)* seem to be transferable to other examples as well. This needs not be the only mechanism for such a morphological change, but it seems to be a productive type of morphological change in German, which is not limited to the morpheme *bio(-)*.

In the case of *bio(-)*, some aspects remain to be examined: The experiment presented here has been limited to the predicative use of *bio*. Similar studies on adverbial use as an adjective and nominal use as object and subject could confirm the results and provide further insights. For the adverbial use, it is likely to be seen that it is only natural in contexts of type C3 since adjectives used adverbially always describe procedures and never things or products (but at most the production itself). Also, a further morphological development of *bio*, e.g. the more frequent occurrence of inflection (see the comparative form in (3a)) or the occurrence in attributive function, is a possible development. In this respect, Olt's conclusion from 1983 is still up to date: "Professional lexicographers should keep an eye on *Bio*" (Olt, 1983: 165, author's translation).

Finally, I would like to close by trying to answer to the question that gave this article its title: *Wie bio sind die Biowaffen?* ('How bio are the bioweapons?'). To the convinced pacifist, as well as to the linguist, there is only one answer left: not even a bit.

References

- Ascoop, K. (2005). Affixoidhungrig? Skitbra! Status und Gebrauch von Affixoiden im Deutschen und Schwedischen. *Germanistische Mitteilungen: Zeitschrift für deutsche Sprache, Literatur und Kultur*, 62, 17-28.
- Bates, D., Mächler M., Bolker B., Walker S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, 67(1), 1-48.
- Donalies, E. (1999). Können Wortbildungsaffixe semantische Kerne sein? Ein Diskussionsbeitrag zur Differenzierung der deutschen Affixe nach semantischen Kriterien. *Deutsche Sprache*, 27, 195-208.
- Donalies, E. (2005). Das Konfix. Zur Definition einer zentralen Einheit der deutschen Wortbildung. In P. O. Müller (Ed.), *Fremdwortbildung. Theorie und Praxis in Geschichte und Gegenwart* (pp. 179-198). Frankfurt am Main: Lang.

- Donalies, E. (2009). Stiefliches Geofaszintainment – Über Konfixtheorien. In: P. O. Müller (Ed.), *Studien zur Fremdwortbildung* (pp. 41–64). Hildesheim: Georg Olms Verlag.
- Duden. (⁴2007). *Das Herkunftswörterbuch. Etymologie der deutschen Sprache*. Mannheim & Zürich: Dudenverlag.
- Duden. (¹⁰2010). *Das Fremdwörterbuch*. Mannheim & Zürich: Dudenverlag.
- Duden. (⁷2011). *Deutsches Universalwörterbuch*. Mannheim & Zürich: Dudenverlag.
- Eins, W. (2008). *Muster und Konstituenten der Lehnwortbildung. Das Konfix-Konzept und seine Grenzen*. Hildesheim: Georg Olms Verlag.
- Eins, W. (2009). Alter Wein in neuen Schläuchen? Zum Konfix. In P. O. Müller (Ed.), *Fremdwortbildung. Theorie und Praxis in Geschichte und Gegenwart* (pp. 65-90.). Frankfurt am Main: Lang.
- Eisenberg, P. (²2004). *Das Wort. Grundriß der deutschen Grammatik*. Stuttgart: Metzler.
- Elsen, H. (2005). Deutsche Konfixe. *Deutsche Sprache*, 33, 133-140.
- Engel, U. (²1991). *Deutsche Grammatik*. Heidelberg: Julius Groos Verlag.
- Fleischer, W. (1995). Konfixe. In I. Pohl & H. Ehrhardt (Eds.), *Wort und Wortschatz. Beiträge zur Lexikologie* (pp. 61-68). Tübingen: Niemeyer.
- Fleischer, W. & Barz, I. (⁴2012). *Wortbildung der deutschen Gegenwartssprache*. Berlin/Boston: Walter de Gruyter.
- Gehlen, J. (2016). *Vom Konfix zum Wort. Unter welchen Bedingungen geht eine solche Morphem-bewegung vonstatten? Eine theoretische und analytische Arbeit am Beispiel des freien Vorkommens von bio-, öko- und turbo- in Zeitungen*. Graduate Thesis. Ludwig-Maximilians-Universität.
- Grimm, H.-J. (1997). Konfixe: Beobachtungen in Tageszeitungen und in Wörterbüchern. In I. Barz & M. Schröder (Eds.), *Nominationsforschung im Deutschen. Festschrift für Wolfgang Fleischer zum 75. Geburtstag* (pp. 277-284). Frankfurt am Main: Peter Lang.
- Kirkness, A. (1987). Einführung. Zielsetzung, Genese und Materialbasis des Vorhabens Lehnwortbildung (LWB). In G. Hoppe, A. Kirkness, E. Link, I. Nortmeyer, W. Rettig & G. D. Schmidt (Eds.), *Deutsche Lehnwortbildung. Beiträge zur Erforschung der Wortbildung mit entlehnten WB-Einheiten im Deutschen* (pp. 53-101). Tübingen: Günter Narr Verlag
- Kluge, F. (²⁵2011). *Etymologisches Wörterbuch der deutschen Sprache*. Revised by E. Seebold. Berlin/Boston: Walter de Gruyter.
- Michel, S. (2009). Das Konfix zwischen ‚Langue‘ und ‚Parole‘. Ansätze zu einer sprachgebrauchsbezogenen Definition und Typologie. In P. O. Müller (Ed.), *Studien zur Fremdwortbildung* (pp. 91-140). Hildesheim: Olms.
- Motsch, W. (1996). Affixoide. Sammelbegriff für Wortbildungsphänomene oder linguistische Kategorie?. *Deutsch als Fremdsprache*, 33, 160–168.
- Müller, P. O. (2000). Deutsche Fremdwortbildung. Probleme der Analyse und Kategorisierung. In M. Habermann (Ed.) *Wortschatz und Orthographie in Geschichte und Gegenwart. Festschrift für Horst Haider Munske zum 65. Geburtstag* (pp. 115-134). Tübingen: Max Niemeyer Verlag.
- Munske, H. H. (1988). Ist das Deutsche eine Mischsprache? Zur Stellung der Fremdwörter im Deutschen. In R. Hildebrandt, H. H. Munske, P. von Polenz & O. Reichmann (Eds.), *Deutscher Wortschatz. Lexikographische Studien* (pp. 46-74). Berlin: De Gruyter.
- Olt, R. (1983). Bio – ein "lebhaftes" Wortbildungselement. *Der Sprachdienst*, 27, 163-165.
- R Core Team (2017). *R: A language and environment for statistical computing*. Wien: R Foundation for Statistical Computing. URL: <https://www.R-project.org/>.

- Scheller-Boltz, D. (2008). »Bio, Burger oder Genfood – Streit ums Essen« *bio(-)* jetzt als selbstständiges Wort? *Muttersprache*, 118, 243-258.
- Scheller-Boltz, D. (2010). Sind Konfixe immer basisfähig? Ein Beitrag zu morphologischen Eigenschaften von Konfixen. *Muttersprache*, 120, 10-22.
- Schmidt, G. D. (1987a). Das Affixoid. Zur Notwendigkeit und Brauchbarkeit eines beliebten Zwischenbegriffs der Wortbildung. In G. Hoppe, A. Kirkness, E. Link, I. Nortmeyer, W. Rettig & G. D. Schmidt (Eds.), *Deutsche Lehnwortbildung. Beiträge zur Erforschung der Wortbildung mit entlehnten WB-Einheiten im Deutschen* (pp. 53-101). Tübingen: Günter Narr Verlag.
- Schmidt, G. D. (1987b). Das Kombinem. Vorschläge zur Erweiterung des Begriffsfeldes und der Terminologie für den Bereich der Lehnwortbildung. In G. Hoppe, A. Kirkness, E. Link, I. Nortmeyer, W. Rettig & G. D. Schmidt (Eds.), *Deutsche Lehnwortbildung. Beiträge zur Erforschung der Wortbildung mit entlehnten WB-Einheiten im Deutschen* (pp. 37-52). Tübingen: Günter Narr Verlag.
- Schu, J. (2005). Zwischen Grundmorphem und Affix. *Deutsche Sprache*, 33, 258-289.
- Winter, B. (2013). *Linear models and linear mixed effects models in R with linguistic applications*. arXiv:1308.5499. Bereitgestellt und zugegriffen am 18.03.2018 unter: <http://arxiv.org/pdf/1308.5499.pdf>

Web References²⁸

- WEB₁: <https://www.bevegt.de/bio-lebensmittel/>
- WEB₂: https://www.focus.de/wissen/videos/lebensmittel-unter-der-lupe-bio-ist-nicht-gleich-bio-was-hinter-der-bezeichnung-steckt_id_5272543.html
- WEB₃: <https://www.bild.de/media/vw-wir-sind-papst-pdf-40595960/Download/3.bild.pdf>
- WEB₄: <https://www.moebelkultur.de/news/neuer-slogan/>
- WEB₅: <http://www.ids-mannheim.de/cosmas2/>
- WEB₆: <http://www.ids-mannheim.de/kl/projekte/korpora/>
- WEB₇: <https://www.limesurvey.org/de>.

²⁸ Last checked and visited 20.06.2020.