A Comparative Analysis of Noun Incorporation Productivity in English and German

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A thesis submitted in partial fulfillment of the requirements for the degree of Bachelor of Arts in Linguistics

Swarthmore College

December 2016

Abstract

Noun incorporation (e.g. crab-walk or hand-hold) is defined by Feist (2013) as a word or expression that includes a noun in the verbal constituent of an utterance. In this paper, I compare the productivity of noun incorporation in English and German. My goal is to determine whether the relationship between noun incorporation in English and German is similar to that of nominal compounding. Berg et al. (2012) posit that German assigns a more important role to compounding than English does, resulting in a higher occurrence of nominal compounds in German. Specifically, their study finds that nominal compounds composed of two constituents are more prominent and productive in German. Meyer (1993) notes that nominal compound productivity in German has very few restrictions and argues that picking up a German newspaper or magazine will expose the reader to a wide range of novel noun-noun compounds. Since the expanding productivity of nominal compounds in German is higher than in English, one might expect the same finding to be reflected in noun incorporation. In this paper, I argue that such is not the case, and that English makes more productive use of noun incorporation than German. I additionally
argue, along with Baker (2009) and Barrie & Mathieu (2016) that one shouldn’t expect the productivity of English and German noun incorporation to perfectly mirror Berg et al.’s findings, since noun incorporation is a syntactic process whereas compounding is a morphological process. In order to facilitate this study, I adopt Mithun’s (1984) classification of noun incorporation, in which she breaks the process of noun incorporation down into four categories. Based on the existence (or lack thereof) of these four types of noun incorporation in German and English, I conclude that English noun incorporation displays comparatively superior productivity. To carry out this comparison, I cite examples from a variety of studies (see Feist 2013; Barrie 2011; Barrie & Spreng 2009; Barrie & Mathieu 2016) and additionally interview two native German speakers.

*I would like to thank Ted Fernald and Emily Gasser for their immensely helpful remarks on previous drafts of this thesis. Additionally, I would like to thank Nathan Sanders for his assistance with my associated squib, and for teaching me the proper citation format. I would also like to thank Ute Bettray and Peter Baumann for allowing me to interview them and gather data from our discussions. Finally, I would like to thank the many linguistics majors who served as peer editors and generally provided useful feedback as my thesis progressed.*
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1 Introduction

At the most basic level, noun incorporation consists of a process in which “a noun stem binds to a verb stem ... in order to produce a derivative verb stem” (Rice & Prideaux 1991:283). The study of noun incorporation in language dates back over a century, to Edward Sapir’s article in 1911 documenting noun incorporation in Native American languages. In this paper, I compare noun incorporation in English and German in an attempt to contrast the productivity of this process in two closely related West Germanic languages.

Both German and English make extensive use of lexical compounding, with German offering a higher frequency of lexical compounds than its West Germanic cousin. Thus, the goal of this paper is to determine whether the same relationship found between compound nouns in German and English (specifically, higher productivity in German nominal compounding) holds true with incorporated nouns in the same languages. As closely related languages in the same language family, one might suspect the syntax and semantics of a given linguistic process, such as noun incorporation, to remain fairly similar. In order to facilitate this study, I utilize Marianne Mithun’s four types of noun incorporation, proposed in 1984.

As a general overview, Mithun identified four distinct types of noun incorporation that occur in the world’s languages, distinguishable by various syntactic and semantic traits. These four types operate in an implicational hierarchy, such that a given language can’t utilize Type 4 noun incorporation unless it also utilizes Types 1-3. This platform provides a strong initial base for comparison, as a difference in the number of types found in German versus in English, or in the
number of instances of each type, would hint at a variation in the productivity of each language’s noun incorporation process.

It is worth noting briefly that the derived verb stem resulting from noun incorporation can occasionally be altered to produce a derived noun stem as well, e.g. to babysit and babysitter (although this may actually be an example of back-formation from babysitter to babysit; see Feist 2013:162). When I refer to noun incorporation throughout this paper, I exclusively imply incorporated nouns that surface as derived verb stems (or gerunds), and from this point forward I analyze the process of noun incorporation as one that produces a derived verb stem.

In the following section, I will briefly discuss compounding in English and German. In Section 3, I discuss whether noun incorporation is a subsection of lexical compounding, or if it is an entirely unrelated phenomenon. In Section 4, I give a summary of Mithun’s noun incorporation theory. In Section 5, I apply Mithun’s theory to my sample of data and identify any potential outliers of Mithun’s typology. I additionally provide a brief overview of noun incorporation in a polysynthetic language (Greenlandic Inuit). In Section 6, I present data found upon interviewing two native German speakers. In Section 7, I make a final comparison between the noun incorporation productivity of these two languages, and I conclude with my results.

2 Compounding in English and German

Berg et al. (2012) provide a direct and relevant comparison of English and German, in which they perform a comparative study regarding the productivity, complexity, and frequency of nominal compounding in English vs. German. They argue that
nominal compounding occurs more frequently, and is more productive, in German than in English. Berg et al. remark, “the German system accommodates compounds more easily than the English one because languages favor morphological processes which create syllabic templates which already exist for base words” (Berg et al. 2012:293). In Section 2.3, I further explore their paper, and provide additional insight regarding Berg et al.’s argument. This paper attempts to prove whether the same relationship described by Berg and his colleagues (with regards to productivity) holds true between noun incorporation in German and in English.

2.1 English Nominal Compounds

Compound words can be defined as lexemes in which “their internal structure shows two or more lexemic bases ... forms which in other places in the language inflect independently and can on their own act as the heads of relevant phrases” (Bauer 2006:485). In English, nominal compounding (compounding noun stems) exists as a highly productive process, although there are differing lexical restrictions on its use when compared with German nominal compounding. Additionally, English compounds often appear as two individual written words, even though they act as one lexeme (e.g. table tennis).

Lexicalization also frequently occurs in English nominal compounds, occasionally to the point where the meaning of a compound word can’t be entirely derived from its lexical morphemes (e.g. tongue twister). Thus, many English compound nouns hold a distinct lexical entry from the lexical morphemes that they contain, referred to by Berton et al. (1996) as ‘semantic compounds.’ For the remainder of this paper, I will refer to such compounds as ‘lexicalized compounds.’
as I find the term ‘semantic compound’ to be inadequate in describing the specific characteristics of this compound type. In lexicalized compounds, “the semantic content of the compound cannot be derived from the semantic content of its constituent parts” (Berton et al. 1996:1165). As a result of these lexicalized compounds, the productivity of nominal compounding is hampered. For example, while *greenberry would not be a possible lexicalized compound, since the word *greenberry has not been lexicalized by (most) native English speakers to contain a specialized meaning that is not simply the sum of its constituents. It is worth noting, however, that *greenberry may still potentially appear as a compound in English in which its meaning is directly derived from the constituents *green and *berry, thus referring to a berry that is green (rather than a specific species of berry, as seen with blueberry).

The opposite of lexicalized compounds are referred to by Berton et al. as ‘orthographic compounds,’ in which “the constituent parts retain their original semantic content, e.g. *apple tree [or *pear tree]” (Berton et al. 1996:1165). For the remainder of this paper I will refer to such compounds as ‘compositional compounds,’ since their semantic interpretation exactly reflects the meaning of the compound’s individual constituents. While compositional compounds certainly occur in English, they are not as easily identifiable in writing since English examples are often written in two distinct words (e.g. *NBC broadcast). Berg et al. explicitly state this disparity, remarking, “whereas English compounds are usually written in two words, German compounds are typically written together (contrast Tischtennis with table tennis)” (Berg et al. 2012:276). As Berg et al. additionally note, the
difficulty in identifying English nominal compounds stretches far beyond simple
word boundaries, as morphology further enhances the difficulty of accurate
compound identification. “English is notorious for its difficulty of distinguishing
compounds from phrases. Neither spelling nor stress placement serve as reliable
criteria for compound identification” (Berg et al. 2012:277). For example, while
English compounds are usually stressed on their initial element (e.g. *hedgehog*,
*fastball*), there are also a bevy of English compounds that defy this trend (e.g.
*Madison Avenue, Boston Marathon*) (Plag et al. 2008:761). As a whole, compounding
is a highly productive process in English, despite occasionally being difficult to
identify at first glance.

2.2 German Nominal Compounds

In German nominal compounds, morphemes of the same semantic role may be
substituted for one another much more freely than in English. Consider the
following examples of German compositional compounds:

1) *Glasflächenreinigung*
   Glass-surface-cleaning
   Glass surface cleaning

2) *Unterhaltsreinigung*
   Floormat-cleaning
   Floormat cleaning

   The initial morphemes in a German compound word, referred to in German
as determinative elements, can be substituted for one another easily, as seen in
sentences (1) and (2). In German, the heightened productivity of nominal
compounding is a direct result of the overwhelming possible iterations of
grammatically acceptable compositional compounds. As Meyer writes, “each issue of
any newspaper or magazine contains a whole range of novel NN-compounds. Hence the reader is not bound to have read them, but is able to understand immediately within the context of the corresponding text” (Meyer 1993:1). It would therefore appear that the amount of possible German compositional compound nouns numbers in the billions, with hundreds of thousands of lexical morphemes (nominals) able to substitute for one another, so long as they exist within the same semantic role. As Meyer readily admits, “German is so productive in forming ad-hoc compounds that there seem to be no restrictions at all” (Meyer 2013:1).

This finding is reinforced by Berg et al., who claim that “German two-noun compounds [the large majority of German nominal compounds] make a larger contribution to the formation of new nouns than do English compounds of the same size” (Berg et al. 2012:290).

2.3 Thomas Berg et al.’s Discussion of Nominal Compounds

In comparing the nominal compounding structures of German and English, Berg and his colleagues specifically aimed to study three aspects: frequency, productivity, and complexity of compound nouns within the two languages. By researching these three measures of compounding, the goal of their work is to study the relationship between these measures, e.g. not only what the productivity of nominal compounding looks like in German, but also how increased productivity effects the frequency of compounding.

In order to facilitate this study, Berg and his colleagues consulted closely related pieces of literature in German and English: contemporary political magazines. An additional study was conducted with German and English fictional
novels, with the linguists selecting a specified (and constant) number of words from each publication, to keep the sample sizes from each language and corpus as identical as possible. After navigating through a number of difficulties in adeptly identifying English nominal compounds, Berg et al. provide data for their three measures, juxtaposing each measurement in English and German.

Berg et al.’s findings concerning the frequency of nominal compounding in German and English confirmed pre-existing linguistic work that compound nouns appear more frequently in German literature than in English literature. The medium of publication (political science journal versus fictional novel) seemed to have a minimal impact on the prominence of nominal compounds. The following table is taken directly from Berg et al.’s publication (Berg et al. 2012:280):

<table>
<thead>
<tr>
<th>Language</th>
<th>noncompound nouns</th>
<th>compounds</th>
<th>total</th>
<th>noncompound nouns</th>
<th>compounds</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>German</td>
<td>6724</td>
<td>8661</td>
<td>15,385</td>
<td>4909</td>
<td>3467</td>
<td>8376</td>
</tr>
<tr>
<td>English</td>
<td>6738</td>
<td>4255</td>
<td>10,993</td>
<td>4537</td>
<td>1777</td>
<td>6314</td>
</tr>
</tbody>
</table>

Using this data, Berg and his colleagues proceeded to measure the effect that heightened compound complexity has on frequency, and found that an inverse relationship exists in both languages. As can be seen in the table below, as complexity increases in both German and English nominal compounds, frequency decreases. A more substantive finding, however, arises by examining the ratio at which German nominal compounds of a given complexity occur compared to English compounds of the same complexity. While simple compound nominals (i.e.}
containing two or three constituents) occur much more frequently in German than in English, the observed frequencies gradually converge when more complex compounds are encountered, so that compound nouns with greater than three constituents appear slightly more frequently in English literature than in German (Berg et al. 2012:281):

<table>
<thead>
<tr>
<th>Complexity:</th>
<th>two-member</th>
<th>three-member</th>
<th>four-member</th>
<th>five-member</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>7837</td>
<td>770</td>
<td>52</td>
<td>2</td>
<td>8661</td>
</tr>
<tr>
<td>English</td>
<td>3648</td>
<td>549</td>
<td>56</td>
<td>2</td>
<td>4255</td>
</tr>
<tr>
<td>G/E ratio</td>
<td>2.1</td>
<td>1.4</td>
<td>0.9</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complexity:</th>
<th>two-member</th>
<th>three-member</th>
<th>four-member</th>
<th>five-member</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>German</td>
<td>3267</td>
<td>196</td>
<td>4</td>
<td>0</td>
<td>3467</td>
</tr>
<tr>
<td>English</td>
<td>1604</td>
<td>166</td>
<td>7</td>
<td>0</td>
<td>1777</td>
</tr>
<tr>
<td>G/E ratio</td>
<td>2.0</td>
<td>1.2</td>
<td>0.6</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Finally, in order to measure productivity of nominal compounds in German and English, Berg and his colleague had to eliminate all redundancies in the data, narrowing the list of available nominal compounds to “hapax legomina” i.e., items occurring only once in a given data set” (Berg et al. 2012:287). By reducing the data to nominal compound hapaxes, and subsequently dividing this quantity by the number of nominal hapaxes, Berg et al. were able to quantify the productivity of nominal compounding in both languages (P*). As the measures of productivity below show, Berg and his colleagues were able to reaffirm that German nominal
compounds (particularly two-member compounds) appear in more instances than the same process does in English (Berg et al. 2012:289):

Table 8. Productivity values ($P^*$) for compounds as a function of complexity

<table>
<thead>
<tr>
<th>Complexity:</th>
<th>Language:</th>
<th>two-member</th>
<th>three-member</th>
<th>four-member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>German</td>
<td>0.67</td>
<td>0.18</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>0.51</td>
<td>0.15</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>0.53</td>
<td>0.07</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>0.38</td>
<td>0.07</td>
<td>0.00</td>
</tr>
</tbody>
</table>

A conceivable expectation based on the data above is that the productivity of German vs. English noun incorporation will closely mirror the trends of nominal compounding. One might expect German to be the more productive language in incorporating nouns, especially when concerning incorporated nouns that aren’t complex. However, this expectation is not as justifiable as one might imagine based on the apparent similarities between noun incorporation and nominal compounding.

3 Is Noun Incorporation a Type of Compounding?

A looming question arises in what can be safely inferred from Berg et al.’s paper and applied to our expectations of noun incorporation in German and English. At the heart of this uncertainty lies an even larger question that must be answered – namely, what is noun incorporation in and of itself? Is noun incorporation simply verbal compounding, or is a wholly different process occurring? For one can’t make
assumptions based on Berg et al.’s work without first understanding how noun incorporation, as a process, relates to compounding. Such is the question that Barrie & Mathieu (2016) attempt to answer. Barrie and Mathieu argue that noun incorporation is not an example of compounding. As evidence, they provide the following dataset, composed of examples of noun incorporation utilizing discourse reference in the polysynthetic languages of Mohawk and Ojibwe (Barrie & Mathieu 2016:3):

(3) ThetA’re’ wa’-ke-nakt-a-hnámnu’-
    yesterday FACT-1.SG.AG-bed-Ø-buy-PUNC
I-k-her-e’
    Uwári a-ye-núhwe’-ne’
Ø-1.SG.AG-think-STAT Mary FUT-3.F.SG.AG-like-PUNC
‘I bought a bed yesterday. I think that Mary will like it.’ (Baker 1996:288)

(4) ngii-moonahapnii mii dash ngii-giziibiginizigan
    n- gii- moonah -apnii -e mii dash
    l- PST- dig -potato -VAI and then
n- gii- giziibigiinig -an
    l PST- wash -3PL
‘I dug up potatoes, and then I washed them.’ (BJ, 2008-12-17)

The possible implementation of discourse reference regarding incorporated nouns constitutes a primary piece of evidence for Barrie and Mathieu (2016) – in some instances of noun incorporation, the incorporated noun can be referred back to later in the same iteration, while such is not the case with compounds. For example, the following English sentence would be ungrammatical as a result of this rule: ‘The teethmarks were especially sharp because of them (where them refers to the teeth).’ Sentences (3) and (4) illustrate the grammatical inclusion of discourse reference in polysynthetic noun incorporation. In sentence (3), nakt (‘bed’) is referred to later in the same phrase, while in sentence (4) the same process occurs with apnii (‘potatoes’). Discourse reference is one of two main pieces of evidence
cited by Barrie and Mathieu to differentiate noun incorporation from compounding (with the other being adjunct stranding). I highlight this particular distinction because it illumines our discussion of noun incorporation, and thus resurfaces in Section 5.2.

The explanation put forth by Barrie and Mathieu (2016) to describe the disassociation between compounding and noun incorporation is to label noun incorporation as a syntactic phenomenon, as opposed to compounding, which is considered a morphological (or perhaps morphosyntactic) process. Additional support for this argument lies in the fact that initial noun stems in English nominal compounds are almost impossible to modify, and thus the two constituents of an English nominal compound are virtually never syntactically independent. Note that there are exceptions to this statement (for example, toothmarks and teethmarks are both grammatical compounds in English, as are passer-by and passers-by). These are, however, exceptions to the overarching pattern that initial noun stems in English nominal compounds cannot be modified. Barrie and Mathieu remark on this lack of syntactic independence, arguing, “we take this contrast to show that noun incorporation is undeniably syntactic in comparison with English compound formation ... we take compounding as a case of root-root merger in the lexicon” (Barrie & Mathieu 2016:4).

Mark Baker reinforces the argument that noun incorporation is a syntactic process in many additional publications (see Baker 1988, 1996, 2003, 2009). Baker argues that noun incorporation is a syntactic phenomenon as opposed to a morphological or lexical phenomenon, positing that instances of noun incorporation
occur due to head movement. A simplified representation of this head movement can be observed in the following syntactic tree diagram (Baker 1996:13):

In the preceding tree diagram, Baker depicts that the underlying representation of the incorporated noun ‘tobacco-buy’ doesn’t involve noun incorporation, and thus appears as the VP ‘buy tobacco.’ However, upon reaching surface form, the head of the NP phrase, ‘tobacco,’ is fronted to form the incorporated noun ‘tobacco-buy.’

Barrie and Mathieu comment on Baker’s analysis, claiming that this representation is an “elegant solution that captures many properties associated with noun incorporation and it is a prevalent account of noun incorporation” (Barrie & Mathieu 2016:5). While I accept Baker’s claim that noun incorporation is a syntactic phenomenon, and thus an unrelated process to lexical compounding, I find Barrie & Mathieu’s evidence inconclusive with specific regard to English and German noun incorporation. We do not see either discourse reference or adjunct stranding (the two pieces of evidence that Barrie and Mathieu use to warrant a syntactic view of noun incorporation) in either English or German noun incorporation. Yet, as we see in Sections 5.2 and 5.3, both English and German contain processes of noun incorporation that fit into Mithun’s original typology. Therefore, I understood Barrie and Mathieu’s introduction of discourse reference
and adjunct stranding not to indicate that such processes are universally obligatory features of noun incorporation, but rather that their presence in certain languages suggests that noun incorporation is a syntactic process. While discourse reference and adjunct stranding don’t occur in the noun incorporation of English or German, and thus don’t assist in our differentiation between noun incorporation and compounding in these specific languages, the fact that these processes can occur in noun incorporation fundamentally contrasts it with compounding, in which such structures aren’t possible.

In this paper, I adopt Baker’s proposal that noun incorporation is an example of head movement that occurs between the underlying representation and surface structure of a given word, thereby further differentiating it from compounding. Certainly, if one is to accept the findings that noun incorporation and lexical compounding are two separate processes, then it is illogical to conclude that the relationship between noun incorporation in German and English will exactly mirror the findings of Berg et al. regarding nominal compounding. Thus, if the productivity (or frequency) of noun incorporation in English were to surpass that of German, it shouldn’t be terribly surprising, since the relations argued by Berg and his team can’t be expected to map directly to an entirely different, syntactic, process.

4 Mithun’s Theory of Noun Incorporation

Mithun (1984) highlights four distinct types of noun incorporation found in the world’s polysynthetic languages. Mithun includes solely examples from polysynthetic languages because it was widely believed, even by prominent linguists such as Mark Baker, that “only polysynthetic languages can correctly be considered
to exhibit true noun incorporation” (Massam 2009: 1078). Thus, at the time of her paper’s publishing, there were no examples provided in Germanic languages because it was conventional theory that no such examples existed. With regard to such examples, C. Weggelaar writes that noun incorporation “occurs in Frisian, but, as far as I know, not in other Germanic languages” (Weggelaar 1986:301). While it has since been shown that noun incorporation occurs in both German and English (Feist 2013; Barrie & Spreng 2009; Barrie 2011; see also Massam 2009), I mention this note on polysynthetic languages because many of my examples used below to illustrate Mithun’s theory occur in polysynthetic languages.

The syntactic variations in incorporated nouns alluded to above are primarily reliant on whether the derived verb stem is transitive or intransitive. The semantic differences typically arise from the purpose of the incorporated noun stem – for example, whether it acts as a classifier (see examples 6 and 7), or whether it serves as a direct vs. indirect participant (see Feist 2013). Feist (2013) perceives the distinction between direct and indirect participation, with regards to the incorporated noun stem, as essential to his typology of English noun incorporation. Thus, words such as *mountain-climb*, in which the complement of the verb, and therefore the direct participant, is incorporated, occupy a different category than words like *filter-feed*, in which the adjunct, and thus the indirect participant, is incorporated. For the purposes of this paper, however, I will rely on Mithun’s typology, and therefore will not distinguish between direct and indirect participants in my comparisons of German and English noun incorporation.
Type 1 noun incorporation is the least complex example of noun incorporation – a form of lexical binding in which a noun stem and verb stem combine to create a newly derived verb stem. As Massam writes, Type 1 noun incorporation occurs when “a verb incorporates its object to form an intransitive compound verb” (Massam 2009: 1078). Mithun (1984) expands on this description, arguing that Type 1 noun incorporation denotes an institutionalized, non-specific activity or state. Mithun’s original definition of Type 1 noun incorporation additionally allows for theta roles that aren’t objects (e.g. instruments) to be incorporated. An important observation to be made is that semantics plays a relatively small role in the definition of Type 1 noun incorporation; rather, syntax accounts for most of Type 1’s defining features. The following example contrasts a sentence that doesn’t utilize Type 1 noun incorporation (3a) with one that does (3b). Both sentences have virtually identical meaning and occur in Mokilese, an Austronesian language:

3)
   a)  *Ngoah kohkoa oaring-kai.*
       I  grind coconut-these
       'I am grinding these coconuts.'

   b)  *Ngoah ko oaring.*
       I  grind coconut
       'I am coconut-grinding.'  (Massam 1984:849)

   Note that while *ko oaring* (‘coconut-grind’) hasn’t been bound orthographically into a single freestanding word, it nevertheless appears syntactically as one bound unit. The resulting incorporated noun isn’t lexicalized, as the underlying meaning of the statement isn’t altered from (3a) to (3b).
Type 2 noun incorporation is structurally similar to Type 1, except that “the verb remains transitive, and a word denoting a peripheral argument takes the position (and case) of the incorporated word” (Feist 2013:160). Type 2 noun incorporation is therefore labeled as the manipulation of case, as case manipulation is one of the features central to the understanding of Type 2. Additionally, the first instance of a significant semantic variation (within Mithun’s typology) appears in constricting the meaning of the incorporated noun stem, as well as the novel direct object. Consider the following example of Type 2 noun incorporation from Yucatec Mayan:

4) k-in-č’ak-če-t-ik in-kool
    INCOMP-l-chop-tree-TR-IMP my-cornfield
    ‘I clear my cornfield.’ (Mithun 1984:858)

In (4), the verb remains transitive by “allowing for another oblique argument ... to become a derived object,” in this case the ‘cornfield’ (Massam 2009:1078-9). The incorporated noun stem ‘tree’ primes the peripheral argument ‘cornfield,’ as the literal translation of (4) would more closely resemble ‘I chop down my cornfield as one would chop down a tree.’ Since the incorporated noun stem ‘tree’ is modifying the verb stem ‘to chop,’ it allows for the previously oblique argument ‘cornfield’ to become a derived object of the verb ‘to tree-chop.’

Type 3 noun incorporation can syntactically consist of either Types 1 or 2, but the incorporated noun is used “to manipulate discourse structure ... a previously discussed noun is backgrounded as old [or previously known] information” (Massam 2009:1079). Consider the following conversation in Hautla Nahuatl, in which Speaker B uses Type 3 noun incorporation:
5) Speaker A) askeman ti-’-kwa nakatl
   never you-it-eat meat
   ‘You never eat meat.’

   Speaker B) na’ ipanima ni-naka-kwa
       I always I-meat-eat
       ‘I eat it (meat) all the time.’

   While the transitivity of the derived verb stem isn’t significant in identifying
   Type 3, the semantic input of the incorporated noun stem is. As Feist notes, “the
   backgrounding [in Type 3 noun incorporation] resembles the effect of using a
   pronoun in English – ‘I eat it all the time.’” (Feist 2013:161).

   Finally, Type 4 noun incorporation requires the verb to remain transitive (and
   thus is also an instance of Type 2) with the added wrinkle that noun classification
   must occur. More specifically, in Type 4 the incorporated nominal stem must act as
   the classifier for the newly derived object. As Massam writes of Type 4 noun
   incorporation, “the incorporated nominal is less specific, and provides the class of
   the object” (Massam 2009:1079). Consider the following examples in Chamorro (6)
   and Gunwinggu (7):

6) Gāi-[ga’] si Jose kātu
   AGR.have-pet UNM Jose cat
   ‘Jose has a pet cat.’

   (Chung & Ladusaw 2004:120)

7) bene-dulg-naŋ mangaralalajmyn
   they.two-tree-saw cashew.nut
   ‘They saw a cashew tree.’

   (Mithun 1984:867)

   In sentences (6) and (7), note the semantic relationship between the
   incorporated noun and the newly derived object. In what is referred to as ‘the
   hierarchy of class inclusion,’ Chung and Ladusaw remark that “either an antecedent
   can be subordinate to its discourse anaphor on the hierarchy, or the two can be
coextensional” (Chung and Ladusaw 2004:119). In (6), cat is subordinate to pet, while cashew is subordinate to tree in (7). Thus, it would be grammatically incorrect to switch the noun stems in (6), so as to say that *Jose cat-has a pet. Chung and Ladusaw’s observation aligns with Massam’s, as it would be difficult to imagine an inferior incorporated noun stem (in terms of the hierarchy of class inclusion) assigning the class of a hierarchically superior object.

While I have covered each type of noun incorporation as proposed by Mithun, it must be noted that this list is perhaps not wholly comprehensive of all forms of noun incorporation occurring in the world’s languages. As this theory was proposed in 1984, more contemporary papers (see Feist 2013) have argued that Mithun’s theory is too restrictive, and that certain examples don’t fit perfectly within the boundaries of Mithun’s 4 types. For example, Feist designs his own, individual, typology specifically aimed to identify the various types of noun incorporation found in English. While his typology is firmly based on Mithun’s theory, Feist adds to her typology by making a further semantic distinction between direct and indirect participants (in terms of the incorporated noun stem). In doing so, however, Feist provides insights as to what each of his ‘types’ of noun incorporation would be considered under Mithun’s typology. In this paper, the purpose of including Mithun’s theory is not to identify every individual form of noun incorporation occurring in English and/or German, as Feist sets out to achieve. Rather, I use Mithun’s theory as a template to identify what (if any) significant differences exist between the productivity of noun incorporation in English vs. German.
5 Applying Mithun’s Typology to Greenlandic Inuit, English and German

In this section, I apply Mithun’s typology to three languages – Greenlandic Inuit, English, and German. For the three languages, I isolate and analyze each possible type of noun incorporation that may occur, gradually ascending the inherent hierarchy proposed by Mithun. I first analyze the polysynthetic language of Greenlandic Inuit in order to introduce a language with an extremely productive noun incorporation process. I then carry out a similar analysis in both English and German, depicting each type of noun incorporation that can occur in these two West Germanic languages.

5.1 Noun Incorporation in a Polysynthetic Language

The most productive and extensive usage of noun incorporation is found in polysynthetic languages, in which morphemes can be easily bound together and thus the limit of possible morpheme combinations stretches far beyond what can be done in languages such as English or German. Before analyzing English and German, examining noun incorporation in a polysynthetic language such as Greenlandic Inuit puts our later analysis into perspective. Furthermore, noun incorporation in Greenlandic Inuit can be rendered into every type described in Mithun’s theory.

However, even in polysynthetic languages such as Greenlandic Inuit, there are still restrictions on the constituents of an incorporated noun. For example, there is a limited list of verb stems that may grammatically incorporate a noun stem, even though there are few, if any, restrictions on the noun stem that is incorporated. Verb stems such as ‘be,’ ‘go,’ ‘have,’ and ‘eat’ are commonly found in Greenlandic Inuit noun incorporation. As Sherkina-Lieber and Murasugi write, “only a restricted set of
bound affixal verbs can incorporate nouns, and incorporation is obligatory with those verbs” (Sherkina-Lieber & Murasugi 2015:2). This is a trend observed throughout the noun incorporation of many languages (although other polysynthetic languages, such as Mohawk, impose no such constraints on what verb stems can and can’t incorporate noun stems). In the agglutinative language of Chamorro, for example, the only verb stem that can grammatically incorporate a noun stem is the verb ‘to be’ (see Chung & Ladusaw 2004). Despite this apparent constraint, Greenlandic Inuit makes extensive use of noun incorporation, and Types 1-4 are all exhibited.

Type 1 noun incorporation is the most common rendition that appears in Greenlandic Inuit. Consider the following sentence, in which the verb stem taaq (‘get’) incorporates its direct object, saa (‘table’):

8) ilisaiji  

\[ \text{Teacher.ABS table-get-PART.3S green-MIK} \]

‘The teacher got a green table.’ (Sherkina-Lieber & Murasugi 2015:2)

Note that due to the aforementioned restriction in which only certain verb stems may incorporate a noun stem, replacing the verb ‘to get’ with ‘to buy’ in (8) would be ungrammatical.

Type 2 noun incorporation also exists in Greenlandic Inuit, although the morpheme order differs from examples later shown in English. Consider the following sentence in Kalaallisut, the most commonly spoken dialect in Greenland of Greenlandic Inuit:

9) tutt-up  

\[ \text{neqi-tor-punga} \]

Caribou-REL meat-eat-INDIC.1S  

‘I ate reindeer meat.’ (Johns 2009:187)
Note that sentence (9) is likely also an example of Type 4 noun incorporation, since the type of meat being eaten is reindeer meat. Thus, the noun steam 'meat' acts as a classifier by priming the noun stem 'caribou.'

Finally, Type 3 noun incorporation can also be found in the Kalaallisut dialect, as is exhibited in the following sentence:

10) Suulut pappiara-mik sana-a-mik nasa-qar-poq.
Suulut paper-MIK make-PASS-MIK hat-have-INDIC.3S
'Suulut has a hat made of paper.' (Johns 2009:186)

In (10), the sentence includes Type 3 noun incorporation because the 'paper' is simply background information describing what the 'hat' is made of. Thus, Greenlandic Inuit productively utilizes Types 1-4 of noun incorporation under Mithun's typology. While we find that neither English nor German can produce all 4 types of noun incorporation, Greenlandic Inuit can be used as a basis of comparison by which to measure the productivity of noun incorporation in these West Germanic languages.

5.2 Noun Incorporation in English

As Feist (2013) writes, "productivity is taken to denote the variety of forms incorporation takes, and the number of instances of each form" (Feist 2013:177). In English, noun incorporation productively utilizes Types 1-3 of noun incorporation. In this subsection, I observe how each type appears in English, and the productivity of each type.

Type 1 noun incorporation, being the simplest rendition of noun incorporation, occurs frequently in the English language and is a fairly productive process. When I attempt to come up with an example of noun incorporation, Type 1
incorporated nouns come to mind most easily. For example, consider the incorporated nouns *to mountain-climb, to sleep-deprive, or to berry-pick*. In all three prior examples, the verb is intransitive (none of the three verb stems can adopt a direct object) and the verb stems have all incorporated their original direct objects to derive a novel verb stem. Type 1 noun incorporation is highly productive in English, especially in conversational context. Consider the following example, in which *berry-pick* is used to derive a new incorporated noun:

11) *While John likes to berry-pick on his farm, Mary prefers to lime-pick.*

While *lime-pick* isn’t likely to appear in one’s pre-existing lexicon, conversational context (initially establishing the lexicalized incorporated noun *berry-pick*) makes *lime-pick* understandable and grammatically acceptable in (11). Note that the same process can be applied to nominal compounding in English, such that *blueberry* can likely be included in an utterance to prime the grammaticality and understanding of *greenberry*.

Type 2 noun incorporation appears to be far less productive in forming new words of English (when compared to Type 1), but is certainly present. Consider the following example, a slightly altered version of the sentence found in Feist (2013:170):

12) *The flight attendant’s job was to help busy travelers catch their connecting flights, or kindly hand-hold them through their delays.*

Note that the incorporated noun remains transitive in (12), with the incorporated noun stem *hand* denoting the peripheral argument *them* (i.e. the travelers whose flights have been delayed). However, this example is lexicalized,
and there are also a number of compositional Type 2 incorporated nouns such that the meaning of the derived verb stem is a sum of the two constituents. Additional examples of Type 2 noun incorporation in English include *babysit, GPS-track, fingerpaint* and *test-drive*. Although not discussed in this paper, an idea for future research would be to study the productivity of each individual type of noun incorporation in a given (polysynthetic) language, to see if productivity decreases as one ascends the hierarchical structure of Mithun's typology.

Finally, Type 3 noun incorporation also occurs in English, usually in the form of an intransitive verb (Type 1). Consider the following example of Type 3, in which the incorporated noun stem exists to background incidental information:

13) *Manta rays filter-feed in the murky broth of plankton.* (Feist 2013:168)

In (13), the sentence literally means that the manta rays are feeding on the plankton using their filters, such that the *filter* becomes incidental information that acts as an indirect participant in the sentence. This is additionally distinct from many English instances of Type 1 in that the verb is no longer incorporating its initial direct object (*filter* is not the incorporated object of *feed*). Once again, Type 3 occurs frequently in English, as the newly derived verb stem is intransitive, but the productivity is hampered by the lack of possible constituent combinations. In other words, English noun incorporation is restricted by the rule that a specific verb stem can only incorporate a limited number of noun stems.

While the presence of three of Mithun's types indicates that noun incorporation in English is at least partially productive, the relative dearth of compositional incorporated nouns in English indicates that productivity is relatively lacking when
compared to the productivity of English nominal compounds. For example, a highly productive means by which to create compositional compounds in English is to think of street names. Madison Avenue, Broad Street, and Baltimore Pike are all nominal compounds in English, in which thousands of noun stems may appear directly in front of the words street or avenue. In English noun incorporation, however, verb stems are highly limited in the noun stems that they can feasibly incorporate. Feist (2013) argues that “different forms of the verb are productive to very different extents ... uses of [finite verbs and] the past tense are uncommon,” while a large majority of noun incorporation instances are nonfinite (Feist 2013:178). Additionally, Feist notes that certain noun and verb stems are more prominent in English noun incorporation than others, such as -walk, hand-, and -eat.

A conceivable predicament that this analogy of English noun incorporation encounters is one of the arguments presented by Barrie and Mathieu (2016:3) in describing the disparities between noun incorporation and nominal compounding. In doing so, the authors argue that noun incorporation is a syntactic process whereas compounding is a morphological process. A key reason cited as evidence for viewing noun incorporation as a syntactic process is that the initial noun stem in a given English nominal compound can’t be referred to later in the same sentence, whereas such can be done with the incorporated noun stem in some polysynthetic examples of noun incorporation (see Section 3). There are many examples of English noun incorporation in which the incorporated noun stem can’t be referenced, or at least the sentence becomes lexically ambiguous. For example, consider the following data:
This raises the question of whether ‘noun incorporation’ in English is actually just verbal compounding, lacking the syntactic traits uniquely found in many examples of noun incorporation, as previously mentioned in Section 3. I argue that the evidence presented by Barrie and Mathieu (discourse reference and adjunct stranding) consists merely of processes that may occur in some instances of noun incorporation, rather than universals that every language’s noun incorporation must allow for. Feist likewise foresees this issue and admits, “I simply accept, with Mithun, Rice & Prideaux, and others, that some constructions that may be called ‘compounds’ are instances of ‘incorporation’” (Feist 2013:162). As previously stated in this paper, I accept Baker’s definition of noun incorporation as a syntactic process, thereby differentiating it from compounding. While I don’t discuss this possible wrinkle any further, this is an area begging for future research to be done (for additional discussion validating noun incorporation in German and English, see Barrie & Spreng 2009; Barrie 2011; Feist 2013).

5.3 **Noun Incorporation in German**

Noun incorporation also appears in German, although solely in the progressive aspect (Barrie & Spreng 2009). Nevertheless, Type 1 certainly does occur in German, as many verbs in the progressive aspect can become intransitive by incorporating their object. Additionally, German noun incorporation can only occur
when preceded by the verb ‘to be’ (sein). While this may seem unusual, restricting the verb stems that can occur in (or in this case, accompany) noun incorporation appears in other languages as well. In Chamorro, as previously stated, the only verb stem that can incorporate a noun stem is the Chamorro equivalent of ‘to be’ (see Chung and Ladusaw 2004). Returning to German, consider the following example of Type 1 noun incorporation:

16) Ich bin am Wasser trinken.
   I be.1SG.PRS PRT water drink.INF
   ‘I am drinking water.’ (Barrie & Spreng 2009:375)

Note that the verb stem has incorporated the noun stem, and acts as a single, unified lexeme. The noun stem in sentence (16), Wasser, could be replaced by any other ‘drinkable’ noun stem (e.g. Wein) and remain a grammatical word of German. While German noun incorporation might only occur in the progressive form, and thus as a gerund, the compositional process leads to a seemingly lengthy list of possible derived verb stems. In this regard, German noun incorporation appears to be quite similar to German nominal compounds.

Barrie and Spreng have made a number of observations regarding the individual constituents of German incorporation as well. For example, they note that "nothing can intervene between the verb and the incorporated noun" (Barrie & Spreng 2009:380-1). Their findings leave the productivity of German Type 1 noun incorporation closely resembling that of English, in that both have a preference for the nonfinite form. However, German nominal compounds often have a ‘compound marker,’ a grammatical morpheme, inserted in between the two lexical morphemes of a noun-noun compound. As Mukai writes of this morpheme, “the inflectional class
of the left-hand constituent determines whether a linking morpheme occurs and what kind” (Mukai 2013:39). For example, consider the following German nominal compound, in which the linking morpheme -er- (indicating a nominative plural) appears:

17) Kind-er-wagen.
    Child-PL-cart
    ‘Buggy.’

(Mukai 2013:39)

Such is not possible with German incorporated nouns, as the morpheme boundary cannot be broken, and the noun stem can’t be modified. Additionally, German instances of noun incorporation may only exist as gerunds, and therefore cannot be conjugated. For example, consider the following sentences:

18)
   a) Ich bin am Bücher verkaufen.
       I be.1SG.PRS PRT books sell.
       ‘I’m selling books.’

   b) Ich verkaufe Bücher.
       I sell books.
       ‘I sell books.’ (Barrie & Spreng 2009:377)

Note that in (18), when one attempts to conjugate the incorporated noun, doing so separates the two constituents and furthermore alters the word order of the sentence. In this regard, German noun incorporation productivity appears to be inferior to that of English.

As a result of this initial comparison, two observations can be made. First, the productivity of noun incorporation within both English and German appears to be inferior to nominal compounding. This is in part due to the limited verb forms that can appear in both languages (e.g. the German progressive and English nonfinite verb stems), as well as the prominence of lexicalized incorporated nouns in English.
Additionally, in both languages there are few verb stems (or noun stems) that appear in more than one instance of noun incorporation. Because of the lexicalization in English, lexical morphemes can’t be freely substituted for one another, while in German the incorporated nouns (and the incorporating verb stems) must be preceded by the verb sein (‘to be’) as well as the pronoun am or bei.

Secondly, English noun incorporation appears to be more productive than German noun incorporation as per Feist’s definition of productivity in noun incorporation, the opposite of what one might assume given Berg et al.’s research (however, as previously noted, it would be foolish to heavily rely on such an assumption). While I have shown that Types 1-3 occur in English, I have only demonstrated that Type 1 occurs in German, and only in the German progressive form. In order to test the validity of my second observation, it is imperative to elicit judgment from a native speaker of German.

6 Native German Speakers

For my research, I interviewed two native German speakers in order to determine whether or not Types 2-4 of noun incorporation can be grammatically constructed in German. Both German speakers are professors at Swarthmore College, one in the German department and the other in the philosophy department. The takeaways from each interview were markedly different in that many examples of German incorporated nouns were acceptable to one speaker but not the other. While this may be due to a dialectal difference (one of the speakers was from Northern Germany, whereas the other grew up in Southern Germany), this contrast between
the speakers’ lexicons was unexpected. The handout given to each professor was identical, containing the same questions and example sentences.

The handout presented to the native speakers contained examples of Type 1 and Type 2 noun incorporation, as my primary goal in this experiment was to determine whether or not Type 2 noun incorporation (transitivity) is possible in German. In order to make sure that Type 1 noun incorporation is grammatical in German, I likewise presented both professors with data from Barrie & Spreng 2009, Barrie 2011, and Feist 2013, as well as asked them to translate English sentences containing Type 1 incorporated nouns into German. In doing so, I aimed to reinforce Barrie & Spreng’s argument that Type 1 noun incorporation is grammatical in German (and subsequently, that the process of noun incorporation occurs in German).

To carry out this study, I presented each professor with two variations of data. The first set of data was comprised of German sentences containing incorporated nouns. These German sentences were either taken from pre-existing works or formed by myself using the sentence structure established in pre-existing works. For example, consider the following examples, of both Type 1 (19, 20) and Type 2 (21) noun incorporation. English translations have been included, although they were not presented on the original handouts created for this study:

19) *Ich bin beim Äpfel essen.*
   I be.1SG.PRS at.the apple eating
   ‘I am (busy) apple-eating.’
   (Barrie & Spreng 2009:378)

20) *Der Mann ist beim Wildschweine jagen.*
   The man is at.the boar.PL hunting.
   ‘The man is boar-hunting.’
   (Barrie 2011:138)
The second dataset consisted of English sentences containing incorporated nouns. The purpose of these examples was to determine whether or not the same phrase (containing noun incorporation) would be grammatical upon being translated to German, as well as to understand how each native speaker would convey the same message in everyday conversation. For example, consider the following sentence in English, containing the incorporated noun ‘babysit.’ While (22) is the exact English translation of (21), and thus may seem redundant at first glance, the purpose of this sentence is to differentiate between Type 2 noun incorporation being a grammatically acceptable feature (21) and a feature that a native German speaker would actually produce (22). I also tested for Type 1 noun incorporation, as seen in sentence (23):

22) John babysits my children.

23) I am (busy) apple-eating.

Speaker A, the philosophy professor, was the first native German speaker that I interviewed. When presented with sentence (19), in which Type 1 noun incorporation occurs, he explained that such constructions were colloquial. Therefore, although he would understand the meaning of sentence (19), Speaker A claimed that he would never produce this structure in a conversational context. When asked how he might convey the concept of himself eating apples, Speaker A provided the following sentence, in which noun incorporation doesn’t occur:
Furthermore, Speaker A found some examples of Type 1 noun incorporation to be ungrammatical, or questionable at best. For example, he remained unconvinced that one might be able to produce (20) as an acceptable construction in German. However, Speaker A also provided a number of instances of Type 1 noun incorporation that he felt to be acceptable in German, including the following words: Gitarre speilen (‘playing guitar’), Vokabular üben (‘practicing vocabulary’), Marathon laufen (‘running a marathon’), and Eis essen (‘eating ice cream’). What can be gleaned from this interview is a confirmation of Barrie & Spreng’s argument that Type 1 noun incorporation exists in German. Speaker A also mentioned that constructions containing Type 2 noun incorporation, as seen in sentence (21), were ungrammatical in German, and he couldn’t think of any alternative formations of Type 2 noun incorporation that he would consider grammatical.

Additionally, Speaker A confirmed the observation that German incorporated nouns may only surface as gerunds, explaining that the conjugated form of Wein trinken (‘drinking wine’) necessitates separating the verb stem from the noun stem, returning the noun stem Wein to the original position of the direct object (following the verb stem). Finally, Speaker A also noted that certain verb stems in German appear to be especially productive in their ability to incorporate noun stems, such as laufen (running), üben (‘practicing’), lernen (‘learning’), spielen (‘playing’), trinken (‘drinking’) and essen (‘eating’). Feist made a similar observation in his analysis of
English noun incorporation, as he noted that specific verb stems appear frequently in English incorporated nouns.

Speaker B’s vocabulary appeared to allow for a heightened frequency (and perhaps productivity) of noun incorporation than seen in Speaker B’s dataset. When presented with the Type 1 incorporated nouns seen in (19) and (20), she recognized both sentences as acceptable constructions in German, and quickly noted that she produces similar constructions in a conversational context. In fact, Speaker B disagreed with the Speaker A’s view of Type 1 noun incorporation as a colloquial phenomenon, perhaps hinting at a dialectal disparity between Northern and Southern Germany. Speaker B likewise produced a number of examples of Type 1 noun incorporation from her own vocabulary, such as the following: *wäschemachen* (‘doing laundry’), *lobsingen* (‘singing praises’), *Steak braten* (‘frying steak’), *Schlittschuhlaufen* (‘ice skating’), *handverlessen* (‘handpicking’), and *segelfliegen* (‘hang gliding’). Speaker B was also quick to note, just as Speaker A did, that these formations may only occur as gerunds.

Speaker B, however, considered my example of Type 2 noun incorporation, sentence (21), to be a grammatical sentence of German (although she readily mentioned that she might be incorrect in her remark). If such is the case, the grammaticality of sentence (21) presents two major challenges to previous work done on German noun incorporation. First, in sentence (21) the derived verb stem is not a gerund, and has been conjugated – a characteristic that is seemingly unacceptable in German noun incorporation. Secondly, in order for sentence (21) to be grammatically acceptable, it would seem as though Type 2 noun incorporation
must exist in German, since the derived verb stem remains transitive. I argue that, even if we accept the grammaticality of sentence (21), it does not provide evidence for either the existence of Type 2 noun incorporation in German, or for the possible conjugation of German incorporated nouns.

In sentence (21), the verb *babysittet* is an English loanword. Therefore, while the derived verb stem *babysit* operates as an example of noun incorporation in English, it does not do so in German. Consider this word from Baker’s syntactic view of noun incorporation, in which head-fronting occurs in the underlying structure, leading to a verb stem incorporating a noun stem to produce a newly derived verb stem. Because *babysittet* is an English loanword, no such head-fronting occurs in German, since the underlying form of the loanword has already been head-fronted in English and subsequently lexicalized. Thus, *babysitten* does not act as an incorporated noun in German because it isn’t an instance of German noun incorporation – it is a loaned verb stem that can therefore be conjugated and remain transitive. Furthermore, neither Speaker A nor Speaker B were able to think of any other constructions resembling noun incorporation in which the derived verb stem was able to conjugate and/or remain transitive, providing no further evidence that Type 2 noun incorporation can appear in German.

In this pilot study, both professors were able to identify sentences such as (19) as grammatical representations of noun incorporation, and both were additionally able to produce sentences containing Type 1 incorporated nouns in German by utilizing the German progressive form. Additionally, neither professor was able to provide a grammatically acceptable construction of Type 2 noun incorporation in
German. Thus, both professors interviewed have, at the most basic level, confirmed Barrie & Spreng’s finding that Type 1 noun incorporation is a grammatical feature of German, while seemingly no other types may occur.

7 Conclusion

As a result of this pilot study, I can make two observations that are essential in comparing the noun incorporation processes of English and German. First, I argue that noun incorporation is more productive in English than in German. Using Mithun’s typology, Types 1-3 of noun incorporation are acceptable in English, whereas only Type 1 is acceptable in German. In other words, noun incorporation in German must remain transitive and the incorporated noun stem can’t semantically background previously known or incidental information. Furthermore, Type 1 noun incorporation is restricted in German so that only one verb stem (‘to be’) can precede instances of noun incorporation, whereas no such constraint is placed upon English. Finally, the derived verb stems in German can only appear as gerunds, and thus can’t be conjugated. While I do not have access to a corpus study comprised of incorporated nouns in German and English (such as Berg et al. in their discussion of German and English nominal compounding), I argue that the productivity quantifier utilized by Berg and his colleagues in their 2012 paper would find English noun incorporation to be a more productive process than its German counterpart. A compelling area for future research would be to replicate the procedure of Berg and his colleagues in order to confirm this paper’s findings, as well as to compare the complexity and frequency of noun incorporation in German and English.
The second observation that can be made is that these results shouldn’t be particularly surprising, even considering the work done by Berg and his colleagues. While Berg et al. (2012) find that German nominal compounding is more productive and more frequently used in literature than English nominal compounding, one can’t expect noun incorporation to replicate these findings. For, as Baker (2009) and Barrie and Mathieu (2016) both argue, noun incorporation and lexical compounding aren’t closely related processes despite their surface resemblance, since the former is syntactic and the latter is largely morphological. A final potential area of future research involves interviewing a larger subset of native German speakers in order to further build on the possible (and impossible) structures of German noun incorporation as well as to determine if the productivity of German noun incorporation varies based on the dialect of German being spoken.
Appendix A

The following legend consists of morpheme abbreviations that appear in the
interlinear glosses of this paper.

ABS = absolutive
AGR = agreement
IMP = imperative
INCOMP = non-complete verb in Yucatec Mayan
INDIC = indicative
INF = infinitive
MIK = specific case marker in Greenlandic Inuktit
PART = intransitive participial
PASS = passive
PL = plural
PRS = present
PRT = particle
REL = relative
TR = transitive
UNM = unmarked morpheme in Chamorro
References


