CONSTRUCTION AFTER CONSTRUCTION AND ITS THEORETICAL CHALLENGES

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The English NPN construction, exemplified by *construction after construction*, is productive with five prepositions—*by*, *for*, *to*, *after*, and *upon*—with a variety of meanings, including succession, juxtaposition, and comparison; it also has numerous idiomatic cases. This mixture of regularity and idiosyncrasy lends itself to an account in the spirit of construction grammar, in which the lexicon includes specified syntactic structures matched with meanings. The internal syntactic structure of NPN violates standard principles of phrase structure, and the required identity of the two nouns (in most cases) presents descriptive difficulties. Furthermore, when NPN appears in NP positions, it can take normal NP complements and modifiers, and it has quantificational semantics despite the absence of a lexical quantifier. These peculiarities collectively present interesting challenges to linguistic theory. The best hope lies in a theory of grammar that (i) recognizes meaningful constructions as theoretical entities; (ii) recognizes a continuum of regularity between words and rules; and (iii) recognizes the autonomy of syntax from semantics and vice versa.*

1. Basic facts. The English NPN construction, exemplified by *construction after construction*, turns out to illustrate several themes that have been developing in recent theories of syntax and the syntax-semantics interface, and it presents numerous challenges to most extant approaches. The construction is a prime example of what Culicover (1999) calls a 'syntactic nut'—an entrenched noncanonical structure. But it is hardly unusual in speech or writing (readers are challenged to count its occurrences in the present article). It has been mentioned here and there in the literature (e.g. Beck & von Stechow 2006, Huddleston & Pullum 2002, König & Moyse-Faurie 2007, Matsuyama 2004, Oehrle 1998, Pi 1995, Postma 1995, Williams 1994) but, as far as I know, the full range of data has not been explored.

Constructions like this appear in a variety of languages, including Dutch (Postma 1995), Japanese (Matsuyama 2004), German and Mandarin (König & Moyse-Faurie 2007), Polish, Russian, Italian, and French, to cite just a random sampling.[1] The present article focuses on the facts of English, which are detailed and idiosyncratic enough to suggest that none of these other languages are likely to be exactly parallel.

The construction includes a number of one-off idioms, such as those in 1.

(1) cheek by jowl, hand over fist, head over heels, hand in glove, tongue in cheek, hand to mouth

Unlike these cases, most instances of NPN require the two nouns to be identical.[2] The idiomatic cases in 2 observe this requirement.

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[1] Thanks to Barbara Citko and Vera Gribanov respectively for pointing out relevant Polish and Russian data.

[2] Coinages with nonidentical nouns are possible if they have clear intended analogues: I recall a tongue-in-cheek science fiction story in which a human and an alien, romantically involved, walk off at the end *hand in pseudopod*, the phrase evidently intended as a joke. The e. e. cummings poem 'anyone lived in a pretty how town' contains coinages such as *when by now*, *tree by leaf*, *bird by snow*, and *if by yes*; but of course, as evidenced by the title, the poem consists largely of ungrammatical sentences.

(2) hand over hand, hand in hand, arm in arm, (tear NP) limb from limb

In the examples in 1 and 2, the choice of noun is relatively limited (e.g. *tongue in tooth*, *finger over finger*, *leg from leg*). However, the NPN construction is productive with a handful of prepositions; that is, the choice of noun is quite free. These prepositions are *by*, *for*, *to*, *after*, and *upon* (with the variant *on*). Examples appear in 3.[3]

(3) a. day by day, paragraph by paragraph, country by country
    b. dollar for dollar, student for student, point for point
    c. face to face, bumper to bumper
    d. term paper after term paper, picture after picture
    e. book upon book, argument upon argument

The construction is highly constrained. The nouns cannot be mass nouns (4a) (with certain exceptions to be seen later); they are not allowed to have determiners (4b) or plurals (4c) (again with exceptions). They are also not allowed to have postnominal modifiers (4d), with one important exceptional case shown in 4e, which is discussed in §4.5. Some of the prepositions, however, permit prenominal adjectives on either the second noun or both (4f).

(4) a. No mass nouns: *water after water, *dust for dust
    b. No determiners: *the man for the man, *a day after a day, *some inch by some inch
    c. No plurals: *men for men, *books after books, *weeks by weeks
    d. No postnominal complements or modifiers: *father of a soldier for father of a soldier, *day of rain to day of rain, *inch of steel pipe by inch of steel pipe
    e. —except with *after* and *upon*: day after day of rain
    f. Prenominal adjectives: day after miserable day, tall boy by tall boy

The positions in a clause in which the construction can occur are predominantly adjunct positions: presententially (5a), after the subject (5b), and in VP after the complements (5c). It can also appear within an NP, in the position normally occupied by a prenominal adjective (5d). *N after N* and *N (up)on N* furthermore can appear in positions characteristic of NPs (5e–h).[4]

(5) a. Page for page, this is the best-looking book I've ever bought.
                                                                    (presententially)
    b. John and Bill, arm in arm, strolled through the park.   (after subject)
    c. We went through the garden inch by inch.   (postcomplement)
    d. Your day-to-day progress is astounding.   (prenominally in NP)
    e. Student after/upon/*by student flunked.   (subject)
    f. We filled crack after/*by crack.   (object)
    g. We looked for dog after/*by dog.   (object of NP)
    h. Student after/*by student's parents objected.   (possessive NP)

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[3] A further possibility suggested by a referee is *X against Y*, as in *hawk against dove*. But this does not observe the constraints on NPN pointed out in 4; for example, *the clever French against the indomitable British* is fine. I suspect therefore that this is a different construction.

[4] Huddleston and Pullum (2002:633, n. 15) notice this difference between *N after N* and the other cases of NPN. They claim that only temporal nouns are acceptable in *N after N* in adjunct positions: they cite *day after day* but **quarrel after quarrel*. The examples throughout this article show that this is not the case, and I find the following example perfectly acceptable: *Quarrel after quarrel, those two somehow manage to remain friends.*

2. THE PRODUCTIVE SUBCONSTRUCTIONS OF NPN. Each of the productive prepositions has its own associated meanings in this construction, which I now go through one by one. Speakers vary in their judgments of some of these cases. For example, one referee disputes my judgment that *century to century* is unusual, finding it ordinary, while another referee finds the same example unacceptable. What is important to the present argument is not so much the exact facts of the NPN construction as its overall texture—its interplay of regularity and idiomaticity, which is maintained despite varying details in speaker after speaker of English.

2.1. *N by N.* The main sense of *N by N* is of some sort of succession.

(6) a. We examined the neighborhood, house by house.
    b. Inch by inch, row by row, got to make this garden grow.
                                      ('The garden song', by David Mallett)
    c. We went through the reptile house snake by snake.
    d. We examined the moon crater by crater.

N by N has a pronominal form, *one by one*. It is a bit unclear whether *one* is actually a pronoun or a numeral here, since we also have *two by two*, as in *the animals came in two by two*. I find larger numerals rather marginal, though there may well be interpersonal variation.

N by N also has the special case *side by side*, which denotes juxtaposition of two entities, and which therefore fits into a semantic paradigm with *face **to** face* and *back **to** back*. I discuss this paradigm in §2.3. Another special case is *little by little*, which has the characteristic succession sense but conjoins two quantifiers. Note that instead of the expected parallel *more by more, we have *more **and** more*.

A semantically unrelated use of *N by N* refers to measures in orthogonal dimensions, as in 7. Notice that the constituents connected by *by* need not be identical, and that not only nouns but also dimensional adjectives can be connected. These differences suggest that this construction is perhaps only a distant cousin of the NPN family.

(7) a. a 200 by 400-pixel matrix
    b. three feet by four feet
    c. 3 feet long by 10 inches wide by ½ inch thick

2.2. *N for N.* The next productive case is *N for N*. This has the sense of matching the members of two sets being compared or exchanged (8).

(8) a. Snake for snake, this is the best reptile house in the world.   (comparison)
    b. This article, line for line, has more mistakes than the previous version.
                                                                          (comparison)
    c. Gandia and Qumar exchanged prisoners man for man.   (exchange)
    d. The candidates matched each other insult for insult.   (exchange)
    e. a syllable-for-syllable replacement that improved comprehensibility
                                                                          (exchange)

In this subconstruction, the two nouns must be identical, even in a situation where the comparison would pragmatically allow nonidentity. Suppose the Wellesley debating team is all women and the Harvard debating team is all men. Example 9a is pragmatically plausible, but the construction forces us to reduce all participants to a common category, as in 9b.

(9) a. *Woman for man, Wellesley's got the better debating team.
    b. Member for member/Student for student, Wellesley's got the better debating team.

A special case of this subconstruction is *word for word*, which expresses an exact matching in repetition or translation of a text.

(10) a. I bet you can't learn/recite *Syntactic structures* word for word.
     b. a word-for-word translation

This seems to be idiomatic, at least in my speech. I use *syllable **by** syllable* and *paragraph **by** paragraph* in the corresponding cases.[5] Another special case is found with numerals, as in *a three-for-two swap of prisoners*.

2.3. *N to N.*

CLOSE CONTACT OR JUXTAPOSITION. *N to N* has a number of uses. One, mentioned in §2.1, expresses close contact or juxtaposition of similar parts of similar objects, particularly body parts.

(11) hand to hand, face to face, cheek to cheek, eye to eye, toe to toe, shoulder to shoulder, base to base, bumper to bumper

This case can occur after *be* (12a), unlike any of the other cases of NPN (12b). It cannot, however, occur after *seem* (12c). And unlike other cases of *N to N*, it can occur as the object of a preposition (12d).

(12) a. Bill and Harry are face to face/shoulder to shoulder.
     b. *Bill and Harry are boy by boy/student after student.
     c. ?Bill and Harry seem face to face/shoulder to shoulder.
     d. Go from bumper to bumper to face to face!

<div align="right">(billboard on Boston's Southeast Expressway, summer 2002)</div>

Many instances of this subconstruction are a bit idiomatic. For instance, *eye to eye* is used primarily in the idiom *see eye to eye*, *hand to hand* in the context of combat, and *cheek to cheek* in the context of dancing. I find near neighbors of the nouns in 11 unusual, as in 13.[6]

(13) ?foot to foot (cf. toe to toe); ?finger to finger (cf. hand to hand); ?arm to arm (cf. shoulder to shoulder); ?front to front (cf. back to back); ?lip to lip (cf. cheek to cheek)

I find many pragmatically plausible cases that are not body parts to be only semi-acceptable—they come with a sense of stretching the paradigm (14a,b). However, such

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[5] Again, there are evidently individual differences. To my surprise, one referee finds 10a unacceptable. A Google search yields a few examples like these.

  (i)   I can recite their liturgy syllable for syllable to this day.
  (ii) . . . take an Ella Fitzgerald solo and learn it syllable for syllable.
  (iii) They know the Qur'an word by word, syllable for syllable.
  (iv) I do wonder exactly how this work would read if read backwards, paragraph for paragraph.
  (v) All you can do is read out word for word, sentence for sentence and paragraph for paragraph someone else's ideas.

In (iii) and (v) the usage is perhaps motivated by a desire to extend *word for word* (although, perversely, (iii) uses *word by word*). My own strong preference would be to use *by* in these examples, in contrast with 8e, in which *for* is perfect.

[6] For what it is worth, a Google search for *hand to hand*, *eye to eye*, *shoulder to shoulder*, and *back to back* yielded citations in the hundreds of thousands, whereas *front to front* and *lip to lip* had about five thousand each, and *wrist to wrist* had less than one thousand. In other words, the ratio of citations for idiomatic cases to those for productive cases is two to three orders of magnitude. This situation parallels the family of denominal verbs such as *butter (the bread)*, *shelve (the books)*, *pocket (the money)*, and so on. Speakers must learn which denominal verbs are conventionalized (e.g. *butter* is but *mustard* and *mayonnaise* are not). At the same time, speakers can stretch to new cases they have not heard before, with appropriate contextual support. For instance, in the context of recipes, a Google search indeed found instances of the

cases are certainly not unattested: 14c comes from the *Boston Globe* (April 16, 2007). And there are also cases in which the nouns are not identical, such as 14d,e (the latter suggested by a referee).

(14) a. ?The cars sat in the parking lot, trunk to trunk.
     b. ?The houses are facing each other, porch to porch.
     c.   . . . two cocktail glasses placed stem to stem
     d. back to front
     e. teapots lined up spout to handle

Overall, then, this juxtaposition reading of *N to N* is not completely productive; it is more like a stretchable collection of idioms. (A particular sort of juxtaposition is also expressed by idiomatic cases with *in* such as *hand in hand*, *arm in arm*, *hand in glove*, and *tongue in cheek*.)

Side to side also has an idiosyncratic meaning that fits in a semantic paradigm with the family of idioms in 15.

(15) back and forth, up and down, to and fro, round and round

SUCCESSION. Another reading of *N to N* involves iterated transitions or successions. This reading can optionally be prefaced with *from* in adjunct position (16a), though not prenominally (16b), and it is productive with nouns that denote time periods.

(16) a. (from) minute to minute, (from) day to day, (from) millisecond to millise-
         cond, (from) year to year, (from) century to century
     b. our (*from) day-to-day progress on the building

This reading is paraphrasable by *from one N to the next*, as in *from one week to the next*.

A related use is the idiom *case to case*, denoting a succession of cases. This can also be used with nouns that denote what something is a case OF, as in 17.

(17) a. We have to make up our minds on a sentence-to-sentence basis.
     b. Adult coloration is highly variable (from) snake to snake.
     c. (From) situation to situation, conditions change.
     d. item-to-item differences/similarities/variation

Again, there are paraphrases along the lines of *From one situation to the next, conditions change*.

Further subcases of succession *N to N* appear in 18.

(18) a. search (from) house to house (= 'successively from one house to the
         next')
     b. travel (from) country to country (= 'successively from one country to
         the next')
     c. sell books (from) door to door (= 'going successively from one door to
         the next')

This reading of *N to N* is close in meaning to succession *N by N*. But an example-by-example comparison reveals semantic differences. For instance, I judge ex. 19a–c better with *by* than with *to*; 19d and e are better with *to* than with *by*, and in 19f–h, both

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phrases *mayonnaise the bread* and *mayo and mustard the bread*. But their numbers were minuscule compared to *butter the bread* (one each versus about a thousand). This situation exactly parallels *hand to hand* vs. *foot to foot*. More systematic corpus work would be of interest here in assessing the status of such semiproductive cases.

seem equally good. Examples 19i–k show a very delicate semantic context-dependence that I have been unable to characterize. In general, *N by N* seems more productive than *N to N*.

(19) a. We went through the reptile house snake by/??to snake.
    b. We examined the moon crater by/*to crater.
    c. We took out the garbage bag by/*to bag.
    d. We traveled country to/??by country. (*but* travel country by country through Asia)
    e. Adult coloration is highly variable snake to/*by snake.
    f. We searched house to/by house throughout the neighborhood.
    g. His condition keeps improving day to/by day.
    h. We have to make up our minds on a sentence-to/by-sentence basis.
    i. We looked house by/*to house at the unusual architecture in New Orleans.
    j. We looked house by/to house for traces of the criminals.
    k. We looked article by/*to article for examples of the NPN construction.

SINGLE TRANSITION. Another case of *N to N* involves transitions in time or space. The two nouns are usually not identical.

(20) a boy-to-man transition, a rags-to-riches story, the Boston-to-New York commute, cradle-to-grave health care, the syntax-to-semantics mapping, a one-to-many mapping, the Christmas-to-New Year's break

Normally, these cases of NPN are only possible prenominally. Most examples require *from* in adverbial positions (21a–e), though a few idiomatically allow *from* to be omitted (21f–h) or even require it to be omitted (21i).

(21) a. He changed *(from) boy to man in less than six months.
    b. His life altered *(from) rags to riches.
    c. The break lasted *(from) Christmas to New Year's.
    d. *(From) Boston to New York, it took us over eight hours.
    e. *(From) syntax to semantics, not all information is preserved.
    f. We lived (from) hand to mouth.
    g. We traveled (from) coast to coast.
    h. This plan protects you (from) cradle to grave.
    i. This function maps syntax to semantics (*from) one to one. (*but* *This function maps syntax to semantics (from) one to many.)

COMPARISON/JUXTAPOSITION WITH DIFFERING NOUNS. A last subcase of *N to N* is shown in 22. It occurs only in prenominal position, and the *to* can be omitted.

(22) a boy-(to-)girl comparison, a student-(to-)professor matchup, the sulfur-(to-)kryptonite ratio, finger-(to-)hand proportions, tongue-(to-)palate contact

Here the nouns that NPN modifies (or is an argument of) are all predicates that involve comparison or juxtaposition. Where counterparts with verbs exist, the complements do not have NPN structure.

(23) a. *We compared boy to girl. We compared (the) boys to (the) girls.
    b. We matched (the) student(s) up to/with (the) professor(s).
    c. The tongue contacted the palate. ?He contacted tongue to palate.
    d. the ratio of sulfur to kryptonite (no verbal counterpart)

Since this case is licensed by the semantics of the noun that it precedes, this subconstruction has the flavor of a compound, parallel to, say, *student association* (= 'association of students').

Notice how different this case is from the other one that expresses comparison, *N for N* (§2.2, especially 8a,b). There the construction is perfectly acceptable in adverbial positions as well as prenominally, and the two nouns must be identical, as shown in 9. This illustrates vividly the idiosyncrasy of the various subconstructions.

2.4. *N after N* AND *N upon N*. The last productive cases of the general NPN construction are *N after N* and *N upon N*. *N after N* always denotes a succession of Ns, either temporal or spatial.

(24) a. Day after day, alone on a hill, the man with a foolish grin is keeping perfectly still. (Beatles, 'Fool on the hill') (temporal)
   b. Telephone pole after telephone pole stretched along the road toward the horizon. (spatial)
   c. That new series of books on imperialist grammar is totally riveting, volume after volume.

Essentially the same sense is expressed by a slightly different construction, *one N after another*, as seen in 25.

(25) a. One day after another, the man with the foolish grin is keeping perfectly still.
   b. One telephone pole after another stretched along the road toward the horizon.
   c. That new series of books on imperialist grammar is totally riveting, one volume after another.

N upon N and its variant *N on N* likewise express spatial succession, but vertically and upward, as in 26. This sense is also preserved metaphorically, as seen in 26c.

(26) a. Layer (up)on layer of mud lay on the seabed.
   b. We threw brick *(up)on brick onto the pile.
   c. She scornfully piled up argument (up)on argument against my position.

N after N and *N upon N* differ syntactically from the other three cases in that, as seen earlier, they can occur in NP as well as adjunct positions. In NP positions they offer further syntactic opportunities that are examined in §4.5.

Pi 1995 points out a further use of *N upon N* that occurs with plural numerals and plural measure phrases, with the meaning of unexpected large quantity (27a,b). The numerals may be different. This case parallels a similar construction with the conjunction *and* instead of the preposition (27c,d).

(27) a. Hundreds upon hundreds/thousands of demonstrators converged on the Capitol.
   b. buckets upon buckets of paint
   c. hundreds and hundreds/thousands of demonstrators
   d. buckets and buckets of paint

This use of the construction seems to have the semantic value of an intensifier, not unlike the reduplication of prenominal adjectives for intensification, as in *a long, long, long parade*.

3. THE PLACE OF NPN IN THE LEXICON AND GRAMMAR. With the data so far, let us ask how the lexicon and grammar encode our knowledge of the NPN construction. The difficulty comes from the construction's complex interweaving of regularity and

irregularity. Of course, the idiomatic cases have to be listed in the lexicon. But this alone does not account for the fact that they all have the idiosyncratic syntactic pattern NPN—they might as well be as syntactically different as the idioms in 28.

(28) by and large, all of a sudden, day in day out, time and (time) again, how dare NP VP, far be it from NP to VP

The productive cases such as *N after N* present more serious problems. Under standard derivational frameworks such as government-binding (GB) or the minimalist program, these cases require two things: first, a general way of generating phrases of the form NPN, with all the constraints on their internal structure; and second, a special sense of the preposition *after* that means multiple succession and that can be inserted only in a structure where it is surrounded by identical nouns. I leave it for adherents of such frameworks to work out an account (bearing in mind all the data).[7]

A perspective that I find more amenable to the facts of the NPN construction is that of construction grammar (Fillmore et al. 1988, Goldberg 1995, 2006, Goldberg & Jackendoff 2004; relevant aspects of this approach also appear in Culicover & Jackendoff 2005, Jackendoff 2002). The basic insight of construction grammar is that languages can contain numerous offbeat pieces of syntax with idiosyncratic interpretations. Some samples are in 29.

(29) a. Off with his head! Into the house with you!
     b. One more beer and I'm leaving. Another incident like this and you're finished.
     c. How about some lunch? [Hair stylist:] How about a little off the back?
     d. John drunk? Him in an accident? (I don't believe it!)
     e. Everyone in the car! Seatbelts fastened!
     f. The Red Sox 10, the Yankees 3.

Construction grammar lists these utterance frames as syntactic constructions that carry with them a piece of interpretation. They all have open variables that can be filled productively: for instance the frame in 29a stipulates a directional PP, filled productively, followed by *with*, followed by an NP. The utterance types in 29a–c stipulate a piece of phonology (*with*, *and*, and *how about* respectively); but those in 29d–f have no characteristic phonology—only a syntactic frame and a constructional meaning.

Three features of the constructional approach recommend it for cases like 29. First, it allows pieces of syntactic structure to be listed in the lexicon with associated meanings, just as individual words are; these are the MEANINGFUL CONSTRUCTIONS of the language. Second, construction grammar makes no principled distinction between words and rules: a lexical entry is more wordlike to the extent that it is fully specified, and more rulelike to the extent that it contains variables that have to be filled by other items in the sentence. The extreme case is a phrase structure rule like VP → V-NP (or, in constraint-based format, $[_{VP}$ V NP]), which is made up entirely of variables and carries little or no independent meaning.

The third relevant feature of the constructional approach, shared with many other constraint-based approaches, is that lexical entries are arranged in an inheritance hierarchy, so that commonalities or redundancies among words and constructions can be

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[7] Anticipating one possible response, it is certainly possible to consider NPN part of the periphery rather than a core phenomenon. But such a move does not free the theorist of responsibility for an account of NPN. Moreover, the fact that variants of the construction are so widespread in the world's languages suggests that there is something cognitively natural about it: in its broad outlines, it may be no more an accidental historical artifact than the passive.

captured by entries at a higher level in the hierarchy. That is, construction grammar gives up the assumption, inherited from structuralist linguistics, that the grammar captures all regularities, and the lexicon is simply a nonredundant list of exceptions, totally distinct from the grammar.

One further feature must be added to this approach in order to account for the NPN construction: the distinction between productive and semiproductive rules. A productive rule has a variable that can be filled freely by anything that meets its conditions, and so the rule can be applied to novel items, for instance *amphibian for amphibian*, or for that matter to brand-new nouns, for instance *wug after wug*. By contrast, with a semiproductive rule, one has to learn the acceptable cases such as *hand to hand* individually, and one recognizes novel cases, such as *foot by foot*, as relatively unusual. Although this distinction is rather uncommon in syntax, it is quite familiar in morphology, for instance in the distinction between the principles for regular and irregular past tenses in English. Given this distinction, one can then say that the NPN construction as a whole is semiproductive—meaning that one has to learn which cases are acceptable. Among its listed subcases are the idioms in 1 and 2. But also among its listed subcases are the productive rules *N by N*, *N for N*, *N after N*, and *N upon N*, plus the semiproductive rule *N to N*. This last case in turn subdivides into the semiproductive juxtaposition sense, the productive succession sense, the productive transition sense, and the productive comparison sense.

Figure 1 is a rough representation of this hierarchy. Some of the outlier cases, such as the orthogonal dimensions use of *N by N*, have been omitted; these complicate the picture further. Productive subconstructions are in bold, semiproductive in italics; approximate meanings are in parentheses. For now I leave aside the important question of how the productive/semiproductive distinction is to be formulated less stipulatively. (See Jackendoff 2002:Ch. 6 for some discussion.)

Viewed at a distance, many of the meanings associated with the NPN construction are vaguely iconic, in that they mostly deal with pairing or succession of some sort. This observation at first glance might be taken as grist for the mill of cognitive grammar in the sense of Langacker 1987 or construction grammar in the sense of Goldberg 1995, in which every syntactic configuration is taken to bear meaning. But the variety of precise meanings associated with the construction—succession, spatial juxtaposition, transition, comparison, exchange, ratio, and dimension—is not predictable.[8]

A different perspective arises by considering not just all the meanings associated with this construction, but also all the structures or constructions that the language has for expressing the same meaning. Many of the meanings associated with NPN have alternative syntactic realizations that are not directly related to NPN. For instance, *N after N* has the semantically indistinguishable but syntactically distinct variant *one N after another*; the quantificational reading of *N(s) upon N(s)* also shows up as *N(s) and N(s)*; some instances of succession *N to N* can be paraphrased by *from one N to the next*; and the succession reading of *little by little* is paralleled by *more and more*. Moreover, all the succession readings are fairly close to *many Ns in succession*. This leads to the position that the syntax of English happens to have this offbeat frame NPN—a bit of noncanonical autonomous syntax—which perhaps comes with a vague

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[8] One could of course respond by saying the NPN construction is inherently meaningful but multiply ambiguous. But such a position has little empirical content. If another meaning were to crop up, it would just be added to the inherent readings of the construction. In other words, no empirical discovery could falsify the position.
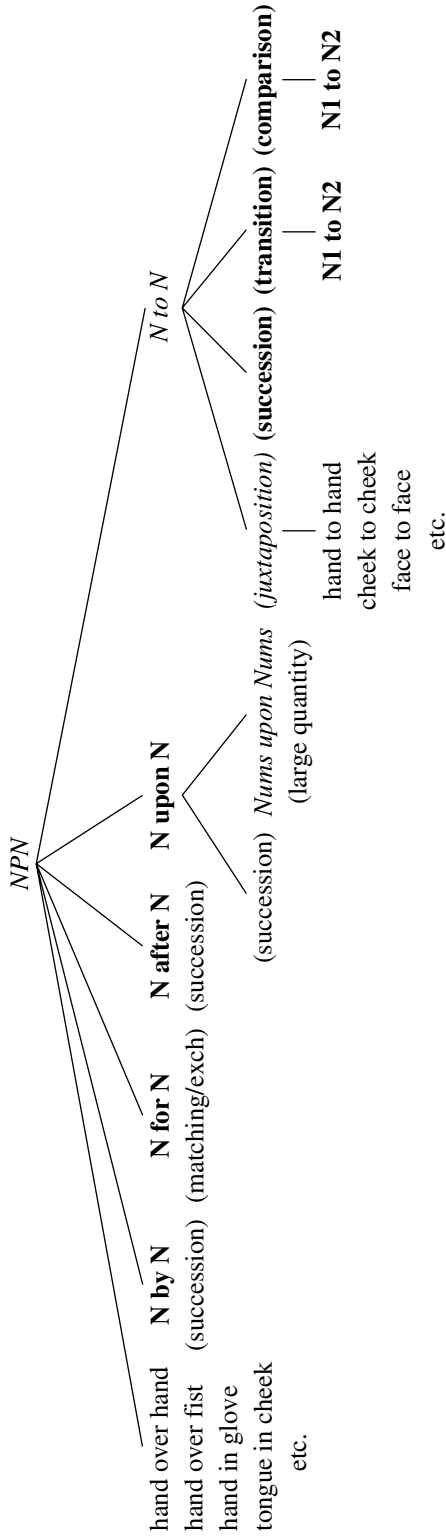
FIGURE 1. Inheritance hierarchy for the family of NPN constructions.

iconic meaning of pairing. But the varieties of precise meaning associated with this frame, either idiomatically or in certain subconstructions, are not entirely predictable, nor is the fact that some of the subconstructions are productive and others are not. Learning the construction as a whole, then, requires learning (i) the syntactic frame and (ii) the particular instances of this frame and how they match to meanings. This is not so different from learning a collection of words that fall together into a semiproductive paradigm of derivational morphology.

Of course, the meanings associated with NPN are not entirely arbitrary. Looking across these cases, there appear to be at least three independent meaning components that mix and match in the various subconstructions: pairing, multiplicity, and time. A rough analysis of the cases then goes like this.

(30) Juxtaposition = pairing (juxtaposition *N to N*)
     Transition   = pairing + time (first one place then the other) (transition *N to N*)
     Matching   = pairing + multiplicity (many pairs matched up) (*N for N*)
     Succession = multiplicity + time (many instances in succession) (*N by/ to/after N*)

This analysis is far too coarse and omits many of the details pointed out in §2. In particular, many subconstructions include a sense of intensification (*day after day* being more intensified than *every day*, for instance). It suggests, however, an inheritance hierarchy of meanings that crossclassifies with the inheritance hierarchy of forms in Fig. 1, yielding a multiple inheritance hierarchy along lines familiar from HPSG (e.g. Sag et al. 2003) and construction grammar (e.g. Goldberg 1995).

One might ask whether the taxonomy in Fig. 1 should be considered as 'in the grammar' or 'in the lexicon'. Its being in the grammar would suggest that the construction is predominantly productive, perhaps overlaid with a few exceptions. Yet this is hardly the situation: the pockets of productivity are systematically interspersed with and embedded in idiomatic and semiproductive cases.

The alternative, that the construction is in the lexicon, might suggest that unusual cases such as *snake for snake* are stored in the lexicon. This is unlikely, given that the construction generalizes to new nouns. Another option is that they are built in the lexicon prior to lexical insertion. However, such an account makes a distinction where there is none: free combination of phrases is normally taken to be in the province of phrasal syntax, not the lexicon. If lexical rules include principles of phrasal combination such as NPN, it is hard to see why the composition of transitive verb phrases does not belong in the lexicon as well.

A better way of framing the issue comes from reconsidering the nature of the lexicon. It is not a repository of words: it is a repository of whatever pieces of linguistic structure have to be stored in long-term memory. Some of these pieces are relatively idiosyncratic, and some include variables that must be filled productively or semiproductively in the course of building a sentence in working memory (Jackendoff 2002:Ch. 6). From this perspective as well as that of construction grammar (Goldberg 1995, Langacker 1987), there is no distinction between in the grammar and in the lexicon; there are only distinctions of productivity in the lexicon.

4. Syntactic puzzles posed by npn.

4.1. What syntactic category is npn? Let us look in more detail at the syntax of the construction. What category is it? Reviewing material from earlier (5a–d): NPN

occurs in adjunct positions in the clause. It is presentential in 31a, after the subject in 31b, in VP after the complements in 31c, and pronominal in 31d.

(31) a. Page for page, this is the best-looking book I've ever bought.

                                                            (presentential)

      b. John and Bill, arm in arm, strolled through the park.   (after subject)

      c. We went through the garden inch by inch.   (VP adjunct)

      d. Your day-to-day progress is astounding.   (prenominal)

N after N and *N upon N* can also appear in positions characteristic of NPs, as seen in 32. The other prepositions are not good here, even when they might mean something appropriate, as *by* does in 32 (repeated from 5e–h).

(32) a. Student after/upon/*by student flunked.   (subject)

      b. We filled crack after/*by crack.   (object)

      c. We looked for dog after/*by dog.   (object of PP)

      d. Student after/*by student's parents objected.   (possessive NP)

It might be reasonable to call the cases in 31 PPs. PPs are typical sentential adjuncts, and some PPs—mostly idiomatic ones—can appear prenominally, as shown in 33.

(33) a. an in-your-face insult (*but* *an in-your-eyes light)

      b. these out-of-the-way locations (*but* *these out-of-the-sink dishes)

      c. an after-the-fact conclusion (*but* *an after-the-concert depression)

It has never been clear how the grammar licenses the idiomatic PPs but not the productive ones in 33. But however it is accomplished, presumably nothing stands in the way of also admitting prenominal PPs like 31d. In addition, at least some NPNs can occur postnominally, the position more typical for PPs, for example, *[A search case by case for the predicted paradigms] turned up no evidence.*

An alternative view might be that NPN is an AP when dominated by NP, and an AdvP when dominated by S or VP. In addition, NPN sometimes semantically parallels secondary AP predicates, suggesting it can be AP even when dominated by VP. For instance, the semantic role of NPN in 31b is not so far from that of the AP in *John and Bill, naked as jaybirds, strolled through the park*. But NPN displays no relationship at all to the structure of canonical APs/AdvPs, so this solution is perhaps even less comfortable than treating NPN as a PP.

A referee suggests the further alternative that NPN is an NP marked with the grammatical function OBLIQUE, rather like the time expression in *He sat there ten minutes*. However, the latter case alternates with the PP *for* ten minutes, whereas there is no comparable paraphrase for adjunct NPN.

In general, the adjunct positions where NPN appears are categorically unselective: they care more about semantics than syntactic category. So yet another alternative is that adjunct NPN has no syntactic category, and its position is determined on purely semantic grounds. At this point, deeper theoretical considerations come into play than I can deal with here. For convenience I categorize adjunct NPNs as PPs, while recognizing that there is no standard category into which they fit comfortably.

4.2. WHAT IS THE HEAD OF NPN, AND WHAT IS THE REST? The internal structure of these phrases is also a puzzle. What follows the preposition is not a normal prepositional object, since, as already noted, it cannot have a determiner.[9]

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[9] Brian Joseph (p.c.) observes that there is a class of preposition-noun expressions in which the noun lacks a determiner, for instance *in/at school*, *in/to bed*, *at/in/to college*, and in British English, *in hospital* and so on. This is quite a different construction from NPN; for instance, it occurs in normal locational PP positions.

(34) *a day by a day, *one face to one face, *this book upon that book

The normal specifiers of PPs and APs are degree phrases and quantifiers (35a). They also include measure phrases (35b), which are arguably NPs but which, unlike the N in NPN, require specifiers.[10] A bare noun acting as a PP or AP specifier is unprecedented.

(35) a.   high on the hill, much further down the road, three days after the accident, very/quite beautiful, much more beautiful
     b.   three inches long

So even if the NPN construction is a PP or AP, it is a very unusual one.

The cases of *N to N* that allow *from*, as in 20–21 (e.g. *boy-to-man transition*), look like they may be at bottom compound PPs of the form *from N to N*, with the *from* deleted, as in the two alternative possibilities 36a,b. Williams (1994) suggests this solution, but it is implausible for any of the other NPN cases (36c).

(36) a.   [PP ~~from~~ NP to NP]
     b.   [PP [PP ~~from~~ NP] [PP to NP]]
     c.   *[PP ~~from~~ NP by/for/after NP]

Now consider cases like 32 with *after* and *upon*, in which NPN behaves like an NP. If indeed it is an NP, what is the head? Huddleston and Pullum (2002) take the first noun to be the head and the rest a complement, as in 37. Beck and von Stechow (2006), Pi (1995), and Postma (1995) propose similar structures, though derived from something far more complex.[11]

(37) [NP N [PP P NP]]

This structure does account for the fact that the construction behaves like an NP. But it is quite a peculiar NP: notice again that the noun must lack a determiner, as seen in 4b and 34.[12] Furthermore, the only place that the special characteristics of the construction could be specified would be in the entry for *after*. This entry would have to say that *after* can occur as a nominal modifier that denotes iterated succession, just in case its complement and the noun it modifies are identical bare nouns (as opposed to ordinary *after* in *the day after the accident*, which denotes a single succession). This is outrageously distant from the restrictions normally found with prepositional modifiers.

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[10] Recall, however, that measure phrases do occur in the orthogonal dimensions case of *N by N*, as in *three feet by two inches*.

[11] Beck and von Stechow (2006), within a formal semantics approach, propose that *dog after dog* is derived by deletion from *one dog after the other dog*, though they admit that the means of accomplishing this derivation is far from obvious.

Pi (1995) derives *N upon N* from an unusual underlying structure in which the preposition is marked 'iterative', and the two nouns both originate as its complements, projected from the same position but differentiated in the third dimension. Pi's focus is generalizing quantificational *N upon N* with things like *boxes and boxes of cookies*; but all the differences between *boxes upon boxes* and the other NPN constructions are basically matters of stipulation. Note also that juxtaposition, transition, and comparison *N to N* are not fundamentally quantificational, so such an approach leaves them out.

Postma 1995 derives NPN from the underlying structure given in (i), in which PRO$_k$ moves to the specifier of DP. This is supposed to be analogous to an alleged derivation of *each dog* from an altogether parallel structure with a null preposition. Thus parallelism of two individually implausible structures is taken to account for the quantificational force of *N after N*, again ignoring the nonquantificational cases of NPN altogether.

(i)   [DP [D′ D^O [PP [NP PRO$_i$ dog] after [NP PRO$_k$ dog]]]]

[12] Under the DP hypothesis, one might be able to say that the construction has the structure [DP NP P NP] rather than the expected [DP P DP]. Still, the unusual structure of NP not dominated by DP needs to be explained.

I would suggest that if there is any head at all in *N after N*, it is the preposition, and the construction as a whole is simply a violation of the X-bar schema—it is an NP headed by P. As with other heads, the preposition is what determines the character of the phrase's interpretation, and the preposition determines what nouns are possible and whether they have to match. Such a situation, in which an NP is not headed by a noun, has a precedent in the familiar English gerund construction, for instance *John's leaving the room so soon*, which is arguably an NP headed by a verb (see Jackendoff 1977, Pullum 1991, Subramanian 1992).

4.3. PRENOMINAL ADJECTIVES. Some cases of the NPN construction—the ones with *by*, *after*, and *upon*—permit an adjective before the second noun, and, if that is present, they also permit an identical adjective before the first noun.

(38) a.   day by/after miserable day
     b.   miserable day by/after miserable day
     c.   *awful day by/after miserable day
     d.   *awful day by/after day

Such adjectives are not possible with the other prepositions, not even with the succession sense of *to* (39a), where it would semantically parallel 38.

(39) a.   The situation is getting worse week to (*miserable/*long) week.
     b.   They walked along hand in (*strong/*greasy) hand.
     c.   They walked along arm in (*muscled) arm.
     d.   They stood side by (*firm/*resolute) side.
     e.   They stood face to (*ugly) face.
     f.   We lived hand to (*hungry) mouth.
     g.   Woman for (*brilliant/*wonderful) woman, you've got the best team.

Crucially, consider the semantics when there is only one adjective, as in 38a: *day by miserable day* is not speaking about a succession of days followed by miserable days, but rather a succession of miserable days. So the adjective is modifying the whole construction, even though it appears to form a constituent with only the second noun. I return to this fact in §6.

4.4. TRIPLICATION. These same cases, but especially *N after N*, can also be triplicated, as in *day after day after day*—or iterated even further, as in *page after page after page after page*. Triplication carries the semantic force of an intensifier. The conditions on prenominal adjectives parallel 38 and show that the adjective appears either on the last noun or on all of them, as seen in 40a–d.[13] It is also possible for the second and third nouns to carry different adjectives if they grow in intensity (40e). (Curiously, the sense of 40e is that the weeks get successively worse, while the literal meaning of *after* suggests that the worst week comes first.)

(40) a.   week after week after miserable week
     b.   miserable week after miserable week after miserable week
     c.   *week after miserable week after miserable week
     d.   *miserable week after week after week
     e.   week after miserable week after thoroughly rotten week

The other prepositions resist triplication, e.g. **page for page for page*, **a baby-to-child-to-adult transition*, and so forth.

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[13] This is reminiscent of the conditions on multiple conjunction: *X and Y and Z and W* or *X, Y, Z, and W*, but not **X, Y and Z and W*. But it is hard to see how to draw a connection between the two phenomena.

4.5. COMPLEMENTS AND POSTNOMINAL MODIFIERS TO NPN IN NP POSITION. A further puzzle is that when NPN is in an NP position, it can be followed by an appropriate NP complement (41a–d) or modifier (41e) (this is noticed in Huddleston & Pullum 2002:634, n. 15).[14]

(41) a. We endured day after day of rain.
     b. We looked at picture after picture by Renoir of his wife.
     c. We demolished argument after argument for the war.
     d. Page after page of tattered, fraying paper with the notations of a bean counter spill from the Archives.   (Stefan Fatsis, *Word freak*, 94)
     e. Country after country that I had never heard of before condemned the US invasion.

However, this is possible only when *N after N* is used in an NP position; elsewhere it is ungrammatical (42), paralleling other cases of NPN. (I have taken care to make the examples pragmatically plausible.)

(42) a. We endured the cold, day after/by day (*of rain).
     b. Picture after/by picture (*by Renoir of his wife), we see the growth of the artist's style.
     c. We compared the documents, page after/for page (*of every volume).
     d. Country after/by country (*that I had never heard of), the UN representatives condemned the US invasion.
     e. We traveled country to country (*of Asia). (n.b. We traveled [country to country] in Asia)

Matsuyama (2004) notices that these complements and modifiers to *N after N* can also appear in extraposed position, given proper prosodic conditions.

(43) a. Picture after picture fell off the wall of the late ambassador from Trafalmadore.
     b. Country after country denounced us that I'd never heard of.

As with the prenominal adjectives, the complements and modifiers in 41 pertain to the entire NP: it is not days of unspecified weather after days of rain that we endured; it is all days of rain. This would suggest that the complement is attached outside both nouns, perhaps with a structure like 44.

(44) [NP [NP N P N] PP]

But there is evidence for a different structure: a short complement can be reduplicated fairly comfortably after the first noun (45a,b). Longer complements, however, become uncomfortable (45c,d).[15] As with the prenominal adjectives, the first noun can have a complement only if the second noun does (45e–f).

(45) a. gallon of paint after gallon of paint
     b. picture of Bill after picture of Bill
     c. gallon (??of green paint) after gallon of green paint
     d. picture (*?of his sister-in-law) after picture of his sister-in-law
     e. *gallon of paint after gallon
     f. *picture of Bill after picture

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[14] One further case should be mentioned: the idiomatic *face to face with NP*.

[15] The possibility of reduplication does not extend to postnominal adjuncts, no matter how short: *meeting (*yesterday) after meeting yesterday*; *student (*in Bonn) after student in Bonn*; *woman (*with Phil) after woman with Phil*.

The variant with three or more nouns likewise follows the pattern of prenominal adjectives: compare 46 to 40.

(46) a.   gallon of paint after gallon of paint after gallon of paint
     b.   gallon after gallon after gallon of paint
     c.   *gallon after gallon of paint after gallon of paint
     d.   *gallon of paint after gallon of paint after gallon

These parallels suggest that if prenominal adjectives form a constituent with the nouns, then postnominal complements do as well. The conclusion is that there is inevitably a mismatch between syntactic and semantic behavior (Matsuyama 2004 arrives at a similar conclusion). These complements present the additional puzzle of how the NPN construction can license ordinary NP complements and modifiers despite its peculiar internal syntax—in particular despite its being headed by a preposition.

4.6. COMPARISON WITH *one N after another* AND *one N at a time*. Before going on with further properties of *N after N*, it is useful to digress a moment to discuss two closely related constructions, *one N after another* and *one N at a time*. The former, as noted in §2.5, appears to mean the same as *N after N*; the latter is very close to succession *N by N*. They both allow complements to the noun, even in adjunct position. Compare 47 to 42, in which adjunct NPNs are unacceptable.

(47) a.   We endured the cold, one day of rain after another/one day of rain at a time.
     b.   One picture by Renoir after another, we see the artist's attention to detail.
     c.   We compared the documents, one page of the volume after another/at a time.
     d.   ?One country that I had never heard of after another/at a time, the UN representatives condemned the US invasion.

Alternatively, the complements and modifiers can be placed at the end of the construction, with the flavor of Heavy Shift, as in 48.

(48) a.   one day after another of heavy rain/one day at a time of distressing news
     b.   one picture after another by Renoir
     c.   one page after another of the volume
     d.   one country after another that I had never heard of

One N after another and *one N at a time* both allow a full NP before the preposition, but the former prohibits a head noun or any modification on *another*.

(49) a.   one very happy child from Siberia after another/at a time
     b.   *one happy kid after another kid
     c.   *one day after another miserable one (cf. day after miserable day)

After another and *at a time* can sometimes be extraposed as if they were complements or adjuncts of *one N* (50a); this is clearly impossible for *N after N* (50b).

(50) a.   One unhappy kid came in after another/at a time.
     b.   *Child came in sick after child.

These constructions have the pronominal forms *one after another* and *one at a time* (note also *two/three at a time*, paralleling *two by two*); the *N after N* construction has no pronominal form *one after one* that might parallel *one by one*.

These cases are altogether consistent with an analysis in which the noun is head, and *after another* and *at a time* are PP adjuncts, that is, a structure like 37. They point up the extraordinary character of NPN, where none of the standard options for analysis work consistently (or even at all).

5. *N after N* AS A QUANTIFIER. Matsuyama (2004), Oehrle (1998), Pi (1995), and Postma (1995) observe that *N after N* has quantificational force and can bind indefinite NPs and pronouns from the same positions as ordinary quantified NPs can. For instance, in 51a, *student after student* binds *a complaint*, parallel to *Every student$_i$ came in with a complaint$_i$*: there is one complaint per student, and they might all be different. Similarly, in 51b, *his* refers to each individual student, just as in *Every student$_i$ talked about his$_i$ attitudes*.

(51) a. Student after student came in with a complaint.
     b. [Student after student]$_i$ talked about his$_i$ attitudes.
     c. Teachers of student after student of ours came in with a complaint.
     d. We could see that there was a serious error on page after page of the document.
     e. From student after student, we've received a serious complaint.

Notice that *one N after another* can be substituted for NPN in any of these.

   Example 51 shows cases in which *N after N* functions as an NP. In contrast, when it is an adjunct, it cannot quantify over a singular indefinite (52) but can quantify over a bare plural (53). Examples 51–53 are matched as closely as possible, configuration for configuration. The only syntactic difference is that in 51d,e, *N after N* is the object of a preposition (hence functioning as an NP), while in 52–53, *N after N* is a stand-alone adjunct.

(52) a. *We could see that there was a serious error, page after page/one page after another. [where it's a different error on each page]
     b. *Student after student, we've received a serious complaint. [only good if it's the same complaint each time]

(53) a. We could see that there were serious errors, page after page.
     b. Student after student, we've received serious complaints.

Adjunct *N by N*, even though it means about the same thing as *N after N*, cannot be quantificational at all: compare 54 with 51e, 52b, and 53b.

(54) a. *Student by student, we've received a serious complaint. [if okay, only one complaint]
     b. *Student by student, we've received serious complaints.

   One *N after N* can even take scope over another, as in 55.

(55) Student after student turned in lousy paper after lousy paper.

Oehrle reads 55 as having a branching quantifier: there is a succession of student-paper pairs. I can also read it as one student after another turning in a succession of lousy papers, that is, with the subject taking scope over the object.

   It is hard to specify exactly what kind of quantifier this is. Matsuyama (2004), Oehrle (1998), and Pi (1995) note that *N after N* in subject position takes singular agreement, like *every/each N* (56a). Richard Larson has pointed out (p.c.) that like *every/each N*, *N after N* cannot be the antecedent of *each other* (56b).

(56) a. Page after page is/*are sprinkled with errors.[16]
     b. Dog after dog bit the others/*each other.

Matsuyama also observes, however, that with respect to aspectuality, *N after N* behaves more like a bare plural (57b) than like *every N* (57c). It also does not pattern exactly with *many Ns in succession*, which is often a decent paraphrase (57d).

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[16] Moira Yip tells me that in British dialects where words like *team* take plural agreement, *N after N* does too: *Team after team are/*is drinking beer*.

(57) a. For hours/*In an hour, student after student walked into my office.
   b. For hours/*In an hour, students walked into my office.
   c. In an hour/*For hours, every student walked into my office. [* in reading where each student walked into my office once]
   d. For hours/In an hour, many students in succession walked into my office.

So although *N after N* is syntactically singular, it is evidently semantically some sort of plural (as might be expected).

The basic problem posed by these data is how to get a quantificational interpretation out of a syntactic structure NPN, with nary a quantifier in sight. In particular, in a framework such as GB or the minimalist program, quantificational interpretations are derived by raising quantified phrases to the position of their scope at LF. But here there is nothing overt to trigger raising. One could of course designate *N after N* as something that raises, but such syntactic raising is patently not based on its syntax—only on its semantics. One could alternatively propose a special phonologically null quantifier that triggers raising. But consider how such a null quantifier would have to be licensed: it must somehow be associated with the use of *after* and *(up)on*, specifically in the context of NPN. In other words, the preposition must specify not only the superficial syntax of the construction, but also the presence of this null quantifier—a kind of syntactic stipulation otherwise unknown (at least to me). Even if we admit such a derivation from something more obviously quantificational, such a proposal fails to capture the generalization that the overt syntax of quantificational NPNs has the exact same internal form as nonquantificational cases such as *N by N*. In short, such a proposal would be just a stratagem to preserve the hypothesis of syntactic quantifier raising.

An alternative conclusion is that the syntax of NPN simply does not match its semantics. Such a conclusion is nothing new. Culicover & Jackendoff 2005 argues that a strong match between syntax and semantic structure is only a default alignment, and there exist numerous mismatches. In particular, construction grammar is founded on arguments that syntactic structure too can carry meaning, independent of the words in it.[17] I argued in §3 that the NPN construction presents another example of a meaningful construction; in this section I have shown that part of the meaning of *N after N* used as an NP is that it is quantificational—whatever its peculiar syntax.

In turn, however, this means that there cannot be a SYNTACTIC level of LF in which all scope of quantification is overt. Rather, scope of quantification is encoded in SEMANTIC structure only, even if it may depend in part on the syntactic position of the quantificational phrase. This is the position urged in Culicover & Jackendoff 2005; NPN presents especially striking evidence.

Let us return to the NP complements and modifiers in 41 and 43. In light of the conclusion about quantification in *N after N*, one might conclude as well that the licensing of complements and modifiers of *N after N* is determined by semantics, where *N after N* has roughly the same semantic structure as *many Ns in succession*. That is, in semantics there are not two Ns that license complements and modifiers; there is only one. Furthermore, the complements and modifiers are realized in syntax exactly as they should be. It is only the weird syntactic realization of the semantic quantifier-head configuration as NPN that leads to the strange configuration in 41 and 43; at a semantic level everything is as it is supposed to be. As with quantification, this conclusion

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[17] One need not agree with some strains of construction grammar that ALL structure is meaningful. But certainly SOME structure is meaningful, as seen in the constructions enumerated in 29 above.

leads to broader questions about how licensing of NP complements and modifiers is accomplished, and it suggests that semantics plays a larger role than is usually assumed.

6. A LEXICAL ENTRY FOR THE NPN CONSTRUCTION. A final question is how to state the rule producing the NPN construction. I propose that this is a reduplicative construction, along the lines of the 'contrastive focus reduplication' or 'salad-salad' construction discussed in Ghomeshi et al. 2004 (see also Horn 1993) and illustrated in 58.

(58) a. I'll make the tuna salad, and you make the salad-salad.
    b. Would you like some wine? Or would you like a drink-drink?

Most work on reduplication has focused on how the phonological component accomplishes reduplication. Ghomeshi and colleagues ask a different question: how does the lexicon encode a morpheme that, like other morphemes, carries a meaning and syntactic structure, but that has reduplicative phonology? Among many possible analyses that Ghomeshi and colleagues explore, the one they find most promising is a constructional analysis based on the parallel architecture of Jackendoff 2002, in which the phonological realization of the focus operator is a reduplication of the word being focused.

A similar approach appears to work for those versions of NPN that require reduplication. The principle can be stated as a constructional idiom that maps between meaning and syntax roughly like 59.

(59)   Meaning   MANY X_is IN SUCCESSION [or however it is encoded]
        Syntax $[_{NP} \text{ N}_i \text{ P}_j \text{ N}_i]$
        Phonology Wd_i after_j Wd_i

The entity being counted maps into both nouns, as notated by the shared subscript i. The preposition in syntax maps into *after* in phonology but does not map directly into anything in semantics. This is what makes the construction idiomatic or noncompositional. In effect, then, this account parallels reduplicative expressions of quantification in other languages, such as Hebrew *boker boker* 'every morning', except that it has this idiosyncratic preposition in the middle.

In order to incorporate adjective modifiers, 59 can be amplified to 60. There are two cases, depending on whether the adjective is reduplicated along with the noun.[18]

(60)   Meaning   MANY (MOD_k) X_is IN SUCCESSION
      a. Syntax $[_{NP} \text{ N}_i \text{ P}_j \text{ (A}_k) \text{ N}_i]$
          Phonology Wd_i after_j $(\text{Wd}_k) \text{Wd}_i$
      b. Syntax $[_{NP} (\text{A}_k) \text{ N}_i \text{ P}_j \text{ (A}_k) \text{ N}_i]$
          Phonology $(\text{Wd}_k) \text{Wd}_i$ after_j $(\text{Wd}_k) \text{Wd}_i$

In 60a, the modifier is mapped to a prenominal adjective preceding the second noun; in 60b it is copied before the first noun as well. This treatment accounts for the fact that a single adjective before the second noun modifies the entire construction: in the semantics, there is only one counterpart of the two nouns, and this is what is modified.

A more extreme variant of the formalization might be stated as 61 (omitting the adjective for convenience).

(61) Meaning   MANY X_is IN SUCCESSION
     Syntax $[_{NP} \text{ P}_j \text{ N}_i]$
     Phonology Wd_i after_j Wd_i

Here the first noun is absent even in the syntax—it appears only in the phonology. For the case of English, there appears to be no reason to have the first noun in syntax: it

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[18] I leave open the issue of whether the A-N sequences are constituents.

doesn't move around or take its own modifiers. However, the Polish NPN construction does provide some evidence for the presence of two separate nouns in syntax, in that the second noun receives the instrumental case governed by the preposition *za*, but the first noun receives the case governed by the larger environment (Barbara Citko, p.c.).

(62) a. Prof. Kowalski oblewa studenta   za   studentem.
         Prof. K   flunks student.ACC behind student.INSTR
                                    ('student after student')

    b. Miasto   za   miastem   glosowalo przeciw tej ustawie.
        town.NOM behind town.INSTR voted   against this measure
               ('town after town')

This account of NPN as reduplication is stipulative, but it does the trick, and it lays the groundwork for a more detailed investigation of the syntax and semantics of the NPN construction in the context of construction grammar and the parallel architecture.

7. INCONCLUSION. The discussion here has hardly 'solved' the NPN construction. It has, however, exposed some of the construction's unexpected complexity and has reflected on the consequences for theoretical alternatives. The syntax of NPN and the way it maps to semantics are sufficiently distant from canonical structures that it appears hopeless to find a classical derivation: we have to accept it as a 'syntactic nut' that is simply a special case in the grammar of English.

The distribution of NPN vividly illustrates the continuity between idiosyncrasy, semi-productivity, and full productivity argued for by construction grammar and related approaches. NPN thus provides strong arguments for a theory in which all knowledge of language is encoded in terms of stored pieces of structure organized into an inheritance hierarchy, without a strict separation between lexicon and grammar.

Finally, the ways in which NPN deviates from canonical structures lead to the conclusion that at least some licensing of complements and modifiers is a function of semantics rather than syntax, and still more striking, that scope of quantification cannot be canonically represented at a syntactic level of LF. The parallel architecture framework of Jackendoff 2002 and Culicover & Jackendoff 2005 accommodates these conclusions nicely. I leave it as a challenge for practitioners of competing frameworks to account for them.

REFERENCES

BECK, SIGRID, and ARNIM VON STECHOW. 2006. Dog after dog revisited. Tübingen: University of Tübingen, MS.

CULICOVER, PETER W. 1999. *Syntactic nuts: Hard cases in syntax*. Oxford: Oxford University Press.

CULICOVER, PETER W., and RAY JACKENDOFF. 2005. *Simpler syntax*. Oxford: Oxford University Press.

FILLMORE, CHARLES; PAUL KAY; and MARY CATHERINE O'CONNOR. 1988. Regularity and idiomaticity in grammatical constructions: The case of *let alone*. *Language* 64.501–39.

GHOMESHI, JILA; RAY JACKENDOFF; NICOLE ROSEN; and KEVIN RUSSELL. 2004. Contrastive focus reduplication in English (The salad-salad paper). *Natural Language and Linguistic Theory* 22.307–57.

GOLDBERG, ADELE. 1995. *Constructions: A construction grammar approach to argument structure*. Chicago: University of Chicago Press.

GOLDBERG, ADELE. 2006. *Constructions at work: Constructionist approaches in context*. New York: Oxford University Press.

GOLDBERG, ADELE, and RAY JACKENDOFF. 2004. The English resultative as a family of constructions. *Language* 80.532–68.

HORN, LAWRENCE. 1993. Economy and redundancy in a dualistic model of natural language. *SKY 1993: Yearbook of the Linguistic Association of Finland*, ed. by Susanna Shore and Maria Vilkuna, 31–72. Turku: The Linguistic Association of Finland.

HUDDLESTON, RODNEY, and GEOFFREY K. PULLUM. 2002. *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press.

JACKENDOFF, RAY. 1977. *X′-syntax*. Cambridge, MA: MIT Press

JACKENDOFF, RAY. 2002. *Foundations of language*. Oxford: Oxford University Press.

KÖNIG, EKKEHARD, and CLAIRE MOYSE-FAURIE. 2007. Spatial reciprocity: Between grammar and lexis. Berlin: Free University Berlin, MS.

LANGACKER, RONALD. 1987. *Foundations of cognitive grammar: Theoretical prerequisites*. Stanford, CA: Stanford University Press.

MATSUYAMA, TETSUYA. 2004. The N *after* N construction: A constructional idiom. *English Linguistics* 21.55–84.

OEHRLE, RICHARD. 1998. Noun after noun. Paper delivered at the annual meeting of the Linguistic Society of America, New York City, January 1998.

PI, CHIA-YI TONY. 1995. The structure of English iteratives. *Proceedings of the 1995 annual conference of the Canadian Linguistic Association* (*Toronto Working Papers in Linguistics*), ed. by Päivi Koskinen, 434–45.

POSTMA, GERTJAN. 1995. Zero-semantics: The syntactic encoding of quantificational meaning. *Linguistics in the Netherlands 1995*, ed. by Marcel den Dikken and Kees Hengeveld, 175–90. Amsterdam: John Benjamins.

PULLUM, GEOFFREY K. 1991. English nominal gerund phrases as noun phrases with verb phrase heads. *Linguistics* 29.763–99.

SAG, IVAN; TOM WASOW; and EMILY BENDER. 2003. *Syntactic theory: A formal introduction*. 2nd edn. Stanford, CA: CSLI Publications.

SUBRAMANIAN, UMA M. 1992. *On internal and external syntax mismatches*. Columbus: The Ohio State University dissertation.

WILLIAMS, EDWIN. 1994. Remarks on lexical knowledge. *The acquisition of the lexicon*, ed. by Lila Gleitman and Barbara Landau, 7–34. Cambridge, MA: MIT Press.

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