

Chapter 3

Ditransitivity

3.1 The puzzle

The dative alternation, illustrated in (1), has served as another paradigmatic example for Baker’s Paradox. It relates *prepositional dative* structures like (1a) to *double object* (or *ditransitive*) structures like (1b).

- (1) a. I gave a book to John.
b. I gave John a book.

The puzzle of interest in this chapter concerns the ability of a verb to license the double object construction, as in (1b).

The double object construction is productive, as evidenced by the fact that when a new verb enters the language, it can be used ditransitively. For example, when the verb *text*, meaning *to send a text message*, entered English, it was extended to the double object construction (*text me your address*). For another example, recall Wasow’s (1981) “prophetic” idea that the verb *satellite* would be invented, meaning “to transmit messages via satellite,” and that it would be usable as a double object form. There is experimental evidence for the productivity of the double object

construction as well from Gropen et al. (1989) and Braine et al. (1990).

There are some constraints, however, on what verbs can be used ditransitively. Even very recently, these constraints have been claimed to be arbitrary; at the outset of their article, Wonnacott et al. (2008:166) claim, “Adult language incorporates both regular, abstract operations and patterns that are idiosyncratic or specific to particular lexical items.” This claim is illustrated with the dative alternation; they go on to claim that “certain verbs are unexpectedly ungrammatical in the ditransitive,” listing *donate*, *carry*, and *push* as examples. These are not the only claims of this type; Wonnacott et al. (2008:167–168) write, “Several researchers have pointed out that some of the postulated class criteria are inconsistent, so that they do not capture the full pattern of verb-structure co-occurrences (Bowerman 1988, Braine and Brooks 1995, Goldberg 1995: Chapter 5). The general conclusion is that, although there are strong correlations between the two, verb distribution cannot be reduced to verb semantics (or a combination of semantic and perceptual cues).” This quotation shows that the existence of arbitrary exceptions in this domain has recently been taken as given. The purpose of this chapter is to argue that the putative examples of arbitrary exceptions can be understood on the basis of general criteria governing the productivity of the double object construction.

Which verbs do Bowerman, Braine and Brooks, and Goldberg claim to be exceptions? Bowerman (1988:84) criticizes the criteria-governed productivity approach to Baker’s Paradox, in response to Pinker (1984, 1987), claiming that “the subsets proposed for rules with lexical exceptions are themselves dotted with gaps: items that fully conform to the semantic/morphological conditions on the rule, but that still do not undergo the rule.” Bowerman continues, “For dative alternation, such an item is *choose*. . . . Many speakers find something distinctively odd about ‘shifted’ indirect objects with *choose*, as in *I chose you a book at the library sale*. Yet *choose* satisfies the putative semantic/morphological restrictions on verbs that allow dative

alternation...” *Choose* is the only example she lists. I will argue in §3.3 that the meaning of *choose* does not in fact conform to the semantic criteria governing the double object construction; the beneficiary of an act of choosing is not in fact a prospective possessor.

Goldberg (1995) discusses two semantic classes that are not uniform in their ability to function ditransitively. She points out that “verbs of permission” do not all allow the ditransitive construction:

(2) Sally permitted/allowed/*let/*enabled Bob a kiss.

Likewise, “verbs of refusal” are not all double-object-friendly:

(3) Sally refused/denied/*prevented/*disallowed/*forbade him a kiss.

Since these verbs do not have corresponding *to*-dative forms, theories that derive the double-object form from the prepositional dative form such as Pinker’s can essentially ignore these cases. But these do constitute exceptions to a productive pattern, so they are relevant to the discussion here.

Another potential set of arbitrary exceptions is found among Latinate verbs. The verb *donate*, for example, is a classic counterexample to the notion that semantic criteria can be used to predict participation in the double object construction. Despite ostensibly having the requisite semantics, *donate* is awkward as a ditransitive verb. This example falls under a historical generalization about which verbs undergo the dative alternation: Roughly speaking, verbs of Latinate origin are unacceptable in the double object construction (e.g. **donate the library \$100*). Pinker’s (1989:45–46) historical explanation goes as follows:^{1,2}

¹Ironically, *donate* did not enter the language in the way that Pinker describes; it is a back-formation from *donation*.

²McFadden (2002) and Polo (2002) give more nuanced accounts of the historical development of the dative alternation through Middle English; Polo (2002) argues that it is the loss of case marking on pronouns (which followed the loss of case marking on lexical nouns) that eliminated dative case from the grammar.

According to Visser (1963), in Old English the order “VP NP-dat NP-acc” was more common than the order “V NP-acc NP-dat.” In Middle English the case markers eroded, resulting in a “V NP[Goal] NP[Theme]” verb phrase similar to the double-object construction of contemporary English. Very few verbs appeared in the prepositional form “VP *to* NP NP” in early Middle English. But in the fourteenth and fifteenth centuries many new verbs entered the language as borrowings from French, which marked the goal phrase with the preposition *à*. When these verbs were assimilated into English, the French argument structure was translated, and thus the preposition *to* (the translation of *à*) was used to mark the goal argument. Native verbs were then allowed to take this argument structure as well... Thus the verbs that take the double-object form are the ones that were already in the language when that form came into being, and the verbs that fail to take that form came into the language more recently from French (and Latin as well), accompanied by a French-like argument structure.

Presumably children lack a collective racial memory for the history of the language...

If the generalization governing verbs’ ability to take the double-object form is *purely* historical, then there are arbitrary exceptions in this domain from the learner’s perspective. Are there any visible cues that a learner could use to predict that Latinate verbs tend to be unacceptable as ditransitive verbs? This question is taken up in §3.4 and the remainder of the chapter.

3.2 Criteria for ditransitivity

As is much discussed, many of the observed restrictions on the use of verbs as ditransitives can be accounted for on the basis of semantic constraints. One such constraint is that in order to be usable ditransitively, a verb’s semantics must entail a transfer of possession, or entail future possession, setting aside “negative” verbs like *deny* and *refuse* (Green 1974; Krifka 1999). This restriction on ditransitivity holds for the benefactive alternation, which relates ditransitive forms to prepositional forms involving

for, as well as the dative alternation proper. *Cut* is an example of a benefactive alternation verb:

- (4) a. Cut a slice of bread for Mary.
 b. Cut Mary a slice of bread.

In (4), there is a transfer of possession. Some benefactive verbs, such as *mend*, do not undergo the alternation:

- (5) a. Mend these socks for him.
 b. *Mend him these socks.

Mending does not entail a transfer of possession, which explains why (5) is unacceptable.

According to Krifka (1999), manner-of-motion verbs like *push*, *shove*, *carry*, *pull*, and *lower*, along with communication verbs like *yell*, *shout*, *assert* and *claim* are incompatible with the double object construction because their meaning specifies manner for both the caused and the causing event, whereas their alternating counterparts *throw*, *pass*, *hand*, *teach*, *tell*, *promise*, and *show* specify manner only for the causing event. For example, because the causer continuously imparts force on the causee in a pulling event, *pull* describes manner for both the causing and caused events. In contrast, *throw* describes only the manner of the causing event, specifying that the projectile must be released.

It appears that Latinate verbs such as *donate* and *explain* satisfy these semantic criteria, but fail to alternate for reasons having to do with their phonological or morphological properties. Pinker (1989), incorporating work reported in Gropen et al. (1989), argues that verbs like *donate* are subject to a “morphophonological constraint,” which has to do with the form of the verbs. The question of how this constraint should be stated is the focus of the nonce word experiments reported later in this chapter.

3.3 Applying the semantic criteria

Bowerman's example, *choose* (as in **I chose you a book*) can be accounted for based on the requirement that a dative verb describe a transfer of possession. *Choose* is like *mend*; it is a benefactive verb whose meaning is unrelated to a transfer of possession.

Other verbs that have been argued to constitute arbitrary exceptions include *carry* and *push*. These involve a transfer of possession, but they fall under a different semantic constraint on the double object construction. Because *carry* and *push* describe continuous imparting of force, they fall into the *pull* class.

The case of verbs of permission such as *permit* and *allow* is somewhat more complicated. Here, an abstract kind of transfer of possession can be said to be involved in the sense that the subject "gives" the recipient permission to carry out some activity:

(6) Sally permitted/allowed Bob a kiss.

As Goldberg (1995) points out, *let* and *enable* are quite semantically similar to *permit* and *allow*, and yet do not license ditransitives.

(7) *Sally let/enabled Bob a kiss.

This is not the only difference between *permit* and *allow* on one hand, and *let* and *enable* on the other. In contrast to *permit* and *allow*, the verbs *let* and *enable* do not function as dative verbs at all:

(8) *Sally let/enabled a kiss to/for Bob.

(9) ?Sally permitted/allowed a kiss to Bob.

(Granted, *permit* and *allow* are not perfectly acceptable with a *to*-PP, but I find the contrast between (8) and (9) quite sharp.) The ungrammaticality of (8) suggests that *let* and *enable* do not have the appropriate semantics to participate in the double

object construction.³ Although there are verbs that occur solely in the double object construction, such as *deny*, the indirect object is always a maleficiary (*cost, forbid, charge*) or a prospective maleficiary (*begrudge, spare, wager*) with these verbs; in all of these cases the candidate for serving as an indirect object either loses something or is in danger of losing something.⁴ Outside of the maleficiary type of case, failure to exhibit either a *to* dative or a *for* dative form can be taken as an indication that a verb lacks the appropriate semantics.

Further support for the idea that semantic properties of *let* and *enable* play a role in their inability to license ditransitives comes from uses of *permit* and *allow* with inanimate subjects. With subjects describing abstract situations like the weather, *permit* and *allow* are like *enable* in not allowing the double object construction:

- (10) a. *The weather permitted/allowed us a visit.
 b. The weather permitted/allowed a visit.

In comparison, when the subject is animate, as in (11), the double object construction is acceptable:

- (11) a. The president permitted/allowed us a visit.
 b. The president permitted/allowed a visit.

I suggest that the uses of *permit* and *allow* shown in (10) manifest verb senses that fall in the semantic class of *let* and *enable*. In particular, these senses do not describe a transfer of possession, but merely an enablement relation between two situations. Because a situation cannot possess anything, transfer of possession is impossible in these senses.

³*Enable* is also phonologically long and arguably morphologically complex, so the “morphophonological constraint” is another possible explanation for its behavior.

⁴Levin (1993:47) lists several others including *issue (ticket/passport)* and *write (check)*, but I disagree with the judgments of these as ungrammatical in the prepositional form.

Refuse and *deny* fall into another semantic class in which Goldberg (1995) argues that there are arbitrary exceptions. Goldberg points out that other “verbs of refusal,” namely *prevent*, *disallow*, and *forbid*, are not acceptable as ditransitives.⁵ All of these may be subject to a finer semantic analysis as well, but they are also subject to the “morphophonological constraint,” described below.

3.4 Identifying the morphophonological constraint

Pinker (1989), incorporating work reported in Gropen et al. (1989), argues that verbs like *donate* are subject to a “morphophonological constraint,” which has to do with the form of the verbs. Evidence that it exists and is productive comes from a nonce word experiment by Gropen et al. (1989), described in detail in §3.5. Their result suggests that verbs like *donate* are subject to a general constraint, and therefore do not constitute individual arbitrary exceptions to the productivity of the double object construction.

Quite a few approaches have been taken to the question of how exactly to characterize the morphophonological constraint. Pinker (1989:123) suggests that there might be a semantic explanation deriving from the fact that non-alternating Latinate stems have “more complex, more abstract, and less basic” meanings, although he “would not be prepared to push the point.” The idea that a semantic factor underlies the unacceptability of Latinate verbs in the double object construction has not been proven or disproven, as far as I know, although the Gropen et al. (1989) results that I will report in §3.5 do speak against it, to the extent that they show that verb *form* affects dativizability independent of semantics.

For a syntactic approach, Randall (1987) pursued the possibility that the restricted class of verbs shares a syntactic feature such as omissibility of the recipient. *Donate*

⁵*Forbid* may be acceptable as a ditransitive; cf. *I forbade him chocolate*.

allows the recipient to be omitted while *give* does not; this leads one to hypothesize that verbs that allow the recipient to be omitted do not occur in double object constructions. This generalization has many counterexamples, though; *tell*, for example, allows the recipient to be omitted and easily allows the double object construction.

The most prevalent hypotheses locate the predictability of double object licensing in the form of the verb. The following sections describe these hypotheses.

3.4.1 The prosodic weight hypothesis

One of ways in which verbs like *give* differ from verbs like *donate* has to do with metrical phonology. *Donate* has two syllables, while *give* has only one. The idea that number of syllables and stress pattern might be important to the double object construction is explored by Green (1974) and Zwicky and Pullum (1986), and rejected by both. Green (1974:78) rejects this hypothesis on the basis of the observations that “*carry, cable, promise* and several other words permit both external and internal direct objects.” Zwicky and Pullum (1986) also list *offer, advance, deliver, guarantee, telephone,* and *radio* in this category, and point out counterexamples in the other direction as well: *lift, raise, lisp, yell, prove,* and *voice* are monosyllabic verbs that fail to alternate.

Grimshaw (2005), building on Grimshaw and Prince (1986), argues for a more subtle metrical classification of verbs, sensitive not to syllables, but to the more abstract notion of the metrical *foot*. Grimshaw’s generalization is that verbs containing only one metrical foot alternate (if they have the appropriate type of semantics), whereas verbs that contain more than one metrical foot do not alternate. This analysis distinguishes among verbs with a strong-weak pattern based on whether the second syllable bears secondary stress; *donate* does, but *promise* does not, hence *donate* contains two

feet whereas *promise* contains only one.⁶ Feet in English are trochaic, so in general, verbs with a weak-strong syllable pattern such as *explain* contain multiple feet, but there is one exception: a syllable containing only a schwa vowel can be extrametrical, so in verbs like *assign* or *allot*, the verb is only one foot because the first syllable does not project a foot.⁷ According to Grimshaw's *prosodic weight* hypothesis, the productivity of the dative alternation is limited to verbs whose prosodic weight is no more than one foot.

Why should number of feet matter? Several answers have been given to this question. Pesetsky (1995) posits a null affix *-G*, which licenses ditransitivity. Like other affixes, its attachment is phonologically restricted; in particular, it imposes a restriction on the prosodic weight of its stem requiring that it not exceed one foot. Because *donate* is too heavy, *-G* does not attach to it; hence the ditransitive construction is blocked.

Anttila (2007) posits a direct link between syntax and phonology to explain this correlation, making crucial use of the following two principles:

- PARSE(Goal): The goal NP must be prosodically parsed together with its syntactic head.
- *TERNARY: No ternary prosodic phrases.

Taken together, these constraints rule out ditransitive *donate* with lexical recipients. The first constraint, PARSE(Goal), requires that in a sentence like *Donate the man money*, there is a phonological constituent containing the verb and the goal/recipient: *donate the man*. The goal/recipient forms its own phonological constituent. Since *donate* contains two feet, this yields a ternary structure: [(*do*)(*nate*) (*the man*)]. This

⁶This pronunciation is variable; some speakers, especially British English speakers, pronounce *donate* with stress on the second syllable.

⁷Grimshaw seems implicitly to analyze *advance* as having only one foot, despite the fact that *d Vance* is not a possible syllable in English.

analysis ties Grimshaw and Prince’s metrical observation together with other metrical effects on the dative alternation: Verbs that are longer than one foot are acceptable with unstressed recipients, and heavy NP shift only occurs with long dative verbs in corpora of spontaneous speech.

Grimshaw (2005) distances herself from the idea that prosodic structure conditions the dative alternation directly. Rather, she proposes that native English speakers have two lexicons, the G(ermanic) and the R(omance) lexicons: “Under this view, properties of the individual verbs do not determine their ability to appear in the NP-NP configuration. Properties of the verbs do determine their assignment to a (sub-)lexicon, and their (sub-)lexicon membership determines their complement possibilities, along with several other properties” (Grimshaw 2005:120). Thus, prosodic weight is an observable, reliable cue to this classification.

These theories make slightly different predictions, but they all take the prosodic weight hypothesis for granted, and derive it as a consequence. Is this a desirable consequence of a theory? Grimshaw (2005) claims that *all* verbs that are dominated by a single prosodic foot alternate, provided that they have the right kind of semantics to be used in the double object construction. This claim implies that there should be no verbs of the type Zwicky and Pullum claim that *prove* and *voice* are, namely, non-alternating monosyllables which should have every right to alternate as far as semantics is concerned. About these verbs, Grimshaw (2005:125) says only that “the issue turns” on whether or not they have the right semantics. I assume that they fall into the *say* class, along with verbs such as *say*, *admit*, and *confess* (Levin 1993:46–47).

There are plenty of multiple-foot verbs that do alternate, such as *catapult*, *radio*, *satellite*, *semaphore*, *telecass*, *telegraph*, and *telephone*. There seems to be both a prosodic and a semantic generalization about these (Anttila 2007). The semantic generalization is that verbs that describe transfer by modern technology can be ditransitive regardless of prosodic structure (Green 1974; Gropen et al. 1989; Krifka 1999).

The phonological generalization is that these multiple-foot, non-alternating verbs all (a) have initial stress and (b) start with a disyllabic foot. Pinker (1989:119) classifies these as *instrument of communication* verbs, one of the “dativizable subclasses insensitive to the morphophonological constraint.” Other multiple-foot verbs that do alternate are *begrudge*, *deny*, and *refuse*. These all have a negative meaning, which may explain their syntactic behavior; Pinker also lists this as a dativizable subclass insensitive to the morphophonological constraint. The set of alternating 2-foot verbs also includes *allocate*, *bequeath*, *guarantee*, and *recommend*. These can be analyzed as verbs of ‘future having’, which is another dativizable subclass insensitive to the morphophonological constraint according to Pinker (1989). This is the explanation Grimshaw (2005) suggests for *allocate* and *guarantee*, and it is a potential explanation for *recommend* as well.⁸ Grimshaw considers *bequeath* a positive exception; Pinker (1989) considers it a verb of future having.

In summary, the positive counterexamples to the prosodic weight hypothesis – verbs that do alternate despite being heavy – seem to fall into a limited set of semantic classes. The negative counterexamples – verbs that fail to alternate despite being prosodically light – may also be subject to a semantic analysis. Thus, the prosodic weight hypothesis appears to be relatively successful from the perspective of the English lexicon.

3.4.2 Two-lexicon hypothesis

Recall Grimshaw’s (2005) idea that native English speakers have two lexicons, the G(ermanic) and the R(omance) lexicons. Let us call this idea the *two-lexicon hypothesis*. Although this hypothesis can be seen as a more elaborated or specific version of the prosodic weight hypothesis, it is more resilient in the face of counterexamples

⁸This explanation might also hold for many of the verbs Grimshaw classifies as having only one foot because of an initial extrametrical schwa: *allot*, *allow*, *assign*, *award*, and *advance*.

such as *bequeath*, since prosodic weight may stand alongside other cues to lexicon membership status.

3.4.3 The morphological complexity hypothesis

Another potential “criteria-governed productivity” approach to this instance of Baker’s Paradox relies on morphological features. Gropen et al. (1989) point out that Latinate dative verbs all contain morphemes from a certain finite list, including *per* and *con*. This leads to the *morphological complexity* hypothesis, that verbs must be monomorphemic in order to alternate. Pinker (1989) also cites Storm (1977) for the idea that verbs must be monomorphemic in order to undergo the dative alternation, and points out: “This largely coincides with the proposal that dativizable verbs must be (morphologically) non-Latinate, since the morphological definition of Latinate is that it consist of combinations of Latinate prefixes and stems. However, it differs in cases where a verb is composed of two or more native morphemes” (Pinker 1989:47).

Harley (2006) also argues that the reason that Latinate verbs such as *exhibit* do not alternate is that they are morphologically complex. She ties together the observation that many of the non-alternating verbs are multi-morphemic with the observation that many of the non-alternating verbs do not take particles when they occur solely with a direct object, as in *give/*donate the money out*.⁹ According to Harley’s analysis, the multimorphemic verbs that fail to take the double object construction contain incorporated particles, so *exhibit* has the same structure as *show off*. This analysis explains why *exhibit* does not co-occur with *off*, and generally predicts that morphologically complex verbs will not allow particles. This generalization has a striking degree of support, but there are some counterexamples: *explain away*, for example,

⁹The observation that “a particle with a Latinate verb is uncommon” is pointed out by DiSciullo and Williams (1987).

is an acceptable combination of a particle and a morphologically complex verb.

Harley's analysis also accounts for the fact that *give* does not allow particles in the double object construction as in (12), through a general prediction that particles should not appear in double object constructions.

(12) *Give them out the money.

Harley's analysis bears a great deal of similarity to Keyser and Roeper's (1992) proposal, which makes the same prediction in roughly the same way. There are, however, cases in which particles do occur in double object constructions without any problem:

(13) Send him up a drink!

Harley's particular analysis does not predict that this should be possible, counter to fact, so this is not a desirable prediction to make. However, she may be correct in her claim that what distinguishes alternating from non-alternating verbs is their level of morphological complexity.

3.4.4 The formality hypothesis

Another feature that may distinguish Latinate from non-Latinate vocabulary is stylistic. Latinate vocabulary is more formal than native vocabulary, as shown by a number of observations. First, native verbs tend to be high in frequency, whereas Latinate verbs are less frequent. Second, as DeForest and Johnson (2001) show, Jane Austen uses Latinate vocabulary as a device for depicting class among her characters. Third, class differences with respect to Latinate vocabulary do not occur only in novels; Corson (1984) finds class differences in the use of Latinate vocabulary in a study of 12- and 15-year-olds in England. Finally, as Pinker (1989:121) relays:

I remember a cover story on Aretha Franklin in *Time* magazine in the mid-1960s, which described her in performance, "perspiration streaming

down her face.” An irate reader wrote in: “Aretha does not perspire. Aretha sweats.”

Alongside evidence that Latinate vocabulary is more formal than native vocabulary, there is evidence that the prepositional dative construction is more formal than the ditransitive construction. Bresnan et al. (2007) found a significant difference between spoken corpora (the Switchboard corpus; Godfrey et al. 1992) and written corpora (the Wall Street Journal corpus) after controlling for a large number of other factors; the written corpus favors the prepositional dative structure.

A possible explanation for the morphophonological restriction on ditransitivity would therefore be in terms of *stylistic discord* (Silva and Zwicky 1975). According to this hypothesis, the relative formality of Latinate vocabulary conflicts stylistically with the relative informality of the double object construction. In this case, the restriction would not be about Latinate vocabulary *per se*; rather, the fact that many of the non-alternating verbs are Latinate would be explained on the basis of their tendency to be formal in style.

3.5 Previous nonce study: Gropen et al. (1989)

There is a limited degree to which we can evaluate the hypotheses listed above merely by looking at lists of English verbs, because semantic factors are difficult to evaluate (partially due to the malleability of verb meanings) and impossible to control. If the morphophonological constraint – stated in terms of prosodic weight, etymology, morphological complexity or formality – is real, then it should govern the productivity of the double object construction. This means that native English speakers should differentiate among novel verbs based on their formal shape.

Gropen et al. (1989) found evidence for the psychological reality of the morphophonological constraint using a judgment task involving nonce words. In this

experiment, 64 adult native English speakers read nonce verbs in paragraphs, and then judged the acceptability of the nonce verb in a series of sentences. Gropen et al. invented two classes of nonce verbs:

- Monosyllabic: *norp*, *pell*, *moop*, *tonk*
- Trisyllabic: *calimode*, *repetrine*, *orgulate*, *dorfinize*

These two classes vary along several dimensions: number of syllables, and, concomitantly, number of feet (the three-syllable ones have two feet; the one-syllable ones have only one), along with morphological complexity (*-ate* and *-ize* being recognizable morphemes). One might argue that the trisyllabic class generally “feels” more Latinate than the monosyllabic as well, perhaps because of their spelling, sound inventory or phonotactic properties. All of the hypotheses discussed above would predict the two classes of verbs to behave differently with respect to the double object construction.

Gropen et al. embedded the nonce verbs in paragraphs such as the following:

- (14) John, the star player of the Boston Whalers, was eager to begin the match against the New York Maulers. He knew that he would be facing their champion – Ben – also adept at using the **pell**. And sure enough, at a critical point in the game, John summoned all of his strength and **pelled** the disc to Ben.
- (15) Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was ready to begin **pellation**, the formal (and only legal) process by which she could obtain the house from him. After Bob had finally **pelled** the house to Sue, she **pelled** her duplex to Francis.

After reading a paragraph, the participants judged a series of 11 sentences, including a double object form and a prepositional dative. They used a 7-point scale, ranging from -3 to 3.

In these two paragraphs, the nonce verb is used in a *to*-dative construction (e.g. *she pelled her duplex to Francis*), but in half of the paragraphs in their experiment, the verb is used in a *for*-dative construction instead (e.g. *she pelled her duplex for Francis*). The paragraphs also varied by whether the meaning was *possessive*, as in (14) and (15), or *non-possessive*, involving a purely spatial or benefactive goal. There were two paragraphs of each type (*to*-possessive, *for*-possessive, *to*-non-possessive, *for*-non-possessive) for a total of eight; (14) and (15) are the only two paragraphs with transfer-of-possession semantics using *to*.

Their key finding holds within the set of paragraphs with transfer-of-possession semantics, in which the nonce verb was presented in a *to*-dative construction. For nonce verbs introduced in such paragraphs, the acceptability of the double object construction, relative to the *to*-dative construction, was related to the number of syllables in the nonce verb. The difference in ratings between one- and three-syllable verbs in the double object construction was significantly larger than the difference in ratings between one and three-syllable verbs in the *to*-dative construction. In other words, there was a significant interaction between construction and number of syllables, such that three-syllable nonce verbs were particularly unacceptable in the double object construction. A graph showing that result is in Figure 3.1. (There was also a statistical main effect of construction, but this could have been due to the fact that the nonce verbs were modelled in the *to*-dative construction.)

Gropen et al.'s findings are important because they show that speakers selectively generalize nonce verbs to the ditransitive construction based on the shape of the word. This in turn supports the existence of a morphophonological constraint on the productivity of the dative alternation, and the general idea that the form of the verb, independent of its semantics, governs the productivity of the dative alternation. However, their study had several limitations. First, only two paragraph items are relevant to the result, (14) and (15); it would be dangerous to base any far-reaching

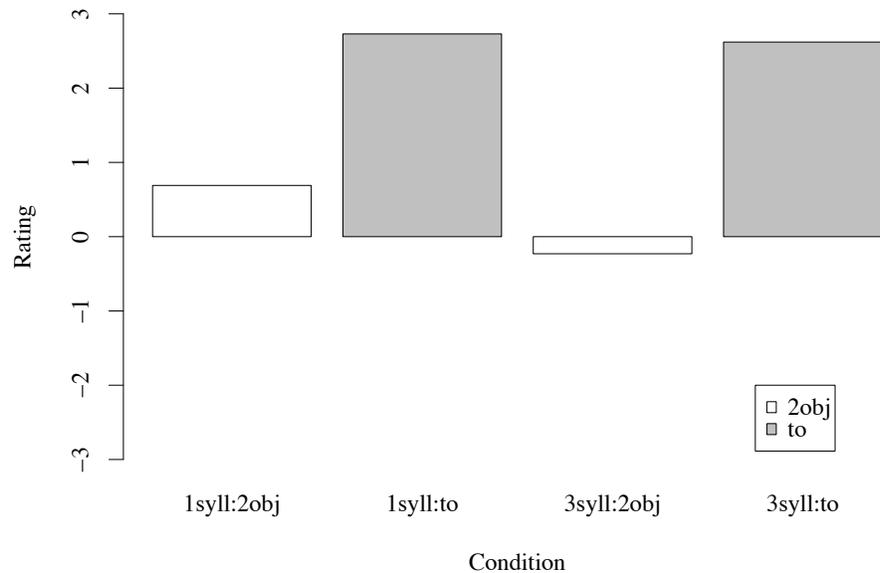


Figure 3.1: Gropen et al. (1989): Mean acceptability ratings by construction and verb shape

conclusions about learnability on this small sample. Second, the verb forms differed in many ways other than in number of feet, so the results, even if they are reliable, do not distinguish among the hypotheses discussed above. The two-lexicon hypothesis would point to the fact that two of their four three-syllable verbs, *orgulate* and *dorfinize*, contain recognizable Latinate suffixes (*-ate* and *-ize*, respectively), and the others, *repetrine* and *calimode*, arguably sound Latinate as well. The monosyllabic verbs *moop*, *tonk*, *pell*, and *norp* do not sound Latinate at all. On this hypothesis, the reason for Gropen et al.'s result is the contrast in apparent etymology of the verbs. Proponents of the morphological complexity hypothesis would point to the recognizable suffixes in *orgulate* and *dorfinize* and suggest that the fact that the two verb classes were not equivalent in morphological complexity is the underlying cause for the contrast in judgments. The prosodic weight hypothesis could also account for their result; the monosyllabic verbs contained only one metrical foot, and the trisyllabic verbs contained more than one.

The factor or factors responsible for the effect may in fact not have been any of these; it is conceivable that number of syllables was a driving factor. It is possible, given just these results, that only nonce verbs with three syllables or more are judged unacceptable as ditransitives. If this were the case, then we would be left without an explanation for the non-alternating status of *donate* and *explain*. Therefore, it is worthwhile to confirm that the constraint that Gropen et al. identified applies to two-syllable cases like *donate* and *explain* as well.

Another goal of the present work is to specify the precise nature of the driving factor(s), and determine whether the contrast Gropen et al. observed is due to prosodic weight, morphological complexity, apparent etymology, some combination of these, or none of the above. The experiments described below were aimed at teasing these potential explanations apart.

3.6 Experiment 1: Prosodic weight in English

As just discussed, Gropen et al.'s key result is consistent with Grimshaw's (2005) hypothesis that prosodic weight conditions the productivity of the ditransitive construction, but their data is consistent with several other hypotheses as well. One way to evaluate Grimshaw's hypothesis is to carry out another nonce word study in which everything but prosodic weight is held constant. I report on such a study in §3.7.

Before addressing that question, however, I will address whether or not the observations that support the prosodic weight hypothesis for English hold. Are 1-foot verbs really more acceptable than 2-foot verbs as ditransitives? Finding such a contrast is a precondition for asking the further question of whether prosodic weight governs the productivity of the ditransitive construction. This section reports on an acceptability study designed to answer this question.

3.6.1 Methods

Participants. 16 adult native English speakers drawn from the Stanford University community participated in this experiment, immediately after participating in Experiment 2 (see §3.7). They completed Experiment 2 before Experiment 1 to avoid any influence that Experiment 1 might have had on the outcome of Experiment 2. The participants received \$14 in exchange for an hour of participation, during which they participated in both experiments.

Verbs. The materials included twelve verbs of differing PROSODIC WEIGHT. Six of the verbs had one prosodic foot and six had two prosodic feet. All of the verbs had two syllables, and half had a strong-weak stress pattern and half had a weak-strong stress pattern:

- 1-foot verbs: *allot, assign, award, signal, render, promise*
- 2-foot verbs: *provide, entrust, present, dictate, donate, forfeit*

Each of the one-foot verbs had a corresponding two-foot verb from the same semantic class, so the two verb sets were roughly matched with respect to semantic content. As the purpose of this experiment was merely to verify claims that are generally agreed upon in the literature, all of the 1-foot verbs were listed as alternating according to Levin (1993), and all of the 2-foot verbs were listed non-alternating.

Sentences. For each verb, there were two sentences, differing in CONSTRUCTION: double object dative, as in (16a), or prepositional dative, as in (16b).

- (16) a. The teacher will forfeit the student the trophy after the game.
 b. The teacher will forfeit the trophy to the student after the game.

FEET	VERB	RECIPIENT	THEME	MODIFIER
1	allot	the employees	the shares	according to seniority
1	assign	his colleague	the task	to save time
1	award	the Russian	the medal	in the contest
1	signal	the program	the error	under most circumstances
1	render	the client	the services	following the agreement
1	promise	the hitman	the cash	within thirty days
2	provide	the landlord	the rent	by the first
2	entrust	the parliament	the decision	without a veto
2	present	the chairman	the check	at the meeting
2	dictate	the assistant	the message	in five minutes
2	donate	the charity	the proceeds	after the concert
2	forfeit	the student	the trophy	after the game

Table 3.1: Experiment 1: Materials

The sentences were all uniform with respect to animacy and definiteness, which Brennan et al. (2007) found to play a role in the choice between alternants of the dative alternation. In every sentence, the theme argument (e.g. *the trophy*) was inanimate and the recipient argument (e.g. *the student*) was animate. Both the theme and the recipient were definite.¹⁰ Table 3.1 lists the components of each sentence. Each participant saw each verb only once, in just one of the two constructions (double-object or prepositional dative).

In addition to the target sentences, there were 48 filler sentences. The fillers were comparable to the test sentences in complexity and acceptability overall, but exhibited a slightly wider range of acceptability than the test sentences.

Procedure. The participants first read the instructions, of which the following is an excerpt:

¹⁰Unfortunately, length was not totally controlled; the theme argument has a mean length of 1.8 syllables in the 2-foot condition and a mean length of 1.5 syllables in the 1-foot condition. However, the two sets of NPs do not differ significantly in length according to a Welch Two Sample *t*-test ($p = 0.4$).

Welcome. In this experiment, you'll be reading some sentences on the computer screen.

Read each sentence OUT LOUD, and press the space bar when you are finished.

After you are done reading the sentence aloud, you will see a question, asking you how natural the sentence is. Rate the sentence on a scale from 1 to 7, with 1 as the worst and 7 as the best. Use 1 if the sentence isn't even English. Use 7 if the sentence sounds perfectly natural, and rolls right off the tongue. You can use either the mouse or the keyboard to give your ratings.

Then you will see a question about the sentence you just read. To answer the question, press the "Y" key for YES or the "N" key for NO. You will be reminded which key is yes and which is no. Try to answer as quickly and accurately as possible.

If you are unsure of the answer (or if you think that both answers are right), try to pick the better answer.

Following three practice items, participants judged a series of 60 sentences, including 12 test sentences and 48 filler sentences. On each trial, the participant read the sentence aloud, rated it on a 1-7 scale (7 being the best), and then answered a yes-or-no comprehension question. Participants then received feedback regarding whether or not their answer was correct.

3.6.2 Results

The data were analyzed using a mixed-effects linear regression model conditioned on CONSTRUCTION and PROSODIC WEIGHT, with crossed random effects for PARTICIPANT and ITEM. The model was created using the `lmer` command in `lme4` package from the R statistical library (Baayen 2008). This type of modelling obviates the need for averaging over participants or items prior to analysis. The significance values reported are based on Markov chain Monte Carlo sampling of the posterior distribution

of the model parameter in question with 10,000 simulations, given by the `pvals.fnc` command from the R `languageR` library. This technique leads to good p -value estimates for datasets of all sizes (Baayen 2008). The model coefficient, B , is reported along with the significance value p .

Treating PARTICIPANT as a random effect is a way of taking into account the fact that some participants tend to give higher ratings than others, but it does not deal with the fact that participants vary in how wide a range of the rating scale they made use of. To take this type of difference between participants into account, the participants' ratings were converted into z -scores, which express the rating given to an item in terms of standard deviations away from the participant's mean rating. Formally, the definition of z -score is:

$$z = \frac{x - m}{s}$$

In our case, x is the rating in question, m is the mean score given to all sentences in the experiment including fillers, and s is the standard deviation of those ratings.

The interaction between CONSTRUCTION and PROSODIC WEIGHT was evaluated using a mixed-effects linear regression model of RATING z -score with crossed random effects for PARTICIPANT and ITEM. According to this model, the expected interaction between CONSTRUCTION and PROSODIC WEIGHT is significant ($B = 0.38$, $p = .011$). The mean acceptability ratings by CONSTRUCTION and PROSODIC WEIGHT are shown in Figure 3.2. As the graph suggests, 2-foot verbs were judged less acceptable than 1-foot verbs in the double object construction, but not in the *to*-dative construction.

There was also one main effect favoring the prepositional dative construction over the double object construction ($B = 0.40$, $p < .001$), which may have to do with the fact that both participants were expressed with definite lexical noun phrases. When the theme and the recipient are both lexical noun phrases, the prepositional dative

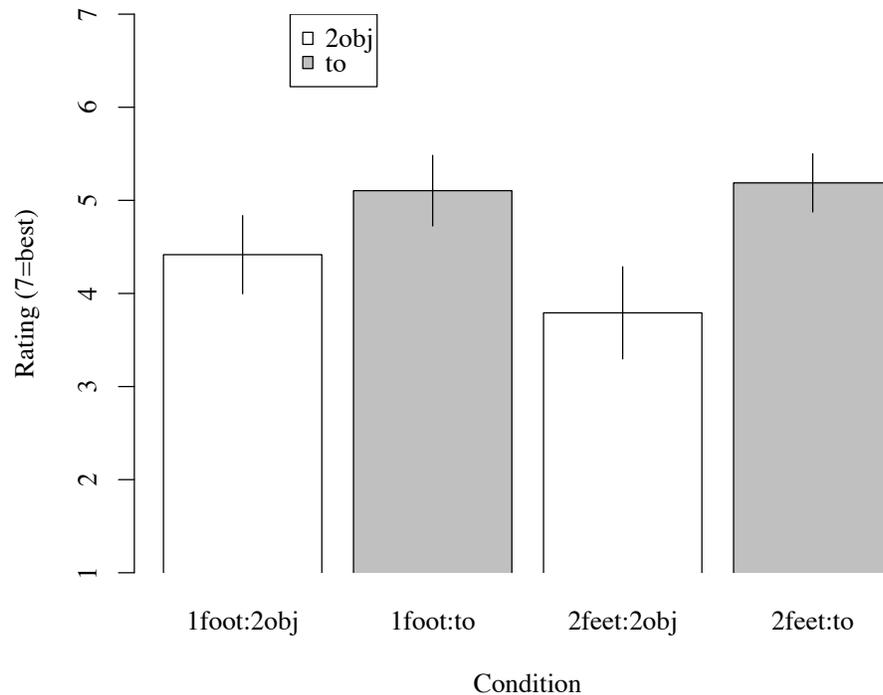


Figure 3.2: Experiment 1: Mean acceptability ratings by construction and word shape

is favored in both spoken and written corpora (Bresnan et al. 2007). There was no significant main effect of prosodic weight ($B = -0.34$, $p = 0.17$).

Table 3.2 lists the mean acceptability ratings assigned to each verb in each construction, and the differences between those means. Although the general trend is for 1-foot verbs to have smaller differences than 2-foot verbs, there are some exceptions. For example, participants did not rate the double object construction worse than the prepositional dative construction with *provide*. This is not entirely unexpected; Quirk et al. (1985:1210) state that there is a double object use of *provide* that is restricted to American use, a claim verified in a corpus study by Mukherjee (2001). Mukherjee also shows that *provide* is more common with *for* and *with* complements than with *to* complements in British and American corpora. This suggests that *to* complements may be dispreferred with *provide*.

FEEET	VERB	2OBJ	TO	DIFFERENCE
1	<i>allot</i>	4.750	5.375	0.655
1	<i>assign</i>	5.125	5.625	0.500
1	<i>award</i>	4.625	5.250	0.625
1	<i>promise</i>	5.000	5.000	0.000
1	<i>render</i>	3.625	5.125	1.500
1	<i>signal</i>	3.375	4.250	0.875
2	<i>dictate</i>	4.125	5.500	1.375
2	<i>donate</i>	3.500	5.500	2.000
2	<i>entrust</i>	2.750	5.125	2.375
2	<i>forfeit</i>	2.000	4.500	2.500
2	<i>present</i>	5.500	5.625	0.125
2	<i>provide</i>	4.875	4.875	0.000

Table 3.2: Experiment 1: Mean acceptability ratings by verb and construction

3.6.3 Summary: Experiment 1

On the whole, participants found 2-foot verbs less acceptable than 1-foot verbs in the double object construction, as expected. This result is not surprising, given that it merely confirms uncontroversial judgments from the literature, but it does provide statistical confirmation of those claims. It also shows that acceptability ratings given on a 1-7 scale can be used to detect differences in behavior between verb classes. This supports the validity of the acceptability judgment-based methodology used in the experiments that I will discuss next. Moreover, since the participants in Experiment 1 also participated in Experiment 2, this result shows that, overall, the participants in Experiment 2 are sensitive to the differences between English verbs that have been discussed in the literature.

3.7 Experiment 2: Prosodic weight in nonce verbs

Recall Gropen et al.'s (1989) finding that one-syllable nonce verbs like *moop* were more acceptable as ditransitives than three-syllable nonce verbs like *calimode*. This finding is consistent with several hypotheses, including Grimshaw's (2005) prosodic weight hypothesis. Experiment 1 supported the presence of a correlation between prosodic weight and ditransitivity in the realm of English verbs. This result makes the prosodic weight hypothesis worth exploring in the realm of nonce verbs, where other factors such as morphological complexity and number of syllables can be controlled.

The prosodic weight hypothesis (in its strictest version) predicts that a two-syllable, morphologically simple verb like *feffam*, pronounced with a schwa vowel in the second syllable, should be more acceptable as a ditransitive verb than a two-syllable, morphologically simple verb like *feffame*, with a long tense vowel in the second syllable. The morphological complexity hypothesis, on the other hand, would not predict a difference between these two. Experiment 2 was designed to help distinguish between these two hypotheses.

3.7.1 Methods

Participants. There were 16 participants in Experiment 2, all of whom also participated in Experiment 1.

Verbs. There were 16 pairs of verbs, differing only in PROSODIC WEIGHT (1 foot or 2 feet). Examples are shown in Table 3.3. In the 1 foot condition, the verb was spelled without a final silent 'e' and pronounced with a short, unstressed (schwa) vowel. In the 2 foot condition, the word was spelled with a silent 'e' and pronounced with a long vowel. For example, the verb *dassude* was pronounced with an [u:] vowel in the second syllable; *dassud* was pronounced with a schwa vowel. Care was taken to

1 FOOT	2 FEET
<i>feffam</i>	<i>feffame</i>
<i>zeepik</i>	<i>zeepike</i>
<i>dassud</i>	<i>dassude</i>
<i>laundib</i>	<i>laundibe</i>
...	...

Table 3.3: Experiment 2: Selected nonce verbs

ensure that the vowel was tense when long, so that the two pronunciations would be clearly distinguishable.

Paragraphs. Each verb was randomly assigned to a paragraph describing its meaning, following Gropen et al.’s (1989) paradigm. Here are two example paragraphs:

- (17) Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was almost ready to **feffame**, the formal (and only legal) process by which she could obtain the house. She hoped that Bob would **feffame** the house to her rather than his daughter.
- (18) John, the star player for his team, was eager to face their rival. He knew that it would be very important for him to **dassude**. And sure enough, it was the deciding moment of the game when John summoned all of his strength and was able to **dassude** the disc to his teammate, Ben.

The full list of paragraphs is given in the appendix, §3.10.1. In addition to the 16 “test” paragraphs, there were 16 “filler” paragraphs. These also contained nonce verbs, and are listed in the appendix, §3.10.2.

In every paragraph, the verb appears twice, first intransitively, and later in a *to* dative construction. The choice to introduce the verb intransitively was based on the

assumption that an intransitive use of a verb is relatively uninformative about how the verb can be used. An alternative design choice would have been to leave out the first mention entirely, but this would have introduced a potentially important difference between the present design and that of Gropen et al. (1989), and would have made it more difficult to make comparisons between the present work and theirs. On the other hand, introducing the nonce verb as a noun, as Gropen et al. do in some cases, would have complicated the analysis, because as Gropen et al. suggest themselves, denominal verbs may behave differently with respect to the morphophonological constraint.

The paragraphs were recorded in two versions, one with a short unstressed vowel in the second syllable of the nonce word, and one with a long vowel bearing secondary stress. The first version corresponds to the 1-foot condition, and the second version corresponds to the 2-foot condition.

Sentences. Each paragraph was associated with four sentences. For the test paragraphs, a *to*-dative and a double object dative were among the four; these were the “test” sentences. Whether the sentence was a double object dative or a prepositional dative was one of the main variables of interest, namely, CONSTRUCTION. The other two sentences contained other constructions: a passive with the theme as the subject, a passive with the recipient as the subject, an imperative transitive, or an intransitive. The sentences were presented without the final ‘e’ in the 1-foot condition and with the final ‘e’ in the 2-foot condition. For example, here is the set of sentences associated with paragraph (17):¹¹

- (19) a. Bob decided to feffam(e) his daughter the apartment instead.
 b. Bob decided to feffam(e) the apartment to his daughter instead.
 c. The apartment was feffamed to Bob’s daughter instead.

¹¹Because the past tense is spelled ‘ed’ when the verb lacks the final ‘e’, there is no spelling difference between the two conditions in the past tense, as in (19c).

- d. Feffam(e) the apartment!

Examples (19a) and (19b) are the test sentences; (19c) and (19d) are the filler sentences. In this case, one of the filler sentences is a passive with the theme as subject (19c), and one of the filler sentences is an imperative transitive (19d). Thus, two of the sentences for each test paragraph were “filler” sentences; these did not contain dative constructions. All four of the sentences for each filler paragraph were filler sentences, so there were three times as many filler sentences as test sentences in total.

Procedure. Subjects first read the instructions, of which the following is an excerpt:

In this experiment, you'll be hearing some passages over the headphones. Each passage will teach you the meaning of a new word.

You will see a cross on the screen while the recording is going. (If the recording does not start right away, please be patient.)

Then you will see a sentence containing the new word. Please read the sentence OUT LOUD, as naturally as you can.

Having learned this new word, give your opinion about how natural the sentence is, on a scale from 1 to 7. Use “1” if the sentence sounds absolutely terrible and could never be an English sentence. Use “7” if the sentence rolls right off the tongue without a problem.

The important thing to focus on is how the word is used in the sentence, not the word itself. Don't worry if you aren't sure; just go with your gut reaction.

After three trials for practice, there were 32 experimental trials. On each trial, participants listened to a recording of a paragraph over the headphones. A crosshair appeared on the screen while the recording played. Each paragraph was immediately followed by a series of four sentences containing the nonce verb, which the participants judged. For each sentence, the participant first read the sentence out loud (again to ensure correct pronunciation), and then judged it on a 1-7 scale.

Half of the 32 paragraphs were “test” paragraphs and half were “filler” paragraphs. For half of the test paragraphs, the recording had a pronunciation of the nonce verb with a long vowel in the second syllable, and for the other half, the recording had a short vowel pronunciation. (There was only one pronunciation of the nonce verb available for the filler paragraphs, of course.) No participant heard any given nonce verb more than once, so each participant heard only one pronunciation of each verb.

3.7.2 Results and discussion: Acceptability

The pronunciations were coded according to whether or not they were identical to the pronunciation given, and if not, whether or not they at least preserved the prosodic structure modelled in the recorded passage. Only responses based on pronunciations that preserved the correct prosodic structure were included in the analysis.

As in Experiment 1, the acceptability ratings were converted to z -scores to take into account differences between subjects in the use of the rating scale. Both PARTICIPANT and ITEM were treated as random effects in a mixed-effects linear regression model of the rating z -score, using the `lmer` command in R. The significance values are again based on MCMC sampling, with 10,000 simulations.

The results are shown in Figure 3.3. As the graph suggests, there was a main effect of CONSTRUCTION ($B = 0.71$, $p < .001$), but no interaction between CONSTRUCTION and PROSODIC WEIGHT on acceptability ($B = -0.05$, $p = .76$). There was also no main effect of PROSODIC WEIGHT ($B = -0.08$, $p = .12$).

Whereas Gropen et al. (1989) found a contrast between monosyllabic verbs and polysyllabic verbs, there was no contrast between 1-foot and 2-foot verbs here. There are several possible explanations for this difference between experiments. The most obvious explanation is that prosodic weight is not sufficient to classify verbs as alternating or non-alternating; either the number of syllables or the number of morphemes or the overall perceived Latinateness of the verbs *calimode*, *dorfinize*, *orgulate*, and

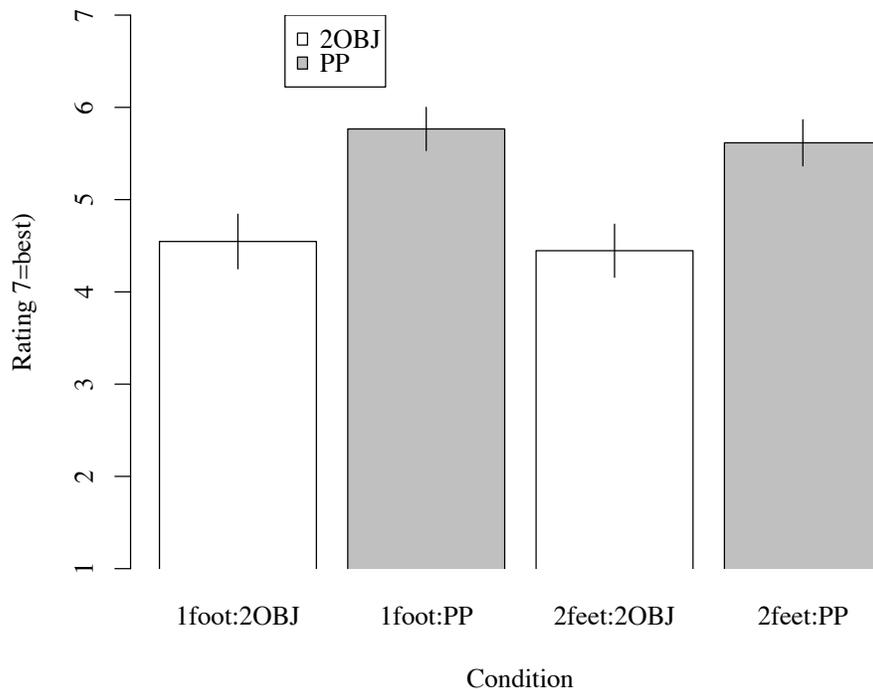


Figure 3.3: Experiment 2: Mean acceptability ratings by construction and word shape

repetrine contributed to their lack of ability to license the double object construction.

Another possible explanation is that our participants are different from Gropen et al.'s. While both samples were drawn primarily from college populations, the two populations differ geographically. Moreover, it is almost 20 years since Gropen et al.'s study. A third possible explanation is that in the present study, but not in Gropen et al.'s, participants developed a conscious awareness of the double object vs. prepositional object manipulation, and chose to assign all of the double object sentences the same rating. This masked any underlying sensitivity to prosodic weight that exists subconsciously.

There is some support for the third of these, the conscious strategy explanation. First, whereas Gropen et al. had 9 filler constructions, I used only 4. More anecdotally, in the debriefing session following the experiment, participants fairly often displayed

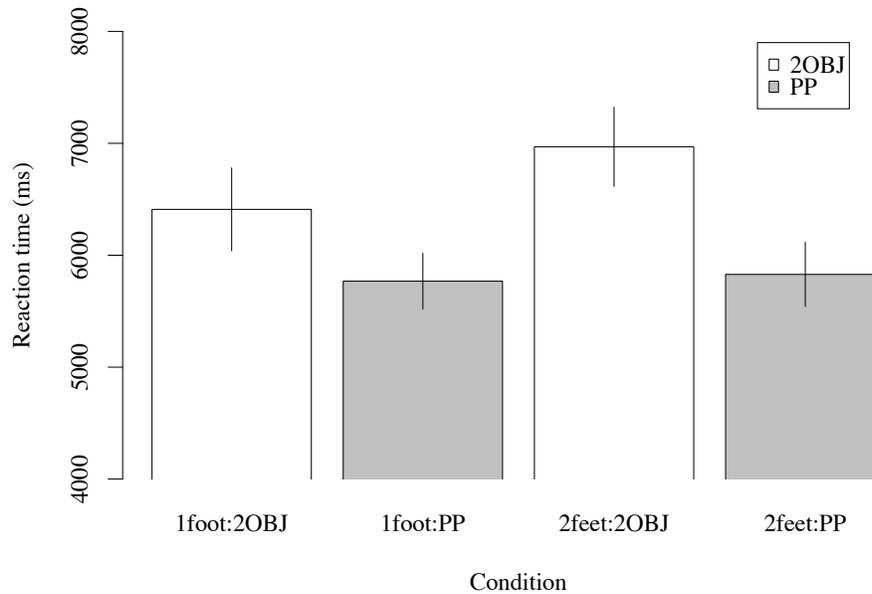


Figure 3.4: Experiment 2: Response times by construction and word shape

awareness of the manipulation between the two alternants of the dative alternation. Finally, the response time results, discussed in the following section, support the idea that there may have been a genuine effect of prosodic weight that failed to appear in the acceptability judgments.

3.7.3 Results and discussion: Response times

Response time provides an additional measure of how participants perceived the stimuli. This measure includes the time it took participants both to read a sentence aloud and to make a decision as to how to rate it.

With respect to response times, there *was* a significant interaction between CONSTRUCTION and PROSODIC WEIGHT ($B = -502.8$, $p = .04$) such that 2-foot verbs took longer for participants to read and make a decision about than 1-foot verbs in the double object construction. This data is shown in Figure 3.4.

There are quite a few ways to interpret these response times. Longer response times could signal either comprehension difficulty or difficulty of evaluation, because they represent the time participants took to complete both tasks. Since evaluation was taking place concurrently with comprehension, it is not possible to isolate the periods during which each task was taking place and measure them separately. However, there is a strong relationship between response time and acceptability rating, as shown in Figure 3.5: Restricting attention to the filler sentences (of which there were $2 \times 16 + 4 \times 16 = 96$), which all of the participants judged, the average response time for sentences that were given extreme ratings is lower than the average response time for sentences that were given intermediate ratings. In other words, when the judgment was extreme, participants were quick to make a judgment, and when the judgment was intermediate, participants took longer. A slower response time, therefore, may be taken to indicate uncertainty. On the upper half of the rating scale (4-7), a slower response time could therefore indicate a less extreme, hence lower, acceptability level. Since the ratings given to the dative sentences were all in the upper half of the rating scale (4-7), the response time result can be taken to indicate that the 2-foot verbs in the double object construction were in fact less acceptable than 1-foot verbs, as the metrical hypothesis would predict.

3.7.4 Summary: Experiment 2

The results of Experiment 2 were mixed. The main result was negative: there was no significant interaction between CONSTRUCTION and PROSODIC WEIGHT on RATING z -score, contrary to the prediction of the prosodic weight hypothesis. This suggests that the contrast between 1-syllable and 3-syllable nonce words that Gropen et al. (1989) found was not due to prosodic weight. However, there could be other explanations for the lack of an effect of prosodic weight.

Prosodic weight *did* interact significantly with construction as a predictor of the

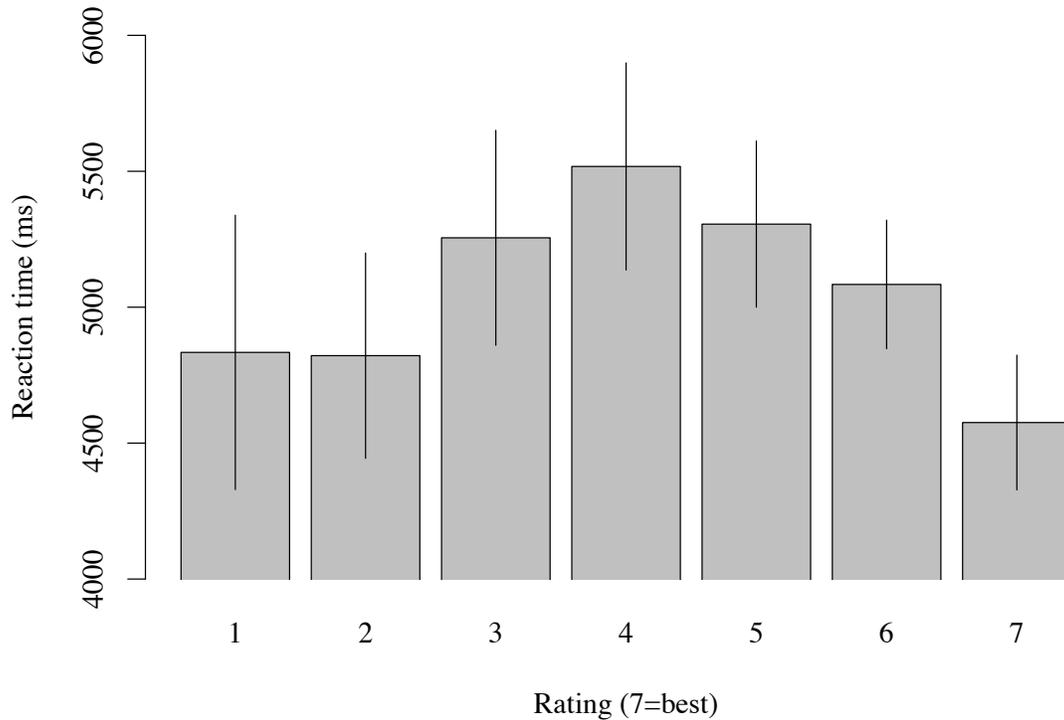


Figure 3.5: Experiment 2: Response times by acceptability judgment, fillers only

time that participants took to respond; participants judged 2-foot nonce verbs significantly more slowly than 1-foot verbs in the double object construction. Prosodic weight therefore does have some impact, independent of all other factors. This result is consistent with the idea that a conscious strategy interfered with participants' ability to discriminate between verbs based on their form in their acceptability judgments. However, it is still unclear whether prosodic weight was a driving factor behind Gropen et al.'s finding.

Another way to synthesize the results of this experiment with those of Gropen et al. (1989) is to view prosodic weight as one among multiple cues that conspired to produce a contrast between 1-syllable and 3-syllable verbs in the Gropen et al. experiment. It is strong enough to produce a perceptible effect in response times, but not strong enough to drive a contrast in acceptability. This idea is consistent with the

view that Grimshaw (2005) espouses, when she claims that prosodic weight is a cue that allows native English speakers to classify verbs into one of their two lexicons, the G-lexicon and the L-lexicon. If this view is correct, then prosodic weight may have conspired with other factors to produce the effect that Gropen et al. observed.

Several open questions remain: Is prosodic weight capable of driving contrasts in acceptability between ditransitive and prepositional dative uses of nonce verbs, under the right experimental conditions? Even if such an effect could be found, it may be that apparent etymology or morphological complexity is the driving factor. The next experiment aimed to tease these possible explanations apart.

3.8 Experiment 3: Etymology in nonce verbs

The previous experiment did not unambiguously support Grimshaw's prosodic weight hypothesis, but was consistent with her more general claim, that prosodic weight allows speakers to classify words of English into two lexicons, the G-lexicon and the L-lexicon. Experiment 3 evaluates this claim. In particular, my goal was to find out whether apparent etymological origin governs the productivity of the double object construction.

The etymology hypothesis predicts that words that appear to have native (Germanic) origin should be more acceptable as ditransitives than words that appear to have Latinate origin, even if they have the same number of syllables, the same stress pattern, and the same number of morphemes. A nonce word such as *forhoove*, which has two syllables, stress on the second syllable, two morphemes, and apparently native origin, should therefore be more acceptable as a ditransitive verb than a nonce word such as *tranject*, which has all of the same features except that it has ostensibly Latinate origin.

A secondary goal of this experiment is to replicate Gropen et al.'s finding that

monosyllabic nonce verbs like *moop* are more acceptable than trisyllabic ones like *calimode*, to ensure that variations on Gropen et al.’s methodology are not eliminating the effect.

By including the conditions used by Gropen et al., I was able to evaluate the predictions of other hypotheses as well. If prosodic weight *per se* was the driving factor, then there should be no contrast between nonce verbs like *forhoove* and ones like *tranject*, but both of these should contrast with monosyllabic verbs like *moop*. The morphological complexity hypothesis predicts that as long as a verb is morphologically complex, it should be unacceptable as a ditransitive, so morphologically complex verbs like *forhoove* and *tranject* should be less acceptable as ditransitive verbs relative to morphologically simple verbs like *moop*. Thus, both of these hypotheses predict that nonce verbs like *forhoove* and *tranject* should pattern with verbs like *calimode*, against verbs like *moop*.

3.8.1 Methods

Participants. Forty adult native English speakers participated in this experiment. Participants were all members of the Stanford community, and primarily undergraduates who participated in the experiment for course credit. Those who did not participate for course credit were paid \$14. None of the participants in this study participated in Experiment 1 or 2.

Paragraphs. In this nonce word judgment task, the materials consisted of 32 paragraphs, and all of them were “test” paragraphs; there were no filler paragraphs, unlike in the previous experiment. Sixteen of the paragraphs described communication events (in which some piece of information or message is conveyed), and 16 others described transfer of possession events (in which the agent no longer possesses the theme after the action takes place).

Example paragraphs describing movement/transfer events are as follows (illustrated with *dorfinize*):

- (20) Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was almost ready to **dorfinize**, the formal (and only legal) process by which she could obtain the house. Sue hoped that Bob would **dorfinize** the house to her rather than his daughter.
- (21) John and Ben, the star players for their team, were eager to face their rival. Ben knew that it would be very important for him to **dorfinize**. And sure enough, it was the deciding moment of the game when John summoned all of his strength and was able to **dorfinize** the disc to Ben.

Here are example paragraphs describing communication events.

- (22) Brian desperately needed to speak to his girlfriend Katie, and he was grounded from the phone and the internet. The only way he could possibly get in touch with her would be to **dorfinize**, using a combination of radio signals and digital technology. After hours of intense engineering, he was able to **dorfinize** his message to Katie.
- (23) Pierre, a top-notch waiter at a five star restaurant, was always worried about how to bring the check. No matter how he did it, he always felt rude. After thinking about it long and hard, he realized that the best strategy would be to **dorfinize**. If he could simply **dorfinize** the check to the guests, then nobody would ever be offended.

The full list of paragraphs is given in the appendix, §3.10.3.

Verbs. For each of the 32 paragraphs, there was one nonce word (although the assignment of verbs to paragraphs varied across four versions of the experiment, as described below). The 32 nonce words in the current study are listed in Table 3.4. There are four WORD SHAPE conditions:

- Condition 1: Monosyllabic
- Condition 2G: Disyllabic with Germanic (native) morphology
- Condition 2L: Disyllabic with Latinate morphology
- Condition 3: Trisyllabic

(The monosyllabic words were more Germanic-sounding and the trisyllabic words were Latinate-sounding, so the “1” condition can be thought of as “1G”, and the “3” condition can be thought of as “3L”.) Each category contained eight words. The two-syllable words contained a prefix of Germanic or Latinate origin, respectively, followed by a stem that either had such an origin or could plausibly be seen to have it. The three-syllable words all had recognizable Latinate suffixes, and plausibly Latinate stems. Each group of eight words was divided as evenly as possible into two groups of four words for the purposes of balancing the assignment of words to paragraphs.

There were four versions of the experiment, each with a different assignment of words to paragraphs. The assignments were counterbalanced such that each word appeared twice in a communication paragraph and twice in a transfer-of-possession paragraph. Furthermore, each paragraph appeared with one word from each WORD SHAPE condition (1, 2G, 2L, 3). For example, one paragraph appeared with the trisyllabic nonce word *secutize*, the disyllabic Latinate word *subfect*, the disyllabic Germanic word *erskall*, and the monosyllabic word *dorf*, across the four versions of the

1-SYLLABLE (GERMANIC)	2-SYLLABLE (GERMANIC)	2-SYLLABLE (LATINATE)	3-SYLLABLE (LATINATE)
stott	gestosh	submote	orgulate
tonk	erskall	obtend	secutize
goam	forhoove	sevolve	volutize
moop	besloff	expute	sedify
pell	forqueath	tranject	pugnavate
dorf	gelaut	subfect	crocinize
norp	erblick	affute	flumenate
blint	begroat	procuse	sulcify

Table 3.4: Experiment 3: Nonce verbs

experiment. Because each participant only saw one version of the experiment, each participant only witnessed one assignment of words to paragraphs.

Sentences. In order to make it more difficult for participants to develop a conscious strategy, the double object and prepositional dative constructions appeared in different *CLAUSE TYPES* (imperative, declarative, yes-or-no question, or subject *wh* question). The clause type of the double object sentence and the clause type of the prepositional dative sentence were not fully crossed, but each argument structure pattern (double object or prepositional dative) appeared with each clause type an equal number of times. In total, there were four *CLAUSE TYPE* conditions associated with each paragraph in each version of the experiment. In the *DECL-IMP* condition, the double object dative was in a declarative clause, and the prepositional dative in imperative clause:

- (24) a. Ron was happy to **dorf** Dave the statistics.
 b. **Dorf** the statistics to Dave!

The *IMP-DECL* condition had the reverse:

- (25) a. **Dorf** Dave the statistics!

- b. Ron was happy to **dorf** the statistics to Dave.

In the WHSUBJ-YN condition, the double object dative occurred in a subject *wh* question, and the prepositional dative in yes-or-no question:

- (26) a. Who **dorfed** Dave the statistics?
 b. Did Ron **dorf** the statistics to Dave?

The YN-WHSUBJ condition again had the reverse:

- (27) a. Did Ron **dorf** Dave the statistics?
 b. Who **dorfed** the statistics to Dave?

In all conditions, the recipient was always a proper noun, and the theme was always a lexical noun phrase, as shown. In general, the factors that Bresnan et al. (2007) found to influence the dative alternation were held constant across items.

In addition to the two test sentences, there were eight filler sentences with distinct argument structure patterns, illustrated in declarative clauses below (the particle chosen for the particle constructions was the most appropriate one for the meaning of the verb given the paragraph):

- (28) a. The statistics will be **dorfed** to Dave. [Theme-subject Passive (TP)]
 b. Dave was **dorfed** the statistics by Ron. [Recipient-subject Passive (RP)]
 c. Ron will **dorf** soon. [Intransitive (IN)]
 d. Ron **dorfed** the statistics perfectly. [Monotransitive (MT)]
 e. The statistics will **dorf** well. [Middle (MID)]
 f. Ron **dorfed** the statistics for Dave. [Benefactive (BEN)]

- g. Ron finally **dorfed** over the statistics. [Monotransitive + Particle (MTPRT)]
- h. Ron refused to **dorf** Dave out the statistics [Double object + Particle (DOPRT)]

The reason for including more filler sentences per paragraph was to make the design more similar to Gropen et al.'s, and to reduce participants' opportunities for forming conscious strategies.

The fillers also varied in clause type (declarative, imperative, yes-or-no question, or subject *wh* question). Clause types were assigned to argument structure patterns in such a way as to ensure that the four clause types were evenly represented across the eight fillers (two sentences of each clause type), and each argument structure pattern occurred an equal number of times with each clause type. For a given clause type condition of a given paragraph, the assignment of clause types to argument structures for the fillers remained constant across all four versions of the experiment. For example, the set of filler sentences in the DECL-IMP condition for one paragraph are as follows:

- (29) a. The statistics will dorf without any trouble. [MID, DECL]
 b. Ron finally dorfed over the statistics. [PRT, DECL]
 c. The statistics should be dorfed to Dave by Ron. [TP, IMP]
 d. Ron should really dorf. [IN, IMP]
 e. Who will dorf the statistics for Dave? [BEN, WHSUBJ]
 f. Who will dorf Dave over the statistics? [DOPRT, WHSUBJ]
 g. Was Dave dorfed the statistics? [RP, YN]
 h. Has Ron dorfed the statistics yet? [MT, YN]

(When a true imperative was impossible, as in the case of passives, or awkwardly short, as in the case of intransitives, a declarative headed by *should* appeared instead.) Again, the rationale for this clause type manipulation was to give participants an alternative factor to posit as a factor of interest for the study and increase the complexity of the manipulations.

Procedure. This experiment had three phases:

1. A nonce word sentence judgment task
2. A memory test, which the participants were informed about before they completed the nonce word judgment task
3. A questionnaire on the etymology of the nonce words, given after the completion of 1 and 2

These will be described in turn.

At the beginning of the session, participants were informed that the session would consist of three phases, and heard the instructions for the sentence judgment phase verbally. They were also informed that there would be a memory test at the end. The instructions for the sentence judgment task included the following:

In this experiment, you'll be reading some short passages. Each passage will describe the meaning of a new word.

After you read the passage, you will see a series of sentences containing the new word. Your job is to judge how well the word is used in the sentence.

To respond, you will be given a scale from 1-7, where 1 means the word is used very BADLY, and 7 means the word is used very WELL.

On each trial of the sentence judgment task, the participant read the paragraph containing the word, and for each of the ten sentences following the paragraph, judged

the sentence on a 1-7 scale. The test and filler sentences following each paragraph appeared in a different random order for each participant. The paragraphs themselves were also randomly ordered.

A memory test followed the sentence judgment task. The memory test contained six sentences that had been presented and six sentences that had not been, modified slightly from sentences that had been presented. The main purpose of the memory test was to encourage participants to pay attention during the sentence judgment task.

After completing the memory test, the participants saw each of the nonce words again and were asked, for each word, what its most likely etymology is, choosing between French, Latin, Old English, and Greek. The purpose of this portion of the procedure was to ascertain whether or not participants could explicitly identify contrasts in apparent etymology, and whether or not this explicit knowledge affected their judgments of the syntactic properties of the nonce words.

3.8.2 Results and discussion: Constructed etymology

The data were analyzed using mixed-effects linear regression models of the RATING (converted into a z -score, as explained above) with crossed random effects for PARTICIPANT, PARAGRAPH, and WORD, created using the `lmer` command in `lme4` package from the R statistical library (Baayen 2008).¹² As in Experiments 1 and 2 (see page 77), the significance values are based on Markov chain Monte Carlo sampling of the posterior distribution of the model parameter in question with 10,000 simulations, given by the `pvals.fnc` command from the R `languageR` library.

The results for WORD SHAPE are shown in Figure 3.6. The vertical axis shows the z -score of the participants' ratings. The ratings are subdivided by CONSTRUCTION (double object or prepositional dative) and WORD SHAPE condition on the horizontal

¹²Including both PARAGRAPH and WORD as random effects amounts to treating both as “item” variables.

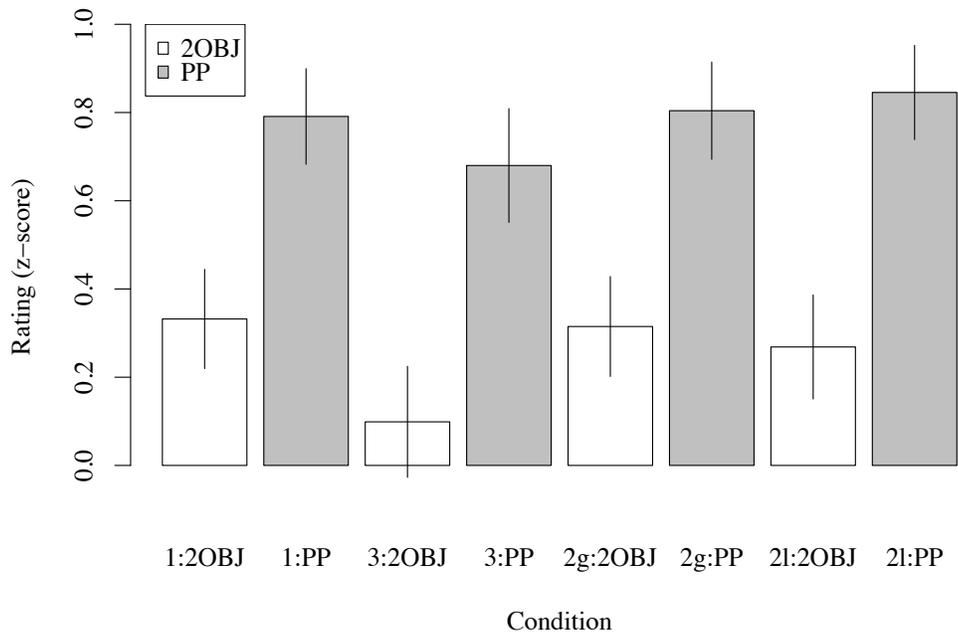


Figure 3.6: Experiment 3: Mean acceptability rating z -score by construction and word shape

axis.

The first four bars in the graph in Figure 3.6 represent a replication of the Gropen et al. (1989) result; there is a significant interaction between CONSTRUCTION and WORD SHAPE, focussing only on the monosyllabic and trisyllabic conditions. This interaction was evaluated using a logistic regression model of rating z -score, limited to the dataset consisting of judgments for the 1-syllable and 3-syllable nonce words, with WORD SHAPE, CONSTRUCTION and their interaction as fixed factors, and WORD, PARAGRAPH, and PARTICIPANT as random effects. CONSTRUCTION was recoded as ‘0’ for the double object construction and ‘1’ for the prepositional dative construction, and WORD SHAPE was recoded as ‘0’ for the monosyllabic condition and ‘1’ for the trisyllabic condition. Within this dataset, there was a significant positive interaction between WORD SHAPE and CONSTRUCTION ($B = 0.236$, $p < .02$), along with main

effects of WORD SHAPE ($B = -0.281$, $p < .01$) and CONSTRUCTION ($B = 0.376$, $p < .01$). The main effect of WORD SHAPE favors one-syllable words; three-syllable words received lower acceptability ratings overall than the one-syllable words. The main effect of CONSTRUCTION favors prepositional datives over double object datives overall. (This is not surprising given that prepositional datives were used in the paragraphs.) The interaction between WORD SHAPE and CONSTRUCTION is such that ditransitive uses of trisyllabic words received significantly lower ratings than ditransitive uses of monosyllabic words, relative to prepositional datives. This interaction is the result of interest, because it suggests selective productivity of the double object construction based on WORD SHAPE.

The rightmost four bars in the graph in Figure 3.6 concern the two disyllabic conditions that were added to Gropen et al.'s design, 2L and 2G. Visually, it appears that they pattern like the monosyllabic condition, leaving the trisyllabic verbs on their own, contrary to the predictions of any of the current hypotheses. Looking pairwise at interactions between WORD SHAPE and CONSTRUCTION by limiting the dataset to judgments for two WORD SHAPE conditions at a time, it is the case that the monosyllabic-trisyllabic contrast interacts significantly with CONSTRUCTION (as reported above; this replicates Gropen et al.'s finding), and there were no significant interactions between CONSTRUCTION and either of the monosyllabic-disyllabic contrasts. However, the disyllabic conditions are not equivalent to the monosyllabic condition: the disyllabic-trisyllabic contrasts also fail to interact significantly with CONSTRUCTION, unlike the monosyllabic-trisyllabic contrast. Hence, the disyllabic conditions appear to be intermediate between the monosyllabic and trisyllabic conditions, not significantly different from either, even though the monosyllabic and trisyllabic conditions are significantly different from each other. The contrast between the two disyllabic conditions (2G and 2L) also did not interact significantly with CONSTRUCTION.

These results do not support any of the predictions discussed above. The prosodic weight hypothesis predicts a significant contrast between the mono- and multi-syllabic conditions, as does the morphological complexity hypothesis, since the multi-syllabic conditions happen also to be bimorphemic. The two-lexicon hypothesis predicts a significant contrast between the Latinate and Germanic conditions.

Since the prosodic weight hypothesis corresponds to the most concrete and measurable property of these words, it is the most easily refuted hypothesis. These results are clearly inconsistent with that hypothesis, as the disyllabic words undeniably contain more than one metrical foot.

The other hypotheses, however, are salvageable. In §3.8.3, I will explore the possibility that what matters is not the language from which the word was intended to derive, but the language from which the word is perceived as deriving (“perceived” rather than “actual” etymology). Likewise, it is possible that although the words in the disyllabic conditions were constructed as morphologically complex, they are not always perceived as morphologically complex, or perceived as complex to varying degrees. This potential way of accounting for the intermediate stats of the disyllabic conditions between the mono- and trisyllabic conditions is explored in §3.8.4. Following that, the formality hypothesis will be further explored, in §3.8.5.

3.8.3 Results and discussion: Perceived etymology

As just discussed, the two-lexicon hypothesis appears at first glance not to be supported by the results shown in Figure 3.6. The prediction of this hypothesis was that there should be a contrast between 2L words and 2G words in their acceptability as ditransitives, but such a contrast was not found. A potential explanation for the absence of the predicted effect might lie in the fact that participants’ perceptions of the properties of these words may not match the properties that they were designed to have. Under this view, it is the etymology that words are *perceived* as having that

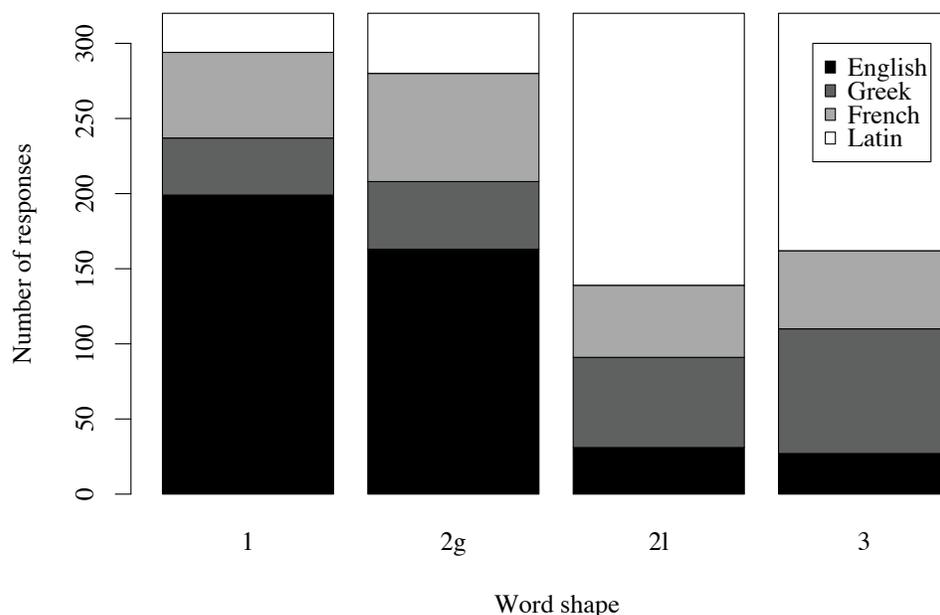


Figure 3.7: Etymology questionnaire: Frequency of response type by word shape

matters.

In Figure 3.7, the frequencies of responses in the etymology section for each of the word shapes are shown (*English* is short for *Old English*, and *Greek* is short for *Ancient Greek*). In keeping with how the words were designed, there were fewer *Latin* and more *Old English* responses in the 1 and 2G conditions than in the 2L and 3 conditions, but there is a fair amount of variability in all conditions.

Several ways of using this variability to predict contrasts in acceptability between double object and prepositional dative structures will be considered in what follows. First, summary statistics at the word level will be considered, followed by summary statistics at the participant level, followed by a fine-grained analysis linking individual participants' responses on the etymology questionnaire with their responses on the acceptability judgment task.

3.8.3.1 Word-level: Perceived Latinateness

One way of exploiting the variability shown in Figure 3.7 is to summarize, for each word, the percent of participants that perceived it as deriving from Latin or Old English, and to use these statistics as predictors of the contrast in acceptability between the double object and prepositional dative constructions. Taking a closer look at perceived etymology of individual words is a potential strategy for salvaging the two-lexicon hypothesis. Words that are *perceived* as deriving from Latin (or Old English) may be less (or more) acceptable as ditransitives, relative to prepositional datives.

The proportions of “Latin” and “Old English” responses in the etymology questionnaire are shown in Figure 3.8. Each point on that graph represents an individual word. The symbols represent the word’s WORD SHAPE category, as indicated in the legend. The proportion of participants who judged a given word as deriving from Old English is shown on the vertical axis, and the proportion of participants who judged the word as deriving from Latin is shown on the horizontal axis. (“French” and “Greek” responses are not represented on the graph.) The graph shows a clear demarcation between the words that were intended to be perceived as native (1, 2G) and those that were intended to be perceived as Latinate (2L, 3), and total overlap between the two “native” classes, and between the two “Latinate” classes. Participants essentially got the intended etymology “right,” and equally so in all classes.

Since participants found 2L-words equally Latinate as 3-words, and found 2G-words equally Latinate as 1-words, perceived Latinateness cannot be the (only) explanation for the contrast between 1-words and 3-words. If it were, then there should have been a significant contrast between 2L and 2G words.

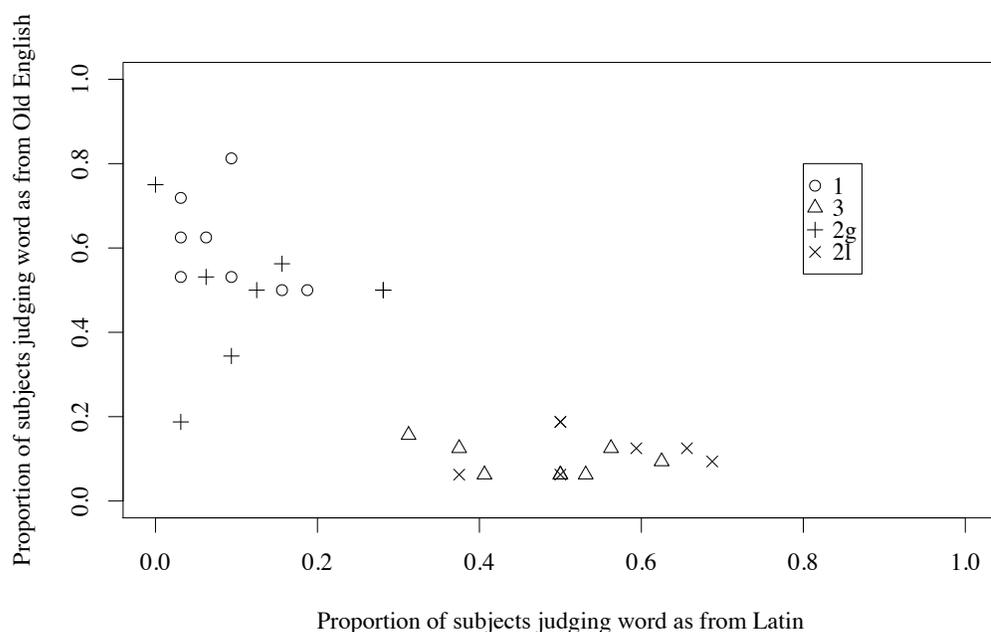


Figure 3.8: Etymology questionnaire: Proportion of “Latin” and “Old English” responses by word

3.8.3.2 Participant-level: Etymology score

Some participants were more “accurate” in their responses on the etymology questionnaire than others. Did those participants show more sensitivity to etymological contrasts than those with less command of etymology? To examine this possibility, participants were characterized by how “well” they did on the etymology questionnaire, i.e., how often their responses conformed to the intended etymology of the nonce verbs (ETYMOLOGY SCORE). *Latin*, *French*, and *Greek* were counted as “correct” for the 2L and 3 conditions, and *Old English* counted as correct for the 1 and 2G conditions. All other answers counted as incorrect. The prediction of the two-lexicon hypothesis is that participants who scored well on the etymology section would show a larger difference between the 2G and 2L conditions.

This prediction was tested with a mixed-effects linear regression model with fixed

effects for WORD SHAPE, CONSTRUCTION, and ETYMOLOGY SCORE, along with all interactions between these factors, and the usual random effects. There was a significant interaction between ETYMOLOGY SCORE and CONSTRUCTION on the acceptability rating z -score, as shown in Figure 3.9. Each data point on the graph corresponds to an individual participant. The horizontal dimension represents the etymology score; the further to the right the point is, the higher the participant's score on the etymology questionnaire. The vertical dimension represents the average difference in acceptability between double object and prepositional datives for that participant; the lower the point is on the graph, the less acceptable double object datives are compared to prepositional datives. This was one of the most robust findings of the experiment, but it is not of particular interest here, since it does not relate to the issue of how formal properties of words govern the productivity of the double object construction. (Since this effect is so strong, it was included in all of the regression models. Including this factor in the models described above does not qualitatively affect the results.)

Despite this strong interaction between ETYMOLOGY SCORE and CONSTRUCTION, there was no support for the idea that people who were good at etymology would show greater sensitivity to WORD SHAPE in their judgments of the ditransitive construction. If the driving force behind native speakers' intuitions that verbs like *donate* and *explain* are unacceptable as ditransitive verbs lies in their implicit understanding of etymology, one would have expected speakers with a strong sense of etymology to have strong intuitions about the grammaticality of nonce verbs based on their apparent etymology. However, there was no three-way interaction between ETYMOLOGY SCORE, CONSTRUCTION, and WORD SHAPE. ETYMOLOGY SCORE does not appear to modulate the interaction between WORD SHAPE and CONSTRUCTION.

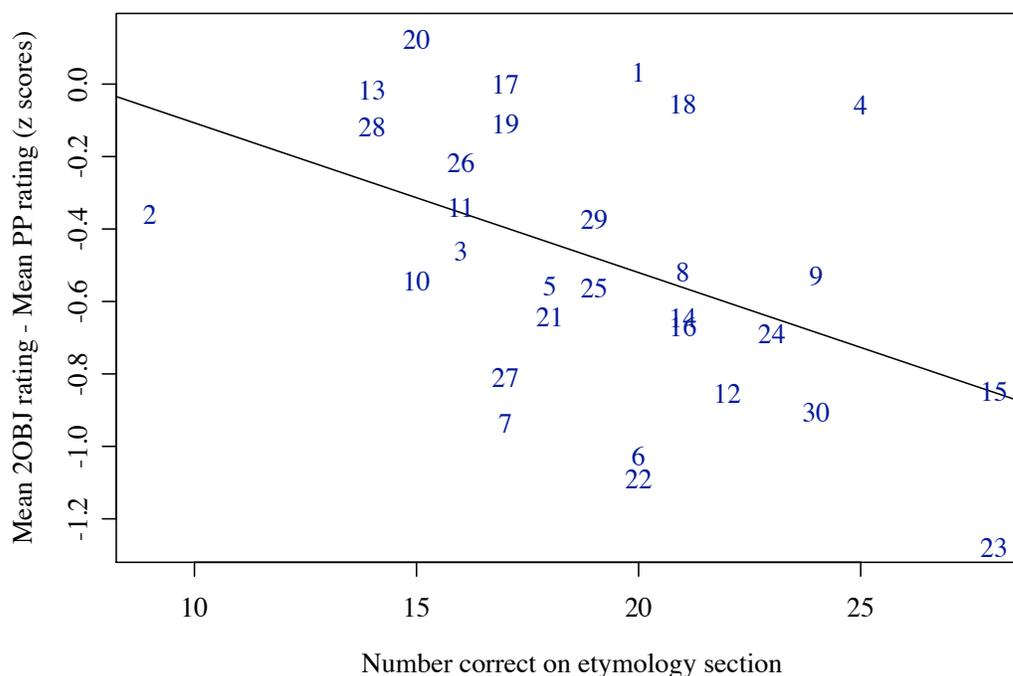


Figure 3.9: Experiment 3: Effect of etymology score on mean acceptability rating z -score by subject

3.8.3.3 Perceived Latinateness

There is yet hope for the two-lexicon hypothesis, because there is a more fine-grained way of measuring perceived etymology. Instead of word-level or participant-level statistics, it is possible to identify, for each word, what etymological origin the participant assigned to it, and use this information (PERCEIVED ETYMOLOGY) as a predictor of the participant's responses for that word. (For example, if participant s assigned *Old English* to *forhoove*, then *Old English* would be the value of PERCEIVED ETYMOLOGY corresponding to all of s 's judgments on sentences containing the word *forhoove*.)

To evaluate the effect of PERCEIVED ETYMOLOGY, a mixed-effects linear regression model of rating z -score (for participant s , and a sentence containing word w) was

constructed with fixed effects for PERCEIVED ETYMOLOGY (of word w by participant s) and CONSTRUCTION. As above, CONSTRUCTION was recoded as ‘0’ for the double object construction and ‘1’ for the prepositional dative construction. Dummy coding was also used to evaluate the effects of each level of PERCEIVED ETYMOLOGY (*Old English, French, Greek, Latin*); here *Old English* was the reference category.¹³ The interaction between ETYMOLOGY SCORE and CONSTRUCTION, was included in the model in order to control for this effect.

In this model, PERCEIVED ETYMOLOGY: LATIN emerges as a significant main effect ($B = -0.18, p < .01$). This means that overall, sentences containing words perceived as deriving from Latin received lower ratings than those containing words perceived as deriving from Old English. In addition to this main effect, PERCEIVED ETYMOLOGY: LATIN yields a significant positive interaction with CONSTRUCTION: PP ($B = 0.226, p < .01$). This means that participants tended to give lower ratings to ditransitive uses of verbs that they perceived as coming from Latin.

The question of interest, however, is whether or not this effect survives once NUMBER OF SYLLABLES is controlled for. There is a significant correlation between NUMBER OF SYLLABLES and PERCEIVED ETYMOLOGY: LATIN, measured on a per word basis as the percentage of participants who judged the word as deriving from Latin (Pearson’s product-moment correlation $r = 0.62, t(30) = 4.3, p < .01$). This association means both that NUMBER OF SYLLABLES is a confounding factor, and that it would be problematic to include both NUMBER OF SYLLABLES and PERCEIVED ETYMOLOGY in a regression model.

One way to evaluate the independent contributions of collinear independent variables is to use residual variance from one model as a dependent variable in another. Let

¹³This means that each level of PERCEIVED ETYMOLOGY other than *Old English* was represented as a ‘dummy’ variable in the regression model, with the levels 0 and 1. The ‘dummy’ variable corresponding to, for example, *French* has the value 1 if the response is *French*, and 0 otherwise.

Factor	\hat{B}	p
(Intercept)	0.679	0.004**
ETYMOLOGY SCORE	-0.009	0.287
CONSTRUCTION=PP	-0.446	0.028*
NUMBER OF SYLLABLES	-0.139	0.005**
ETYMOLOGY SCORE \times CONSTRUCTION=PP	0.030	<0.001***
CONSTRUCTION=PP \times NUMBER OF SYLLABLES	0.118	0.008**

Table 3.5: Experiment 3: Fixed effects in the basic linear regression model of rating z -score

the “basic” model be a mixed-effects linear regression model that includes CONSTRUCTION, ETYMOLOGY SCORE, and their interaction, along with NUMBER OF SYLLABLES as fixed factors, and PARTICIPANT, WORD, and PARAGRAPH as random factors. The estimated coefficients of the fixed effects in this “basic” model (\hat{B}) are given in Table 3.5 along with significance values. The columns of the table show the mean estimate of the model coefficient obtained by Markov chain Monte Carlo sampling, the p -value obtained through MCMC sampling, and the significance level. (‘*’ indicates significance at the .05 level; ‘**’ at the .01 level; ‘***’ at the .001 level.)

The difference between the model prediction and the actual response for each observation was obtained using the `resid` function in the R `stats` library. These differences functioned as the dependent variable in a linear regression model with dummy-coded variables for PERCEIVED ETYMOLOGY, CONSTRUCTION, and their interactions as predictors.

PERCEIVED ETYMOLOGY does not predict a significant amount of the residual variance from the basic model, nor does it give rise to a significant interaction with CONSTRUCTION ($p = 0.19$). None of the predictors in the model of residual differences described in the preceding paragraph emerged as significant. Thus, controlling for NUMBER OF SYLLABLES, the effect of PERCEIVED ETYMOLOGY falls away.

3.8.3.4 Summary: Perceived etymology

Four ways of measuring the impact of perceived etymology on acceptability as a ditransitive verb have been considered, but none of these measures succeeded in predicting acceptability of the ditransitive construction, independent of number of syllables. Three measures were based on judgments of etymological origin, and these closely mirrored the intended etymology, as shown in Figure 3.8. The contrast that Gropen et al. (1989) found between monosyllabic Germanic nonce verbs and trisyllabic Latinate nonce verbs therefore cannot be explained solely by the contrast between these verbs in apparent etymological origin.

3.8.4 Follow-up study: Morphological complexity

The previous section evaluated the hypothesis that apparent etymology plays a role in governing the productivity of the double object construction. The initial results based on WORD SHAPE condition did not support the hypothesis, and other ways of construing and evaluating the hypothesis also failed to find support. None of these possibilities succeeded; apparent etymology was not a significant factor, controlling for number of syllables.

The WORD SHAPE results also suggests that morphological complexity did not have a significant impact on the acceptability of a nonce word as a ditransitive verb; the words in the disyllabic conditions were designed as morphologically complex, so they should have patterned with the trisyllabic verbs. However, the fact that they were designed to be morphologically complex (and indeed contained two morphemes) does not imply that they were necessarily *perceived* as morphologically complex.

To assess the perception of morphological complexity, I carried out an online survey in which participants assessed whether the nonce words were *simple* or *complex*. If perceived morphological complexity drives the contrast in acceptability between

moop-type verbs and *dorfinize*-type verbs as ditransitives, then morphological complexity ratings should emerge as significant predictors of the acceptability ratings found in the sentence judgment task.

3.8.4.1 Methods

Participants. The participants in Experiment 3 were recruited to participate by email. Sixteen participants completed the survey.

Materials. There were no paragraphs or sentences in this experiment; words were presented out of context. The words were identical to those in Experiment 3.

Procedure. The instructions were taken from Hay (2003), modified slightly thus:

In this survey, we will be interested in the structure of made-up words. You will see a number of words, and will be asked to decide whether they are more likely to be simple or complex words.

In English, for example, the word “writer” can be broken down into two units: “write,” and “er”. “er” is a unit which occurs at the end of many English words. In “writer,” “er” has been added to the word “write” to make a new, more complex word “writer.” We will call a word which has been made out of smaller units in this way, a complex word.

“Reddish” is another example of a complex word in English. It can be broken down into “red” and “ish”.

Words which are not complex are called simple words. Here are some examples of simple words in English: *yellow*, *sing*, *table*. It is impossible to break down the word “table” into smaller units. “Table” is a simple word.

In this survey you will read some made-up words. We are interested in whether you think each word is more likely to be a simple word or a complex word.

For each word, first indicate whether you think it is more likely to be a simple word, or a complex word. Then rate from 1 to 4 how certain you are of your answer. If you feel very certain of your answer, you should choose 4. If you feel very uncertain of your answer, you should choose 1. Remember that there are no right or wrong answers; we are only interested in your intuitions.

Following Hay's (2003) design, subjects were asked to make a binary choice about the morphological complexity of the word ("complex" or "simple") and rate their confidence on a 1-4 scale as well.

3.8.4.2 Results and discussion

Although all of the words in both of the 2-syllable conditions were designed to be morphologically complex, and equal in complexity to the words in the 3-syllable condition, the words in these three conditions were not equivalent in perceived morphological complexity. Figure 3.10 shows the average complexity ratings in each of the four WORD SHAPE conditions.

These ratings make it possible to carry out a more nuanced investigation of the role of morphological complexity in determining the acceptability of nonce words in the ditransitive construction. This can be done by treating the proportion of participants who rate a given word as complex (MORPHOLOGICAL COMPLEXITY) as a factor and measuring its interaction with CONSTRUCTION in a mixed-effects linear regression model of rating z -score with MORPHOLOGICAL COMPLEXITY, CONSTRUCTION, and their interaction, along with ETYMOLOGY SCORE and its interaction with CONSTRUCTION. In this model, a significant interaction between morphological complexity and construction does emerge, such that the more morphologically complex a word is, the less acceptable it is as a ditransitive, relative to the prepositional dative construction.

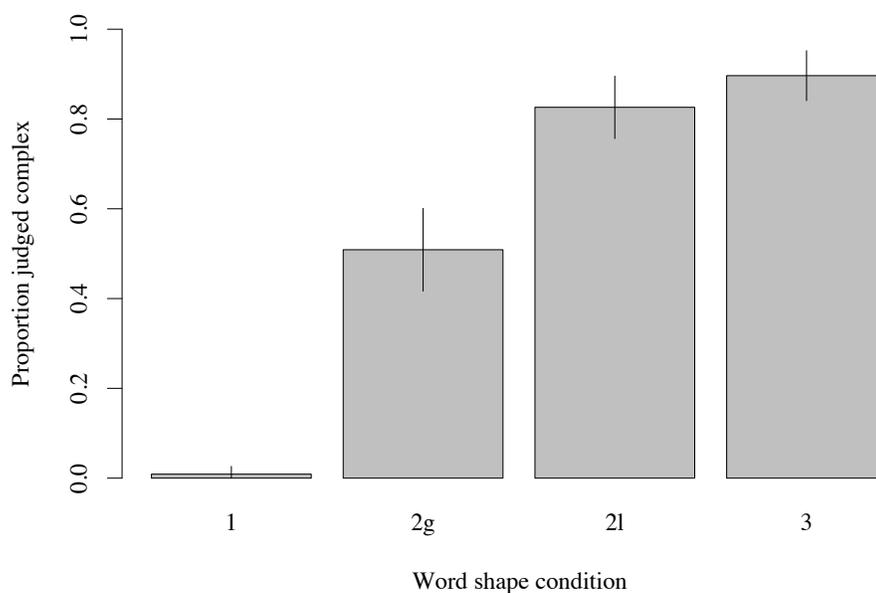


Figure 3.10: Experiment 3: Mean morphological complexity rating by word shape

This effect is illustrated in Figure 3.11, where acceptability of the ditransitive construction, relative to the prepositional dative construction, is shown on the vertical axis, and morphological complexity rating is shown on the horizontal axis. Acceptability of the ditransitive construction relative to the prepositional dative construction is measured for each word as the average rating z -score for the word as a ditransitive, subtracting the average rating z -score for the word as a prepositional dative. The distance below zero at which a word appears on the graph corresponds to how much worse the ditransitive construction is than the prepositional dative construction. The fact that the words tend to lie below zero in the vertical dimension means that the ditransitive construction tends to be worse than the prepositional dative construction.

This interaction does not survive once NUMBER OF SYLLABLES is controlled for, using the residual-based technique described above. Like PERCEIVED LATINATENESS, MORPHOLOGICAL COMPLEXITY is highly correlated with number of syllables (Pearson's product-moment correlation $r = 0.8$, $t(30) = 7.36$, $p < .001$). This collinearity

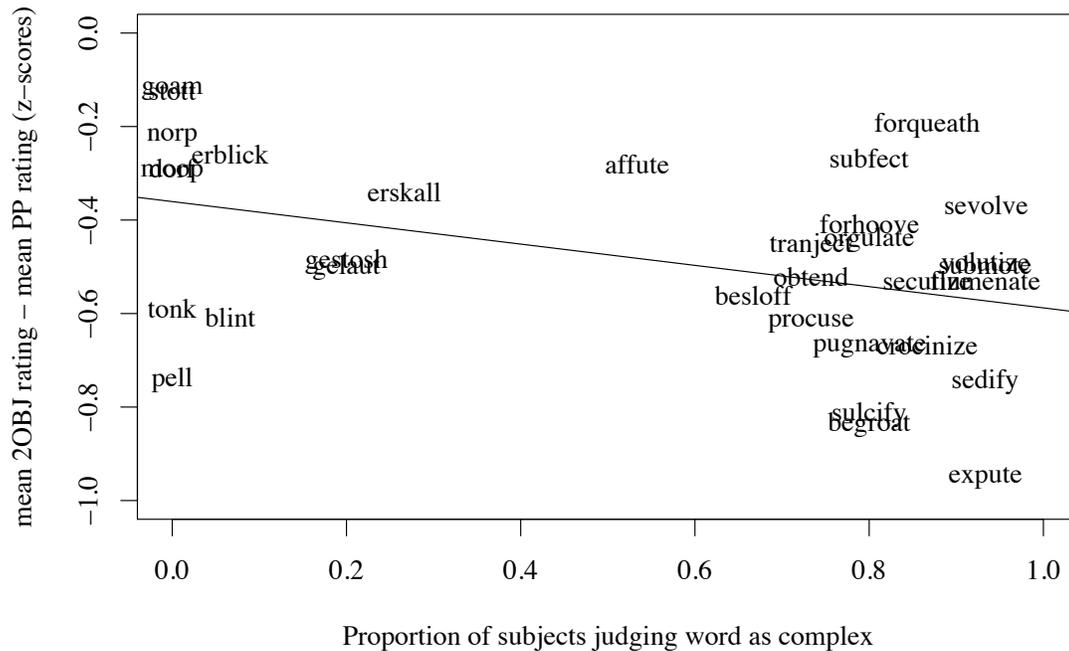


Figure 3.11: Experiment 3: Effect of morphological complexity on acceptability of ditransitive construction, relative to prepositional dative, by word

makes it problematic to include both as factors in the same regression model, but this problem can be overcome by treating the residuals of the basic model (given in Table 3.5) as the dependent variable in a new model that treats complexity as predictor of the residual data. Morphological complexity is not a significant predictor of the residual variance. This result remains once the certainty ratings are taken into account as well.

Unlike PERCEIVED ETYMOLOGY, it is not clear that MORPHOLOGICAL COMPLEXITY *should* remain significant once NUMBER OF SYLLABLES is controlled under the morphological complexity hypothesis, since the materials were not designed to include

words that varied in morphological complexity while remaining constant in number of syllables. A future study with this manipulation would be necessary in order to determine whether or not morphological complexity has an independent influence on the acceptability of nonce verbs as ditransitives.

3.8.5 Follow-up study: Formality

Another way in which the trisyllabic verbs differ from the monosyllabic verbs is that the trisyllabic verbs appear to be more formal. Being derived from Latin and being morphologically complex could contribute to the perceived formality of a word. Perhaps there is not really any constraint against the use of Latin-derived or morphologically complex verbs *per se*; instead, these factors may provide cues to the more general property of formality. As discussed in §3.4.4, stylistic discord (Silva and Zwicky 1975) provides a viable candidate for a more general explanation, because Latinate vocabulary is associated with a more formal register than native vocabulary (e.g. DeForest and Johnson (2001), Corson (1984)), and the prepositional dative construction is also relatively formal, compared to the double object construction (Bresnan et al. 2007). If this explanation is correct, then the apparent effect of perceived Latinate-ness could be an epiphenomenon of formality.

Additional support for the plausibility of the formality hypothesis is that the effect of morphophonological form was not as strong as the effect of using inappropriate semantics for the ditransitive construction. Violations of the morphophonological constraint were rated close to 0, in the middle of the rating scale, which ranged from -3 to 3. The mean ratings for verbs with nonpossessive semantics were much lower (-2.3), near the minimum (-3). This suggests that the morphophonological constraint is a weaker constraint than the semantic constraint involving transfer of possession. This is what would be expected if the morphophonological constraint was stylistic, assuming that a stylistic violation would be expected to have a relatively weak impact,

compared to a grammatical violation.

In order to assess the formality hypothesis, formality ratings were collected for each of the nonce words used in the sentence judgment task, and these ratings were used as predictors of acceptability in the double object construction.

3.8.5.1 Methods

Participants. 43 adult native English speakers, recruited via email, participated in the study.

Materials. The words in this experiment were identical to those of the sentence judgment task.

Procedure. The participants read the following instructions:

In this survey, we will be interested your impressions about made-up words.

You will see a number of words, and will be asked to decide how *formal* or *casual* you think they are, based on how they sound.

In English, for example, the word “stuff,” as in “There is some *stuff* missing” is very casual. In an official document, you would never see the word “stuff”; you would only use the word “stuff” in casual situations. The word “items” is much more formal – an official document might say “There are some *items* missing.”

In the following pairs of words, the word on the right is the more formal word:

whole – entire
 leave – exit
 help – assist
 mistake – error
 let – enable (to)
 ask – inquire

tell – notify (of)
go (to) – attend

In this survey you will read some made-up words. We are interested in how formal you think the words are, just based on how they sound.

Please think of the made-up words as *verbs*. For example, if the word is *flune*, imagine it as the verb *to flune*. You can imagine any meaning you like for the verb.

You will have a scale from -3 (very casual) to +3 (very formal). Use 0 to mean “neutral.”

After reading the instructions, the participants simply rated each nonce word on a scale from -3 to 3, 3 being the most formal and -3 being the least formal.

3.8.5.2 Results and discussion

Like the complexity ratings, the formality ratings for each word were averaged across participants to produce an estimate of the formality level of each word (FORMALITY). Monosyllabic words tended to receive the lowest formality ratings; (30) lists the words in increasing order of associated formality ranking:

(30) *tonk* < *dorf* < *moop* < *norp* < *goam* < *blint* < *gestosh* < *pell* < *stott* < *erblick* < *besloff* < *gelaut* < *begroat* < *erskall* < *obtend* < *crocinize* < *subject* < *volutize* < *sevolve* < *sulcify* < *affute* < *submote* < *forhoove* < *secutize* < *sedify* < *pugnivate* < *flumenate* < *expute* < *tranject* < *orgulate* < *procuse* < *forqueath*

Using the formality ratings as predictors in a mixed-effects linear regression model of acceptability rating *z*-score in the sentence judgment task, we find that the interaction of FORMALITY with CONSTRUCTION is not significant, whether or not NUMBER OF SYLLABLES is controlled for using the residuals technique described above. The formality hypothesis is therefore not supported.

3.8.6 Summary: Experiment 3

This experiment has provided additional support for the existence of a “morphophonological constraint” on ditransitivity by replicating Gropen et al.’s (1989) finding that nonce words like *moop* are more acceptable as ditransitives than nonce words like *calimode*. Since this experiment contained more items and controlled the way that the paragraph contexts were set up more carefully, we can be more confident in the existence of such a constraint. This is a key point for the central thesis of this dissertation: Since the form of a nonce word affects its acceptability as a ditransitive verb, there are form-based criteria governing the productivity of the double object construction. Verbs that are subject to these limitations, such as *donate* and *explain*, are therefore not arbitrary exceptions.

The experiments in this chapter tested a number of hypotheses regarding the precise nature of the morphophonological constraint, and the results of these experiments make it possible to reject some of these hypotheses: the prosodic weight hypothesis, the two-lexicon hypothesis, and the formality hypothesis. The morphological complexity hypothesis remains consistent with the results obtained.

The prosodic weight hypothesis predicted that there should be a contrast between monosyllabic verbs (the ‘1’ condition) and multisyllabic verbs (the 2G, 2L, and 3 conditions), since all of the multisyllabic verbs happened to contain more than one metrical foot in this experiment. This prediction was not borne out. Because it is quite straightforward to measure prosodic weight in metrical feet, it is clear that the predictions of the prosodic weight hypothesis were not met.

The hypothesis that apparent etymology governs the productivity of the double object construction predicted a contrast between the 2G and 2L conditions, which did not emerge. Several subjective measures of apparent etymology were considered as well, and none of them supported the role of apparent etymology as a factor above and beyond the length of the word in syllables.

The morphological complexity hypothesis, like the prosodic weight hypothesis, predicted a contrast between the monosyllabic and multi-syllabic verbs, since the multi-syllabic verbs were all designed to appear morphologically complex. Again, this prediction was not borne out. However, it is possible that this objective measure of morphological complexity did not provide an adequate test of the morphological complexity hypothesis. It may still be possible to salvage the hypothesis by measuring morphological complexity subjectively. Subjective morphological complexity ratings for each of the nonce words were obtained in a follow-up study to Experiment 3. Measured as a subjective factor, MORPHOLOGICAL COMPLEXITY did interact significantly with CONSTRUCTION. It did not survive as an independent factor beyond NUMBER OF SYLLABLES, but as the experimental materials contained very little variability in morphological complexity among words with the same number of syllables, this finding does not refute the morphological complexity hypothesis. It is therefore consistent with the results obtained here.

Finally, this study also addressed whether the apparent formality of a word is a driving force behind the contrasts observed by Gropen et al., and replicated here. I collected formality ratings for the nonce words in a follow-up study, but these ratings did not have any significant impact on the acceptability of nonce words used as ditransitives.

In summary, the data fail to confirm the predictions of three of the four hypotheses about the nature of the morphophonological constraint: the prosodic weight hypothesis, the two-lexicon (or “apparent etymology”) hypothesis, and the formality hypothesis. The only hypothesis that remains consistent with the data is the morphological complexity hypothesis, although it was not positively supported.

3.9 Conclusion

Although the experimental data do not make it possible to identify the precise nature of the morphophonological constraint, they do support the crucial point for this dissertation, which is that it is real. That the form of a nonce word affects its acceptability as a ditransitive allows us to conclude that there is a general restriction on ditransitives, a restriction that words like *donate* and *explain* are subject to. As long as learners have grasped this general restriction, there is no need for them to memorize *donate* and *explain* as arbitrary exceptions. Other putative exceptions listed in the literature can be explained on semantic grounds. I therefore conclude that there are no good examples of arbitrary exceptions in this domain.

The nature of the morphophonological constraint was the focus of Experiments 1–3. Experiment 1 supported the view that for a particular sample of two-syllable English verbs, verbs that are prosodically heavy (containing more than one metrical foot) are less acceptable as ditransitives than those that are prosodically light. Prosodic weight, however, is confounded with morphological complexity in English, so Experiments 2 and 3 used nonce words. Experiment 2 tested a prediction of Grimshaw and Prince’s (1986) prosodic weight hypothesis (ditransitives may not consist of more than one metrical foot). This prediction was not supported by acceptability judgments, although it was supported by response times. These results suggest that prosodic weight is just one of several cues that contribute to the classification of verbs as members of either the G[ermanic]-lexicon or the L[atin]-lexicon (Grimshaw 2005). Experiment 3 explored this hypothesis and disconfirmed it. Experiment 3 also found no evidence for the prosodic weight hypothesis. The formality hypothesis was also not supported. The hypothesis that ditransitive verbs must be morphologically simple in order to be ditransitive (Storm 1977; Harley 2006) remains a possibility.

Regardless of exactly how the morphophonological constraint should be formulated, it does not appear to be a hard-and-fast constraint, or a constraint governing the *grammaticality* of verbs as ditransitives. Violations of the morphophonological constraint give rise to effects of smaller magnitudes than violations of semantic constraints on ditransitivity, as Gropen et al.'s (1989) data show. Furthermore, it is not the case that every word that violates this constraint is worse as a ditransitive than every word that does not; there is a great deal of overlap. It appears that violation of the morphophonological constraint has a real but small and gradient impact on acceptability. This is in line with Bresnan and Nikitina's (2003) claim that semantic constraints on manner-related motion verbs such as *drag* and *push* are not hard constraints, but soft constraints that can be overridden.

It follows that words like *donate* and *explain* are not really "exceptions" in the grammatical sense; they do not give rise to violations of any grammatical principle when used in the double object construction. The solution to Baker's Paradox in this domain is not what can properly be called a "criteria-governed productivity" solution, although it does deny the existence of arbitrary exceptions in this domain. A criteria-governed productivity solution to Baker's Paradox explains apparent exceptions to a productive pattern on the basis of general constraints limiting the productivity of the pattern. To say that the productivity of a pattern is limited in some way is to imply that the grammar does not generate the set of forms corresponding to the limitations. In other words, under a criteria-governed productivity solution, the general constraints serve to render the exceptions ungrammatical. The relevant general constraint here, however, merely serves to render certain things that are grammatical (use of *donate* as a ditransitive, for example) relatively less acceptable.

3.10 Appendix: Experimental materials

3.10.1 Paragraphs for Experiment 2

The following is a list of the paragraphs that were used in Experiment 2.

1. Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was almost ready to **feffame**, the formal (and only legal) process by which she could obtain the house. She hoped that Bob would **feffame** the house to her rather than his daughter.
2. John, the star player for his team, was eager to face their rival. He knew that it would be very important for him to **dassude**. And sure enough, it was the deciding moment of the game when John summoned all of his strength and was able to **dassude** the disc to his teammate, Ben.
3. Ted, a native of the North, was quite unfamiliar with the customs of the South, where his wife Kate was from. For instance, he had no idea that he was supposed to **zeepike** when he proposed. Luckily, the mother of the bride set him straight and graciously explained how to **zeepike** the ring to Kate.
4. Amy was in desperate need of certain supplies that were only available from a firm that took months to process orders. After speaking with a customer service representative, however, Amy learned that certain special circumstances, they might be able to **koofove**. If she demonstrated that she met the requirements, the firm would **koofove** the goods to her.
5. Patrick and Bob were working hard on their new communication software based on the ability to **laundibe**, which would allow users to perform introductions over the internet. Just the thought of being able to **laundibe** his roommate to his co-worker made Patrick certain that they would be making millions in no time.
6. After 5 years of intense training, Mary had finally learned to **sharnoke**, and now she could apparently move objects just by thinking. This came in surprisingly handy at her housewarming party; just by concentrating extremely hard, Mary could **sharnoke** refreshments to her guests from the kitchen.
7. Ron, who had promised Dave that he would provide him with some data for his research, was feeling some regret. It had been a full month since he had last tried to **zannele**, and he was worried that the information might not go

- through. He was very relieved after he was able to **zannele** the crucial statistics to Dave.
8. Ned, a young but upcoming inventor, needed to spring his latest idea on the world. He had invented a very exciting machine that was able to **pauthete**. He thought he'd begin with his ex-girlfriend, Cindy, by causing flowers to appear in her hand with it. Wisely, Ned's friend informed him that it would not be a good idea to **pauthete** the flowers to Cindy.
 9. Gail, a recent graduate of Magic Academy, was eager to try out her newly-acquired skills on Frank. She was especially proud of her ability to **shapame**, which allowed her to perform practically instantaneous movement. Everyone was very impressed when Gail showed that she could **shapame** her pencil to Frank.
 10. George, the famous biochemist, was disgusted by Carl's negligence in dealing with hazardous materials. He explained to Carl that he should always remember to **darpuke** when sharing samples with other labs, so that the toxins are safely contained. George decided to **darpuke** a sample to Carl, in order to remind Carl what a superior method this was.
 11. Nancy could not contain her excitement for the show. All her life she had wanted to see an acrobat **plutike**, an amazing form of baton-throwing done without using the hands. At the climax of the show, when she saw an acrobat **plutike** a flaming baton to her colleague, Nancy was almost in tears.
 12. Brian desperately needed to speak to his girlfriend Katie, and he was grounded from the phone and the internet. This would not stop him though: using a combination of radio signals and digital technology he rigged up a device that would allow him to **traggove**. After hours of intense engineering, he was able to **traggove** his message to Katie.
 13. Penelope and her partner Alex had always wanted to learn to **driggibe**. As performing artists, they were convinced that this would take their work to the next level and make them famous. When Penelope tried to **driggibe** a long, flowing scarf to Alex, however, they realized they had a lot of work ahead of them.
 14. Pierre, a top-notch waiter at a five star restaurant, was always worried about how to bring the check. No matter how he did it, he always felt rude. After thinking about it long and hard, he realized that the best strategy would be to **hezzoke**. If he could simply **hezzoke** the check to the guests, then nobody would ever be offended.

15. William's hearing was starting to decline, and it was really starting to bother him and everyone around him. His wife Clara decided to invest in learning to **slegele**. That way, whenever William failed to hear something, she could simply **slegele** the words to him.
16. Joe was a very talented musician, and was always interested in learning new ways to create sound. On his trip to India, he met a woman who taught him how to **veenete**. After just an hour of instruction, Joe was able to **veenete** one of his own compositions to her. She was very impressed.

3.10.2 Filler paragraphs for Experiment 2

The following is a list of the filler paragraphs for Experiment 2.

1. Gregory was suffering from a terrible disease that prevented him from being able to speak. The only way he could communicate was to **sheefnoll**, a very laborious task that required a lot of concentration. His friends tried not to ask him too many questions, because they didn't want to make him **sheefnoll** the answer to them.
2. Andrew, a rising star in the business consulting world, wanted to do something to make himself stand out even more. He realized that the perfect way to quickly and efficiently communicate decisions throughout the company would be to **plickore**. Once the management began to **plickore** its decisions to the company, Andrew got a huge promotion.
3. Under the new rules, everyone was required to **nardoy** daily. It was part of a general movement towards greater accountability – this new policy would allow employers to keep closer track of the hours spent on various projects by the employees. Now, before going home each day, every employee had to **nardoy** their hours to their boss.
4. Jordan would never forget his trip to the small village where the women were all taught to **solfnop**. This was an elaborate type of calligraphy that involved certain intricate patterns. Jordan was deeply honored when his host was so kind as to **solfnop** a good-bye card to him.
5. In order to be a member of the resistance group known as the Society for Justice, one had to be able to **mazzem**. This was an extraordinarily discreet type of body language that would allow members to recognize other members in the presence of enemies. The ability to **mazzem** one's membership status to another member was crucial to the success of the movement.

6. Ben, the CEO of Innovative Software, Ltd., was very upset to learn that his demo had somehow failed to reach a very important potential client. He realized that it would be necessary to **piddet** it; this would ensure that it reached every single checkpoint intact. It was extremely expensive for Ben to **piddet** the demo to the client, but worthwhile in the end.
7. Janice was fed up with her boss Nick. He was always making her **mevvipe**, and it was a terribly odious cleaning task, especially when it involved the refrigerator. Finally one day she told Nick that she would rather quit than **mevvipe** that refrigerator for him again. Nick was very understanding.
8. Blair, a graduate student in organic chemistry, was obsessed with getting molecules to **puvwot**. She knew that if she could **puvwot** nitrogen to a protein, she would practically have a Ph.D. in her hand. Indeed, she was able to graduate just a month after she finally did it.
9. Bridget, a line cook at Le Gout restaurant, was looking forward to learning how to **slemeep** at culinary school. She had seen it on cooking shows on TV, but was convinced there were secrets to it that they weren't telling her. She knew that if she could **slemeep** a lobster for the head chef just right, she might be promoted to sous-chef.
10. Sam, an avid gardener, was keen on learning how to **banauk**. This technique would ensure that exactly the right amount of water was distributed to each plant at exactly the right time. After Sam had managed to do his own garden, his neighbor Gabby asked if he would **banauk** her garden for her.
11. The international community was appalled when China developed the ability to **wedack**. With this technology, China would be able to launch a nuclear probe that could land on the moon. If China were to **wedack** a probe to the moon, then it would be sending a clearly hostile signal to the rest of the world.
12. Laurie was the only girl in her whole class who knew how to **neriss**. While other girls tried to show off with round-offs and backbends, Laurie would put them all to shame as she began to **neriss** herself across the soccer field. But her skill, unfortunately, backfired: she was generally regarded as a show-off.
13. Lisa, the mother of two young boys, badly needed a babysitter, immediately. She knew Brad would be willing to, but he wasn't able to come over since his car had broken down. In a flash of insight she realized that she could **dashiff** to get the boys safely to his place. She told Brad she would **dashiff** the boys to him right away.

14. Kirk, the commander of the emergency response unit, insisted that his men **striboke** as a way of leaving the battlefield; this was the safest and most efficient manner of exiting. Whenever it was time to retreat, he would always **striboke** his troops out of the combat zone.
15. Ted was always on top of the latest products, and always eager to show them off to his neighbor Marsha. When he got a new **pirkife**, he offered to do Marsha's kitchen ceiling with it. Marsha was so impressed that she asked Ted to **pirkife** the ceiling in her dining room too.
16. Sergio, the top technician for I.N.C. Incorporated, was overwhelmed with all of the machines had to fix. He decided he would have to start to use **apofe**, the new job-tracking software the company was using. Whenever a new job came in that he couldn't take, he would just **apofe** the job to his assistant.

3.10.3 Paragraphs for Experiment 3

The following is a list of the paragraphs that were used in Experiment 3. The first 16 paragraphs describe movement/transfer events.

1. Sue, who had wanted the deed to the house for twenty years, was very excited when her lawyer called with the good news. Her lawyer told her that Bob, the current owner, was almost ready to **dorfinize**, the formal (and only legal) process by which she could obtain the house. Sue hoped that Bob would **dorfinize** the house to her rather than his daughter.
2. John and Ben, the star players for their team, were eager to face their rival. Ben knew that it would be very important for him to **dorfinize**. And sure enough, it was the deciding moment of the game when John summoned all of his strength and was able to **dorfinize** the disc to Ben.
3. Ted, a native of the North, was quite unfamiliar with the customs of the South, where his wife Kate was from. For instance, he had no idea that he was supposed to **dorfinize** when he proposed. Luckily, the mother of the bride set him straight and graciously explained how to **dorfinize** the ring to Kate.
4. Patrick and Bob were working hard on their new communication software that enabled users to **dorfinize**, a great new way to share files over the internet. Just the thought of being able to **dorfinize** his photos to Bob made Patrick certain that they would be making millions in no time.

5. After 5 years of intense training, Mary had finally learned to **dorfinize**, and now she could apparently move objects just by thinking. This came in surprisingly handy at her housewarming party; just by concentrating extremely hard, Mary could **dorfinize** refreshments to her guests from the kitchen.
6. Ned, a young but upcoming inventor, needed to spring his latest idea on the world. He had invented a very exciting machine that was able to **dorfinize**. He thought he'd begin with his ex-girlfriend, Cindy, by causing flowers to appear in her hand with it. Wisely, Ned's friend informed him that it would not be a good idea to **dorfinize** the flowers to Cindy.
7. Gail, a recent graduate of Magic Academy, was eager to try out her newly acquired skills on Frank. She was especially proud of her ability to **dorfinize**, which meant she could perform practically instantaneous movement. Everyone was very impressed when Gail showed that she could **dorfinize** her pencil to Frank.
8. Nancy could not contain her excitement for the show. All her life she had wanted to see an acrobat **dorfinize**, an amazing form of baton-throwing done without using the hands. At the climax of the show, when she saw Cleopatra **dorfinize** a flaming baton to Napoleon, Nancy was almost in tears.
9. George, the famous biochemist, was disgusted by Carl's negligence in dealing with hazardous materials. He explained to Carl that he should always remember to **dorfinize** when sharing samples with their partner lab, so that the toxins are safely contained. George decided to **dorfinize** a sample to Carl, in order to remind Carl what a superior method this was.
10. Hector, a firefighter, dashed up to the burning third-floor apartment to save Mrs. Wilson's cat. Unfortunately, there was no way the cat could make it down the flaming staircase alive, but the window would allow Hector to **dorfinize**. To everyone's relief, Hector successfully **dorfinized** the cat to Mrs. Wilson.
11. Penelope and her partner Alex had always wanted to learn to **dorfinize**. As performing artists, they were convinced that this would take their work to the next level and make them famous. When Penelope tried to **dorfinize** a long, flowing scarf to Alex, however, they realized they had a lot of work ahead of them.
12. Steve, the CEO of Innovative Software, Ltd., was very upset to learn that his demo had somehow failed to reach a very important potential client, Kim. He realized that it would be necessary to **dorfinize** it; this would ensure that it

reached every single checkpoint intact. It was extremely expensive for Ben to **dorfinize** the demo to Kim, but worthwhile in the end.

13. Sergio, the top technician for I.N.C. Incorporated, was overwhelmed with all of the machines he had to fix. He told his assistant Mike that he would have to start to **dorfinize**, using the new job-tracking software the company was using. Whenever a new job came in that he couldn't take, he would just **dorfinize** the job to Mike.
14. Natasha loved to paint, but she'd had one too many masterpieces ruined when she tried to send them to the local gallery. Her friend told her about a new delivery method in which the post office would **dorfinize** in order to protect the package. Ever since Natasha started to **dorfinize** her paintings to the gallery, she never saw one damaged again.
15. Tricia, a lawyer, was interested in doing some pro bono work. She began perusing a charity database and soon hit upon a case worthy enough for her to **dorfinize**. The client, Chris, was grateful to have Tricia **dorfinize** her services to him.
16. Ron, who had promised Dave that he would provide him with some data for his research, was feeling some regret. It had been a full month since he had last tried to **dorfinize**, and he was worried that the information might not go through. He was very relieved after he was able to **dorfinize** the crucial statistics to Dave.

The paragraphs describing communication events are as follows:

1. Brian desperately needed to speak to his girlfriend Katie, and he was grounded from the phone and the internet. The only way he could possibly get in touch with her would be to **dorfinize**, using a combination of radio signals and digital technology. After hours of intense engineering, he was able to **dorfinize** his message to Katie.
2. Pierre, a top-notch waiter at a five star restaurant, was always worried about how to bring the check. No matter how he did it, he always felt rude. After thinking about it long and hard, he realized that the best strategy would be to **dorfinize**. If he could simply **dorfinize** the check to the guests, then nobody would ever be offended.
3. William's hearing was starting to decline, and it was really starting to bother him and everyone around him. His wife Clara decided to invest in learning to **dorfinize**. That way, whenever William failed to hear something, she could simply **dorfinize** the words to him.

4. Joe was a very talented musician, and was always interested in learning new ways to create sound. On his trip to India, he met a woman named Ritu who taught him how to **dorfinize**. After just an hour of instruction, Joe was able to **dorfinize** one of his own compositions to her. She was very impressed.
5. Gregory was suffering from a terrible disease that prevented him from being able to speak. The only way he could communicate was to **dorfinize**, a very laborious task that required a lot of concentration. His best friend Sam needed to ask Gregory a question, but he wasn't sure if he should make Gregory **dorfinize** the answer to him.
6. Andrew, a rising star in the business consulting world, wanted to do something to make himself stand out even more. He realized that the perfect way to quickly and efficiently communicate decisions throughout the company would be to **dorfinize**. Once the management began to **dorfinize** its decisions to the company, Andrew got a huge promotion.
7. Under the new rules, everyone was required to **dorfinize** daily. It was part of a general movement towards greater accountability – this new policy would allow employers to keep closer track of the hours spent on various projects by the employees. Now, before going home each day, every employee had to **dorfinize** their hours to the boss.
8. Jordan would never forget his trip to the small village where the women were all taught to **dorfinize**. This was an elaborate type of calligraphy that involved certain intricate patterns. Jordan was deeply honored when his host Lu was so kind as to **dorfinize** a good-bye card to him.
9. In order to be a member of the resistance group known as the Society for Justice, one had to be able to **dorfinize**. This was an extraordinarily discreet type of body language that would allow members to recognize other members in the presence of enemies. Although he was only a beginner, Benjamin managed to **dorfinize** his status to his comrade Richard at a crucial moment.
10. Charlie wasn't doing well in school, so his teacher Ms. Houseman called his father in for a conference. He told her that Charlie had a very unique learning style, and that he needed her to **dorfinize**, in order to be able to grasp the concepts. Once Ms. Houseman began to **dorfinize** the material to Charlie, his grades began to pick up.
11. Emily, an aspiring singer, had trouble getting a record contract because she was told her sound was not distinctive. That all changed when she taught her voice

to **dorfinize**. Emily found that whenever she **dorfinized** the lyrics to her fans, she was met with wild applause.

12. At Wittgenstein University, it was the custom to **dorfinize** as a way of advertising for performances and other kinds of student events. Marie, a freshman at Wittgenstein, wanted to do things right and really get the word out about her dance performance, so she **dorfinized** the event to everyone she talked to, even the professors.
13. Centuries ago, there were religious groups in India who would **dorfinize** whenever they wanted to make a request to the gods. This constituted a beautiful dancing ritual that enacted their desire. One of their most famous legends is of a farmer named Raj who would often **dorfinize** a rainstorm to the rain goddess Rita. She apparently loved him because she always made it happen.
14. Senator Franklin's campaign was worried about his recent poll numbers, which showed his opponent, Representative Richards, with a 10-point advantage. Knowing that drastic action was necessary, he decided it was time to **dorfinize**. Once Franklin **dorfinized** a dirty rumor about Representative Richards to the newspaper, the race turned in his favor.
15. First Lieutenant Clark had been left in control of the ship while Admiral Wilson was undergoing surgery. In case of severe emergency, she was to **dorfinize**. When electricity was lost and the modern controls stopped working, she felt she had to **dorfinize** the problem to the admiral.