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Diachronic Demorphologization and Constructionalization of Compounds from the Perspective of Distributed Morphology and Cartography

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As for the morphosyntactic size of a compound, it has occasionally been suggested that some of the N-N compounds can be larger than derived words but are smaller than phrases (Allen (1978), Giegerich (2005)) or that some of the V-V compound are words, while others are phrases (Kageyama (1993, 2001), Nishiyama (1998)). However, exactly how large each compound is remains controversial, partly because their nature is synchronically variable in terms of phonology, morphology, syntax, and/or semantics. In relation to this problem, there has been a long-standing issue of which of morphology and syntax should deal with the internal structure of these two types of compound and others. Here arises a set of reciprocative discussions between the lexicalists and anti-lexicalists over the data that belong to morphosyntax, and yet no settlement has been reached so far, because both types of approach have as much defects as merits. With these problems recalcitrant to a synchronic analysis in mind, I will shed a diachronic perspective on them. More specifically, this article launches a simple hypothesis that the morphosyntactic size of a compound tends to be diachronically enlarged from the domain of morphology to that of syntax, as is known by the names such as demorphologization and/or constructionalization. I will collect relevant data from the Corpus of Historical American English (COHA) and the literature on the traditional Japanese linguistics. Then, I will provide a morphosyntactic analysis of the diachronic generalization, in terms of two outstanding syntactic theories: Distributed Morphology (Halle and Marantz (1993), Marantz (1997)) and Cartography (Cinque (2003, 2006)). Three kinds of data presented in support of the above hypothesis are: (i) the demorphologization of many combining forms including -phobia, -holic, psycho-, techno-, their reanalysis as independent words, and their development as N-N compounds, (ii) the emergence of the resultative construction from the corresponding V-A form in English, and (iii) the development of the syntactic V-V compounds from the lexical V-V compounds such as kami-kiru ‘bite-cut’ and yomi-kiru ‘read-cut’ in the history of Japanese (Aoki (2010)). I will argue that these three types of diachronic changes are the instances of what I call “syntactic constructionalization” at the so-called “word” level, the VP/vP-level, and the AspectP-level, respectively.

KEYWORDS: compounds, combining form, resultative construction, constructionalization, COHA

1. Introduction

In the generative camp, language is defined as the internal, innate, and intrinsic property of the human mind/brain, which is composed of Universal Grammar as a set of grammatical principles and a set of parameters whose (probably binary) values are to be fixed in the course of language acquisition. Moreover, linguistic theory is believed to be “concerned primarily with an ideal speaker-listener, in a completely homogeneous speech-community, who knows its language perfectly and is unaffected by such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his knowledge of the language in actual performance” (Chomsky (1965: 3)).

In this view, it has generally been supposed that if a language can change diachronically, it can only change in the course of language acquisition by a generation $G_{i+1}$, who is to fix the value of a parameter differently from that of the previous generation $G_i$ (Lightfoot (1991)). Not only does this view presuppose that a child can acquire a different grammar of a particular language than what his or her parents have acquired (Halle (1962)); it also seems to presuppose that a language can slightly change instantaneously from one generation to the next generation, when a language of the parent generation is acquired by their child.

At first sight, this view seems to contradict with the generally recognized fact that a language can change gradually along a cline, as has often been pointed out by historical linguists. On the basis of this fact, one might argue against a theory of language armed with principles and parameters. However, such a counterargument is not justified at all, because language acquisition is not merely the fixing of a single parameter. Rather, “[i]n modern grammatical thinking, a clause has a ‘Functional Structure (F-structure)’, a spine consisting of some number of non-lexical heads, perhaps as

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many as 150, with the lexical verb at the bottom” (Williams (2010: 132); cf. also Cinque (1999, 2006)). Then, if the timing of the value setting of each parameter in the course of language acquisition lags behind that of the others slightly, and if, for example, the positive setting of the binary value of a parameter \( P_{i+1} \) on \( F_{i+1} \), where \( i \) ranges from 0 to 4, presupposes the positive setting of the value of a parameter \( P_i \) on \( F_i \), then we can have a picture of gradual change that leads to a set of radically different properties in some parts of the syntax just in one generation (i.e. in around 20 to 30 years) like the following, where the cross axis refers to the temporal axis and the vertical axis refers to the parameters \( P_i \) which can have either one of the binary values on \( F_i \) in the hierarchy of the F-structure:

<table>
<thead>
<tr>
<th>( t_0 )</th>
<th>( t_1 )</th>
<th>( t_2 )</th>
<th>( t_3 )</th>
<th>( t_4 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( P_i ) on ( F_i )</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>( P_{i+1} ) on ( F_{i+1} )</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>( P_{i+2} ) on ( F_{i+2} )</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>( P_{i+3} ) on ( F_{i+3} )</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>( P_{i+4} ) on ( F_{i+4} )</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Also, since different children can be borne at different times, if every child is to fix the value of the same parameter \( P_i \) (\( 0 \leq i \leq 4 \)) at the same age after birth, \( t_i \) for a group of children may well correspond to \( t_{i+1} \) for another group of children. Moreover, an increasing number of children can be born at different times ranging from \( t_0 \) to \( t_4 \). Hence, the number of those children who have different values of parameter setting on the multiple parameters \( P_i \) (\( 0 \leq i \leq 4 \)) than those of their parent’s generation will gradually increase as time goes by and a particular language can change gradually accordingly, if the data qualified as the positive evidence for the setting of the values of the relevant parameters are in themselves the outputs of the resetting of the adjacent parameters and/or the structural reanalysis of the adjacent domain now in progress. Therefore, if a historical corpus has a sufficiently large set of diachronically sorted language data, which arguably reflect some property of “I-language”, then we can see the tendency of gradual language change as a whole, even if each parameter setting which occurs in the mind/brain of a single language learner is instantaneous in itself. If this reasoning is on the right track, the gradualness of grammaticalization along a cline can be fully compatible with a well-designed theory of generative linguistics, as far as the phenomena in question are relevant to a set of multiple morphosyntactic parameters.

Another salient property of grammaticalization is its unidirectionality. Brinton and Traugott (2005: 99) define grammaticalization as “the [diachronic] change whereby in certain linguistic contexts speakers use parts of a construction with a grammatical function. Over time the resulting grammatical item may become more grammatical by acquiring more grammatical functions and expanding its host-classes.” The initial step of change from a lexical or contentful item to a grammatical item is sometimes called “primary grammaticalization,” whereas the next step of change whereby a grammatical item becomes more grammatical on the cline of lexical-functional continuum is sometimes called “secondary grammaticalization” (Hopper and Traugott (1993)).

It has been generally believed that there is a strong tendency of unidirectionality in the process of grammaticalization (Lehmann (1982), Heine, Claudi and Hünnemeyer (1991); Hopper and Traugott (1993); Bybee, Perkins, and Pagliuca (1994); Newmeyer (1998); Haspelmath (1999), Heine and Kuteva (2002); Heine (2003)). The unidirectionality of grammaticalization has more often been discussed in the field of cognitive linguistics than in the field of generative linguistics. However, it is not the case that the tendency resists a syntactic analysis. In fact, there are a couple of syntactic analyses of the unidirectionality of grammaticalization, one of which is Roberts and Roussou’s (2003) “upward reanalysis” of verbs as auxiliaries:

(1) Successive upward reanalysis along the functional hierarchy is thus how we define grammaticalization path.

By “the functional hierarchy” we can refer to the recent trend of “cartography,” led by the syntacticians such as Rizzi (1997, 2004), Cinque (1999, 2003, 2006), Svenonius (2006, 2010), and Kayne (2000, 2005, 2010), among others. Nishiyama and Ogawa (2013, this volume) and Ogawa and Niinuma (2011) also claim that Cinque’s cartography provides a new way to approach the issue of grammaticalization of the second verb of V-V compounds (cf. also Matsumoto (1996)).

In a diachronic view of the syntax-morphology interfaces, there is a well-known dictum by Givón (1971, 1979), which says that “today’s morphology is yesterday’s syntax.” In accordance with Givón’s dictum, it has often been said that grammaticalization involves language change from syntax to morphology or from an independent word to a clitic or an affix, whereas there are only a few cases of counterdiachronic diachronic change, which has been called “degrammaticalization” (Ramat (1983)), “demorphologization” (Joseph and Janda (1988)), “partial syntacticization” (Klausenberger (2002)), or “lexicalization” (Brinton and Traugott (2005)). Heine (2003: 173-174) estimates that this tendency is 90% true, while exceptions to this generalization are less than 10% of all the diachronic changes. The latter type of diachronic change is exemplified by such cases as logy as an independent word derived from -logy as a
combining form referring to a subject of study, ex as an independent word derived from the prefixal ex- of ex-wife, and so on.

The point here is their claim that “demorphologization” is quite rare in cases, compared with the large amount of cases of unidirectional grammaticalization. However, their observations about the quantitative comparison between grammaticalization and demorphologization (or lexicalization) seem at least partially wrong, as far as we compare the transition from a bound stem to a free morpheme with the transition to the opposite direction. On the one hand, we can see only a couple of cases in which a previously autonomous morpheme became an affix, such as the derivation of adjectivizing suffix -ly (e.g. manly) from an independent word liç in Old English (OE) or likam ‘like’ in Proto-Germanic (cf. Bybee (2010)), the derivation of the nominalizing suffix -hood (e.g. childhood) from had ‘person, condition, quality’ in OE, and the derivation of nominalizing suffix -dom (e.g. kingdom) from doom ‘fate’. On the other hand, there are more than a dozen cases of demorphologization in which what was previously a bound morpheme such as an affix or a combining form became an autonomous word without radically changing the meaning, such as bus, burger, phobia, logy, ism, hood, teen, holic, ex, bi, pseudo, techno, photo, and psycho, in addition to what is illustrated by Brinton and Traugott (2005: 60), such as ade, gate, itis, ocracy, and ology.4,5

This observation should force us to reconsider how we should approach the processes of grammaticalization and demorphologization. One morphological approach to diachronic matters of the syntax-morphology interface is to adopt Booij’s (2010) idea of “Construction Morphology” and extends it to the issue of diachronic change from bound morphemes to free morphemes or a change to the opposite direction, just as Goldberg’s (1995, 2006) “Construction Grammar” has been extended to apply to phenomena about grammaticalization in the last decade.

“Construction Grammar” is a theory of grammar which Goldberg proposed as a radical alternative to the generative syntax. Originally, it was launched as a synchronic theory of our mind/brain, and claims (2):

(2) All levels of grammatical analysis involve constructions: Learned pairings of form with semantic or discourse function, including morphemes or words, idioms, partially lexically filled and fully general phrase patterns. (Goldberg (2006: 5))

Goldberg had no intention of extending the proposed grammar to the matter of diachronic language change. However, since Lehmann (1982: 406) suggested that “grammaticalization does not merely seize a word or morpheme […] but the whole construction formed by syntagmatic relations of the element in question,” such an intuition was shared among historical linguists, so that it was naturally expected that Construction Grammar has been applied to data on historical change. Thus, Himmelmann (2004) is an attempt to redefine the unit to which grammaticalization applies as “construction” as a whole rather than as a single word or isolated lexical item. In the same vein, Bergs and Diewald (2008) have coined the new word “constructionalization,” as defined below:

(3) Strictly speaking, it is never just the grammaticalizing element that undergoes grammaticalization. Instead, it is the grammaticalizing element in its syntagmatic context which is grammaticalized. That is, the units to which grammaticalization properly applies are construction, not isolated lexical items. (Himmelmann (2004: 31))

(4) It should have become clear that constructional approaches to linguistic change, and construction grammar in particular, not only raise some interesting new questions here, but that they are also well suited for dealing with these problems and for treating multiple elements as single units, either in the form of constructions or what could be termed constructionalization, i.e. the formation of new units (constructions) out of hitherto independent material. (Bergs and Diewald (2008: 4))

See Fillmore and Kay (1999), Akimoto and Maeda (2013), and Hilpert (2013) for a similar view. If we try to extend the idea of constructionalization one step further and apply it to the domain of morphology, Booij’s (2010) theory of “Construction Morphology” may be helpful in dealing with the matter of demorphologization.

In any event, the process of demorphologization and/or constructionalization is in affinity with “Construction Grammar” as a usage-based cognitive model of grammar. However, this does not mean that the generative syntax, as a theory of I-language, has nothing to say about the issue of demorphologization and/or constructionalization, for reasons stated in note 2. In fact, the recent trend of Distributed Morphology (henceforth, DM) also seems to be in affinity with the diachronic issues on the morphology-syntax interface. DM is launched by Halle and Marantz (1993) and extended by Marantz (1997), Harley and Noyer (1999), Arad (2003), Embick and Noyer (2008), Basilico (2008), Harley (2009), and Borger (2005, 2012), among others. Its major thesis is that it does not assume “words” as a rigid morphosyntactic boundary between syntax and morphology, and that the sizes of the so-called “words” and “phrases” are merely relative to each other with respect to how many lexical and functional categories are merged with the root before it is categorized (and is spelled-out).

All in all, data about historical change and/or data from historical corpus should be as compatible with generative syntax as with Construction Grammar. In fact, the aim of this article to show that DM and Cartography can offer a new syntactic perspective on the diachronic issues of demorphologization, constructionalization, and their unidirectionality.
Arguably, this aim can be best achieved if we choose certain phenomena about compounding which have been recalcitrant to a synchronic analysis because they face either or both of the following two situations: (i) the morphosyntactic size of a compound has been controversial, because application of various diagnostic tests in terms of phonology, morphology, syntax, and/or semantics to relevant data shows that some of the N-N compounds are larger than derived words but others are smaller than phrases (Allen (1978), Giegerich (2005)) or that some of the V-V compound look like words and phrases at the same time (Kageyama (1993, 2001)); (ii) given two constructions which are allegedly mutually related, there has been unsettled controversy over which construction is derived from the other, partly because sufficient evidence has been proposed supporting either of the synchronic syntactic analyses. From these perspectives, three kinds of data to be dealt with in this article: (i) demorphologization of many combining forms including -phobia, -holic, psycho-, techno-, their reanalysis as independent words, and their development as N-N compounds, (ii) emergence of the resultative construction from the corresponding V-A form in English, and (iii) the development of the syntactic V-V compounds from the lexical V-V compounds such as kami-kiru ‘bite-cut’ and yomi-kiru ‘read-cut’ in the history of Japanese (Aoki (2010)).

This article is organized as follows: in section 2, I will present a new generalization based on COHA about demorphologization of combining forms and provide a DM-based analysis of how certain bound morphemes could acquire a free morpheme counterpart diachronically. In section 3, I will present a new set of corpus data about the resultative construction and the corresponding V-A form and argue that the two constructions are diachronically related in that the former can be derived from the latter via syntactic constructionalization, in a way compatible with the principle of economy. I will also claim that the diachronic relation between the two constructions is reflected on the synchronic derivation of the two constructions. In section 4, I will turn to the grammaticalization in Japanese V-V compound, and exploiting an observation by Aoki (2010) and a DM-based theory of grammaticalization put forth by Nishiyama and Ogawa (2013, this volume), I will provide a syntactic analysis of how various uses and aspectualized meanings of the Japanese verb kiru ‘cut’ in V-V compounds have been developed diachronically. Section 5 is a conclusion.

2. Demorphologization of Combining Forms: A DM Analysis

This section illustrates a couple of examples of the morphemes which, according to a historical corpus, had previously been used only as combining forms but came to be used as free morphemes from the early 20th century on, and discusses how the establishment of their usage as an independent word is correlated with other usages of the same morphemes, including them as part of a N-N compound.

The corpus I will use most often to justify the above-mentioned facts is the Corpus of Historical American English (COHA), which was launched by Mark Davies of Brigham Young University on 2009 and includes as many as 400 million words cited from texts of American English from the years 1810 to 2009. It tells us the frequency (per million) of each word or collocation per decade. Occasionally, I also use the Corpus of Contemporary American English (COCA), which is also administered by Mark Davies and accommodates 450 million words cited from texts of American English from 1990 to 2012.

2.1 Phobia as FCF and as Independent Word

Using this corpus, we can see, for example, that the morpheme phobia, which means an extreme fear to or aversion of something, had only been used in combination with the initial combining form hydro- as hydrophobia in the former half of the 19th century, but came to be used as a final combining form which can be combined with several initial combining forms, such as acrophobia, xenophobia, russophobia, and so on, when its frequency in use began to increase in the late 19th century, as shown in Figure 1.
In due course, it acquires its new use as an independent word in the 1920s, in combination with a definite or indefinite article, demonstrative, adjective, genitive possessive pronoun, with examples of collocations such as [at\*] phobia (such as a phobia, the phobia), [d\*] phobia (such as this phobia, that phobia), [f\*] phobia (such as typical phobia, simple phobia), [app\*] phobia (such as my phobia, their phobia), and so on. In much the same period, the collocation of phobia [i\*], i.e. phobia followed by a PP, begins to be used too. Finally, in the 1930s, there arises the frequency of several uses of phobia as part of N-N compound, such as dog phobia, cancer phobia, disease phobia, and so on. The various independent uses of phobia except for N-N compounds, available from COHA, are summarized in Figure 2:

The comparison between the frequency in uses of phobia as a final combining form (FCF) and that of phobia as an independent use is illustrated in Figure 3:
Figure 3 shows that the uses of *phobia* as a FCF are gradually increasing from the 1820s on, while it is not until the 1920s that the uses of *phobia* as an independent word emerge in COHA.

What should be compared with Figures 2 and 3 is the fact that the first instance of N-N compound whose N2 is *phobia* emerges for the first time in COHA in the 1930s (the specific example is *war phobia*), and similar examples increase thereafter, as in Figure 4:

To summarize so far, the first-emergences of *phobia* as a FCF, *phobia* as an independent word, *phobia* followed by a PP, and *phobia* as the second element of a N-N compound are periodically aligned in this order. If this ordering is limited to *phobia*, the fact is not worth receiving a theoretical explanation. However, essentially the same ordering is observed with other instances of FCFs, such as *-phobic, -a(holic, -burger*, and so on. This means that the above mentioned sequential order has the status of a descriptive generalization which should be explained by any theory of
lexicalization. To make this point, in the next subsection, we will delve into the data on -phobic, -(a)holic, and burger.

2.2 Phobic as FCF and as Independent Word

Here, again, we can see from COHA that the first-emerging periods of phobic as a FCF, phobic as an independent word, and phobic as the second element of a N-A compound are periodically aligned in this order, as shown in Figure 5:

![Fig. 5.](image)

More specifically, the first use of ICF+phobic, or a combination of an initial combining form and phobic, i.e. hydrophobic, emerges in the 1830s, and this is the only instance of ICF+phobic up until the 1900s, when claustrophobic is first used. The first uses of sexophobic and photophobic are seen in the 1930s, and COHA gives us the first example of an independent use of phobic in 1946, as in (5):

(5) Personality types varied widely and showed no uniformity of emotional conflict. Eleven patients were predominantly compulsive, nine unaggressive, eight bisexual, seven phobic, three overaggressive and three hysterical.

After the 1950s, we can sporadically see examples like a phobic, the phobic, severe phobic, and the predicative uses of phobic. In the 1970s, phobic begins to take a PP complement. As for the first emergence of a N+phobic compound, however, we must wait until the 1990s, when we find one or two examples of commitment phobic, school phobic, germ phobic, fashion phobic and closet phobic, respectively.

Above all, it is important to note that the first instance of N+phobic compound appears about five decades after the first independent use of phobic emerges.

2.3 Burger as FCF and as Independent Word

As is well-known, hamburger as one of the best-known first-foods in USA is etymologically related to a certain place name, i.e. Hamburg. As far as the word Hamburger was originally used as referring to the people who lived in a particular city in Germany, the word could only be morphologically divided into Hamburg and -er, just like New Yorker. Even when hamburger began to be used in 1918 as referring to the same edible thing as hamburger steak (as old as 1912) and hamburg steak (as old as 1905), the morphological divide was not placed between ham and burger. Probably, it was not until 1954 or years later that burger got the status of a morpheme via ‘resegmentation’ (cf. Bauer (2003: 219), Haspelmath (2002: 56)), when Burger King, the franchise which sells hamburger and sandwich, was launched. In COHA, the first use of Burger King appears in 1968, the first collocation of an adjective and burger appears in 1975 as double fat burger, the first collocation of a noun and burger appears in 1977 as cheese-burger, and the first use of ham-burger appears in 1980.
Again, COHA proves that the demorphologization of burger from hamburger in 1968 is followed by the first use of its adjectival modification, i.e. fat burger, and the first use of burger taking a PP complement (e.g. a tasty double fat burger with chili) found in 1975, which is followed by the first use of burger as part of a hyphenated N-N compound in 1977, i.e. cheese-burger. Although we can see one example of a downtown burger bar in 1979, it is not until the 1990s that we come to see productive uses of non-hyphenated N-N compound such as venison burger (1992), buffalo burger (1993), veggie burger (1998), vegetable burger (1998), onion burger (1998), discount burger (1999), poultry burger (1999), etc.

This periodical order in the various uses of burger is identical to that in the various uses of phobia and phobic we have observed in the previous subsections.

2.4 Holic as FCF and as Independent Word

Another support for the proposed generalization comes from the demorphologization of holic. Originally the final combining form (FCF)+holic could only be combined with the initial combining form (ICF) alco- meaning alcohol, until the 1890s. There are totally 1807 instances of alcoholic from the 1810s to the 2000s in COHA. However, the initial use of workaholic emerges in a 1905 text in COHA. Thereafter, most of the totally 2010 uses of holic as FCF that appear in COHA have been preceded by the linker -a- or -o- without any hyphenation, such as alcoholic, sexoholic, bagoholic, rageoholic, jordanohoic, workaholic, buyaholic, spendaholic, shopaholic, and so on, and most of them, except for alcoholic, have just begun to be used after the 1980s, as can be seen in Figures 6 to 8. On the other hand, there are only seven cases each of ICF+holic and ICF+aholic, with hyphenation, including juice-aholic, rage-aholic, work-ahoic, game-show-aholic, choco-holic, rind-a-holic, and so on. Compared with the 303 cases of ICF+holic without hyphenation, those cases with hyphenation (with or without a linker) are far smaller in number.

I take orthography to be crucial in determining the syntactic size of a morphological unit: if two morphemes are combined by hyphenation or without space, I take the combination to be a “word” in the traditional sense of the minimal projection of a category (or the “categorized root”, if DM is adopted), since it should be impossible to put together two or more morphemes without any hyphenation or space if they constitute a “larger-than-word-level” syntactic phrase. Thus, root compounds such as choco-holic and buyaholic are analyzed as a “word” (or equivalently nP in DM), while “word compounds” such as war phobia or veggie burger can be syntactic phrases, and phobia of a dog, which can never be spelled out as phobia-of-a-dog, must be a syntactic phrase, i.e. at least as large as a nP that dominates another nP. Moreover, we assume that the presence or absence of a linker -a-/o- is not relevant to the determination of wordhood of a compound: thus, chocoholic and workaholic are identical with respect to their morphosyntactic status.

As for holic as an independent word, we cannot find any example in COHA or COCA. However, we can see one in another corpus: Urban Dictionary. In the corpus, we can see a definition of holic as an independent word and one of its uses, as in (6):

![Fig. 6.](image-url)
(6) Definition: Someone who is obsessed or addicted with something. Usually the thing that the person is obsessed with is implied.

e.g. Hey man, get some sleep. Don’t be a holic! (workaholic)

As (6) shows, holic in this example is used with the meaning of workaholic. It then seems that holic has just begun to be used as an independent word, with this specific meaning. As for N+holic with a space between the two morphemes, such as work holic, neither COHA nor Urban Dictionary shows any such example. We can conclude from all this that holic provides us with another piece of evidence for the generalization that N-N compounds based on a combining form (CF) emerge after the CF has established its new usage as an independent word.
2.5 *Techno* as ICF and as Independent Word

The process of demorphologization and N-N compound formation we have observed about *phobia*, *phobic*, *burger*, and *holic* is not limited to the FCFs but can be extended to the ICFs, such as *ex*, *psycho* and *techno*. In this section and the next one, we will illustrate this point, using *techno* and *psycho*, respectively.

*Techno*- is originally the ICF that could only be combined with the FCF *-logy* to form *technology*. The first use of *technology* appears in COHA in 1828. It is not until 1913 that *techno-* associates with another FCF *-cacy* to form a new word *technocracy*. After that, there have been created a couple of instances of *techno*+FCF, including *technophobia* (1946), *technophobe* (1947), *technotronic* (1970), *technophile* (1985), and so on. In due course, there emerges a use of the ICF *techno-* in which it is combined with another independent noun via hyphenation, as in *techno-society* (1973), *techno-superliner* (1989), *techno-managerial image* (1989), and so on. The first use of *techno* as an independent word appears in COHA in 1994, as *the techno thrush*, but in COCA, the same type of example appears 1991, that is, three years earlier, in a fiction titled “Drifter,” written by William C. Dietz, as in (7). Finally, the first use of *techno* as part of a N-N compound appears in COHA in 1995, as *retro techno funk*, but again, in COCA the same type of examples appears in 1992, that is, three years earlier in a news journal titled *People*, as in (8).

(7) Your custom-designed bugs could turn *Techno* into a pile of orbiting bug poop if they ever got loose.

(COCA, 1991, FIC)

(8) Hip-hop, house and *techno music* will be spun by DJ Bob-on-Disc.

(COCA, 1992, NEWS)

As such, the diachronic order in which various uses of *techno* as ICF or as an independent word or part of a N-N compound emerge traces what we have shown up to the previous subsections.

2.6 *Psycho* as ICF and as Independent Word

*psycho-* is an ICF meaning “relating to the mind or psychology.” It was originally selectively combined with *-logy*, as *psychology*, whose first occurrence is already present in the first decade of COHA. Its combination with another FCF begins to appear from the late 19th century, as in *psychoanalysis* (1894), *psychosis* (1904), *psychotherapy* (1905), etc. The combination of *psycho* with another independent noun via hyphenation also begins to occur in the late 19th century, a bit later than the non-hyphenated non-spaced version, as in *psycho-physical* (1898), *psycho-physics* (1904), *psycho-analysis* (1914), *psycho-therapy* (1914), etc.14 More than 40 years later, the first use of *psycho* as an independent word in COHA, as in (9), appears in a 1944 text. And the first use of *psycho* as part of a N-N compound (with a space between the two Ns), as in (10), also appears in COHA in a 1948 text.

(9) He should know better’n to go after a *psycho* without me.

(COHA, 1944)

(10) And quit faking that *psycho act* before I throw you in a straitjacket.

(COHA, 1948/4, MAG)

Again, the diachronic order in which various uses of *psycho* as ICF or as an independent word emerge traces what we have just seen in the previous subsection about *techno*.

2.7 The Proposed Generalization

Let us repeat the proposed generalization, as in (11), which applies at least to the four instances of FCF *-phobia*, *-phobic*, *-burger*, and *-holic*, and the three instances of ICF *techno*- *psycho*-, and *ex*:-

(11) When an initial combining form (ICF) or a final combining form (FCF) undergoes lexicalization and acquires its new usage as an independent word, the extension of its usage proceeds diachronically as follows.15

a. In the first stage, only a combination of a particular ICF and a particular FCF can be observed (e.g. *hydrophobia* (1827), *technology* (1828), *alcoholic* (1833), *hydrophobic* (1838), etc.).

b. In the second stage, the particular FCF/ICF begins to be combined with more than one ICF/FCF, without a space or sometimes with a hyphen, to form a “stem compound” or “neoclassical compound” (Bauer (1983), Lieber (2009)). (Constructionalization Stage I). In this stage, the version without a space between the two nominal elements generally appears earlier than that with a hyphen (e.g. *anglophobia* (1856), *anglo-phobia* (1893), *technocracy* (1913), *techno-society* (1973), *psychoanalysis* (1894), *psycho-analysis* (1914), etc.).

c. In the third stage, the particular FCF begins to be used as an independent word, which could be preceded by an (in)definite article and/or an adjective. (Constructionalization Stage II)

d. In the fourth stage, the lexicalized FCF begins to be followed by a PP, which could semantically be a modifier of the FCF. (Constructionalization Stage III)

e. In the fifth stage, the lexicalized FCF begins to be combined with another lexical noun to form what we refer to as a “word compound” (either N-N or N-A compound) with a space between the two morphemes. (Constructionalization Stage IV; e.g. *computer phobia* (1932), *fashion phobic* (2002), *double king burger* (1975))
f. At around the same time, the lexicalized FCF begins to be combined with an attributive modifier (e.g. a typical phobia (1932)).

Particularly interesting among the five steps is the fact that a new use of an original ICF or FCF as the N1 or N2 of a N-N compound emerges after its use as an independent word emerges. This is particularly surprising for CFs because they are originally bound morphemes and their combination with another CF, an affix, or a word (stem) is their unmarked form, and hence their combination with another independent noun with a space should occur in much the same period as their uses as bound morphemes, if a N-N compound had the same structure as a stem-compound, as in (12):

\[
\begin{align*}
\text{NP} & \quad \text{XP} \\
\text{N1} & \quad \text{X} \\
\text{N2} & \\
\end{align*}
\]

I do not deny that some example of N-N compound has this structure. In fact, an example like psychoanalysis may have this structure. However, I claim that (12) is not the only structure of a N-N compound. More specifically, I claim that another type of N-N compound, which is referred to as word compound, has something like a structure in (13), in which the first and second elements are both independently categorized, both conjuncts can be phrases which occupy specifier and complement positions, respectively, and their combination is dominated by another functional projection (a modified structure of (13) will be given in the following section):

\[
\begin{align*}
\text{XP} & \quad \text{nP1 X} \\
\text{N1} & \quad \text{n X} \\
\text{N2} & \\
\end{align*}
\]

Given this assumption and the proposal that a N-N compound based on two independent nouns without hyphenation must always have the structure of the (13) type, it is naturally expected that the establishment of an independent word from a CF must be a prerequisite for the emergence of a N-N compound based on the CF. Harley (2009) proposes a similar analysis of N-N compounds in English. My claim is a modification of her proposals. In the following subsections, we will provide two pieces of evidence for the proposed structure of a N-N compound based on a CF, in views of two well-known diagnostics which those who argue for the syntax-morphology division or the lexicon-syntax division usually adopt: one is one-replacement and the other is stress shift. The following two subsections are devoted to a discussion of N-N compounds based on CFs, from the viewpoint of these two diagnostics.

2.8 One-Replacement

One well-known difference between a lexically composed N-N compound and an NP is that while the latter can have its head replaced by the pro-form one, while the former cannot. Thus, (14a) is well-formed, while (14b) is ill-formed, in violation of the anaphoric island constraint (Postal (1969)):

\[
\begin{align*}
a. & \quad \text{In order to build a dog house, you'll buy white boards, but I bought [NP black ones].} \\
b. & \quad \text{You like a classroom with a whiteboard in it, but I like a classroom with a [NP black one] in it.}
\end{align*}
\]

It is not the case that if a collocation constitutes a noun phrase, its head can always be replaced by one. First, one-replacement must replace an N', which must include a complement to the N. As a result, if a noun that takes an internal argument is replaced by one, the internal argument cannot be realized outside of the pro-form, as in (15a), while if a noun that takes only a modifier is replaced by one, the modifier can be realized outside of the pro-form, as in (15b):

\[
\begin{align*}
a. & \quad \text{That student of chemistry and this one of physics sit together.} \\
b. & \quad \text{That student with short hair and this one with long hair sit together. (Harley (2009: 134))}
\end{align*}
\]

In the framework of the DM, Harley (2009) attributes the contrast between (15a) and (15b) to the assumption that one-replacement replaces the category of NP, which is the maximal projection of the functional category nominalizer.
(16) One-replacement replaces nP in a DM-based morphosyntactic derivation.

Given (16), (15a) is ill-formed because the constituent which excludes the complement (of) physics in (15a) can only correspond to a smaller category than nP. More specifically, she claims that the verb study and the noun student share the root stud-, which is verbalized and nominalized by incorporating itself to the suffix -y and -ent, respectively. In both cases, the complement (of) chemistry occurs at the complement of the root stud-, as in (17a,b):

(17) a. vP
    \[\sqrt{\text{STUD}} \text{stud-} \text{chemistry}\]
    \[v^0 \text{STUD} v^0 \text{STUD DP}\]
    \[\text{stud-}\text{-y}\text{ chemistry}\]

b. nP
    \[\sqrt{\text{STUD}} \text{stud-} \text{chemistry}\]
    \[n^0 \text{STUD} (of) \text{DP}\]
    \[\text{stud-}\text{-ent}\text{ chemistry}\]

A similar incorporation of the root to the nominalizer also takes place in (15b), whose derivation is shown in (17c):

(17) c. nP
    \[\text{nP PP}\]
    \[n \sqrt{\text{STUD}} P DP\]
    \[\text{stud-}\text{-ent}\text{ with short hair}\]

However, (17c) differs from (17b) in that the \(\sqrt{\text{P}}\) in (17b) occurs at the complement of the nominalizer, whereas the \(\sqrt{\text{P}}\) in (17c) is adjoined to nP since it is a modifier. Given (16), we can rule in (15b) because in (17c) there is a segment of nP which dominates student but excludes the modifier PP.

Harley (2009) makes a further claim about the syntactic derivation of N-N compounds, whereby root compounds and synthetic compounds are derived in a parallel fashion, as shown in (18) and (19), which only differ in the semantic relation between the root (shoe or drive) and its complement (nurse and truck), the former being a head-modifier relation and the latter being a predicate-argument relation:

(18) root compounds (e.g. nurse shoe):

\[\sqrt{\text{NURSE}} \text{nurse shoe}\]

\[\sqrt{\text{SHOE}} \text{nP}\]

\[\text{nP}\]

\[\text{nP}\]

\[\sqrt{\text{SHOE}} \text{nP}\]

\[\text{nP}\]

\[\sqrt{\text{SHOE}} \text{nP}\]

\[\text{nP}\]

\[\sqrt{\text{NURSE}} \text{nP}\]

\[\text{nP}\]

\[\sqrt{\text{NURSE}} \text{nP}\]
The gist of Harley’s claim is that both root compounds and synthetic compounds are essentially derived in syntax via head-movement, and that the resulting structure is a minimal projection of n^0, as far as the phonetically pronounced part is concerned, even if the compounds as a whole is nP if copies of the moved heads are included. Given the proposed derivation, we predict that neither nurse shoe nor truck driver can be replaced by nurse one or truck one, even if the antecedent of the pro-form is linguistically identified, since such a replacement does not satisfy (16).

With this in mind, I will propose a different derivation for the N-N compound of the war phobia type, where phobia is the lexicalized version of the FCF.

(20) is supposed to be a modification of (13). In (20), the N-N compound war phobia is derived from phobia (of/against) war by moving the n2P headed by /\WAR from a position adjoined to the right of the nP headed by /\PHOBIA to the Spec of another functional category tentatively called XP, via phrasal movement.

Harley’s proposed derivation and mine make two different predictions, as in (21a,b), because the first element of an N-N compound is nP in mine, but n^0 in Harley (2009), and because the second element of an N-N compound is dominated by nP in mine, but it is an incorporated n^0 in Harley (2009):

(21) a. My proposal, but not Harley’s (2009), predicts that the first element of an N-N compound can host a phrase.
    b. My proposal, but not Harley’s (2009), predicts that the second element of an N-N compound can be replaced by the pro-form one.\(^{17}\)

In what follows, we show that my proposal is better fitting with the empirical data.

First, as is known from as early as Allen (1978), the morphosyntactic size of a N-N compound seems bigger than that of a morphologically derived form such as nominalization. Thus, as Ackema and Neelman (2007: 342) illustrate, a bona-fide noun phrase, with a noun head followed by a PP complement, can be the first element of a N-N compound but cannot be the input of nominalization with the suffix -ist (cf. historicist).\(^{18}\)

(22) a.  [N [NP history of science] ist]
    b.  [N [NP history of science] lecture]

We can find a pile of similar data to (22b), as in (22c-e), so that (22b) cannot be rare cases of exception:

(22) c.  [N [NP quality of life] ranking]
d. [N [NP pursuit of happiness] phrase]^{19}
e. [N [NP origin of life] story]

We can explain the well-formedness of this type of N-N compound, since n2P in (20) can dominate a noun phrase. On the other hand, there is no legitimate way of explaining this well-formedness in Harley’s (2009) system, which assumes that the surface form of a N-N compound is an amalgamation of various heads.

Data related to the second prediction is illustrated below:

(23) a. I have acrophobia and you have claustrophobiaone. (with the meaning of claustrophobia)
b. I have a feline phobia and you have a dog one. (with the meaning of dog phobia)
c. I have a dog phobia and you have a feline one. (with the meaning of feline phobia)
d. I have a phobia of dogs and you have one of cats. (with the meaning of phobia of cats)

In (23a), claustrophobia is a combination of a bona-fide ICF and a bona-fide FCF, whose structure should be like (12) below, in which the entire nP can be replaced by one, but only the lower segment of \(\sqrt{N2}\) cannot be:

(12) 
P
   n
   \(\sqrt{N1}\)
   \(\sqrt{N2}\)

This is why (23a) is ill-formed. On the other hand, we assume that (23b) has the same structure as (20), where there is a nP which dominates phobia but excludes dog, hence only phobia can be replaced by one.^{20}

Although essentially the same explanation could also apply to (23c), a qualification may be in order. Examples like feline of feline phobia are referred to as associative adjectives, which are defined by Giegerich (2005: 575) as adjectives which "stand in a recurrent semantic relationship though (crucially) not in a transparent morphological relationship, to a noun, such that the meaning of the adjective is 'pertaining to', 'associated with' that noun." Thus, feline is related to cat, canine to dog, bovine to cow, and so on. A combination of an associative adjective (henceforth, AssocAdj) and a subsequent noun behaves like a lexical N-N compound in that AssocAdj is never gradable, just like a noun (e.g. *more feline), that no intervention of another modifier between AssocAdj and N (e.g. bovine contagious tuberculosis; cf. bovine tuberculosis), that the collocation of an AssocAdj and N is very restricted (e.g. vernal equinox vs. *vernal flowers), and that AssocAdj + N can sometimes be interchangeable with N + N without changing meaning (e.g. vernal equinox vs. spring equinox), among others.

What is interesting about AssocAdj in the present context is that the N in an AssocAdj + N combination can sometimes be replaced by the pro-form one, but otherwise not, as shown in (24) and (25):

(24) a. Is this the bovine strain of the disease or the feline one?
b. Is he a rural policeman or an urban one?
c. Do you mean the parliamentary election or the presidential one?
d. Do you need a back massage or a cardiac one?
(25) a. Do you mean the autumnal equinox or the vernal one?
b. Is he a constitutional lawyer or a criminal one?
c. Is this a mental disorder or a nervous one?
d. Is he a financial advisor or a legal one? (Giegerich (2005: 580-581))

As Giegerich himself notes, there is a considerable disagreement in these judgments among native speakers of English: some regarded all the examples in (24) and (25) as ungrammatical while others accepted all of these distinctive ‘odd’. However, as far as his own distinction in judgments among the examples in (24) and (25) represents those of the majority, the well-formedness of (24a-d) poses a problem for his own analysis of the AssocAdj+N combination, which he claims to be lexical. To solve this problem, he suggests that there are speakers for whom all AssocAdj+Ns are lexical (for whom these are all ruled out) and others for whom some AssocAdj+Ns are produced in the syntax and hence eligible for the pro-form. For this group of speakers, the AssocAdj+Ns that have an argument-predicate structure, such as cardiac massage, is lexical, while those with a truly attributive construction, such as tropical fish, is syntactic, and hence tropical one is licit.

Now, returning to (23c), I claim that such an example is well-formed for at least some native speakers because they are syntactically derived. More specifically, I will give to it the following structure, which minimally differs from (13) in that nP is replaced by AssocAdj:
In (26), the nP headed by \textit{phobia} can be replaced by \textit{one} because \textit{phobia} is exclusively dominated by it.

(23d) is particularly interesting in view of its comparison with example (15a): in both there is of-insertion between the two, and yet (23d) is grammatical, while (15a) is ungrammatical. It is important to note here that the head noun and its complement in \textit{student of physics} can only be taken to have an argument-predicate relation, whereas \textit{dog in phobia of dog(s)} can be analyzed as having an attributive relation to \textit{phobia}. As evidence, they can occur in the ‘this X is Y\textsubscript{Adj}’ construction, whose acceptability presupposes the existence of entities which are both X and Y:

(27) a. the student of physics and the one of chemistry
   b. The student is of physics. (Travis (1984: 83))

(28) a. I have a phobia of dogs and you have one of cats. (= (23d))
   b. Another danger of needle phobia is that it can cause sufferers to avoid visiting the doctor or dentist. Although the actual phobia is of needles, it can lead to a more generalized fear of medical and dental healthcare providers.
   (http://phobias.about.com/od/introductiontophobias/a/trypanophobia.htm)

Recall here Giegerich’s (2005) suggestion that the AssocAdj+Ns that have an argument-predicate structure is lexical, while those with a truly attributive construction is syntactic. The contrast between (15a) and (15b) is also one between the argument-predicate relation and the attributive one. Then, the well-formedness of (23d) is naturally explained by assuming a similar structure to (26), such as (36e) below.

Before closing this section, let us make a brief consideration of two mutually related questions as stated in (29):

(29) a. What is the motivation of the syntactic movement of nP in (20) and aP in (26)?
   b. What is the nature of the functional category X in (13) and (26)?

Let us consider (29a) first. We have just concluded that the relation between \textit{dog} and \textit{phobia} in \textit{phobia of dog} is an attributive one, just as the relation between \textit{feline} and \textit{phobia} in \textit{feline phobia} is. It is well-known that in English, an attributive modifier must precede the modified noun, unless the former has a complement, as in (30):

(30) a. a proud man /*a man proud
   b. a man proud of his son /*a [AP proud of his son] man

Now that \textit{proud of his son} in (30b) can only occur post-nominally, it is natural to assume that the adjective \textit{proud}, which in DM is relabeled as aP, is also merged post-nominally, and is moved to the prenominal position as a result of syntactic movement, and that this movement is due to the attributive nature of the aP.

Larson (1998) points out that when a stage-level adjective and an individual-level adjective co-occur in a prenominal position, the former occurs in a higher position than the latter, so that the former precedes the latter, as in (31):

(31) a. an invisible visible star
   b. a visible invisible star

(31b) is marginal because a star which has the attribute of being invisible (i.e. it is of the six-magnitude or lower) cannot be visible through a naked eye, even temporarily. (31a) does not have the same problem because a star which has the attribute of being visible through a naked eye can be temporarily invisible. Here, the individual-level adjective is a kind of attributive adjective, whereas the stage-level adjective is not an attributive adjective, by definition. Hence, the
contrast in (31) shows that the stage-level adjective must take scope over the individual-level adjective and is located in a relatively high position in a noun phrase. I will claim that the individual-level adjective must occur in the Spec of XP which immediately dominates nP, and that the movement takes place in order to get aP/nP as an attributive modifier outside the scope of the nP which categorizes the nominal root of the relevant noun phrase.22

Given the discussion so far, we can tentatively assume that the label of XP in (13) and (26) can be identified as AttributiveP or whatever label refers to the same function.23 We will not go into the detail of attributiveness any further, since attributive adjectives are divided into various subgroups, e.g. intersective attributives vs. non-intersective attributives, process-oriented attributives vs. modal-attributives (cf. Cinue (2010), Pullum and Huddleston (2002) and references therein), and a detailed discussion of subtle syntactic distinctions among them is far afield of the main issue of this article.

2.9 Stress Placement

One diagnostic which is often invoked in the distinction between compounds and phrases is stress (Bloomfield (1933), Lees (1963), Marchand (1969), Liberman and Sproat (1992)). Thus, the compound blackboard always has the primary stress on black, while the NP black board can have the primary stress on board, unless it must have an emphasis on black so as to contextually distinguish it from white board, red board, and so on. However, Giegerich (2004) shows that the situation with N-N compounds is rather complicated: while phrasal construction always have end-stress (e.g. metal bridge), lexical construction may have fore-stress or end-stress (olive oil vs. engine oil). In particular, the attributive N-N compounds are notably variable in that they can have either phrasal or lexical stress (e.g. olive oil) (Giegerich (2005: 586)).

Here again, AssocAdj+Ns behave like N-N compounds. Although the fore-stress is available only with the construction made in the lexicon, AssocAdj+Ns have both fore-stress and end-stress because they can sometimes be syntactic. Recall here that AssocAdj+Ns of a lexical origin resist one-replacement, while those of a syntactic origin allow it. What is interesting in this respect is that there are AssocAdj+Ns which are eligible for one-replacement, and yet have fore-stress, as in (32).24

(32)  a. Is this the medical building or the dental one?
    b. Is this the general hospital or the mental one?
    c. Is he a legal advisor or a financial one?

Since the possibility of one-replacement is a diagnostic of syntactic origin, whereas the presence of fore-stress is a diagnostic of lexical origin, Giegerich (2005: 588) concludes from this kind of data that some individual AssocAdj+Ns are “simultaneously lexical entities (‘compounds’) in some respects and syntactic entities (‘phrases’) in other respects. It follows that the lexicon and the syntax are not separable, distinct modules in the grammar. They overlap.”

Now, if we focus on word compounds and root compounds based on CFs, similar variations in stress pattern are also observed with them. First, words based on CFs like hydrophobia, claustrophobia, alcoholic, workaholic, psychodynamics, and ex-convict have end-stress, while words like technofreak, technobabble, landplane, rocketplane, hamburger, and cheeseburger have fore-stress.25 The fact that they sometimes accept end-stress suggest that they can sometimes be syntactic phrases, since word-like N-N compounds can only have fore-stress. Second, among the CF-based N-N compounds, there are cases which native speakers say accept or require fore-stress, such as cargo plane, space plane, dog phobia, cat phobia,26 and such N-N compounds with fore-stress can accept one-replacement of the second N, as shown in (23b) above, and also in (33a,b) below, which I got through a Google search on 6th October, 2013:

(33)  a. I can assure that ANY comercial [sic] passenger plane has at least one survival kit. Not so sure about cargo ones, but being cargo, maybe there’s something in that cargo you may find helpful?
    b. @italianfoodie Ah, perhaps. Thanks. It’s been a bad week for my cat phobia - hope they leave me alone when I leave the office terrified @mediaflash I have a dog one:
    (https://twitter.com/italianfoodie/statuses/377891751274741760)

These facts about N-N compounds based on CFs will corroborate the conclusion Giegerich (2005) reached through his consideration of AssocAdj+Ns: “the lexicon and the syntax are not separable, distinct modules in the grammar [but (t)hey overlap.”

2.10 A Query into the Diachronic Lexicalization Process

Now, recall my proposed generalization based on the observation in sections 2.2 to 2.6 that the use of a CF as part of an N-N compound (such as war phobia (1932)) typically emerges after it acquires its use as an independent word, collocated with a definite or indefinite article (such as the/a phobia (1923)), an adjective (such as typical phobia (1932)), or a post-nominal a PP (such as a phobia for the theatre (1928)). Why is the emergence of N-N compounds
with a space so late compared with the establishment of their uses as independent words, despite the fact that their combination with another CF or a word without a space or with hyphenation, which is their original usage, is quite similar to the N-N compounds?

I believe that this generalization can receive a DM-based explanation, given a set of natural hypotheses about syntactic construction and syntactic constructionalization, as stated in (34) and (35), respectively:

(34) **Syntactic Construction:**
If a morphosyntactic constituent that dominates two or more morphemes (Y₁, …, Yₙ, X) (n ≥ 1, X=head) contains at least one variable Yᵢ, call it a Syntactic Construction. Yᵢ is qualified as a variable iff there are at least two candidates for substituting Yᵢ in combination with a particular head X.

(35) **Syntactic Constructionalization:**
When a syntactic constituent, which was not a syntactic construction at the earliest stage, becomes a minimal syntactic construction (i.e. which contains only one variable and one categorizer) at a later stage, and comes to have more than one variable and/or more functional categories than ever and possibly enlarges the size of its syntactic constituent, in a unidirectional fashion, call the diachronic process **Syntactic Constructionalization**.

(34) means that, up until the period in which the FCF -phobia could only combine with the ICF hydro-, the composed word was not a syntactic construction, but when it became possible to make a new “word” such as anglophobia, claustrophobia, russophobia around the 1880s, the resulting “words” have become a syntactic construction. Note, incidentally, that in DM the notion of “word” corresponds to the root which is categorized by the relevant functional head. Independently, what has traditionally been regarded as constructions in Goldberg (1995, 2005) such as “have a [swim / run / read / etc.]” and “[push / elbow / lie / etc.] one’s way PP” and productive idioms such as “give a [belch / cough / hiccup / etc.]” and “[kick / hit / knock / etc.] the shit out of X” also belong to the syntactic construction in (34), since they involve at least one variable in the V or N head position(s) and at least one functional category such as D and/or P.²⁷

(35) means that the size of a syntactic construction tends to enlarge in a unidirectional fashion from the minimal one to a larger one diachronically. This is a notion similar to what the phenomenon which Bergs and Diewald (2008) subsumed under the name of “constructionalization”, except that I define the notion in syntactic terms. Just as Bergs and Diewald’s “constructionalization” intend to redefine grammaticalization in its terms, we also try to redefine in its terms the traditional syntactic approaches to grammaticalization such as Roberts and Roussou’s (1999, 2003) reanalysis of verbs as auxiliaries (cf. Kume (2009), Akimoto and Maeda (2013)).

With these in mind, let us propose the diachronic process of lexicalization of a CF into an independent word and a further development of the N-N compound based on the CF. This process involves syntactic constructionalization as schematized in (36a-f):

(36) a. When hydrophobia was the only usage of phobia as FCF (the 1820s ~ 1850s)

   ![Diagram](attachment:image.png)

   nP (= free form, categorially specified)

   n° CF2 (= bound morpheme, categorially unspecified root)

   φ CF1 CF2

   hydro- phobia

b. When phobia as FCF came to be combined with a nominal variable such as ICF or a stem, without space or with hyphenation (the 1860s ~ 1910s)

   ![Diagram](attachment:image.png)

   νCF1

   hydro- n° CF2 (= bound morpheme, categorially specified)

   ν CF1

   nP (= free form, categorially specified)

   φ phobia
c. When *phobia* came to be used as a free morpheme following the definit or indefinite article (from the early 1920s ~)

```
DP
├── D
│   └── nP
   └── the/a
     └── n1 (\(\sqrt{\text{CF}}\))
         └── phobia
```

d. When *phobia* became able to take a modifier PP to the right of it. (from the late 1920s ~)

```
DP
├── D
│   └── nP
   └── nP
     └── PP
         ├── \(\sqrt{\text{CF}}\)
         │   └── n1 (\(\sqrt{\text{P}}\))
         │       └── for
         │           └── the theatre
         └── P
```

e. When the head of the postnominal PP modifier of nP headed by *phobia* is replaced by an empty P and the PP moves to [Spec, X] which hosts an attributive modifier. (from the 1930s ~)

```
DP
├── D
│   └── nP
   └── PP
     └── \(\sqrt{\text{CF}}\)
       └── n1
          └── phobia
```

f. When (36e) becomes available, the following derivation, where the PP in (36e) is replaced by an attributive modifier AP, also becomes available.

```
DP
├── D
│   └── AP
   └── nP
     └── \(\sqrt{\text{CF}}\)
       └── phobia
```

The process of unidirectional change from (36a) to (36f) involves increase in the number of variables and/or the number of functional categories in the nP/DP in that (36a) contains no variable and one functional category, (36b) contains one variable and one functional category, (36c) contains one variable and two functional categories (D and n),
contains two variables (CF1 and the DP at the complement of P) and at least three functional categories (D, n, and P), and (36e) contains two variables and at least four functional categories (D, X, n1, and P). Hence, this process is in conformity with the definition of syntactic constructionalization as defined in (35).

A deeper question that remains is: why syntactic constructionalization proceeds in such a unidirectional way? At first sight, it may be possible to find a pragmatic answer to this question, in that language tends to seek a variety of expressions with a single word. But as far as the mental grammar which seeks a more economical way of linguistic computation is concerned, it is not straightforward to answer the question of why an expression with more functional categories is preferred to one with less functional categories, despite the apparent violation of the principle of economy of derivation and representation. In any event, a meaningful answer to this question needs to wait for a deeper understanding of why functional categories emerged in the mental grammar in the first place, since a proto-grammar which used only lexical categories (or roots) and which had no syntactic movement at all would contribute to a far simpler computation from numeration to LF (cf. Heine and Kuteva (2007)). With only such a view, however, we would not be able to account for the fact that many languages in the world have only a few number of adpositions, while English has already had more than one hundred prepositions and the number is still increasing. Although this last question is independent of the question of the unidirectionality of constructionalization or grammaticalization, it would be desirable if we could provide a unified answer to the question about unidirectionality of constructionalization and the question about the emergence and proliferation of functional categories. We will leave these non-trivial questions for future research.

3. The Resultative Construction and the V-A Form

In the previous section, I have discussed what I call “syntactic constructionalization” from a bound stem to a free stem to a N-N compound. Independently, Snyder (2001) claims that both cross-linguistic evidence and evidence from child language acquisition shows that the availability of N-N compounding is a necessary condition for the availability of the resultative construction. Mateu and Rigau (2002), McIntyre (2004), and Zubizarreta and Oh (2007) also have proposed a variant of the compounding analysis for the resultative construction in English. Using their insight, in this section, I will assume that the resultative construction is a kind of compounding, and argue for the occurrence of syntactic constructionalization from a smaller size of compounding from a larger one in the VP domain in English. More specifically, I will discuss an instance of the syntactic constructionalization from a lexicalized verb-adjective combination to the resultative construction from a diachronic perspective.

3.1 Previous Analyses about the Related Constructions

Resultative construction is the construction which expresses by AP or PP a result state of the action denoted by the matrix verb in the following word order: S V O AP/PP. With a transitive verb, the resultative predicate is predicated of the direct object of the verb, which is usually referred to as the Direct Object Restriction (DOR) (Levin and Rappaport Hovav (1995)). Typical cases of transitive resultative construction are illustrated as in (37a) and (38a), whereas we will refer to the construction in (37b) and (38b) as the “V-A form”:

(37) a. John pushed the door open.
    b. John pushed open the door.
(38) a. Mary bleached the shirt white.
    b. Mary bleached white the shirt.

The V-A form does not differ from the resultative construction only in word order: The V-A combination behaves as if it forms a lexical unit, in that no adverb can modify the resultative predicate, as in (39b), even if the corresponding resultative construction allows it, as in (39a); moreover, the V-A form can be the input to nominalization, whereas the resultative construction cannot, as shown in (40a,b):

(39) a. John pushed the door wide open
    b. John pushed wide open the door.
(40) a.?? John’s continuous pushing of the door open irritated his wife.
    b. John’s continuous pushing open of the door irritated his wife. (Taniwaki (2006: 257))

To capture these differences between the resultative construction and the V-A form, Taniwaki (2006) argues that the V-A combination in (37b) and (38b) is a kind of lexical compound and the V-A form is not derivationally related to the resultative construction. Nagano and Shimada (2009) differ from Taniwaki (2006) in claiming that the alternation in (38) involves lexicalization of V+A in (38b), whereas the alternation in (37) is a syntactic alternation similar to the Verb Particle alternation between pull the leeches off and pull off the leeches, for example (Bolinger (1971)). Nagano and Shimada claim that the two alternations in (37) and (38), which appear to be identical, are actually distinguished in terms of their aspectual property: in (37), both the resultative construction and the V-A form are telic in that it can...
occur at the complement of the telic verb *finish*, whereas in (38), the resultative construction is interpreted as atelic in that it can occur at the complement of *finish* but the V-A form is not:

(41) a. John finished pushing the heavy door open.
   b. John finished pushing open the heavy door. (Nagano and Shimada (2009: 87))

(42) a. John finished bleaching the shirt white.
   b.* John finished bleaching white the shirt.
   c. John bleached white the shirt for an hour/??in an hour.

They argue that this is because the *bleach-white* combination behaves as a lexicalized atelic verb meaning decolorization, while *bleach X white* behaves as a telic predicate because it means that someone causes X to become white as a result of the bleaching action. Thus, (43a) is a contradiction, but (43b) is not:

(43) a.* John bleached the shirt white, but the stain remained.
   b. John bleached white the shirt, but the stain remained. (Nagano and Shimada (2009: 86))

I will put aside the peculiar property of the *bleach-white* alternation for the moment (see note 38), and focus our attention to the *push-open* alternation. As far as the *push-open* case is concerned, Nagano and Shimada’s claim do not seem different from Taniwaki’s in a significant way because they both regard the V-A form as a lexical unit, whether they call it lexicalization or compounding. As far as they are a lexical unit, it should be predicted that the V and A can no longer be separated by further morphosyntactic operations. However, there is at least one piece of evidence against this prediction.

My two informants tell me that in the resultative construction using *push* and *open*, there can occur between the direct object and the resultative adjective an adverb showing the manner of pushing, as in (44a-e); although (44b-e) are slightly degraded for one of them, (44a) is perfectly acceptable for both:

(44) a. I pushed the door slowly open.
   b.%I pushed the door gently open.
   c.%I pushed the door suddenly open.
   d.%I pushed the door silently open.
   e.%I pushed the door politely open.

A quick search on COHA also shows a couple of similar examples as in (45a-c):

(45) a. She let the knob move back to its original position and **pushed the door slowly open**. (COHA; 1996; FIC)
   b. Softly she descended the stairs, more softly and more slowly she crossed the passage to their own side of the house, **pushing the door warily open**. (COHA; 1941; FIC)
   c. I **pushed the door gently open** and went in. (COHA; 1899; FIC)

If, as is usually assumed, the resultative construction had a structure like (46), the well-formedness of (44) and (45) would never be expected, since a state-denoting adjective would not be modified by a manner adverb, and the verb *push* is too far away to be modified by the manner adverb, if the result adjective occurs in the syntactically lowest position in the relevant VP:

(46) 

\[ \text{VP} \]

\[ \text{V} \]

\[ \text{SC?} \]

\[ \text{push DP ADV open} \]

On the other hand, if we assume a Larsonian VP-shell as in (47), in which the verb *push* is initially merged with the adjective *open* to form a VP somehow and moves to a higher verbal category thereafter, crossing the manner adverb and the direct object, then the adverb can modify the verb *push* successfully even if they are remote superficially, and a legitimate interpretation comes from the syntactic structure.\(^3^1\)
3.2 A DM-based Derivation of the Two Constructions

For this reason, in this section, I will propose a DM-based alternative to Taniwaki’s (2006) and Nagano and Shimada’s (2009) views of the V-A form. More specifically, I will claim that both the resultative construction in (37a) and the V+A form in (37b) are constructed in syntax by Merge: on the one hand, the resultative construction is derived if $\sqrt{A}$ is first merged with an adjectivizer (=$a^0$) before the combination is merged with the $\sqrt{V}$, which is followed by the syntactic head movement of only $\sqrt{V}$ to verbalizer, stranding the $\sqrt{A}$+$a^0$ complex; on the other hand, the V-A form is derived if $\sqrt{V}$ and $\sqrt{A}$ are directly merged first and then syntactic head movement to the verbalizer applies to the combination of $\sqrt{V}$ and $\sqrt{A}$. The derivations of (37a) and (37b) are represented as in (48a) and (48b), respectively.

(48)

a. the derivation of 

\[
\text{push open the door}^{32}
\]

b. the derivation of 

\[
\text{push the door open}
\]
Not only is (48) a claim about syntactic derivation in the mental computation of a native speaker of English, but I also intend that the relation between (48a) and (48b) is a claim about diachronic change. In the earliest stage of constructionalization, as in (48a), \( \sqrt{V} \) is directly merged with \( \sqrt{A} \) to form the smallest syntactic construction. Subsequently, \textit{push open the door} is derived as a result of the head-movement applying to the root complex. (48a) could be a more costly derivation than moving only the root \( \sqrt{push} \) in terms of economy principle, if the latter operation were possible, since the economy principle would require as small an element as possible to move. Nevertheless, moving the root complex is chosen in (48a) since it is impossible to separate only the root \( \sqrt{V} \) from the combination of \( \sqrt{V} \) and \( \sqrt{A} \), due to the lexical integrity. This is why the V-A form results, even if the derivation appears to violate the principle of economy because of the pied-piping.

(48b) is the next stage of constructionalization. Here, \( \sqrt{A} \) is merged with an adjectivizer before the complex is merged with \( \sqrt{V} \), so that the constructed vP is larger in (48b) than in (48a), in conformity with the definition of syntactic constructionalization in (35). In (48b), it is possible to move just \( \sqrt{V} \) to v and the \( \sqrt{V}+v \) complex to F, leaving \( \sqrt{A} \) in situ, because \( \sqrt{A} \) is independently categorized by the adjectivizer. In fact, if the exclusive movement of \( \sqrt{V} \) is possible, then such a movement should be chosen in terms of economy principle, because it is the smallest possible unit that can be moved. This is why the resultative construction results.

The derivation in (48b), when we focus locally on syntactic head-movement, satisfies the principle of economy because \( \sqrt{V} \) only is moved to v and F, without pied-piping \( \sqrt{A} \). However, the principle of economy can be satisfied this way here because of the syntactic constructionalization, which means replacement of \( \sqrt{A} \) to be merged with \( \sqrt{V} \) by aP here. Then, an immediate question that arises is: does the syntactic constructionalization itself satisfy the principle of economy? Apparently, it does not, if an independent categorization of \( \sqrt{A} \) were unnecessary. In order to solve this apparent problem, we assume that categorization of a root is immune from the principle of economy since it is an indispensable syntactic step for any derivation to converge at PF and LF.

This means that when there is a compound, there are always two possible ways to categorize the two (or more) roots, one is categorizing the root-t-root complex in one fell swoop, and the other is categorizing each root independently and merging the categorized roots for another reason than categorization. As far as the alternation between the resultative construction and the V-A form in English is concerned, the fact that the English grammar permits both in apparent conflict with the principle of economy, because of the choices given to the timing of categorization. As for the N-N compounds based on one or more CF, too, I have argued in section 2 that there are two such possibilities, as a result of which they behave sometimes like “words” and otherwise like “phrases”. In section 4, I will argue that the same thing also applies to V-V compounds in Japanese. Before that, however, just as we saw a historical development of N-N compounds from ICF+FCF in the previous section, we will see in the remainder of this section how the resultative construction and the V-A form in English are diachronically ordered.

### 3.3 The Historical Data

It is interesting to note that the syntactic constructionalization predicts that the pied-piping of \( \sqrt{A} \) in the head-movement of \( \sqrt{V} \) in (48a) takes place diachronically earlier than the single movement of \( \sqrt{V} \) in (48b), and the resultative construction emerges diachronically later than the V-A form. I will show in this section that, as far as the push-open cases, this prediction is indeed borne out.

First, look at the upper half of Table 1 overleaf, which is a result of searching on COHA the initial occurrence of each collocation using push or a semantically related verb and the result adjective open. The following 17 verbs including push are examined, in order to compare how differently the verbs expressing manner of opening a door (or an openable object) or the verbs expressing the sound emitted when a door (or an openable object) is opened behave when they are paired with the resultative adjective open: push, swing, kick, blow, slide, fling, shake, pry, pull, break, throw, cut, burst, and tear, which are manner of motions verbs, and slam, bang, and creak, which are sound emission verbs (cf. Levin (1992)).

The result shows beautifully that for each of the 17 verbs, the initial occurrence of the V+A+DP sequence (such as push open the door) emerges earlier than or at the same time as the initial occurrence of the V+DP+A sequence (such as push the door open) emerges in the corpus. For one verb creak, COHA did not show one occurrence of the sequence [creak] the [nn'] open, whereas there is at least one occurrence of [creak] open the [nn']. But this is not a problem for us because it only shows in my theory that CREAK has not yet been able to be merged with aP that dominates OPEN, although CREAK can be directly merged with OPEN.

Even with the uniform precedence of the V-A form over the resultative construction for the 17 verbs, one might doubt that this is a result of the constructionalization, because for some verbs the interval between the initial emergence years is less than 10 years. However, it is also important to note that in Table 1, the average interval between the initial emergence years of the two constructions is about 22 years, which roughly corresponds to the interval between one generation and the next generation. Given Lightfoot’s (1979) hypothesis that diachronic change takes place as a result of parameter resetting when a language spoken by the population of one generation is learned by the population of the next generation, the interval of 22 years in average seems to be a natural consequence of a change of generation.

Second, look at the lower half of Table 1, which is a result of summing up every occurrence of the collocation using
each of the 17 verbs and the adjective open. This result also shows beautifully that for each of the 17 verbs, the total occurrences in the 200 years of the V+DP+A sequence (such as push open the door) are larger in number than those of the V+DP+A sequence (such as push the door open). This is naturally expected under the principle of economy and syntactic constructionalization, since the V+DP+A sequence has a more economical structure than the V-DP-A sequence and is derived from the earlier stage of constructionalization than the V-DP-A sequence.

It is important to note here that not all of the first occurrences of the resultative construction emerged diachronically after those of the corresponding V-A form. Thus, if open is replaced by shut, we have the opposite result that the resultative construction in (49a) emerged almost fifty years before the emergence of the corresponding V-A form:

<table>
<thead>
<tr>
<th>Verb</th>
<th>push the [nn*] open</th>
<th>swing the [nn*] open</th>
<th>slam the [nn*] open</th>
<th>kick the [nn*] open</th>
<th>blow the [nn*] open</th>
<th>bang the [nn*] open</th>
<th>creak the [nn*] open</th>
<th>slide the [nn*] open</th>
<th>fling the [nn*] open</th>
<th>shake the [nn*] open</th>
<th>pry the [nn*] open</th>
<th>pull the [nn*] open</th>
<th>break the [nn*] open</th>
<th>throw the [nn*] open</th>
<th>cut the [nn*] open</th>
<th>burst the [nn*] open</th>
<th>tear the [nn*] open</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>year</td>
<td>1830</td>
<td>1885</td>
<td>1949</td>
<td>1892</td>
<td>1898</td>
<td>1879</td>
<td>0</td>
<td>1947</td>
<td>1833</td>
<td>1978</td>
<td>1875</td>
<td>1851</td>
<td>1919</td>
<td>1825</td>
<td>1897</td>
<td>1823</td>
<td>1822</td>
<td>1881.4375</td>
</tr>
<tr>
<td>collocation number</td>
<td>474</td>
<td>106</td>
<td>8</td>
<td>48</td>
<td>16</td>
<td>11</td>
<td>3</td>
<td>42</td>
<td>212</td>
<td>2</td>
<td>74</td>
<td>192</td>
<td>177</td>
<td>697</td>
<td>57</td>
<td>64</td>
<td>270</td>
<td>2453</td>
</tr>
</tbody>
</table>
At first sight, this fact shown in Table 2 appears to pose a problem with my proposed derivation of the constructionalization from the V-open-the-door cases to the V-the-door-open cases, because for each of the 11 verbs that occur in the V-shut-the door cases, the resultative construction emerges earlier than the corresponding V-A form, whether it uses a manner of motion verb or a sound emission verb.35

In fact, Table 2 shows that the average interval between the initial emergence years of the two constructions is about 21 years, which roughly corresponds to the interval between one generation and the next generation. Moreover, it also...

---

**Table 2. PUSH-X-SHUT vs. PUSH-SHUT-X**

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>push shut the [nn*]</td>
<td>1913</td>
<td>&lt; 1884</td>
<td>39</td>
</tr>
<tr>
<td>swing shut the [nn*]</td>
<td>1897</td>
<td>= 1897</td>
<td>0</td>
</tr>
<tr>
<td>slam shut the [nn*]</td>
<td>1911</td>
<td>&lt; 1868</td>
<td>43</td>
</tr>
<tr>
<td>kick shut the [nn*]</td>
<td>1969</td>
<td>&lt; 1917</td>
<td>48</td>
</tr>
<tr>
<td>blow shut the [nn*]</td>
<td>0 hit</td>
<td>&lt; 1946</td>
<td></td>
</tr>
<tr>
<td>bang shut the [nn*]</td>
<td>1919</td>
<td>&lt; 1900</td>
<td>19</td>
</tr>
<tr>
<td>check shut the [nn*]</td>
<td>0 hit</td>
<td>&lt; 1950</td>
<td></td>
</tr>
<tr>
<td>slide shut the [nn*]</td>
<td>1981</td>
<td>&lt; 1925</td>
<td>44</td>
</tr>
<tr>
<td>fling shut the [nn*]</td>
<td>0 hit</td>
<td>&lt; 1910</td>
<td></td>
</tr>
<tr>
<td>shake shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>pry shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>pull shut the [nn*]</td>
<td>1920</td>
<td>&lt; 1869</td>
<td>51</td>
</tr>
<tr>
<td>break shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>throw shut the [nn*]</td>
<td>0 hit</td>
<td>&lt; 1943</td>
<td></td>
</tr>
<tr>
<td>cut shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>burst shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>tear shut the [nn*]</td>
<td>0 hit</td>
<td>[year]</td>
<td></td>
</tr>
<tr>
<td>average</td>
<td>1930</td>
<td>&lt; 1909</td>
<td></td>
</tr>
</tbody>
</table>

the total number of each collocation during the 200 years shown in COHA

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>push shut the [nn*]</td>
<td>2</td>
<td>&lt; 41</td>
<td></td>
</tr>
<tr>
<td>swing shut the [nn*]</td>
<td>5</td>
<td>&lt; 25</td>
<td></td>
</tr>
<tr>
<td>slam shut the [nn*]</td>
<td>42</td>
<td>&lt; 201</td>
<td></td>
</tr>
<tr>
<td>kick shut the [nn*]</td>
<td>2</td>
<td>&lt; 52</td>
<td></td>
</tr>
<tr>
<td>blow shut the [nn*]</td>
<td>0</td>
<td>&lt; 2</td>
<td></td>
</tr>
<tr>
<td>bang shut the [nn*]</td>
<td>6</td>
<td>&lt; 26</td>
<td></td>
</tr>
<tr>
<td>check shut the [nn*]</td>
<td>0</td>
<td>&lt; 1</td>
<td></td>
</tr>
<tr>
<td>slide shut the [nn*]</td>
<td>1</td>
<td>&lt; 27</td>
<td></td>
</tr>
<tr>
<td>fling shut the [nn*]</td>
<td>0</td>
<td>&lt; 3</td>
<td></td>
</tr>
<tr>
<td>shake shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>pry shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>pull shut the [nn*]</td>
<td>7</td>
<td>&lt; 106</td>
<td></td>
</tr>
<tr>
<td>break shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>throw shut the [nn*]</td>
<td>0</td>
<td>&lt; 1</td>
<td></td>
</tr>
<tr>
<td>cut shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>burst shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>tear shut the [nn*]</td>
<td>0</td>
<td>&lt; 0</td>
<td></td>
</tr>
<tr>
<td>sum</td>
<td>65</td>
<td>&lt; 485</td>
<td></td>
</tr>
</tbody>
</table>

(49) a. [push] the door shut (initial occurrence in COHA = 1868)
b. [push] shut the door (initial occurrence in COHA = 1913)
shows beautifully that for each of the 11 verbs, the occurrences of the resultative construction using V and shut during the 200 years are more than seven times as large in number as those of the corresponding V-A form. Then, does this fact undermine our hypothesis about syntactic constructionalization? The answer to this question is negative: we can get around the potential problem by claiming that it is not the case that any √V and any √A can always be combined directly to form a complex root. More specifically, I claim that √PUSH and √OPEN can be combined directly, but √PUSH and √SHUT cannot.

The reasoning is as follows: as for the push-open case, √PUSH and √OPEN can be combined directly because they can constitute a natural semantic unit in terms of force dynamics: we can naturally imagine that a container or a door-like entity tends to change from a closed state to the open state if some external force is added to it; this is essentially independent of the shape or size or material of the container. In other words, force exertion on an entity and the subsequent opening of the entity constitute a natural causal relation. We may refer to it as “semantic congruity” in Shibatani’s (2007) sense. This will allow a syntactic rule of any language to combine two elements, a verb denoting force-exertion (typically an atelic verb) on the one hand and on the other hand a verb denoting an action that expresses culmination to a natural result state (typically a telic verb) or an adjective denoting a natural result state, to form a minimal syntactic unit. In fact, in English, there are a couple of instances of adjectival passive, -able suffixation and nominalization which consist of a force-exerting action verb and the adjective open, as in (50a-c):

(50) a. the smashed-open safe (Carrier and Randall (1992: 195))
   b. pull-openable (Nagano and Shimada (2009: 91))
   c. push-opener / pusher-open (ibid.: 91)

In Japanese, too, there are a number of lexical V-V compounds consisting of a force-exerting action verb and akeru ‘open’, a result-denoting verb, as in (51):

(51) a. oshi-akeru ‘push-open’
   b. keri-akeru ‘kick-open’
   c. koji-akeru ‘jerk-open’

In Dutch, too, when the action of opening is expressed by the verb maken ‘make’ and the adjective open ‘open’, the overt V-raising of maken can optionally pied-pipe the adjective:

(52) a. dat ik de deur wilde open maken
   "that I the door wanted open make"
   b. dat ik de deur open wilde maken
   "that I the door open wanted make" (Booij (2010: 135))

As such, push or a similar force-exerting action verb (or a causative verb) and the root √OPEN, whether it becomes a verb or an adjective, can constitute a semantically congruous unit. On the other hand, there seems to be no similar natural causal relation imagined between a force-exerting action and a result state of something being shut, because something open which received an external force does not necessarily close the openings, and in fact, what has once opened will never be shut in some cases. In other words, there is no semantic congruity between a force-exerting action verb and a verb or adjective denoting the result state of being shut. Indeed, there is no legitimate instance of nominalization or adjectival passive using shut and corresponding to (50), such as *push-shuttable or *push-shutter. In Japanese, too, there is no lexical compound such as *osi-simeru ‘push-shut’, *keri-simeru ‘kick-shut’, *koji-simeru ‘jerk-shut’.37,38

For these reasons, I will claim that (49a) will have a structure as in (53):

(49) a. [push] the door shut (initial occurrence in COHA = 1868)
   b. [push] shut the door (initial occurrence in COHA = 1913)
In (53), the root √SHUT is initially merged with an adjectivizer, which is then merged with the root √PUSH. Next, the verbalizer and the complement √PUSH-P are merged to form vP, in whose Spec the direct object is merged. The root √PUSH undergoes head-movement through v to F, without pied-piping the root √SHUT, just as in (48b).

Given this structure, there is no point in the derivation at which √PUSH and √SHUT are directly merged. Therefore, (49b) must be independently derived either by the head-movement of √SHUT to the adjectivizer, followed by the movement of the aP+∅ complex to v, or by the phrasal movement of aP headed by √SHUT to the outer Spec of vP by scrambling, where head-movement and scrambling can both be post-syntactic operations. Or the combination of √PUSH and aP headed by √SHUT could be identified as “lexicalization” as a synchronic process. In any event, what is important to note here is that as for the push-shut pair, the resultative construction is built up first, and the V-A form is constructed later via a non-syntactic operation which does not feed into LF, because push and shut are not semantically congruous. Since this is synchronically valid, it follows from my entire theory that it should hold diachronically as well: the V-A form (i.e. push-shut-X) should emerge in a later stage than the corresponding resultative construction (i.e. push-X-shut).

My proposed derivation of (48a,b) entails that, just like the push-open case, in the push-shut case too, there is a point in the derivation at which the main verb occurs in a position c-commanded by the direct object. Then, it predicts that the examples corresponding to (44) and (45) are ruled in. In fact, a quick COHA search gives a couple of examples of the collocation [v/C3 the [nn/C3 r/C3] open], as in (54):

(54) a. I slipped into one of the stalls, pulling the door quietly shut behind me and throwing its latch. (COHA, 1997, FIC)
   b. Maruca motioned Ruhama outside and drew the door carefully shut behind them. (COHA, 1949, FIC)
   c. He drew the door softly shut behind him. (COHA, 1939, FIC)
   d. He slammed the door violently shut, and with clenched hands and blazing eyes, he faced his companion. (COHA, 1911, FIC)
   e. Gene Wasson came in and slammed the door emphatically shut after him. (COHA, 1907, FIC)

Furthermore, if we abstract away irrelevant examples of an adverb modifying the resultant state, such as push the door [wide / completely / slightly] open, slam the door tightly shut, the parlors are always shut, and collect examples in which the adverb unambiguously modifies the manner of force-exerting action, then it turns out that in COHA there are totally 14 types and 16 tokens of the collocation [v/C3 the [nn/C3 r/C3] open] (examples of relevant adverbs are farther, further, slowly, gently, warily, roughly, suggestively, officiously, quickly, and timidly), while there are 11 types and 15 tokens of the collocation [v/C3 the [nn/C3 r/C3] shut] (examples of relevant adverbs are softly, carefully, smartly, irritably, emphatically, violently, quietly, and creakily)—the numbers of tokens turned out to be almost identical. This is no surprising if we (tentatively) suppose that the verb root √PUSH can always select aP that dominates √SHUT, even if the direct merger of √PUSH with √SHUT is excluded by semantic congruity. Once √PUSH selects aP, the movement to a verbalizer always applies to the verb root rather than the rootP dominating aP and √A. Then, it follows that the resultative construction will emerge earlier than the V-A form for this type of the V-A pairs.

3.4 The Resultative Construction Void of the Corresponding V-A Form

Let me point out one more important fact about the V-A form related to the resultative construction. Taniwaki (2006) and Nagano and Shimada (2009) illustrate examples of the resultative construction which do not have the corresponding V-A form, as in (55):
Although COHA compiles one to four actual uses of the allegedly ungrammatical V-A forms for three of the five verbs, the search results are by and large compatible with the judgments shown in (55) to (59), in that the initial uses of the (a) examples emerge earlier than those of the (b) examples or that there is no example corresponding to the (b) examples, and that there are more (a) examples than (b) ones for each pair, as shown in Table 3 below:

### Table 3. Restrictions on the V-A Forms

<table>
<thead>
<tr>
<th>Collocation</th>
<th>Date (Year)</th>
<th>COHA Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>[paint] white [at*] [nn*]</td>
<td>1900</td>
<td>4</td>
</tr>
<tr>
<td>[shake] awake [at*]</td>
<td>1956</td>
<td>2</td>
</tr>
<tr>
<td>[drink] dry [at*] [nn*]</td>
<td>1883</td>
<td>1</td>
</tr>
<tr>
<td>[hammer] flat * [nn*]</td>
<td>0 hit</td>
<td>0</td>
</tr>
<tr>
<td>[dye] black * hair</td>
<td>0 hit</td>
<td>0</td>
</tr>
</tbody>
</table>

the total number of each collocation during the 200 years shown in COHA:

<table>
<thead>
<tr>
<th>Collocation</th>
<th>COHA Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>[paint] white [at*] [nn*]</td>
<td>4</td>
</tr>
<tr>
<td>[shake] awake [at*]</td>
<td>2</td>
</tr>
<tr>
<td>[drink] dry [at*] [nn*]</td>
<td>1</td>
</tr>
<tr>
<td>[hammer] flat * [nn*]</td>
<td>0</td>
</tr>
<tr>
<td>[dye] black * hair</td>
<td>0</td>
</tr>
</tbody>
</table>

Given what we have said so far, nothing would rule out derivation of the (b) examples in (55) to (59), since the result-denoting adjectival root should be able to move to the adjectivizer, followed by the movement of the complex to v, followed by the movement of the complex to F. Thus, we need to admit a possibility of deriving the resultative construction without alternating it with the V-A form.

I will claim that in addition to (48b) and (53) we have a way to build the resultative construction without head-movement, resorting to the direct merger between the verb root and v, as in (60):

(60) the derivation of dye my hair black

\[
\text{\text{vP}}
\quad
\text{v}
\quad
\text{aP}
\quad
\text{\text{\sqrt{DYE}}}
\quad
\text{v}
\quad
\text{\text{DP}}
\quad
\text{a'}
\quad
\begin{array}{c}
\text{hair} \\
\text{a}
\end{array}
\quad
\sqrt{\text{BLACK}}
\quad
\begin{array}{c}
\phi \\
\text{black}
\end{array}
\]

In (60), the root \sqrt{DYE} is directly merged with the verbalizer which takes aP as its complement, and what appears to be the direct object of the verb dye is actually realized in the Spec of a which adjectivizes \sqrt{BLACK}. (60) may be reminiscent of Hoekstra’s (1988) analysis of the resultative construction in which the main verb always selects a small clause complement, whether transitive or intransitive. Or one may recall Mateu and Rigau’s (2002) and/or Zubizarreta...
and Oh's (2007) analysis of the resultative construction and/or Cause-Directed Motion Construction in which the phonetically realized verb is not the argument-taking predicate but is merely adjoined to the invisible argument-taking predicate such as v (cf. also Nishiyama and Ogawa (2013, this volume) for an extension of their views). Anyway, (60) differs from (53) in one important respect: in (53), the minimal projection that dominates the direct object DP is vP and the DP is a true thematic argument of the verb push, for example. On the other hand, in (60), what appears to be a direct object of the verb dye is actually in aP, which contains neither the verb (root) nor a trace of it, and hence it is not a true thematic argument of the verb (root). What kind of different predictions do these distinguished phrase structures would make?

My answer to this question is concerned with quantifier scope. Consider (61):

(61) a. Taro dyed his hair black again.
b. Taro dyed [his hair black] again
   (Tomioka (2011: 163))
c. Taro dyed his hair black for the first time, after it became white due to his age.

Tomioka (2011) points out that in the resultative construction in (61a), there is no implication that Taro had dyed his hair black previously and he did the same action again. Rather, (61a) is compatible with the situation in which Taro dyed his hair black for the first time, after it became white due to his age, as in (61c). This fact is exactly what is predicted if (61a) has the syntactic structure in (60): since the adverb again is adjoined to aP in (60), it will not take the verb dye in its scope, and hence the dying action does not have to take place repetitively; rather, the restitutive reading in (61) naturally follows. However, this implication would be unexpected if (61a) had the structure in (53), since in the structure the minimal projection in which the adverb again could adjoin to should be the vP, and the vP is the minimal projection that dominates all of the object DP, the trace of the raised verb (root) and the result state-denoting aP. Therefore, given (53), the adverb again should be able to take the verb dye in its scope, and the repetitive reading should result. It seems safe to conclude from this that (61a) has the structure in (60) rather than (53).

As predicted from the discussion so far, (62a) does have the repetitive reading in which I had pushed the door open previously, and pushed it open again, as in (62c):

(62) a. I pushed the door open again.
b. I [pushed the door open] again
   (Paul Anthony (p.c.))
c. I had pushed the door open previously, and pushed it open again.
d. I pushed the door open for the first time, after it had been closed by wind.

Rather, (62a) is anomalous in the restitutive reading as stated in (62d). This fact naturally follows from my theory, since in the push-open-type resultative construction, the verb root PUSH is directly merged with aP and its projection is merged with v, in whose Spec the direct object DP is generated. In this case, the adverb again needs to adjoin to the vP, from which it dominates the (trace of the) verb (root). Hence, the restitutive reading is naturally excluded.

A remaining question is: why is it that (55a) to (59a) must have the syntactic structure in (60), while the push-open/shut resultative can have the structure in (53)? A partial answer to this question might follow from the fact that the verbs that occur in (60) are semantically intransitive. Thus, the DP the pub in (59) is not the internal argument of eat and eat in this use is intransitive. Similarly, the verbs paint and hammer, both being contact verbs, have the use as an intransitive verb (i.e. the conative use), as in (63):

(63) a. He painted on wooden panels of five plies of maple to retain the full luminosity of old masters’ gesso techniques.
    (COHA, 1981, FIC)
b. Growing desperate, he hammered against the lid, yelling for someone to come and help him.
    (COHA, 1981, FIC)

Moreover, the intransitive verbs that do not take an internal argument (or unergative verbs) typically can occur in the resultative construction but do not have the corresponding V-A form, as in (64):

(64) a. He danced his feet sore.
b. He danced sore his feet.
   (Nagano and Shimada (2009: 81))

Hence, the obligatoriness of the internal argument for the verb that occurs in the resultative construction should be a partial factor that can solve the matter at hand. However, since a comprehensive understanding of the issue of semantic selection is far beyond the scope of this article, I will leave it for future research.
4. Constructionalization and Grammaticalization in Japanese V-V Compounds from the Perspective of Cartography

In the previous section, we discussed syntactic constructionalization from a lexicalized verb-adjective combination to a verb phrase. In this section, I will focus on the constructionalization in a much larger syntactic domain: from within the VP-domain to the TP domain. More specifically, we will discuss constructionalization of V-V compounds in Japanese from lexical ones to syntactic ones as a result of grammaticalization, with special attention to the historical development of the verb kiru. The original (lexical) meaning of this verb is 'to cut', as in (65):

(65) Taro-ga ki-o nokogiri-de kit-ta.
   Taro-Nom tree-Acc saw-with cut-Past
   'Taro cut a tree with a saw.'

4.1 Kageyama (1993): The Pioneering Work

In Japanese, there are quite a few number of V-V compounds, and Kageyama (1993) is the pioneering work on them in the field of generative grammar. He divides V-V compounds into lexical V-V compounds and syntactic ones. The former is formed in the lexicon, by the direct merger of two lexical head, as in (66). The latter is formed in the syntax, by the selection of VP1 or V'1 by the second verb V2, as in (67a,b):

(66) V
    V1   V2

(67) a. VP2
    VP1   V2
    DP1   V'1   V1
    DP2   V1

b. VP2
    VP1   V2
    DP1   V1

Kageyama (1993) proposes four syntactic tests that can distinguish lexical V-V compounds from syntactic ones, one of which is the possibility of substitution of a verbal noun (VN) + si ‘do’ for V1, which is at least as large as V: since V1 in (66) is a minimal projection of the lexical verb, it cannot be replaced by a VN+si, while V1 in (67a,b) is projected up to V’ or VP, the entire complement of V2 can be replaced by a VN+si. Using this test, we can, for example, distinguish a lexical V-V compound kiri-taosu ‘cut-topple’ from a syntactic V-V compound kiri-oeru; the former cannot be replaced by bassai-si-taosu, as in (68a), because it has the structure in (66), where there is no room for V1 to accommodate VN+si, whereas the latter can be replaced by bassai-si-oeru without changing the meaning, as in (68b), because it has the structure in (67b), where V’1 can accommodate VN+si:

(68) a. kiri-taosu ‘cut-fell’ / bassai-si-taosu ‘cutting.do-fell’
   b. kiri-oeru ‘cut-finish’ / bassai-si-oeru ‘cutting.do-finish’

The verb kiru ‘cut’ can also occur in V2 as well. In this case, too, it can occur both in a lexical V-V compound and a syntactic one, as in (69a) and (69b), respectively:

(69) a. akusyuu-o tati-kiru
    bad.habit-Acc shut.off-cut
    ‘(lit.) cut off a bad habit (kick a bad habit)’

b. hon-o yomi-kiru
    book.Acc read-cut
    ‘(lit.) cut off reading a book (finish reading)’

(69a) corresponds to (68a) and has the structure in (66), while (69b) corresponds to (68b) and has the structure in (67a). As expected, tati in (69a) cannot be replaced by a VN+si, as in *bundan-si-kiru ‘dividing-do-cut’, whereas yomi in (69b) can be replaced by a VN+si, as shown in (70):
(70) a. Taro-wa aite-no dekata-o yomi-kit-ta.
   ‘Taro completely read the opponent’s tactics.’

b. Taro-wa aite-no dekata-o keisan-si-kit-ta.
   ‘Taro completely figured out the opponent’s tactics.’

Now, what is interesting about kiru is that the same verb can occur in the V2 position of both the lexical and syntactic V-V compounds, but its meanings differ in the two constructions: while the former has the original meaning of severing, the latter has the aspectual meaning of finishing or completing. Why is this the case? Neither Kageyama (1993) nor subsequent works on the issues of V-V compounds from the perspective of lexical semantics have provided any answer to this question.

4.2 Nishiyama and Ogawa (2013): A Cartography Analysis

A new syntactic framework, set forth by Fukuda (2009, 2013) and developed by Yashima (2009), Nishiyama and Ogawa (2013, this volume), and Ogawa and Niinuma (2011), has a way to explain this fact. Fukuda (2009) approaches the issue by adopting Cinque’s (2006) analysis of Italian restructuring verbs in terms of “cartography”. Cartography is a worldwide project that tries to clarify the universal hierarchy of functional categories from the lexical verb to Force (cf. Rizzi (1997), Cinque (1999), and references therein). In this project, what was traditionally regarded as complex clause consisting of a restructuring “verb” and an embedded verb in its defective complement clause in Rizzi (1982) has been reanalyzed as a simple clause consisting of a modal or aspectual functional category which occupies somewhere in the universal functional hierarchy and a lexical verb in the matrix clause. Fukuda (2009, 2013) extends Cinque’s analysis of Italian restructuring “verbs” to aspectual “verbs” that occur in syntactic V-V compounds in Japanese, and claims that (71a), for example, has a structure like (71b):

(71) a. Taro-ga hon-o yomi-oe-ta.
   ‘Taro finished reading a book.’

b. [TP Tarogae [VoiceP t, [AspP [VP hon-o yomi] Asp (oe)] Voice (ϕ)] T (ta)]

Nishiyama and Ogawa (2013, this volume) extend Fukuda’s (2009, 2013) analysis to some of the V2s in what Kageyama (1993) identifies as lexical V-V compounds, and claim that aruku/akasu ‘walk/spend.a.night’ of tabe-aruku ‘(lit.) eat-walk (ear around)’ and odori-akasu (lit.) dance-spend.a.night (continue to dance)’ have been grammaticalized into a functional category denoting repetitive and continuative aspect below VoiceP, respectively.

Ogawa and Niinuma (2011) extends Nishiyama and Ogawa’s (2013, this volume) analysis of aruku and akasu to more controversial cases of lexical V-V compounds and claim that ageru/agaru ‘raise/go.up’ in V-V compounds of the V+ageru/agaru type which are divided into three subtypes: (i) the first type has the same syntactic status as the verb root and the same meaning as the lexical verb (e.g. osi-ageru ‘push-raise’), (ii) the second type is located between the root and vP and has an auxiliary (Aux) status, that is, does not take an internal argument of its own (e.g. tumi-ageru ‘(lit.) pile-raise (pile up)’), and (iii) the third type is located between vP and VoiceP and has been grammaticalized into a functional category denoting completive aspect (e.g. suri-ageru ‘(lit.) print-raise (finish printing)’).

As a natural application of Nishiyama and Ogawa’s (2013) and Ogawa and Niinuma’s (2011) analyses to kiru ‘cut’, in this section, I will propose that kiru of tati-kiru ‘shut.off-cut’ in (69a) and (72a) is a lexical verb (root), that kiru of omoi-kiru ‘(lit.) think-cut (give no further though to, give up)’ in (72b) is Aux below vP, that kiru of yomi-kiru in (70a) and (72c) is AspP below VoiceP, and that kiru of hie-kiru ‘(lit.) cool-cut (freeze-cold)’ in (72d) below is AspP above VoiceP:

(72) a. tati-kiru ‘sever’:
b. *omoi-kiru* ‘give up’:

```
vP
  OBJ    v'  
    AuxP v ( = φ )
      \vV1 Aux (= \vV2)
        \omoi kir
```

c. *yomi-kiru* ‘finish reading’:

```
VoiceP
  AspP Voice
    vP Asp (rare)
      OBJ v' kir
        \vV2 v yomi ( φ )
```

d. *name-kiru* ‘make.light.of-cut (make light of someone extremely)’:

```
AspP
  VoiceP Asp
    vP Voice (kir)
      OBJ v' kir
        \vV2 v name ( φ )
```

Summarizing (72a-d) in a single structure, we will have (73):

```
(73) TP
  AspP T
    VoiceP Asp (ru/ta)
      SUBJ Voice kir (in (72d))
        AspP Voice (rare)
          OBJ v' kir (in (72c))
            vP Asp (rare)
              OBJ v kir (in (72b))
                AuxP v ( φ )
                  \vV1 \vV2 kir (in (72a))
```
4.3 Diachronic Semantic Change and Synchronic Syntactic Variations

What we have seen so far are theoretical analyses of V-V compounds in Japanese, among which there is a cartography analysis which regards some of the aspectual or modal V2 as a functional category. They are based on syntactic theories about synchronic grammar but have had no support from diachronic data. However, we can use the V-V compounds in Japanese to support my proposal about syntactic constructionalization, if we can show that the various uses of *kiru* as in (72b-d) developed as a result of diachronically grammaticalization as upward reanalysis of V2 from (72a) to (72b) and (72c) to (72d) (and/or constructionalization of the V-V compounds as a whole).

Recall here the definition of ‘syntactic constructionalization’ in (35), repeated below:

(35) **Syntactic Constructionalization:**
When a syntactic constituent, which was not a syntactic construction at the earliest stage, becomes a minimal syntactic construction (i.e. which contains only one variable and one categorizer) at a later stage, and comes to have more than one variable and/or more functional categories than ever and possibly enlarges the size of its syntactic constituent, in a unidirectional fashion, call the diachronic process Syntactic Constructionalization.

If this is qualified as a correct generalization on diachronic changes, we can expect that the four different uses of *kiru* in V-V compounds as shown in (72a-d) have emerged in this order, since the later uses have a larger number of functional categories and a larger size of phrase structure than the earlier ones. This prediction is by and large borne out.

Himeno (1999: 173-175) classifies various uses of *kiru* by first distinguishing lexical V-V compounds from syntactic ones, and then dividing each of the two types of V-V compounds into two subclasses, as in (74):

(74) a. lexical V-V compounds:
[property: transitive verb + *kiru* = intransitive verb + *kiru* = transitive verb]  
meaning (ii) termination: *wari-kiru* (lit.) divide-cut (come to a clean decision), *omoi-kiru* (lit.) retrospect-cut (give up), *ii-kiru* (lit.) say-cut (say definitely), *nori-kiru* (lit.) mount-cut (get through), etc.

b. syntactic V-V compounds:
[property: transitive verb + *kiru* = transitive verb; intransitive verb + *kiru* = intransitive verb]  
meaning (iii): completion: *hasiri-kiru* (lit.) run-cut (finish running a certain distance), *yomi-kiru* (lit.) read-cut (finish reading), etc.
meaning (iv): extremity: *hie-kiru* (lit.) ‘cool-cut (freeze cold)’, *name-kiru* (lit.) make.light.of-cut (make light of somebody extremely)

Based on Himeno’s classification, Aoki (2010) observes around when each new use of the verb *kiru* as the second verb of a V-V compound emerged in the history of Japanese literature, as summarized below:

(75) a. The use of *kiru* with meaning (i) was a traditional one, and it could only be preceded by a limited number of verbs that expresses manner of cutting.

b. In the use of *kiru* with meaning (ii), *kiru* actually means “leave off” with some emphasis such as ‘clearly’ or ‘plainly’, which keeps adjacent to the original meaning of the lexical verb in that it expresses cutting of space rather than cutting of material.

c. During the times between the Heian Period and the Early Middle Ages or the Kamakura Period (around A.D. 800 to 1330), *kiru* was used with only the meaning (i) and the uses with the meaning (ii) were limited to *ii-kiru* ‘say definitely’ and *omoi-kiru* ‘give up’.

d. In the Late Middle Ages or the Muromachi Period (around A.D.1300 to 1570), other uses of (74a) with the meaning (ii), which expresses that some action led to a final state, emerged, such as *sizumari-kiru* (lit.) grow.still-cut (to grow completely quiet), *huri-kiru* (lit.) swing-cut (swing all the way through).

e. In the stage of (74a), the second verb *kiru* selectively combined with a change-denoting telic verb. From the Early Modern Times or the Edo Period on (from around the year 1570 on), however, *kiru* become able to be combined with an atelic verb to express the meaning of completion of the action, as in (74b).

When we rephrase Himeno’s (1999) classification and Aoki’s (2010) diachronic observation in terms of grammaticalization, it seems safe to say that among the two meanings of the lexical V+*kiru* compounds, meaning (ii) is a more grammaticalized (or semantically generalized) one than meaning (i), since severing of a space is more abstract than severing of a material, and that among the two meanings of the syntactic V+*kiru* compounds, meaning (iv) is a more grammaticalized (or semantically generalized) one than meaning (iii), since the action or change of state denoted
by V1 does not specify a clear end point on a scale in terms of location, time, or degree. Then, as far as Aoki’s observation shows that meaning (i) comes earlier than meaning (ii), which comes earlier than meaning (iii), which comes earlier than meaning (iv), and if there are rough correspondence between meaning (i) and structure (72a), meaning (ii) and structure (72b), meaning (iii) and structure (72c), and meaning (iv) and structure (72d), then we can conclude that the grammaticalization of kiri, or the constructionalization of V+kiri, has developed in a way fully predictable from the hypothesis in (35).

In fact, it is not controversial whether meaning (i) corresponds to structure (72a). As for meaning (ii), it has undergone both semantic bleaching from meaning (i) and auxiliation in that the internal argument of omoi-kiri ‘retrospect-cut’ is more an argument of omowu ‘retrospect’ than it is an argument of kiri ‘cut’. Thus, consider (76a):

(76) a. {kako-o / naki hito-o } omoi-kiru
    past-Acc / dead person-Acc retrospect-cut
    ‘stop thinking about {the past / the dead person}’

b. kako-o kaisou-si-kiru
    past-Acc retrospection-do-cut

As the paraphrase of the Japanese example shows, the accusative-marked object is the object of omowu, and kiri takes the whole VP in its scope, feeding the meaning that someone stops thinking about the past or the dead person. In this sense, kiri in this usage is similar to terminative aspect. However, its syntactic status is different from kiri of yomi-kiri in (72c), that is, Asp above Vp, since V1 in this case cannot be replaced by VN+sì, as shown in (76b), whereas V1 in yomi-kiri can be, as shown in (70b). Hence, given Nishiyama and Ogawa’s (2013, this volume) and Ogawa and Niinuma’s (2011) framework, we can identify the grammatical status of kiri in (76a) as Aux below Vp, and the structure of omoi-kiri as (72b) rather than (72a,c,d).

Kiri of yomi-kiri ‘read-cut’, as shown in (70a), is semantically a completive aspect that corresponds to meaning (iii). Other instances of this type of kiri are tabe-kiri ‘eat-cut’, tori-kiri ‘take-cut’, nomi-kiri ‘drink-cut’, and so on. The assumption that this use of kiri syntactically corresponds to Asp below VoiceP and above Vp is justified by the fact that kiri of a completive aspect can be combined with VN+sì, as shown in (70b). Hence, the syntax-semantics correspondence between structure (72c) and meaning (iii) is also justified.

Finally, the instance of kiri in (72d) is non-distinct from that in (72c) in that they refer to a completive aspect. However, I claim that they differ syntactically in whether they occur below or above VoiceP. Which syntactic position is chosen for a completive aspect can be determined by checking the passivizability of V1: if V1 in a V-V compound can be passivized, V2 should be Aspect above VoiceP, while if it is not, V2 should be Aspect below VoiceP (cf. Cinque 2003, Fukuda 2009, 2013, Nishiyama and Ogawa 2013). With this in mind, consider (77):

(77) a. Sandoitti-wa kirei-ni tabe-are-ta/*tabe-are-kit-ta.40
    sandwich-Top completely eat-cut-Pass-Past / eat-Pass-cut-Past
    ‘All the sandwiches were completely eaten.’

b. Yamada-sensei-wa, gakusei-tachi-ni kanzen-ni
    Yamada-Professor-Top student-PL by completely
    name-rare-kit-tei-ta /*/name-kir-are-tei-ta.
    make.light.of-Pass-cut-Prog-Past / make.light.of-cut-Prog-Pass-Past
    ‘Professor Yamada was being completely made light of by his students.’

Since kiri in (77a) must occur closer to the root than the passive voice morpheme, it must be a realization of a functional category lower than VoiceP, given the Mirror Principle. Hence, we can identify it with the lower Aspect in (72c). On the other hand, since kiri in (77b) must occur more remote to the root than the passive voice morpheme, it must be a realization of a functional category higher than VoiceP. Therefore, we can identify it with the higher Aspect in (72d).

All in all, the four different types of kiri that occur in the V2 of a V-V compound have the structures in (72a-d), respectively, and it seems safe to conclude that their syntactic structures enter into a one-to-one correspondence to (74a-i,ii) and (74b-i,ii), respectively, as schematized in (73). Given that Aoki’s (2010) observation is correct in that the four different uses of kiri have emerged diachronically in this order, it provides a rather strong piece of evidence for our proposed hypothesis about syntactic constructionalization as defined in (35).31

5. Conclusion

In this article, I have argued for a simple claim that both lexicalization and grammaticalization on a diachronic scale proceeds in such a way that satisfies the hypothesis of syntactic constructionalization as defined in (35). Since the claim that grammaticalization should be reanalyzed as constructionalization has occasionally been made in the literature on historical linguistics (Himmelman 2004), Bergs and Diewald (2008), Bybee (2010), Akimoto and Meda (2013),
Hilpert (2013)), my claim about the relation between grammaticalization and syntactic constructionalization, as argued for in section 4, is not so unique. In fact, in the field of generative syntax, too, Roberts and Roussou (2003) have already provided a quite similar view to (35), as in (78):

(78) Successive upward reanalysis along the functional hierarchy is thus how we define grammaticalization path. (Roberts and Roussou (2003: 202))

Hence, my contributions to this field are just two-fold: first, I have applied Nishiyama and Ogawa’s (2013, this volume) and Ogawa and Niinuma’s (2011) approaches to Japanese V-V compounds, which are themselves extension of Cinque’s (2003, 2006) cartography approach to restructuring verbs in Italian, to a new case of Japanese V-V compound which neither of these articles have dealt with. Second, I have endorsed their cartography approach to Japanese V-V compounds from a diachronic perspective, on the basis of Aoki’s (2010) observation in the field of Japanese linguistics. I believe that these are small but significant contributions to the entire cartography project.

Another, and more important, contribution of this article is both theoretical and empirical. On a theoretical level, I have argued that lexicalization in the sense of demorphologization is not an exceptional phenomenon as Brinton and Traugott (2005) claim, but is a rather productive process that falls under the independently attested claim about (syntactic) constructionalization. As a result, we have subsumed not only grammaticalization but also lexicalization under (syntactic) constructionalization. The important generalization we have observed in this field is that an N-N compound based on a combining form (CF) comes to use after a new use of the CF as an independent word (i.e. free morpheme) is established. This is a rather surprising generalization in view of the previous assumption that both N-N compounds and the ICF+FCF are lexical constructs. However, once N-N compounds are reanalyzed as a syntactically rich construction which contains categorization of each N independently, as Harley (2009) claims, then we can make a DM-based explanation of the generalization. Moreover, we have corroborated Giegerich’s (2005) conclusion from his discussion of AccocAdj+N construction, i.e. “the lexicon and the syntax are not separable, distinct modules in the grammar [but] (t)hey overlap,” which is also a conclusion in affinity with the DM-based approach to compounds.

I have provided another support for the syntactic constructionalization, in the context of discussing the relation between the resultative construction and the corresponding V-A form from a diachronic perspective, which has not been provided in any previous work, as far as I know. From the discussion, it turned out that the resultative construction which was traditionally divided into at most two subtypes should actually be divided into three types in its relation to the V-A form, and that, against the previously believed view, a certain type of the resultative construction, i.e. the push-open type, must be diachronically derived from the V-A form, as a result of the syntactic constructionalization. Moving a step further, I also claimed that the push-open type resultative construction is derived from the V-A form synchronically as well. Since this claim presupposes that the V-A form does not constitute a lexical unit, my claim is tantamount to an argument against both Taniwaki’s (2006) and Nagano and Shimada’s (2009) analyzes of the V-A form. I have supported my own claim from the fact that a manner adverb that modifies the manner-of-motion verb can occur between the direct object DP and the resultative adjective, a fact unexpected from any lexicalist view.

Although many questions remain in the fields of grammaticalization, lexicalization and constructionalization which we have discussed, I believe that this article will be a food of thought for those who are interested in the syntactic aspect of these diachronic changes of language, which tended to be evaded in a discussion of generative syntax.

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Notes

1. What kind of parameter is valid is a controversial issue among generative linguistics proper. Thus, Borer (1984) proposed that parameters are typically expressed in terms of lexically listed, morphosyntactic requirements of functional heads, and Kayne (1984) emphasizes the importance of microparameters in accounting for the syntactic variation observed across closely related Romance dialects. In fact, Kayne’s (1994) antisymmetric view of language has an important consequence of eliminating head-parameter, a representative of macro-parameter, from grammar. On the other hand, Baker (1996) proposes a polysynthetic parameter, a kind of macroparameter, and argues that both
macroparameters and microparameters are needed to account for observed patterns of crosslinguistic variation. Snyder (2001) argues for the compounding parameter, which is also a kind of macroparameter. We will not take a particular stance on this issue, except for adopting the shared view that many parameters are reduced to functional categories.

2. Corpus data is sometimes wrongly identified as “E-language” or “performance”, and for this reason, it is sometimes argued that it is of little use in studying the nature of speaker-hearer’s competence or knowledge of language. Many barren arguments against generative linguistics have been put forth because of its alleged disrespect for corpus data or data obtained from actual use of language, in the current situation in which we can obtain a large size of such corpus data. For example, Leech (1992:113) argues that “[t]his may mean that, in trying to account for phenomena of performance, CCL [=computer corpus linguistics] just makes no claim about the mental phenomena which underlie the production of corpus data.” However, this is an obvious misunderstanding of Chomsky’s statements about the distinction between competence and performance. Thus, Chomsky (1965: 18) suggests that “[c]learly, the actual data of linguistic performance will provide much evidence for determining the correctness of hypotheses about underlying linguistic structure, along with introspective reports (by the native speaker, or the linguist who has learned the language).” Chomsky (1986: 36-37) also notes that “In practice, we tend to operate on the assumption, or pretense, that these informant judgments give us ‘direct evidence’ as to the structure of the I-language and initial state could come from many different sources apart from judgments concerning the form and meaning of expressions: perceptual experiments, the study of acquisition and deficit or of partially invented languages such as creoles, or of literary usage or language change, neurology, biochemistry, and so on. … As in the case of any inquiry into some aspect of the physical world, there is no way of delimiting the kinds of evidence that might, in principle, prove relevant.” See Ohna (2013) for a detailed discussion of this issue.

3. See also Newmeyer (1998: 275-6), who suggests that “a rough impression is that downgradings have occurred at least ten times as often as upgrades.”

4. See also Newmeyer (1998: 270) for the statement that the upgrading of clitic pronouns to full lexical pronouns seems to have happened repeatedly.

5. The development of the suffix -ly from -liç, for example, via grammaticalization took several times as much time span as the development of the free form from a combining form via demorphologization, which is about as long as 50 years. On the basis of this fact, one may suggest that the two phenomena are too disparate to be argued on the same forum. However, the historical development of an affix from a free form also generally involves semantic bleaching as well as loss of morphological autonomy and (sometimes) phonological erosion, none of which is relevant in the derivation of demorphologization from a combining form (CF) to a free form. Hence, it seems natural that grammaticalization can take far more time than demorphologization. Note also that I do not intend to argue that syntactic constructionalization is a tendency of language change as a result of the combinatorial applications of various morphosyntactic and semantic processes. Hence, it is no surprising even if there is a divide between the temporal period for which an instance of syntactic constructionalization to take and the temporal period for which another takes. All we are interested in is the uniformity in the direction and order of all the diachronic changes concerned, sometimes called “unidirectionality,” the only notable exception to which being the fact just noted in the text.

6. The numbers in the highest line of Figure 1 and other figures, i.e. 1, 2, 3, …, 20, refer to the period of time per decade that begins from 1810s to 2000s. The numbers are used instead of the actual historical dates, just for space limitation in the figures.

7. [at*] is the variable for articles such as the, a, every, no, etc. [d*] is the variable for determiners such as that, this, any, quantifiers such as each, what, whose, and some adjectives necessarily paired with determiner such as same, own. [app*] is the variable for possessive pronouns such as my, your, his, her, their. [j*] the variable for any adjective. [nn*] is the variable for any noun. As other variables used in other figures, [i*] is the variable for any preposition, [r*] is the variable for any adverb, and [p*] is the variable for any non-possessive pronoun. Incidentally, “*” is the category-unspecified variable.

8. Examples of X+phobia with the two morphemes hyphenated are abstracted away from the examples of N-N compounds, because we take it to be a variant of ICF+FCF, where ICF is an abbreviation for “initial combining form”, such as hydro-, psycho-, and so on. Actually, the hyphenated version tend to emerge earlier than the one in which the two morphemes are intervened by a space, which appears later than the emergence of the lexicalization of the relevant FCF.

9. See Harley’s (2009) and Sato’s (2010) analyses of phrasal compounds. Also, in English, there are some N-N compounds which have free variations, like doghouse/dog house, greenhouse/ green house, and an anonymous reviewer also asks whether the speakers who write doghouse and those who write dog house have different views on “wordhood.” A rigid application of the comment in the text would imply that they do. However, we will not go deep into the issue here, since it would be impossible to study whether for each such compound the one-word form emerged diachronically earlier than the two-word form. As for an argument against the relatedness of orthography and “wordhood,” see Bauer (1983).
10. In DM, the notation that “a constituent is smaller or larger than word level” could be replaced by the notation that “a constituent is dominated by a categorizer or not.”

11. However, this is an assumption just for simplicity. In fact, there can be the possibility that the linker heads an independent functional category and that workaholic is syntactically larger than work-holic, if there is such a word. However, we will not go into the detail of any issue on linking elements here. See note 23 and Neef (2009) for relevant discussions.

12. This is a corpus which contains 7,528,029 definitions and usage of newly-coined words in American English since 1999 (as of January 30, 2014) and is enlarging its storage day by day. See http://www.urbandictionary.com.

13. In COHA, a similar tendency can also be found on photo. On the other hand, we cannot find a clear example of N-N compound based on ex in COHA. We can see therein a few cases of ex+N with a space between the two morphemes, such as ex wife and ex President. However, I am not sure whether these are clear cases of compounds or cases of NP in which an adjective modifies N or a wrong transcript of ex-wife and ex-President, since the amount of examples is quite small. On the other hand, COHA proves that both the frequency in use of ex connected with another morpheme via hyphenation and the number of collocations with ex have been gradually increasing since the 1810s, and the first use of ex as an independent word emerges in COHA in 1934, as in (i). These facts are all compatible with the proposed generalization:

(i) you’d want to go on getting your income and not give your Ex a chance to cut it off, the dirty hog!
   (Work of Art, by Sinclair Lewis, 1934)

14. In counting the number of this type of example, clear cases of mistranscription such as psycho-logy (1901) and psy-cho-logical (1905) are ignored.

15. “Combining form (CF)” is also referred to as “affixoid,” and Bauer (1983) distinguishes the CFs which procliticize to a word or another CF and those which encliticize to it as “initial combining form (ICF) and final combining form (FCF), respectively. In any case, CFs are to be distinguished from affixes, generally for the following two reasons: first, while a single morpheme cannot behave both as a prefix and a suffix, while a CF can (e.g. phobism, hydrophobia); second, while an affix cannot be directly combined with another affix, a CF can: phob- can be combined with the suffix -ia, -ic, or -ism, as in phobia, phobic, phobism, while no such combination is possible with a bona-fide affix. See Stein (1977), Bauer (1983), Plag (2003), and Prčić (2008) for a general distinction between affixes and CFs.

16. Giegerich (2004) draws a distinction between two types of N-N compounds: the attributive construction (e.g. metal bridge), which is typically produced in syntax but can be lexicalized, and the argument-predicate construction (e.g. watch-maker), which can be generated in the lexicon only. Although I do not intend to correspond these distinctions to the distinction between (12) and (13), we can reach a similar conclusion if the attributive construction tends to use space between the two morphemes, while the argument-predicate construction tends to use hyphenation between the two morphemes. Kato and Kageyama (1998) also make a claim to the effect that a distinction between (12) and (13) is necessary for phrasal compounds. It is an important issue to determine which of (12) and (13) is chosen for each case, but we will not pursue this issue here, because it takes us far afield from the present issue. A possibility to tell which is chosen will be discussed in section 2.8.

17. My proposal, but not Harley’s (2009), also predicts that the first element of an N-N compound can be replaced by a pro-form like such. Actually, a quick Google search tells us that there are a number of examples with the collocation such phobia(s), many of which seem to involve an anaphoric use of such. It is true that the pro-form such, unlike one, is more likely to be used as an outbound anaphora that refers back to part of a word, as shown by Watt (1975). However, such does not differ from one in that it cannot be used as an inbound anaphora, against which they argue there is a purely grammatical restriction:

(i) a.* Harry was looking for a rack for magazines and he found a one-rack.  
   b.* John is working as a frogman, and Mary wants to marry a suchman.

Given the ill-formedness of (ib), the possibility of such phobia in (ii) may suggest that not only the N+phobia compound as a whole but also each of the two Ns are phrasal.

(ii) The most common phobias such as fear of spiders, snakes and enclosed spaces (claustrophobia) are the ones we hear most about, but there are phobias for just about everything in life (for example vomiting, buttons, policemen, balloons, etc.) I’ve treated many such phobias and have a high success rate in terms of eliminating or greatly reducing the phobias.

(http://www.reachouttherapy.co.uk/pg/conditions/fears--phobias; with an orthographical mistake modified)

However, I admit that this is not so strong a support for my hypothesis, because it is highly likely that such phobia is not a pro-form for a N-N compound but for a bona-fide noun phrase, just as such a phobia is, and because a such phobia is ill-formed irrespective of the context it is used. As for the syntactic nature of such+N, there is also an interesting question of why such precedes the indefinite article a, while it follows other quantifiers such as many, some, all, most, etc. However, I will leave them for future research. See Ward, Sproat, and McKoon (1991: 444-445) for a compact summary of previous approaches to anaphoric islands since Postal (1969) and their proposal about the
necessary distinction between inbound and outbound anaphora in terms of syntax and pragmatics. I thank Hideki Kishimoto and Akiko Nagano for reminding me of these issues and references.

18. See Allen (1978: 237) for exceptional data of suffixes selecting a phrase, such as black and blueness, blood and thunderish, spider’s webby, and so on.

19. (22c-e) are examples brought to my attention by Paul Anthony (p.c.).

20. Kato and Kageyama (1998) show that, against what is predicted from Lieber’s (1992) analysis of N-N compound, the second element of what they classify into the second and third types of phrasal compound can be replaced by one:
   (i) — Is it a cost-of-living index or a consumer price index?

If the contrast between the perfect well-formedness of (i) and the slight marginality of (23b) is a real one, I have no explanation of it.

21. This contrasts with the fact that stage-level adjectives such as stars visible, rivers navigable, etc. can occur post-nominally. See Yasui, et al. (1976), Cinque (2010), and references therein for various issues on this type of adjectives.

22. The fact, which Giegerich (2005) points out, that another modifier cannot intervene between and AssocAdj and N, as in bovine contagious tuberculosis, can also be attributed to the same reason as the ill-formedness of (31b), though we will not make any further argument on it.

23. If there is a language in which a linker occurs between a modifier and the head noun, it can be qualified as a piece of morphological evidence for the existence of X. See also note 16 for a relevant discussion. Also, Ito and Mester (2003) propose a structure like (13) for Japanese N-N compounds involving rendaku, a kind of voicing, and that the phonological voicing feature is located in X. See also Nishiyama (2009) for related discussions. I thank Kunio Nishiyama for bringing these facts to me.

24. It is reasonable to suppose that the fore-stress observed here is partially attributable to the contrastive focus implicated here. See Watt (1975), Ward, Sproat and McKoon (1991) and references therein for relevant discussions.


26. I thank Anthony Paul and Anne Thomas, again.

27. We assume with Grimshaw (1991) and Baker (2003) that P is a functional category.

28. The occurrence of a compound with a pre-head nP modifier being temporally subsequent to that of a phrase with a post-head PP modifier is often observed in a single text too, as in (i):
   (i) — Babies who are fed on demand are more likely to have a higher IQ and perform better at school, according to new research. The study suggests that eight-year-olds who were demand-fed as infants had IQs that were four or five points higher than those who were fed to a schedule.
   (http://www.theguardian.com/society/2012/mar/17/babies-fed-demand-better-school)

Not only N-V compounds and N-A compounds but also N-N compounds are a kind of contracted expression. Hence, they do not seem to be used unless what it means has been explained in the previous text or fully established in a previous context. The fact that (36e) follows (36d) diachronically could have something to do with this pragmatic reason. I thank Hiroyuki Nawata for bringing this issue to me.

29. Jespersen (1954) seems to be the first to observe the variable relationship between the two elements of an endocentric compound in English, as exemplified by sun cream, face cream, rash cream. Lees (1963) is probably the first to discuss the variable relationship in generative linguistics. The claim that N-N compounds are based on the endocentric compound in English, as exemplified by

30. After (36e), the resegmentation of [ap n0 phobia] as [ap √phob- [nP n0(-i-o)]] may have taken place. A direct consequence of this process is the emergence of the adjectival counterpart of phobia, i.e. phobic, in 1945, according to COHA. However, we will not go into the detail of the resegmentation here.

31. Although I am tentatively notating the mother node immediately dominating V2 and open as V2’, I do not intend to claim that they form a non-lexical unit; whether they form a lexical unit or a phrasal unit depends on the theory we adopt. In fact, we will revise (47) in DM terms later in this section.

32. In the stage of (44a), the result of the merger of √V and √A is still a root, and hence, the right-hand head rule (RHHR) of Williams (1981) does not apply to this construction. And adjunction of this complex root to v0 conforms to the RHHR because v0 occurs to the right of the root complex. This is why the V-A sequence behaves like a word, even if it seems to be V-initial in the V-A complex. It is also important to note that open of push open the door is not a verb or verbal root; if so, the inflection of the complex predicate would be push-opened the door, which is totally impossible, in contrast to the rare cases of V-V compounds in English, like stir-fry, crash-dive, sleepwalk, etc. But see Bauer (2009) for the non-universality of the RHHR.

33. Note that (i) shows clearly that the postverbal inflected element in the resultative construction is an adjective rather than a verb, both categorically and morphologically, even when flat is potentially ambiguous between A and V:
   (i) Mary hammered the metal flutter and flutter for three hours. (Travis (2010: 110, note 27))

Note also that there are a couple of phonetically overt adjectivizers such as -able of readable, and -y of thorny, some of which can occur in the resultative construction, as in (ii):
pull-tighten’, which can mean ‘tighten / take up the slack’. It is clear that hiki-simeru (pull-shut) is intended to mean. Hence, we will ignore these 6 verbs for a discussion of the current issue.

Hence, there is good reason to suppose that the root open in (48b) is dominated by aP, even if the adjectivizer is phonetically empty here. On the other hand, we predict that examples in (iii) should be ill-formed. See also Embick (2004) for a relevant discussion.

(ii) sharpen the pencil / sharpen pointy the pencil

Hence, however, this is not always the case with the resultative construction in Dutch. See Snyder (2001: 327) and references therein for relevant data.

Hence, there is good reason to suppose that the root open in (48b) is dominated by aP, even if the adjectivizer is phonetically empty here. On the other hand, we predict that examples in (iii) should be ill-formed. See also Embick (2004) for a relevant discussion.

(iii) hammer flatter the metal / sharpen pointy the pencil

34. One might suspect that if the principle of economy chooses one structure over the other, the more economical structure would always be chosen and a structure resulting from a less economical derivation should always be banned.

35. As the table 2 shows, for 6 of the 17 verbs, COHA does not provide any example of either the resultative construction or the V-A form. Hence, we will ignore these 6 verbs for a discussion of the current issue.

36. However, this is not always the case with the resultative construction in Dutch. See Snyder (2001: 327) and references therein for relevant data.

37. There is a Japanese V-V compound hiki-simeru (pull-tighten), which can mean ‘tighten / take up the slack’. However, given the pronunciation as hiki-simeru (pull-shut) is intended to mean.

38. Here, let us return to the bleach-white case we put aside in section 3.1. COHA does not show much about this case, because there is only once instance each of the resultative construction and the V-A form using bleach and white. However, when the two cases are compared, the V-A form emerges earlier (the year 1853) than the resultative construction (the year 1869). This fact is compatible with the assumption that BLEACH and WHITE were directly merged first, just as the push-open cases.

39. See Svenonius (2006) and den Dikken (2010) for an application of the cartography to PP so as to clarify the hierarchy of functional categories from the lexical adposition to the highest functional adposition.

40. See also Nishiyama and Ogawa (this volume: note 33).

41. Although this is not as wide-spread and generalized as kiru, the grammaticalization and constructionalization of taosu ‘topple’ which occurs as V2 of a V-V compound seems to be in progress, especially among the youth vernaculars and/or in the Kansai dialect of Japanese. First, while taosu of oshi-taosu ‘push-topple’, keri-taosu ‘kick-topple’, and kiri-taosu ‘cut-fell’ keeps the literal meaning of toppling, that of ogami-taosu (lit.) worship-topple (persuade sb to do sth by pleading with him), asobi-taosu (lit.) play-topple (play thoroughly), kui-taosu (lit.) eat-topple (ruin oneself by eating extravagantly) has the flavor of doing the action denoted by V1 repeatedly, which implies that the taosu as the V2 of these two compound verbs has been grammaticalized into repetitive aspect (see http://csd.ninjal.ac.jp/comp/ for more data). In fact, a quick Google search shows us that there are a bunch of (indecent or vulgar) examples in which V1 is replaced by a VN+, such as kouryaku-si-taosu (lit.) overrunning-do-topple (overrun sth thoroughly), katayou-si-taosu (lit.) utilization-do-topple (utilize sth thoroughly) in the colloquial Japanese. Then, we can say that taosu has at least been grammaticalized up to the Asp below VoiceP.

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