Denominal verbs: An overview

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Abstract *The article provides an overview of (the literature on) denominal verbs. Section 2 discusses semantic and pragmatic issues. Section 3 treats structural matters, namely (i) whether denominal verbs are best analysed using derivation from nouns, category underspecification or category-neutral roots, (ii) the various syntactic and non-syntactic approaches, and (iii) complex denominal verbs, where prefixes and particles co-occur with otherwise unacceptable denominal verbs.*

1. Introduction

When a journalist wrote that protestors had *gnomed* the Reserve Bank of Australia (i.e. adorned it with garden gnomes), when Shakespeare wrote *It out-Herods Herod*, and when a linguist was heard to say *I George W. Bushed my way through my talk*, they were exploiting a word-formation pattern which has inspired a voluminous literature. We will see that a correct analysis of the creation of verbs from (elements otherwise used as) nouns could teach us much about the interaction of semantics, pragmatics, syntax, morphology and the lexicon.

This overview begins by reviewing the main interpretational issues discussed in the literature on denominal verbs. Section 2.1 illustrates the main semantic classes of denominal verbs and problems of semantic analysis (e.g., does *saddle horses* directly express motion of the saddle onto the horse or is this a grammatically irrelevant inference from a semantics corresponding more closely to *provide horses with saddles*). Section 2.2 deals with semantic and pragmatic constraints on their interpretation, e.g., why the verb *file* can mean 'to put in a file' only in contexts where the file is used in its intended storage function: *file {documents/*paperclips}*.

Section 3 concerns morphological and syntactic aspects of denominal verbs, firstly treating the derivational source of (items called) denominal verbs (section 3.1): Is *hammer*$_{V}$ (i.e. the verb *hammer*) derived from *hammer*$_{N}$ (the noun *hammer*), or vice-versa, or are both derived from a root whose category is underspecified? We review the various (syntactic and non-syntactic/lexical) accounts of the structure of denominals (section 3.2). Finally, section 3.3 examines problems raised by complex denominal verbs, in which prefixes and particles occur with otherwise unacceptable denominal verbs (*we pigged out* vs. **we pigged*).

Notes on terminology: The term *denominal* (*verb*) refers to all verbs which are seen by at least some linguists as being derived from nouns. It applies to *hammer*$_{V}$ although not all theories derive it from *hammer*$_{N}$, as well as to cases like *profiteer*$_{V}$ ← *profiteer*$_{N}$ (where *profiteer*$_{N}$ is uncontroversially the derivational source since *-eer* is otherwise a noun-forming suffix). The term *denominal* implies no analytic choice; it is used even by linguists who deny that *hammer*$_{V}$ is from *hammer*$_{N}$. We speak of *denominal verbs* irrespectively of whether they are formally identical to nouns (*hammer*) or show formal differences such as consonant voicing (*shelf*$_{N}$/*shelve*$_{V}$), apophony/ablaut/umlaut (German *Haut* 'skin$_{N}$' → *häut-* 'skin$_{V}$') or overt affixes (*crystallize*, *derail*). Our area of interest thus partly overlaps with conversion/zero derivation, terms used here for any category-changing derivation effected without overt category-determining affixation (see article 18 on conversion). A final terminological point is that we will refer to the noun which is the (putative) base of the denominal verb as the *incorporated N*, again without presupposing any particular analysis.

2. The interpretation of denominal verbs

2.1. Semantic classes of denominal verbs

Semantic analyses of denominals often classify them into subgroups according to the relation of the incorporated N to the event they name. An illustration is the classification of English converted denominal verbs in (1)-(7), a simplification and partial modification of the classification in Clark and Clark (1979; henceforth C&C). The terms *location* and *locatum* in (1) and (2), now standard in research on denominals, refer respectively to the internal (ground) and external (figure, theme) arguments of prepositions.

(1) Location verbs: Direct object (intransitive subject) moves to/into/onto incorporated N:
  a. *bottle the wine, {box/shelve/catalogue/blacklist} the books*
  b. *the share {peaked/bottomed out} at $1; they surfaced*

(2) Locatum verbs: Incorporated N moves to/onto/into the direct object (intrans. subject):
  a. *{perfume/cream/powder/bandage} her face, {paper/paint/tile/soil} the wall, man a ship, {name/crown/arm} people, {address/stamp} a letter*
  b. *the window {iced over/fogged up}; the sky clouded over*

(3) Privative location verbs: Direct object is removed from incorporated N:
mine the gold, quarry the marble, shell the peas

(4) Privative locatum verbs: Incorporated N is removed from direct object:
{gut/skin/milk} animals, dust shelves, stone the fruit, weed gardens

(5) Instrument verbs: incorporated N is an instrument in the event V names:
  a. *rollerskate/jet to London; ship/wheelbarrow them to another place*
  b. *microwave the food, knife people, mop/sandpaper/varnish/plane the floor*

(6) The incorporated N comes into existence:
  a. Cause obj. to become N: *{orphan/outlaw/scapegoat} someone, cup one's hands*
  b. Become N: *the clouds mushroomed, the truck jack-knifed*
  c. Produce N: *the animal foaled/calved, the child teethed*

(7) Agent verbs: Subject acts in the capacity named by incorporated N:
  a. *{pilot/guard} aircraft, butcher animals, mother children, police the area*
  b. *they {pickpocketed/modelled for H&M/starred in films/fooled around}*

This classification is one of several semantic classifications in the literature on denominal verbs in English and other languages (others are given in Gottfurcht 2008, Kaliuščenko 1988, 2000, Karius 1985, Leitner 1974, Marchand 1969, Rimell 2012). Since detailed comparison of these is beyond the scope of this article, we will confine ourselves to illustrating the most important problems in the semantic classification of denominals. First, it is often hard to determine which semantic-conceptual properties of a situation named by a denominal verb are referred to by the rule which created it. It is thus unclear if the rule that productively forms 'locatum' verbs like (2) specifically states that verbs can be formed from Ns naming objects that move to the direct object referents. Noticeably many 'locatum' verbs can equally well be analysed in terms of possession or some related notion expressible with *with* or *have*. Thus, *WD-40 the chain* would mean 'provide it WITH WD-40 (a lubricant)' rather than 'put WD-40 on it', *the sky clouded over* could mean that it became covered WITH clouds or came to HAVE clouds on it. Linguists have often assumed either this possessive analysis (Hale and Keyser 1993, 2002; Hirschbühler and Labelle 2009; Kiparsky 1997; Stiebels 1997; Volpe 2002) or the motion analysis (C&C, Gottfurcht 2008, Lieber 2004, Plag 1999) without real comparison of the two analyses. This requires detailed empirical study, but my preliminary tests favour the possessive analysis: *Post-mortem/wound him* entails that he HAD a post-mortem/wound. Post-mortems and wounds do not move (except perhaps in a hard-to-verify metaphorical sense). *Partitioning a room with a shelf* entails providing the room WITH a partition (and not a

physically impossible movement into the room of something which, prior to the event, was not a partition and may have already been in the room). The possessive analysis is dubious for *they stoned him*, but it is unclear if the motion of the stones is relevant here or if such examples are instances of the productive class of instrument verbs in (5).

The lesson here is that obvious aspects of a situation, say the motion of the oil in *I oiled the chain*, could be mere *entailments* of the semantics of denominal verb formation without being intrinsically part of it. This problem of identifying *grammatically relevant aspects of meaning* applies to countless other issues, for instance (i) whether the fact that many *–ee*-nouns like *employee* correspond to objects of the related verbs is specifically referred to in the job description of the affix or is a coincidental side-effect of the semantics of *-ee* (cf. article 53 on semantic restrictions in word-formation: the English suffix *-ee*), (ii) whether the nonhead of *car wrecker* is grammatically represented as an argument of *wreck* or merely as an entity standing in some relation to *wrecker* (cf. articles 21 on composition, 35 on synthetic compounds in German) and (iii) whether *to* in *give books to her* characterises its complement as a goal of motion or as a recipient/possessor (Rappaport Hovav and Levin 2008).

Any polysemous word-formation device raises questions about the right level of generality: Is it empirically feasible to posit unified semantic descriptions for *-er* in *writer of novels*, *toaster* and *prisoner* (cf. article 72 on agent and instrument nouns) or for compounds of the types *toymaker*, *toy box* and *toy car* (cf. article 21 on composition)? Taxonomies like (1)-(7) likewise raise questions about the right compromise between (i) maximally specific descriptions which risk losing larger generalizations by trying to capture unsystematic, unproductive cases (*the barstaff carded me* 'checked my ID card' vs. **the police passported me*), and (ii) maximally general (underspecified) semantic descriptions, which risk overgeneration, vagueness and untestability. To illustrate (ii), consider a claim that the classes in (1)-(7) are not explicitly sanctioned anywhere in grammar but are just specific manifestations of a general rule which states only that denominal verbs can be formed from nouns naming salient participants in an event (cf. Aronoff 1980). Such analyses are challenged by the differing degrees of productivity of the patterns in (1)-(7). Agent verbs like (7) are less productive than those in (1) and (2). Examples like **they actor/lawyer for a living* or **he schoolmasters too often* strike me as at best adventurous and metalinguistic. One might tender pragmatic explanations for such gaps (see Aronoff 1980: 753 on **surgeon*$_{V}$), but this risks excluding well-formed parallel verbs in German (*schauspielern* 'actor$_{N>V}$, do acting', *schulmeistern* 'act like a schoolmaster').

The classes in (1)-(7) are meant to illustrate problems of semantic analysis of denominal verbs using the example of English converted verbs, of course without implying that every denominal verb formation process in every language will yield the same semantic classes. Within English there has been comparison of the semantics of conversion and of overt affixes like those in *hospitalize* or *classify*, particularly with reference to whether the apparent greater semantic flexibility of the conversion mechanism points to a fundamental difference between conversion and affixation (see Baeskow 2006, Gottfurcht 2012, Lieber 2004, Plag 1999 and section 3.2). Apart from Kaliuščenko (2000), crosslinguistic variation in denominal verb formation has had little attention, despite the potential interest in knowing how classes like (1)-(7) are expressed with overt and unmarked denominal verb formation mechanisms in other languages, and which semantic classes tend towards having uniform exponents in other languages.

Also illuminating would be a crosslinguistic study which asks which functions a marker can have in addition to denominal verb formation. Examples of such polyfunctional markers include *-i/-j* affixation in early Germanic languages, which formed deverbal and deadjectival causatives and various kinds of denominal verbs (van Gelderen 2011 and references), Indonesian *-kan*, which forms causative, benefactive, resultative and denominal verbs (see

Son and Cole 2008, esp. footnote 12, p. 130f) or mediopassive/non-active morphology in Latin, which formed e.g. passive, impersonal, reflexive, deadjectival and denominal verbs (Miller 1993: 225-229, Kallulli 2013).

2.2. Semantic drift and pragmatic questions

Semantic analyses of denominal verbs must deal with various forms of semantic drift. Denominals often undergo metaphoric shifts (ideas can be *shelved*, *ditched* or *spiced up*) or idiosyncratic semantic specialization: for some speakers *doctor*$_V$ only has a metaphoric reading (*doctor the evidence*/$^{\%}$*patient*), and there is no (obvious) reason why *trash*$_V$ means 'lay waste to' and *rubbish*$_V$ means 'criticise', and not vice-versa (see C&C, p. 781 for other examples). Some denominals are synchronically unanalysable (and perhaps not perceived as denominal) because the extralinguistic factors that led to their creation are forgotten. *Lynch* and *boycott* are derived from the names of now little-known historical figures. *Dialing* numbers or *booking* people need no longer involve dials and putting names in books. These shifts are nothing new in word-formation. Nominal compounds and complex verbs can also be metaphoric (*wallflower*, *overturn governments*), specialised (*wheelchair* 'chair for the disabled', *overstep the {line/*objects on the floor}*) or outlive the extralinguistic phenomena for which they were originally coined (*watchmaker* 'repairer of clock-like devices', *ring off* 'end a telephone conversation, no longer with concomitant ringing').

In much-discussed contrasts like (8) the acceptability of the parenthetic instrument phrases diagnoses the ability of a denominal verb to be used when the incorporated N does not strictly name the entity involved in the event. Such contrasts have often been taken to show that there are two semantically distinct rules at work, for instance differing in whether the input is a noun (as with *tape*) or a category-neutral root (*hammer*) (Kiparsky 1997: 485-491; Arad 2003; Don 2005). However, such formal approaches are not compelling. Driving in nails with shoes has a far greater resemblance to using hammers than inserting pins does to applying tape, and Dowd (2010) notes that analogous contrasts exist with *use shoes as hammers* vs. **use pins as tape*, arguing that *hammer*, unlike *tape*, is defined more in terms of function than shape. It is thus superfluous to posit distinct denominal verb formation rules for contrasts like (8a, b). Harley and Haugen (2007) observe that (8c) is possible if the nails are twisted in in a screw-like manner. One can add that the unacceptable interpretations of (b) and (c) are blocked by the well-established verbs *pin, zip* and *nail* respectively.

(8) a. hammer nails in (with shoes), brush coats (with towels), shelve (books on tables)
b. tape it to the wall (*with pins), button the coat up (*with a zip)
c. $^{\#}$screw it to the wall with nails

Denominal verbs are sometimes subject to what is sometimes called the *Canonical Use Constraint* (CUC): they are sometimes specialized to naming events in which the incorporated N is used in its canonical, designated function (Kiparsky 1997, C&C 785f). Thus, we find *file*$_V$ *the documents* but not **file the paperclips*, since files are made to function as containers for documents but not for paperclips. Similar examples are given in (9).

(9) *hospitalise {patients/*nurses}, postcode {letters/*an address book}, drug {athletes/*the medicine cabinet}, clothe {children/*washing lines}*

The CUC is perhaps an instance of a more general phenomenon in which some word-formation processes are confined to *nameworthy* concepts. This notion is frequently invoked in the literature on incorporation (see sources in Rimell 2012: 186). An illustration is that English backformed noun-incorporating verbs tend to name activities which are sufficiently frequent and entrenched in Anglophone (sub)cultures to merit names (*babysit, fundraise, head-bang*, but **clock-scrub, *piano-burn, *frog-criticize*). Similarly, A-N compounds are confined to nameworthy concepts, cf. *híghchair* (well-known type of chair for children) and *upside-dówn fridge* (fridge with the freezer at the bottom), while non-nameworthy cases of

elevated chairs and inverted fridges do not receive compound stress. Nameworthiness also constrains the interpretation of denominal verbs. Data like *she pocketed her wallet (*in the trousers lying on the sofa)* do not follow from CUC, but make sense if *pocket*$_V$ lexicalises the familiar (and thus nameworthy) action of putting objects in pockets in clothes one is currently wearing. Privative verbs like *weed gardens* or *dust the shelf* likewise name memorized activities (and not canonical uses of the incorporated Ns) and the limited nameworthiness of the act of removing powder from objects makes it unlikely that *powder the shelf* can have this sense. Nameworthiness can also explain CUC effects: the contrast *crown {kings/*display cabinets}* exists because coronations have more ritual significance than putting crowns on display.[1]

CUC and nameworthiness effects do not hold for all denominal verbs: The use of *gnome*$_V$ 'adorn with gnomes' mentioned at the start of this article is hardly a canonical, memorized use of gnomes. C&C (785f) give further examples, including attested uses of *bottle*$_V$ in the sense 'throw bottles at'. Such examples may involve spontaneously created concepts, but this is hard to test. Perhaps denominal verb formation occupies an intermediate position between word-formation processes like those seen above which are confined to nameworthy concepts, and processes showing no such constraints (e.g., nominals like *clock-scrubber, piano burner, frog criticizer*). For more on the CUC and nameworthiness, see Rimell (2012: ch. 5).

Kiparsky (1997) contended that the CUC supports a lexical approach to denominals, but, building on Harley (2008), this wrongly commits us to lexical analyses of clearly syntactic structures. The PPs in (10) are syntactic entities, since they contain full DPs/NPs, but have canonical use interpretations. Specifically, (10a) entails that the workers went to (possibly different) banks as customers (an effect which disappears if the spatial preposition *zu* is used). Similarly, if (10b) has a weak definite interpretation in which the cleaners visited different pubs/doctors, then the cleaners must be interpreted as customers/patients of the pubs/doctors.

(10) a. Die Bauarbeiter gingen auf die Bank. [German]
The building workers went to the bank.
b. The cleaners both went to the local {pub/doctor}.

3. Structural questions

3.1. Are denominal verbs really denominal?

Analyses of the structure of denominal verbs must decide whether they are denominal at all. In any given N-V pair, one must decide between the options in (11):

(11) a. V is in no sense denominal, since N is derived from V.
b. V is formed by a process specifically taking a *noun* as input.
c. Non-directional analyses: Neither N nor V is derived from the other, and either
i. N and V are both derived from category-neutral roots, or
ii. A root is underspecified between N and V, and may thus be used in either noun-typical or verb-typical environments without any process which specifically turns it into a noun or verb (e.g., Farrell 2001).

[1] The nameworthiness of denominals can sometimes be confirmed by their having simplex translational equivalents in other languages: *stone*$_V$ 'execute with stones' matches French synchronically underived *lapider*; French *balayer* 'sweep' (< *balai* 'broom') and *poignarder* 'stab' (< *poignard* 'dagger') match underived English *sweep* and *stab*.

Option (c i) requires comment. Some linguists (e.g., Arad 2003, Borer 2014, Harley 2005) maintain that lexical roots do not intrinsically have categories like N or V, but obtain them by embedding in noun- or verb-specific contexts (e.g., *her love*$_N$ vs. *you will love*$_V$ *it*) or by merger with category-determining affixes (*love-able*$_A$). In such approaches derivatives like *syllab-ify*$_V$, *syllab-ic*$_A$ need not be derived from the noun *syllable* by truncation but are derived from the root *syllab-* (as is *syllab-le*$_N$). Neither element of the N-V pair *syllable-syllabify* is derived from the other. Similar remarks would hold for the denominals in (12).

(12) *colonize, fantasize, harmonize, notarize, prioritize, theorize, calcify, quantify, terrify*

Arguments for category-neutral roots extend beyond the mere desire to eliminate truncation from grammar. Borer (2014) describes several such arguments. We give one example. Many morphologically unmarked nominalizations in English do not support argument structure (*the walk* (**of the dog*) vs. *the walking of the dog*). This correlation between lack of affixes and lack of arguments is explicable if we assume that (i) argument structure can only emerge when roots are embedded under functional heads that categorize roots as verbs, (ii) affixes like *-ing* can select projections of such functional heads, and thus allow argument realization, (iii) English has no zero affix that acts like *-ing* in this respect, (iv) *walk*$_N$ is a root that is nominalized by embedding under nominal functional heads like *the*. Thus, *walk*$_N$ was never a verb and thus never had the argument structure of *walk*$_V$.

Since converted denominal verbs involve no overt affixation, they also invite us to contemplate derivations involving category-neutral roots. While the argument from (8) that some denominal verbs are formed from category-neutral roots (Kiparsky 1997: 485-491; Arad 2003; Don 2005) is not compelling (see section 2.2 and Borer 2014), this does not in itself refute the claim that at least some English denominal verbs are formed from category-neutral roots, and root-based derivations appear to be particularly plausible for Hebrew (Arad 2003).

We now turn to the directional analyses in (11a,b), listing a selection of (alleged and genuine) arguments in their favour. The conclusion will be that at least some denominals are clearly from *nouns*, but that non-directional analyses like (11c) might be valid in other cases.

A) Semantic evidence: intuitively *personify*$_V$ is semantically more complex than *person*$_N$. As in other denominals meaning roughly 'cause to become N' (*demonize/saint someone*, cf. (6a)), *person*$_N$ names a concept which is part of the meaning of *personify*$_V$ and can be conceptualized without reference to the verbal event-kind, but not vice-versa. These considerations (coupled with overt affixation on *personify*) exclude any derivation of *person*$_N$ from *personify*, so *personify* is derived either from *person*$_N$ or from a category-neutral root.

B) Overt affixes on the input: Verbs containing noun-forming affixes constitute an apparently uncontroversial argument for a N>V analysis: *lever<u>age</u>*$_V$, *commiss<u>ion</u>*$_V$, *refer<u>ence</u>*$_V$, *profit<u>eer</u>*$_V$; French *règlement(er)*[2] 'regulate' ← *règle<u>ment</u>* 'regulation'; *clôt<u>ure(r)</u>* 'close off' ← *clôt<u>ure</u>* 'enclos.ure', German *gärt<u>ner(n)</u>* 'garden$_V$' ← *Gärtn<u>er</u>* 'garden.er'; *deutschtümel(n)* 'be hyper-Germanophile' ← *Deutsch<u>tum</u>* 'German.ness'.

C) Regularization of inflection: In some N-V pairs V has regular (default) inflection and not the irregular inflection of a morphologically related verb. Thus, although *slide* is normally an irregular verb, cf. (13a), the use of *slide* in (13b) is regular. The regular use is, unlike that in (13a), intuitively 'derived from' *slide*$_N$ as a productive instantiation of the well-attested location pattern in (1a). This is easily explained on a directional approach: *slide*$_N$ is derived from *slide*$_V$ in (13a) (it names an entity which is *slid* under a microscope). Denominal *slide*$_V$

[2] The French and German examples are given in their infinitive forms (the standard citation forms), with the infinitive affixes bracketed to distinguish them from the verb stems created by denominal verb formation rules.

cannot inherit information about irregular past tenses from the lexical entry of *slide*$_N$, since nouns cannot inflect for tense. This, coupled with the low productivity of irregular inflection, means that *slide*$_V$ in (13b) can only receive default (regular) inflection. Variants of this account available in some theories include that the information about irregular inflection is too deeply embedded in the structure [$_V$[$_N$[$_V$ slide]]] to be accessible (cf. Pinker 2000: 184) or that *slide*$_V$ in (13b) is headed by an unpronounced affix, meaning that *slide* is not the head and thus unable to contribute information about inflection (cf. section 3.2).

(13) a. *I {slid/*slided} the sample under the microscope.*
b. *I {slided/*slid} the sample.* ('put it on a *slide*')

Regularizations like (13b) are well-attested. With examples noted in Pinker (2000: 185), we can name *they grandstanded* 'sought applause, as if in a *grandstand*', *he flied out* 'did a *fly* in baseball' (*he flew out* would be used if speakers treat *fly out* as being directly derived from *fly*$_V$ or follow injunctions of untrained language critics, cf. Pinker 2000: 186f). German has regularly inflected *beauftragen* 'to assign someone a task', from *Auftrag*$_N$ 'task', itself from irregularly inflected *auftragen* 'to assign as a job'. Analogous is *haushalten*$_V$ 'to keep house, budget' ← *Haushalt*$_N$ 'household' ← irregular *halten* 'to hold'. The best cases of irregular inflection in denominal verbs I know are *hamstrung* (← *hamstring*$_N$) and archaic *clad* (← *clothe*), *shod* (← *shoe*$_V$). Here the events seem to be conceptually dependent on the entities named by the related nouns, excluding a V-N derivation (see point A above), so the verbs are either from nouns or category-neutral roots.

Farrell (2001: 126-128) criticizes directionality-based accounts of inflectional regularization on the grounds that they cannot explain regularization phenomena such as *computer mouses* or *baddest* (superlative of *bad* in the sense 'excellent'). For Farrell the explanation for regularization is always that semantic shifts have obscured the relation of the shifted lexeme to the source lexeme, so there would be no reason to apply the irregular inflection of the latter to the former. This is arguably supported by speakers who use *highlighted* but *floodlit*, since *floodlight*$_V$ is a hyponym of *light*$_V$ while *highlight*$_V$ is not. Farrell's account would need to be completed with an explanation for why irregular forms like *underwent, understood, upset, overtook, withstood, babysat, midwives* exist despite their at best tenuous semantic connections to the heads, and why there is no tendency towards regularization in any of the sense extensions of highly polysemous verbs like *have, do, make*. Does *I took sick* have a stronger connection to other senses of *take* than *He flied out* does to *fly*$_V$? Future work would have to ask whether the irregular inflection in these cases is a memorized relic of stages where the structures had more compositional interpretations (e.g., *midwives* once meant 'intermediate women' and *withstood* 'stood against').

D) Phonological facts can aid linguists in determining the direction of a derivation. We give three examples. First, Don (2005) observes that Dutch allows consonant clusters in syllable codas in nouns but not verbs, except denominal verbs (*oogst-* 'harvest$_V$' ← *oogst* 'harvest$_N$'). That denominals are exceptional in this regard follows if they are truly derived from nouns.

Second, German has umlauted verbs like *hämmern* 'to hammer', *häuten* 'to skin' which are related to un-umlauted nouns (*Hammer, Haut*). (This is a relic of phonological conditioning by the Germanic *-i-*affix mentioned at the end of section 2.1) Since some German morphological processes trigger umlaut (e.g., plural: *Hämmer* 'hammers') but no morphological rule de-umlauts its input, we cannot derive the un-umlauted nouns from umlauted verbs. Thus, either we derive the verbs from the nouns, or derive both the nouns and verbs from category-neutral roots.

Third, English has dozens of N/V pairs where N has initial stress and V final stress, cf. *remáke*$_V$ vs. *rémake*$_N$, and analogous contrasts with the items in (14a-b). These stress-shift

pairs do not involve N>V derivations, as the verbs allow irregular verbal inflection (*remade, redid, rethought*) and the prefix *re-* normally attaches to verbs. In triplets like (14c-e) the verbs on the right have the initial stress and idiosyncratic interpretation of the nouns, suggesting that these verbs are truly denominal (Kiparsky 1982: 13, Arad 2003: 759f). The relation between nouns and the finally stressed verbs like those in (14c-e) is less transparent semantically and the stress shift is unpredictable ((14f) shows that stress shift probably cannot be predicted from independently needed principles like noun extrametricality). Kiparsky explained triplets like (14c-e) by assuming that V>N conversion is at Level I and N>V conversion at Level II (under the Level Ordering Hypothesis, Level I is prior to and more idiosyncratic than Level II). Arad argued that the finally stressed verbs and the nouns in (14c-e) are both derived from category-neutral roots, while the initially stressed verbs are from nouns. The greater semantic and phonological idiosyncrasy of stress shifting derivations follows from the common assumption that processes operating directly on category-neutral roots are more prone to irregularity.

(14) a. *conflict, produce, torment, present, transfer, invite, download, affix, permit*
b. *retard, rethink, redo, rework, repaint*
c. *digést*$_V$ → *dígest*$_N$ 'summary' → *dígest*$_V$ 'summarise'
d. *discóunt*$_V$ 'not count, disregard' → *díscount*$_N$ 'rebate' → *díscount*$_V$ 'sell at a rebate'
e. *protést*$_V$ → *prótest*$_N$ 'political demonstration' → *prótest*$_V$ 'demonstrate'
f. *mísprint*$_N$/*mistrúst*$_N$, *díscharge*$_N$/*disgúst*$_N$, *cónvert*$_N$/*contról*$_N$

Particularly from points B and D above, we can conclude that there are verbs which are unambiguously derived from nouns. However, this does not show that alternative derivations involving category-neutral roots or underspecification are not warranted for other N-V pairs, leaving us with much work to do in finding out which denominal verbs are truly denominal.

3.2. The structure of denominal verbs

3.2.1. Syntactic analyses

We now describe the main structural approaches to denominals, starting with syntactic approaches. Many current syntactic approaches (e.g., Arad 2003; Hale and Keyser 1993, 2002; Harley 2005, 2008; Haugen 2009, Mateu 2001) form denominals by incorporation of nouns or category-neutral roots into syntactic heads which may be unpronounced. We present a simplified version of such analyses, based on (15). (See also article 23 on incorporation, section 4, for a more technical overview.) The underlined elements (either category-neutral roots or, as depicted here, bare nouns) are assumed to unite with the elements in bold type by head movement (see below) to form what we perceive as denominal verbs.

(15) a. [$_{VP}$ *they* [$_{V'}$ **V*$_{do}$** [$_N$ *experiment*]]] (VP in *They experimented.*)
b. [$_{VP}$ *they* [$_{V'}$ **V*$_{cause}$** [$_{VP}$ *horses* [$_{V'}$ **V*$_{be}$** [$_{PP}$ **P*$_{with}$** [$_N$ *saddle*]]]]]] (*They saddled horses.*)
c. [$_{VP}$ *they* [$_{V'}$ **V*$_{cause}$** [$_{VP}$ *the thief* [$_{V'}$ **V*$_{go}$** [$_{PP}$ **P*$_{in/to}$** [$_N$ *jail*]]]]]] (*They jailed the thief.*)
d. [$_{VP}$ *they* [$_{V'}$ **V*$_{cause}$** [$_{VP}$ *him* [$_{V'}$ **V*$_{become}$** [$_N$ *outlaw*]]]]] (*They outlawed him.*)

The bold-faced elements in (15) are unpronounced light verbs or prepositions which contribute closed-class elements of meaning corresponding to semantic primitives used in decompositional theories of semantics. They are marked with subscripts giving rough English glosses of their interpretations. Some such elements can appear overtly in other constructions. The silent P in (15c) is pronounced in *imprison* or *put in jail*. V$_{cause}$ in (15d) is arguably

realized as an affix in *colonize* or *demonize*. V_{do} in (15a) surfaces as a light verb in *they did an experiment* or as an affix *-ier-* in German *experimentier-* 'experiment$_V$'.[3]

In other cases explicit overt paraphrases are often either unacceptable (**they caused horses to be with saddles*, cf. (15b)) or have the wrong interpretation (*they caused the thief to go to jail* expresses less direct causation than (15c)). This could have trivial causes such as the availability of more economical ways of expressing the same situations (including denominal verbs or single-verb structures like *give the horse a saddle, put the thief in jail*), but may also suggest that the semantic analysis underlying the syntax needs adjustment. For instance, consensus is mounting that monoclausal causatives should not be decomposed with BECOME in addition to CAUSE (McIntyre 2010: 1254, and references), so one might replace (15d) with a structure closer to what is overtly visible in *they made him an outlaw*.

In most syntactic approaches denominal verbs are formed by incorporation of the bare nominals or roots into the heads selecting them. Here incorporation takes the form of head movement, which can be defined as in (16). (16b) names two operations which have been employed for denominal conversion verbs (see Haugen 2009 for comparison). Strategy (16b i) is more appropriate for cases like those mentioned above in which the empty elements in (15) are pronounced.

(16) Head movement is a situation where both (a) and (b) hold.
   a. The complement of a head X is (the projection of) another head Y.
   b. Either (i) Y adjoins to X to form a complex word [$_{X^\circ}$ YX], or (ii) X has a defective phonological matrix and inherits Y's phonological representation.

(16) reflects the standard assumption that a head can only move to the head selecting it as complement. This makes some empirical predictions which Hale and Keyser (1993: 60) saw as evidence that denominal verb formation involves syntax. The first prediction is that there is no incorporation of specifiers, which excludes incorporation of Themes-of-Motion and of Agents. An illustration of this might be that (15c) lacks paraphrases such as **The judge thiefed into jail* (Theme incorporation) or **It judged the thief into jail* (Agent incorporation). The ban on Agent incorporation mirrors a crosslinguistic tendency against incorporating Agents in noun incorporation constructions (see article 23 on incorporation). An open question here concerns data like (7). Perhaps *model*$_V$ and *mother*$_V$ *children* derive from structures like *be a model* or *be mother (of) children*, and thus involve incorporation of (heads of) complements, which conforms to the Hale-Keyser approach, but this matter requires careful assessment. The ban on incorporating Themes of motion is only justifiable if the incorporated Ns in *they saddled the horses* and other cases in (2) are not grammatically represented as moving to the direct objects, but merit analyses like (15b). Hale and Keyser assumed this analysis without providing independent motivation, but we saw in section 2.1 that it might be empirically superior to the motion analysis.

A second consequence of (16a) is that *jail* in (15c) can only reach V_{cause} by moving through P_{in} and then V_{go}. Longer movements would violate the widely accepted Head Movement

[3] Hale & Keyser (1993: 54f) appeal to the more widespread use in some languages of overt light verbs or affixes corresponding to the item labelled V_{do} in (15)a) in arguing that all unergative verbs like *laugh, dance* are underlyingly denominal. This claim, if applied to irregularly inflected forms like *I spoke/thought/spat*, relativizes the claim reviewed in section 3.1.1 that denominals always inflect regularly. To uphold both claims, one would presumably have to argue that irregularly inflected unergatives like *speak* are derived by incorporation of category-neutral roots into V_{do}, and that inflectional regularization occurs with verbs derived from nouns, but not (necessarily) with verbs derived from category-neutral roots.

Constraint. Hale and Keyser (1993: 60) argued that this explains the unacceptability of cases with unincorporated prepositions like (17): to incorporate into V, *bottle/shelf* would have to incorporate into *in/on*, which should then incorporate into V (this kind of derivation is observed in French *embouteiller le vin* 'in.bottle the wine' or *imprison the thief*). However, there are potential counterexamples like *box/cage/fence them in*, and German structures like (20c) below. If the incorporated Ns here truly start life as complements of the overt prepositions, then the Hale-Keyser argument is empirically faulty. If they do not, then there is a way of forming denominals other than head movement, which also undermines this argument.

(17) **I bottled the wine in. *I shelved the books on.*

If any denominals are formed by head movement, it is clear that not all of them are. As Harley (2005: 60-65) and Rimell (2012: 25) note, head movement derivations are implausible for the very productive class of denominals naming instruments (*hammer*$_V$ and others in (5)), e.g., since instruments are otherwise adjuncts and not complements, and since complement positions are often occupied by other material (*brush the coat, hammer the metal flat*). Similar problems attend (less frequent) cases like *she authored/refereed a text* and other (apparently) agent-naming denominals in (7). Head-moving the nominals out of the specifier positions where agents are introduced is undesirable for reasons seen above.

Rimell (2012) notes other problems for head movement approaches, e.g., that English denominal verbs naming the patients or themes of non-motion events are far less productive than one would expect if incorporation of complements were a theoretical option. We do not find *apple*$_V$ 'eat an apple' or *novel*$_V$ 'read a novel', although such events involve canonical uses of apples/novels which are readily reconstructed in cases like *I finished the apple/novel*.

Rimell argues that roots in denominal verbs are not incorporated out of argument positions but merge with null light verbs in a compounding-like operation (see also Hirschbühler and Labelle 2009). (18) illustrates this structural proposal (to save space V_{create} and V_{go} replace the more sophisticated system of light verbs used by Rimell, which cannot be reviewed here). A leading idea here is that roots which normally name properties of entities are coerced into being event modifiers.

(18) a. *They* [$_{V^\circ}$ *drill*-V_{create}] *a hole.* b. *They* [$_{V^\circ}$ *author*-V_{create}] *a text.*
c. *They* [$_{V^\circ}$ *cycle*-V_{go}] *to London.*

3.2.2. Non-syntactic analyses

There are numerous non-syntactic accounts which generate denominal verbs in a component of grammar often identified as the lexicon. Like most syntactic accounts, many non-syntactic accounts assume semantic decomposition approaches to verb meanings, but semantic primitives like GO or CAUSE are not present in syntax and indeed need not have any specific morphological realization. Such non-syntactic decompositional accounts have been applied to both affixed and affixless denominal verbs (Gottfurcht 2008; Kiparsky 1997, Lieber 2004, Plag 1999, Stiebels 1997, Wunderlich 1987). A simplified illustration of such approaches is (19) (a non-syntactic version of (15)). In each decomposition, y corresponds to the incorporated N, z to the subject and x to the direct object.

(19) a. DO (z, y) (*they experimented/sermonized*)
b. CAUSE (z, HAVE (x, y)) (*they motorized/named it*)
c. CAUSE (z, GO (x, TO (y))) (*they hospitalized/jailed him*)

d. CAUSE (z, BECOME (x, y)) (*they demonized/outlawed him*)

Non-syntactic decomposition approaches differ regarding notation but also in more fundamental semantic assumptions. For instance, Plag (1999: 140) posits (a notational variant of) (19c) as a uniform semantics for all *–ize* verbs, except that the CAUSE component and its Causer argument are absent in intransitives (*it carbonized*). Gottfurcht (2008) makes similar claims for all denominal verb formation processes in English. This localistic approach entails for instance that the incorporated N is a metaphorical goal in *demonize someone* and that the incorporated N in *motorize a car* realizes the x variable in (19c) (Plag and Gottfurcht do not discuss the possessive analysis in (19b) and section 2.1). This approach is less convincing in cases like (19a). Does *theorize*$_V$ really mean 'cause theories to go somewhere' or 'cause something to go to theories', and if humans conceptualize theorizing in terms of such metaphors, what events could *not* be conceptualized in such terms? More promising is Lieber's (2004: 86f) suggestion that these deviate from the core meaning of *-ize* (which for her is also roughly as in (19c) due to extralinguistic pressure to coin names for such events.

Other approaches like those of Kiparsky (1997), Stiebels (1997) and Wunderlich (1987) assume that the operations forming denominal verbs do not lead to unified semantic representations. A potential pitfall here is a proliferation of semantic representations with little in common, making one wonder why English *–ize* and conversion denominals have a largely similar range of uses. Perhaps these decompositions have in common that they instantiate particularly frequent skeletons of verbal meaning ('prototypical verbal concepts', Wunderlich 1987: 314). The advantage is that the semantic representations are more precise and testable and court fewer potential overgeneration problems. Distinct semantic representation approaches also allow analysts to state generalizations on the semantic properties of the incorporated N. Kiparsky (1997) and Stiebels (1997: 273) suggest that only the least prominent entity in a semantic representation can incorporate (for instance only the goal in (19b) and only the Possessed entity in (c)), replicating Hale and Keyer's syntactic account of these effects. Proponents of unified representations would presumably appeal to pragmatic constraints like those in section 2.2 to explain these effects.

Various assumptions about the structure of denominal verbs are available in non-syntactic accounts. Denominal conversion verbs could be derived with the help of an unpronounced (zero) morpheme (Kiparsky 1982, Marchand 1969, Wunderlich 1987: 312-322), but the process of morphologically unmarked denominal verb formation might alternatively be seen as a lexical operation which has no formal correlate. Apart from one's position on the cline between an item-and-arrangement view (all morphology involves concatenation of morphemes) and an item-and-process view (affixation has no privileged status and is one of several possible morphological processes), the choice hinges mainly on whether one sees substantial semantic or grammatical differences between overt affixation and conversion.

Arguments against zero affixation include that the putative zero affix in (English) denominal verbs has a range of uses not found with overt affixes (Lieber 2004, Plag 1999), and positing multiple zero affixes incurs the cost of accidental homophony. Imaginable replies might invoke Gottfurcht's (2008) arguments that zero and overtly affixed denominal verb formation devices have the same overall distribution of senses, and the fact that some morphologically unmarked processes are *less* productive than overtly affixed ones: zero-derived property-naming deadjectival nouns like *good*$_{A>N}$ (*a force for good*) are marginal compared to overtly affixed ones like *justice, fairness, scarcity*. Moreover, the unmarked denominal verb formation mechanisms in current English have various diachronic sources, including French unmarked N/V pairs (*arm*$_{N/V}$, *trouble*$_{N/V}$ and others in Marchand 1969: 365) and formations that still had the overt affix *-i* in Old English (*answar<u>i</u>an* 'answer$_V$' ← *answaru* 'answer$_N$', *end<u>i</u>an* 'end$_V$' ← *ende* 'end$_N$'). Zero affixation proponents might argue that any connection

between lack of overt marking and extensive polysemy need not be encoded in synchronic grammar but is a reflex of the fact that zero exponence is a common direction of phonological change. These arguments are indirect. Direct evidence against objections to zero affixation would be an overt denominal-verb-forming affix in some language which functions as freely as English conversion. It would be interesting to know if such affixes exist.

If zero affixes are rejected there are several ways of expressing a more direct connection between the semantic flexibility of denominal verb formation by conversion and the lack of formal marking. Lexicalists could express this idea using some variant of the underspecification hypothesis (recall (11c) above). An alternative defended by Lieber (most recently 2004: 91-93) is to view conversion as an unsystematic and semantically undetermined process of coining names for events by relabeling nouns as verbs.

Relevant to these questions is the claim that overt markers that specifically form denominal verbs are crosslinguistically less frequent than affixes marking V>N derivations (see sources in Słodowicz 2011). If this observation is correct, how do we explain it? Does it show that verbs are formed with the mechanisms mentioned in the previous paragraph more often than nouns, and if so, why? Or does it have explanations that are compatible with zero affixation? For instance, do V>N derivations need more overt disambiguation than N>V ones? (A nominalizer with all the functions seen in *the employment/employer/employee of John* would perhaps be intolerably ambiguous, while ambiguities in denominals like *dust*$_V$ cause no problems for English speakers.) Or are there more diachronic sources for overt V>N markers than for N>V markers (excluding affixes used in other verbal functions like causative, see the last paragraph of section 2.1)?

3.3. Complex denominal verbs

Special problems arise with *complex denominal verbs* (henceforth CDVs), i.e. denominals coexisting with preverbs (i.e. verb prefixes or particles). Many CDVs are unacceptable without preverbs. For instance *they sexed up the theory* 'made it more appealing' lacks a corresponding use of *sex*$_V$ without *up*. More cases of CDVs lacking (relevant) preverbless uses are seen in (20).[4]

(20) a. *derail, behead, underline, outjockey, unhand, rejig, downsize, imprison, endanger, enthrone, enrage, entomb, enslave, encase, envision*
b. *tone/scale down, size up, soldier on, pig out, tee off, clock in*
c. German *aufbahr-* 'put on a stretcher (lit. on.stretcher)', *anlein-* 'put on a leash', *eintüt-* 'put in a bag', *einsarg-* 'put in a coffin', *einkerker-* 'put in a dungeon', *einsack-* 'put in a sack', *einzäun-* 'fence in'
d. German *entkalk-* 'decalcify', *versilber-* 'silver-plate', *erdolch-* 'stab with a dagger'
e. French *emprisonn-* 'imprison', *embarque-* 'board a boat', *empoche-* 'pocket'

The role of preverbs as apparent licensers of denominal verbs is more prominent in languages like German. While German unmarked N>V conversion is productive (cf. *es müllerte* 'it Müller-ed, i.e. Thomas Müller scored a goal'), Kaliuščenko (1988: 112) notes that preverbs have become increasingly common with denominal verbs since Old High German times. My Germanophone students propose that the creative use of *gnome*$_V$ mentioned at the start of this article should be translated with prefixed verbs like *bezwergen, verzwergen* (← *Zwerg* 'gnome').

[4] None of these verbs have overt verbalizing suffixes, but German has some denominal verbs which require a prefix *and* an overt suffix, consider *benachrichtigen* 'inform' (<*Nachricht* 'news'; cf. **nachrichten, *benachrichten, *nachrichtigen*), and similarly with *beherzigen* 'take to heart', *beerdigen* 'bury'. The closest English analogues are sporadic deadjectival verbs like *embolden, enliven*.

Some cases where preverbs occur with otherwise illicit denominal verbs may have trivial explanations like ambiguity avoidance (cf. the semantic contrasts *unhand* vs. *hand*$_V$, *scale down* vs. *scale*$_V$) and blocking (*imprison* blocks **prison*$_V$, which is not intrinsically ill-formed, cf. *jail*$_V$), but it is unclear if all cases allow such explanations.

The ability of prefixes to co-occur with otherwise unacceptable denominal verbs like those in (20a,d,e) is sometimes explained by treating the prefixes as heads, making the complex verbs rare instances of left-headed structures (e.g., Williams 1981: 250; Lieber and Baayen 1993: 65-69). Williams suggested that English *en-* is independently the head because it can license otherwise illicit *–ment*-nominals (*entrapment/*trapment*; **(en)actment, *(en)listment*). This argument predicts that the prefix in **(with)drawal* is head of *withdraw*, although *draw* is its head judging by its irregular inflection (*withdrew*). Cases like **(en)listment* can be explained without reference to headedness by assuming that *-ment* prefers Romance and/or morphologically complex input (most nouns with monosyllabic input like *payment, placement, treatment, figment* are synchronically memorized exceptions which entered the language as French borrowings, as can be verified by typing in **ment* at www.onelook.com).

Some preverbs in (20) are clearly not verbalizing heads. First, the particles in (20b, c) are not verbs. If anything they are prepositional (see article 24 on particle verb formation), and they do not host verbal inflection: *I pigged out/*pig outed*. In German *eingezäunt* 'in.*ge*.fence.d, i.e. fenced in' the participial circumfix *ge-…-t* regards the non-particle constituent as the head. Second, the phenomenon in (20) is not confined to preverbs. The denominal verb uses in (21) obligatorily occur with syntactic complements which one would not want to regard as verbalizing heads. Expletive *it* in (a), the PPs in (b, c) and the possessed NPs in (c, d) are not verbs.

(21) a. *stiff-upper-lip *(it)* (C&C 768), *leg *(it)* 'run', *lord *(it) over others, cane *(it)* 'travel fast'
b. *she padded *(down the stairs)* 'walked on the pads of her feet'
c. *he wormed *(his way) *(out of responsibility)*
d. *he craned *(his neck/*his arm)* 'stretched it out, like a crane'

Third, particles like those in (20b) and prefixes like *out-, re-* only sporadically co-occur with items not otherwise used as verbs, and thus differ substantially from genuine verbalizers like *-ize* (*idolize, Clintonize*). This raises the question of how to handle preverbs which appear to combine *systematically* with nouns. Candidates include German/Dutch *be-* and *ver-*, but these also have various deverbal uses (see, e.g., Wunderlich 1987, Lieber and Baayen 1993, Stiebels 1997, Mateu 2001 for analyses). We will illustrate this problem with English/French *en-/em-/im-* in (20a,e), which more often combines with nouns than with verbs (*enclose*). It functions semantically like a bound variant of the preposition *in/en* than like a verb (*imprison/emprisonner* vs. *in prison/en prison*; *enrage/enrager* vs. *in a rage/en rage*; *enslave* vs. *make into a slave*). Productive German analogues like those in (20c) feature the prepositional particle *ein-* 'in' which is not a verbalizing head for reasons seen above. *Ein-* combines with verbs, but dozens of *ein*-verbs combine with otherwise illicit denominal verbs (this is rare with English *in*). On *ein-* see the articles in Olsen (1998).

The paraphrases with *in*-PPs tempt one to treat the incorporated N as the ground (internal argument) of a prepositional *in*-relation expressed by *en-*. One could express this by treating *en-* as a bound P which merges (either in syntax or the lexicon) with a noun to form a constituent [$_{P(P)}$ *en*-N] which is obligatorily verbalized (with or without an empty V). Bound P+N constituents have a precedent in *in-home entertainment, in-pocket device, over-shoulder bag* (cf. **it was in-home/in-pocket/over-shoulder*). One question regarding such analyses is why [$_{P(P)}$ *en*-N] is only usable as part of a complex verb, and not, e.g., as a compound nonhead

in **the encage lions* ('the encaged lions'). Analyses of this type are also hard to defend for separable particle constructions like *fence/box/cage them in* and the German *ein*-verbs in (20c).

An alternative is to assume that the incorporated N in *encage* or *cage in* is not grammatically represented as an argument of a preposition *en-* or *in*. Rather, *cage* forms a denominal verb by whatever mechanism one adopts for simplex denominal verbs like *I caged the lion*. We can still treat *en-* as prepositional, but it means 'in(to) some (contextually identified) enclosure', as it clearly does in deverbal cases like *enclose* or *close in*. In this analysis *encage* and *cage in* would mean 'perform a cage-related act, causing the object to go into an enclosure', with the enclosure pragmatically identified as a cage (see Mateu 2001 for partly related proposals).

The latter kind of analysis poses a paradox in any case where the preverb *systematically* combines with denominal verbs (as for instance with *en-*, which mostly co-occurs with roots otherwise used as nouns). Here linguistic theory must somehow accommodate *complex operations*, operations which obligatorily consist of two other independently attested operations (here: addition of prefix/particle plus conversion, however these operations are implemented theoretically). Precedents for this include Raffelsiefen's (1992) *composed functions*, and others mentioned in article 31 on parasynthesis in Romance and article 35 on synthetic compounds in German. If, e.g., *en*-prefixation is an example of a complex operation in this sense, challenging questions arise about how it should be analysed: Is it, for instance, part of a lexically listed constructional template, or is it a bound preposition which merges with N and must incorporate into a light verb? This is yet another question which the present article cannot answer, but which deserves further attention.

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