Why lexical syntax? Evidence from English object pronoun enclitics

Joan Bresnan
Stanford University

Proceedings of the LFG'23 Conference

Miriam Butt, Jamie Y. Findlay and Ida Toivonen (Editors)

2023

PubliKon

lfg-proceedings.org

Abstract

The English object pronoun enclitics are of particular interest because they and their host verbs are syntactically independent in c-structure but show classic evidence of lexicalization: (1) allomorphy of the enclitic in the context of the host, (2) prosodic wordhood with the host, and (3) the existence of special pragmatics and meanings. Moreover, their cooccurrence probabilities in spoken corpora predict both (4) the probability of enclisis and (5) the probability of special pragmatics and meanings. The latter points are further signs of shared lexical representation, because within a hybrid exemplar-based lexicon, cooccurrence probabilities approximate the *strength* of lexical representations.

Previous formal accounts of the enclitic object pronouns fail to account for their syntax, and none explain the new probabilistic evidence presented here. The hybrid formal and usage-based framework of Bresnan (2021a) provides a coherent explanation of these facts, and it broadens and deepens the evidence for lexical syntax.

1 Introduction

Examples (1a–c) are authentic uses of object pronoun enclitics in spoken English.[†1]

(1) a. She had twins and she didn't know what to name them and she'd run out of names that she liked so—just pick couple of names off the menu—so she **named them [neɪmdəm]**—Lemonjello, and Orangello—lemon jello, orange jello.

b. So I threw his ass in the car and **took him [tʊkm̩]** downtown and took him inside.

c. I found out it's a girl. What're you gonna **name her [neɪmɚ]** Rosie—Rosie cozy? You've got to be kidding she said.

The enclitics are unstressed third-person object pronouns marked by loss of an onset and forming the final syllable of the preceding host.[2] They are widespread and very common in conversational speech, but far less so in orthographic texts.

[†]My thanks to Joan Maling, Tom Wasow, Matt Tyler, and Ida Toivonen for critical comments on the near-final version and to Danielle Turton for providing phonetic information from her work when I was starting out on this topic in 2019. I used the open-source R language and environment for statistical computing and graphics together with contributed packages of functions within R (R Core Team 2023; Harrell Jr. 2021; Sarkar 2008) to collect, analyze, and plot graphics of the corpus data in this study. These may be freely downloaded from https://cran.r-project.org/.

[1]These examples are from the Buckeye Corpus (n. 10), edited for readability by capitalization and by either replacing labels for non-speech sounds with punctuation or deleting them.

[2]The broad IPA transcription here corresponds to the labeling in the phonetic alphabet of the Buckeye corpus (Kiesling et al. 2006). Attested examples throughout are boldfaced, as are corresponding unattested ungrammatical examples marked with '*'.

The pronoun enclitics are of interest here because they and their host verbs are syntactically independent in c-structure but show evidence of shared lexical representations: (1) allomorphy of the enclitic in the context of the host, (2) prosodic wordhood with the host, and (3) the existence of special pragmatics and meanings. Moreover, their cooccurrence probabilities in spoken corpora predict both (4) the probability of enclisis and (5) the probability of special pragmatics and meanings. The latter points are further signs of shared lexical representation, because within a hybrid exemplar-based lexicon, cooccurrence probabilities approximate the *strength* of lexical representations.

The plan of this study is first to present the general underlying theory assumed here and in Bresnan (2021a,b), next to apply it to object pronoun enclisis, and then to draw out the empirical consequences, which will provide opportunities for comparing previous approaches to these pronoun forms. A summary and final remarks conclude.

2 The underlying theory

The conceptual core of the underlying theory is that (1) the host+enclitic form is a single lexical exponent of adjacent syntactic categories in constituent structure and (2) that cooccurrence probabilities in usage approximate the strength of representations in the mental lexicon.[3]

Varying formalizations of these components of the theory are possible, but here we follow Bresnan (2021a) in adopting both Wescoat's (2005) formal theory of lexical sharing for English enclitics and Pierrehumbert's (2001) hybrid dynamic exemplar model of the mental lexicon.[4] In the hybrid exemplar-based model of the mental lexicon based on Pierrehumbert (2001), levels of representation from formal grammar serve to label memory traces of language use—detailed probability distributions learned from experience and constantly updated through life. The hybrid lexicon provides a map of the perceptual space of linguistic experience and a set of labels, or structural descriptions, over this map. Long-term memory traces are located in the perceptual space, organized into regions, or clouds, of exemplars by similarity. Each exemplar has an associated strength or resting activation, such that exemplars of frequent recent experiences have higher resting activation levels than those of infrequent and temporally remote experiences.

Figure 1 provides a simplified visualization of tensed auxiliary contractions in this model. The labels *you, you're,* and *are* with their varying pronunciations stand for (partial) 'lexical entries' in traditional linguistic terminology and correspond to structural descriptions at several levels. Each entry maps onto a matching set of remembered instances of its utterance—the memory traces, or exemplars, structured into 'clouds' represented by different colors. The visualization is simplified to show

[3] Bybee (1985: p. 117) proposes that the lexicon responds dynamically in this way to usage probabilities: "Each time a word is heard and produced it leaves a slight trace on the lexicon, it increases in lexical strength." Krug (1998) and Bresnan (2021a,b) apply the proposal to English auxiliary contraction.

[4] For more recent developments in this theory see Todd et al. (2019) and the references therein.

only varying pronunciations of remembered instances; it omits links to further grammatical, pragmatic, semantic, and social information. Fresh experiences and memory decay lead to continual updating of the entries in the mental lexicon, so that frequent, recent instances are more highly activated than infrequent, temporally remote ones.

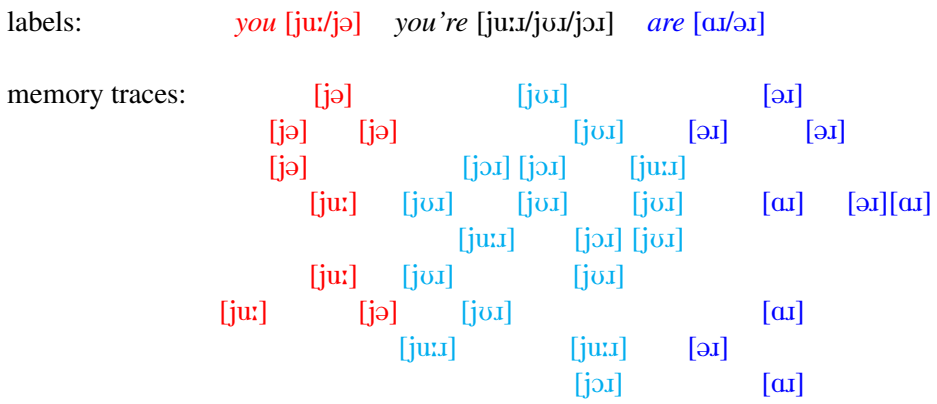


Figure 1: Exemplar-based lexicon

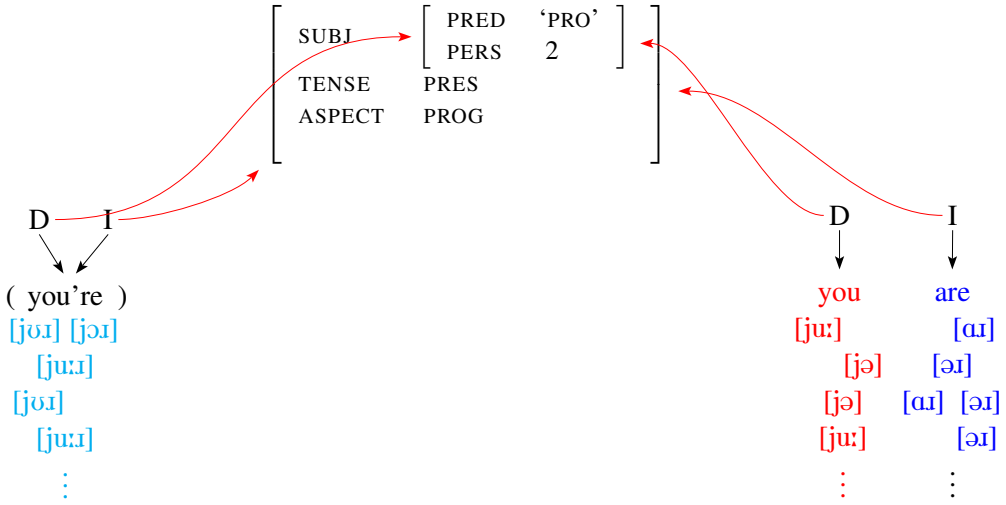


Figure 2: LFG functional schemata label lexical exemplar clouds

Bresnan (2021a) proposes that the hybrid lexicon replace the 'lexical entries' (labels) in Figure 1 with LFG lexical schemata within the lexical sharing theory, so that LFG structures serve to label or index the clouds of memory traces. The result is visualized in Figure 2, where the lexical schemata for contractions are depicted by f-structures resulting from their co-instantiation in the theory of lexical sharing of Wescoat (2002, 2005).

Assuming a production bias favoring the short allomorph parallel to the production bias favoring lenition at the level of word phonetics (Pierrehumbert 2001, 2002, 2006, 2016), Bresnan (2021a) argues that the crucial connection between high-

probability host-auxiliary bigrams and higher incidences of contraction in speech production is straightforward: under memory decay the clusters of more frequently uttered bigrams refresh their stores of contracted exemplars more often while less frequently uttered bigrams are more temporally remote, lower in activation, and less likely to be randomly selected targets of production.

In this way the hybrid model embodies the concept of the STRENGTH of a lexical representation: stronger representations are those with larger clouds of more highly activated and more recent memory traces.

3 Application to pronoun enclitics

Like subject-auxiliary contraction, English verb-pronoun encliticization can be formally modeled by lexical sharing in LFG. Figure 3 shows that the composite lexical exponent *take'em* occupies the same sequence of syntactic positions in c-structure as do the full words *take them*, and it also creates the same f-structure. The f-structure represents grammatical relations and dependencies, abstracting away from stylistic, prosodic, and discourse differences between *take'em* and *take them*.

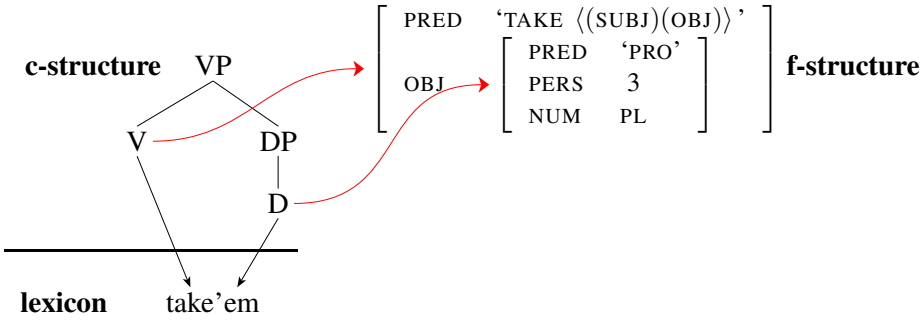


Figure 3: An enclitic object of *take* represented by lexical sharing in LFG

The mapping from terminal syntactic categories to lexical exponents is many-to-one, as indicated by the arrows pointing from the terminal c-structure categories V, D to the lexical exponent *take'em*. In (2) the arrows correspond to lexical instantiation rules as defined by Wescoat (2002, 2005) to allow composite lexical exponents like *take'em* to fill adjacent syntactic categories in c-structure:

(2) Lexical instantiation rules
take ← V
them ← D
take'em ← V D

The lexical exponent *take'em* in LFG has a lexical entry consisting of attribute-value equations in the LFG formalism which binds together the grammatical relations and features of its atomic components, specifying that the third-person plural pronoun

'em must be the object of the adjacent verb *take*. An example is (3).[5]

(3) A lexical entry

take'em ['teɪkəm] ← V: (↓ PRED) = 'TAKE ⟨(SUBJ)(OBJ)⟩' ; ↓ = ⇓ — D: (↓PRED) = 'PRO' ; (↓PERS) = 3 ; (↓NUM) = PL ; (⇓ OBJ) =$_c$ ↓

Figure 4 provides a more intuitive visualization of the grammatical relations specified in the formal notation of (3).

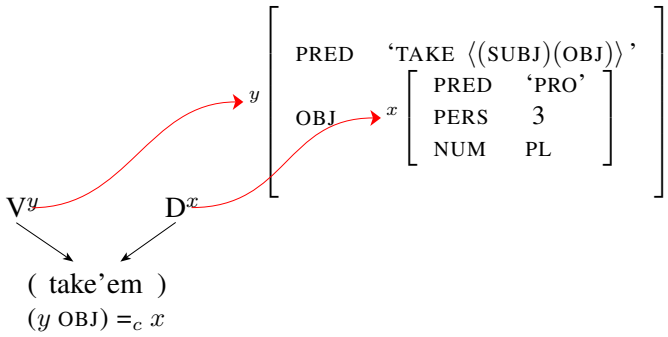


Figure 4: Visualization of the shared lexical entry in (3): the curved arrows represent mappings from c-structure terminals to f-structures and the straight arrows are mappings from the c-structure terminals to their shared lexical exponents. (⇓ OBJ) =$_c$ ↓ constrains the f-structure of the pronoun to be the value of the OBJ attribute in the f-structure of the verb.

The particular shared lexical entry for *take'em* is an instance of more abstract lexical schemata like that in (4) which would index multiple clouds of exemplars and could apply to unfamiliar or less often used verbs.

(4) A general lexical schema for verb-object pronoun enclisis

V=pron$_{encl}$ [...] ← V: ↓ = ⇓ — D: (↓PRED) = 'PRO' ; (↓PERS) = 3 ; (⇓ OBJ) =$_c$ ↓

4 Consequences

4.1 C-structure independence

English full object pronouns can function as the objects of conjoined heads, unlike morphosyntactically attached pronominal clitics or affixes, and the object pronoun

[5] In (3) '⇓' represents the f-structure of the shared entry, which allows annotations of the atomic elements V and D to refer to the same f-structure (Wescoat 2005). See Appendix II for formal details.

enclitics behave like the former. An authentic example of English object enclisis with conjoined verbs is from a web recipe for almond croissants (https://www.gullycreek-cottage.com/almond-croissants/, accessed on 12-17-2022):

(5) This recipe isn't too complex, just several steps and I would certainly make the cream and syrup the day before you plan to **prepare and eat 'em**.

Here *'em* refers to the almond croissants that the author will prepare and eat the next day. Functioning as the object of both conjoined verbs is exactly what the full pronoun *them* does in normal VP object position following the verb *eat*: ***prepare and eat them***.

In contrast, French object clitics, which are attached to the verb (Abeillé & Godard dir.; Pescarini 2021: 166), do not relate grammatically to conjoined verbs in this way, and must be repeated for each verb. Culbertson (2010) provides this example:[6]

(6) *Jean les a préparé et a mangé.
Jean les a préparé et les a mangé.
John prepared them and ate them.

Figure 5 shows how the enclitic pronoun has the same syntactic relation to the conjoined verb head as its full pronoun counterpart would. See Appendix II for details.

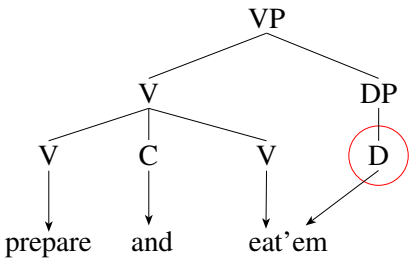


Figure 5: An enclitic object of conjoined verbs

Also like full English pronouns, the enclitic object pronouns can appear in construction with the postposed quantifiers *both, all*, as in *take them both* and *throw them all back*. Maling (1976) convincingly demonstrates that these postposed quantifiers are not "floating" quantifiers detached from lexical noun phrases, but "flipped" quantifier constituents of an NP (here, DP) that dominates the pronoun.[7] See Figure 6. Again, formal details are given in Appendix II. Authentic examples of the enclitic object pronouns in construction with "flipped" quantifiers are given in (7)–(8).

[6]This behavior is in contrast to the French subject clitics, which are not attached to the verb, except in colloquial French (Culbertson 2010: pp. 101–2).

[7]For example, she shows (p. 714) that unlike floated quantifiers, flipped quantiers can occur in phrase-final positions:

I called them all/both.
I called the men *all/*both.

Moreover, the postposed quantifier forms a constituent with the pronoun: *resonance can not be represented by two individual structures, but* ***it is them both that*** *make up the … O3 molecule*, https://quizlet.com/744691435/chapter-7-flash-cards/, accessed on 12/2/23.

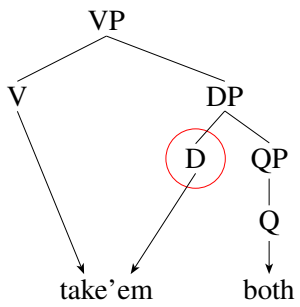


Figure 6: An enclitic object pronoun in the Q-pro flip construction

(7) John Wayne had cancer twice. Second time, they took out one of his lungs. He said, "**Take 'em both!**"
(https://www.quotes.net/mquote/68229, accessed 12-17-2022)

(8) In one strip, Rev. Dunn said, "Lord, I know we're called to be fishers of men. But I want to **throw 'em all back**."
(https://magazine.wfu.edu/2013/06/05/remembering-will-dcampbell-awake-foresterandrenegade/, accessed 12-17-2022)

The two construction types may be combined in examples like (9):

(9) If you need engine block bolts, you can buy or steal'em all.

The quantified enclitic object in (9) has semantic scope over *buy or steal*. The sentence can mean not only that all the engine block bolts can bought or all can be stolen (as with the conjoined VPs *You can buy them all or steal them all*), but also that all the engine block bolts can individually be either bought or stolen (a reading inaccessible from the conjoined VP analysis). The key generalization about constituent structure coordination here is that complements external to conjoined heads are shared between them, while those internal to one conjunct are not shared with the other (Peterson 2004).

In these ways the English object pronoun enclitics behave like their full pronoun counterparts in belonging to major constituents of phrase structure.

This evidence of syntactic independence counters some previous phonological analyses of the pronoun enclitics as morphosyntactically attached or adjoined to the host (cf. Selkirk 1972, 1984, 1996; Ito & Mester 2018, 2019). The latter analyses are proposed to explain why phrase-final stress does not fall on the object pronouns, preventing enclisis, but the present analysis provides an alternative explanation, discussed below.

The same evidence also problematizes a previous syntactic analysis of the enclitics as "weak" or structurally deficient pronouns moved by object shift from a complement position to a higher verbal phrase where they receive a theta (argument) role

from the moved verb (Wallenberg 2009, building on Cardinaletti & Starke 1999).[8] In order to receive theta roles from both verbs in (5), the pronoun must be moved from the complement position of each verb into conjoined higher verbal phrases, but as seen above in (9) the conjoined VP source is not in general equivalent to the structure with conjoined verb heads.

4.2 Lexical enclitics

Some very early accounts of the enclitic pronoun forms (e.g. Zwicky 1970, 1977) analyze them as pronunciation variants derived by postlexical rules of casual or fast speech from full pronouns with "ordinary syntax".

However, it seems likely that allomorphy (alternative morpholexical forms), not phonological rules of fast or casual speech, underlies the form variation (Kaisse 1985; Inkelas 1991). The dropping of [ð] is restricted to a handful of lexical words of contemporary English, and *'em* and *them* reportedly have separate diachronic lineages: plural *'em* from Middle English *hem* (DAT/ACC 3PL), and *them* from an Old Norse form *þeim* "to those, to them" (Stevenson & Lindberg 2010). Thus *'em*, rather than deriving from contemporary *them*, is likely a distinct allomorph.[9]

The third-person singular onsetless object enclitics (*'er* and *'im*) could be allomorphs morphologized from productive *h*-dropping. Kaisse (1985) observes that unlike the "lexically governed" dropping of [ð], *h*-deletion is a very productive fast speech rule: initial *h* can drop from any syllable not utterance-initial or bearing sentence stress, as in *pro(h)ibition* or *I like (h)er style*. While it is possible that the onsetless forms of *her* and *him* are simply the products of a general rule of fast speech, Bresnan (2019) provides evidence consistent with the simultaneous existence of both *h*-dropping in fast speech and an onsetless allomorph of the pronoun *her* functioning as object of the preceding verb.

Bresnan (2019) extracted all instances of the pronoun *her* from the Buckeye corpus of phonetically transcribed speech,[10] and coded the postverbal instances as objects of the preceding verb or as possessives of an object following a verb (e.g. *draw <u>her</u>/draw <u>her</u> last breath*). The first environment is a syntactic context for the clitic

[8] Pescarini (2021) argues against the structural deficiency theory of clitics in Romance languages on independent grounds.

[9] According to Van Gelderen (2011: p. 98) contracted pronoun objects—which she exemplifies with plural *'em* and singular *'t* for *it*—are not in evidence in Old and Middle English, but become more common by Early Modern English and widespread after 1600. Her contemporary spoken English examples include singular *'m* as well.

[10] The Buckeye corpus (Pitt et al. 2005) provides both word-by-word orthographic and broad phonetic transcriptions. Full and enclitic pronouns are not distinguished orthographically. The corpus consists of one-hour interviews with each of 40 people, amounting to about 307,000 words. Data collection for it was initiated in 1999 and took about a year and a half to completion. Speakers are Caucasian, long-time local residents of Columbus, Ohio. The language is unmonitored casual speech. The data are stratified by age and gender: 20 older (defined as age 40 or more), 20 younger; 20 labeled as male, 20 as female. The words and phones are aligned with sound waves, provided with broad phonetic labeling, and orthographically transcribed. The phonetic labeling does not include stress and there is no schwa in their phonetic alphabet (Kiesling et al. 2006: p. 18).

object pronouns, but the latter is not. If there is an onsetless enclitic allomorph of *her* apart from a general fast-speech process of *h*-deletion, one would expect *h*-dropping of *her* to be substantially more common in the first context. Table 1 bears out this expectation.[11]

Table 1: Data from the Buckeye Corpus

	postverbal instances	
	object *her*	possessive *her*
onset	42	51
no onset	125	34
proportion no onset	0.75	0.40

Thus, consistent with the lexical sharing theory, the enclitic forms of the onsetless object pronouns are lexically represented allmorphs rather than on-line adjustments of fast speech by phonological rules.

4.3 Prosodic wordhood

Lexical sharing implies prosodic wordhood of the lexical exponent, because lexical words are prosodic words (Bresnan 2021a). See Figure 7.[12]

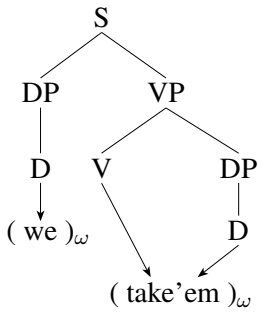


Figure 7: Lexical sharing implies prosodic wordhood

In support of the prosodic wordhood of verbs and their object pronoun enclitics is the simple observation that the enclitics cannot be separated from their hosts by hesitations or fillers (Inkelas & Zec 1993: p. 244):

(10) *John likes . . . uh. . . 'əm. (< . . . them)

The prosodic wordhood of host and enclitic also explains the absence of phrase-final stress on the enclitic pronoun (cf. Selkirk 1972, 1984, 1996; Ito & Mester 2018, 2019).

[11] A two-sided exact Fisher test to determine whether the odds of no onset with a pronoun object vs. a possessive differ from chance yielded a p-value $= 1.023 \times 10^{-07}$.

[12] Lexical wordhood is particularly tested by directionally divergent, or 'ditropic', clitics (Klavans 1985; Cysouw 2005). An English case is fully discussed and analyzed in Bresnan (2021a); see n. 20.

Phrase-final stress will indeed fall on the final prosodic word, but as the final syllable of the trochaic foot of this prosodic word, the enclitic object pronoun will not itself receive stress.[13]

Note that purely prosodic attachment of enclitic to host is not sufficient (cf. Inkelas & Zec 1993; Tyler 2019) to explain examples like (11) from Haig (2018: 809) and (12):

(11) **take'em off**
***take off'em**

But of a pickpocket's victims one can say (12):

(12) What did he take off'em?

Thus, in addition to forming a prosodic word with the host, the enclitic pronouns must have an object relation to it. The same requirement also accounts for the contrast shown in (13), where the indefinite pronoun *everyone* does not allow an object relation to the enclitic.[14,15]

(13) As for my secrets, I don't **tell everyone them**.
Cf. . . . I don't ***tell everyone 'em**.

4.4 Special pragmatics and meanings

In addition to their lexical allomorphs and prosodic wordhood, another sign of the lexicalization of the English enclitics with their hosts is the accumulation of noncompositional meanings through special pragmatics or semantics, as in (14).

(14) *go get'em*: encourages the addressee in a (job or sports) competition
give'em hell: (similar to above)
let'er rip: go ahead, continue without restraint
take'im/'em: start the fight in a standoff
ooh kill'em!: expresses praise for dance moves

[13] Other evidence that host and enclitic object pronoun form a phonological word is discussed in Abercrombie (1964); Selkirk (1972); Zwicky (1977); Klavans (1995), among others. Abercrombie (1964) observes that *l*-darkening [ɬ] occurs before word boundaries but not before the object *it* in his speech, a pattern that Turton's (2014) articulatory evidence from ultrasound tongue imaging confirms. In Turton's data across two experiments the same RP speaker pronounces *heal* in *Can you heal* [l] *it?* with a light [l] and *Neal I sent Neal* [ɬ] *interesting emails* with a dark [ɬ] (Turton 2014: p. 238). See also Turton (2016, 2017) on the scope of l-darkening in different varieties of English.

[14] Wallenberg (2009: p. 83) makes a similar point with the examples **because he'd given the boy 'em all* and **John picked up 'em all*, "(Even with stress on all.)"

[15] In (13) the bolded variant with *them* separated from the verb had multiple Google hits; replacing *them* with *'em* yielded zero hits, while reordering the enclitic in the starred variant next to the verb (*tell 'em to everyone*) did have a few hits. These differences accord with the judgments of the author.

Prefixing *don't* to these examples or replacing the enclitics with full pronouns favors literal and compositional meanings.

These are classic effects of lexicalization, part of the empirical foundations of lexical syntax: when composite words are lexically stored as wholes, they tend to acquire their own usage profiles and depart from the compositionality of their simple constituents (e.g. Chomsky 1970 on nominalizations, Bresnan 1982 on passives). They are immediately available to memory for coining fresh usages.

Importantly, the same is true of host-clitic sequences (Bybee & Scheibman 1999; Bresnan 2021a), because syntactic co-lexicalization in the exemplar-based lexicon strengthens independent usage profiles and departures from compositionality.

4.5 Enclisis probability

A further consequence of the underlying theory applied to object pronoun enclisis is that the probability of $\boldsymbol{verb}$ + $\boldsymbol{pronoun}$ enclitics should increase with the bigram probability of $<$ $\boldsymbol{verb}$ $\boldsymbol{pronoun}$ $>$ in usage. To test this prediction, the author collected object pronouns and their contexts from two spoken corpora, the Buckeye Corpus (Pitt et al. 2005) and the Fisher Corpus (Cieri et al. 2004).

From the Buckeye Corpus a perl script was used to extract the orthographic words *her, him, them* together with their twelve-word contexts on each side, in order to compare the probability of an onsetless pronoun in the broad phonetic transcription to the cooccurrence probabilities of the verb and pronoun in the orthographic transcription. (The Buckeye Corpus provides standard orthographic transcriptions of the words *him, her, them* regardless of their pronunciation.) Preceding verbs were identified using COCA word frequency data containing word forms (Davies 2008–), and manual filtering was used to distinguish postverbal objects from other postverbal occurrences of the pronoun forms (e.g. *draw her*/*draw her last breath*). The resulting totals are given in Table 2.

Table 2: Buckeye object pronoun data

	them	*him*	*her*	total
extracted	1,093	566	417	2,076
postverbal objects	631	342	167	1,140
no onset after verb	351	243	125	719

The Fisher corpus[16] contains orthographic transcriptions of both *them* and *'em*

[16]The Fisher corpus was developed as a data source for Automatic Speech Recognition. It consists of two parts released in 2003 and 2005, together containing 11,699 recorded telephone conversations totalling approximately 1,960 hours, amounting to ∼22,750,000 words. The conversations, averaging 10 minutes long, are between strangers who were randomly assigned topics. Speakers of multiple varieties of English were recruited, 6,813 female, 5,104 male. Orthographic transcriptions were produced using quick methods that lack the quality controls of smaller corpora of transcribed speech; 12% were produced at the Linguistic Data Consortium (LDC), using a different approach than Bolt Baranek and Newman (BBN), which produced the rest. The original BBN files underwent further processing by LDC for Automatic Speech Recognition, but the original versions are preserved in the Corpus.

forms of the third-person plural object pronoun. It lacks orthographic transcriptions for *'er (her), 'im (him)*. The data for the present study were extracted from the original BBN transcripts included with the Fisher corpus. These use syntactic punctuation (periods, commas, dashes, capitalization to initiate sentences), which was removed in the subsequent LDC processing of these files.

From the original BBN files a total of 58,439 instances of these forms together with their contexts were collected using an R script. Each production of the *them* variants was labeled for the category of the preceding word, using COCA word frequency data containing word forms (Davies 2008–). Forms of the verb *be*, auxiliaries, and contractions with *n't* were excluded because they do not host object pronoun enclitics. The present study uses the subset of conversations that contain at least one occurrence of *'em*, hence showing variation.[17] See Table 3.

Table 3: Fisher object pronoun data

	them	*'em*	total
extracted:	43,839	14,600	58,439
postverbal:	23,431	8855	32,286
American English speakers:	22,129	8739	30,868
in conversations showing variation:	11,196	8739	19,935

Bigrams and unigrams to calculate the cooccurrence probabilities of the verb hosts and pronouns in spoken English were collected from Parts 1 and 2 of the Fisher corpus (Cieri et al. 2004) and the SwitchBoard corpus (Godfrey & Holliman 1997) using R scripts. The cooccurrence probability is here taken to be the log of the conditional probability (15a), which is estimated as in (15b):

(15) a. Cooccurrence probability: $logP(verb|pronoun)$

b. Estimate of conditional probability: $\frac{count(verb, pronoun)}{count(pronoun)}$

The Buckeye datasets for *him* and *her* were combined because of data sparseness, leaving three datasets to be analyzed: Buckeye *him/her*, Buckeye *them*, and Fisher *them*. In addition to cooccurrence probability the datasets were annotated for the control variables of gender, age, and prior occurrence of a clitic or full pronoun form ('persistence' Szmrecsányi 2005), which were found to affect contracted auxiliary enclisis; these variables were defined as in Bresnan (2021a). For the Buckeye *him/her* dataset an index of *her/him* was found to interact with speaker gender (women speakers using enclitic *her* more than men), and that interaction was added to the model for that dataset.

[17] Different teams of transcribers were used in the production of the corpus, and some uniformly transcribed *them*, producing no occurrences of *'em*. Models of the full dataset and the restricted version showing variation yield the same key findings, but the model of the restricted dataset was preferred because of its superior residuals. See n. 18.

A binomial logit "working independence model" (Harrell Jr. 2001) with these predictors was fit to each of the three datasets. In each model, the log odds of no onset is a linear combination of the independent variables, as shown in (16). In (16) β_0 is the intercept, or mean, of the onsetless observations given the reference values of all of the predictors; β_i are the coefficients of the independent variables; j is the number of rows of observations of the dataset; and x_{ji} are the columns of data labeled by each independent variable i. (The interaction of two terms x_{jk}, x_{jl} in the Buckeye *him/her* model is expressed by adding an additional multiplicative term $\beta_{n+1}[x_{jk} \times x_{jl}]$ to the n terms in the formula.)

$$(16) \quad log\frac{P(\textit{noOnset} = 1)}{1 - P(\textit{noOnset} = 1)} = \beta_0 + \sum_i \beta_i x_{ji}$$

Bootstrap resampling of speaker clusters with replacement was used to correct for intra-speaker correlations (Harrell Jr. 2001: p. 247). The quality of these simple glm models was high.[18] The partial effects of cooccurrence probability on onsetlessness of the object pronoun are shown in Figure 8.

In sum, the underlying theory of syntactic co-lexicalization in the hybrid exemplar-based lexicon implies that high-probability sequences yield higher incidences of contraction and enclisis in usage, which is true in three datasets of spoken American English verb-object pronouns. In other words, sequences of words like *get them* and *take them* which frequently co-occur are on average far more likely to encliticize than those cooccurring the least, like *pet them, bake them*.

4.6 Probability of special pragmatics and meanings

A final consequence of the underlying theory is that the probability of special pragmatics and meanings for $\boldsymbol{verb}$ + $\boldsymbol{pronoun}$ should increase with the bigram probability of $< \boldsymbol{verb\ pronoun} >$ in usage. The reason is simply that higher cooccurrence probabilities strengthen syntactic co-lexicalization, and syntactic co-lexicalization strengthens independent usage profiles and departures from compositionality, as discussed in Subsection 4.4.

To test this prediction the author divided the Fisher dataset into four bins of roughly equal numbers of instances ordered by the average cooccurrence probabilities of *'em* (using the cut2() function of Harrell Jr. 2022). The bins and their average cooccurrence probabilities are shown in Figure 9.

[18] Using Gelman and Su's 2018 binnedplot() function, a proportion of 0.95 of average observed minus expected values in 25 bins of the Buckeye model of *them*, 1.00 in 22 bins of the Buckeye model *him/her* data, and 0.92 in 140 bins of the Fisher model of *them* were within 2 standard errors—close to what one would expect "if the model were actually true." These values were far higher than those for corresponding mixed-effect models with random effects of speaker and host, which were rejected as unacceptable. And the distribution of the binned 'residuals' in the full Fisher dataset not restricted to conversations showing variation had severe bimodal bunching, in contrast to the uniformly distributed residuals of the data consisting of conversations showing *them/'em* variation (Table 3).

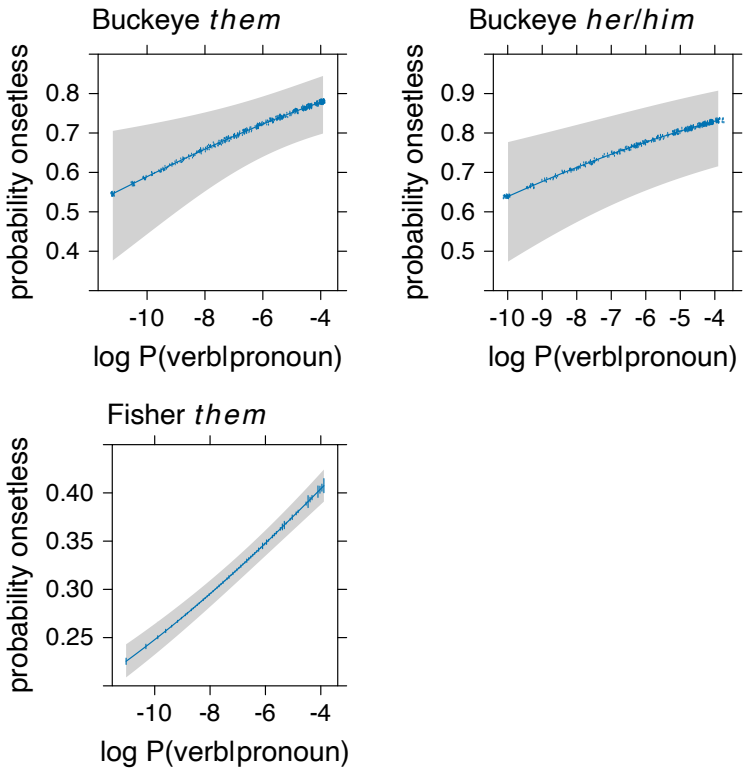


Figure 8: Partial effects of cooccurrence probability on occurrence of the enclitic object pronoun in spoken data, with blue ticks on the curve indicating the data distribution and 95% confidence intervals shaded gray.

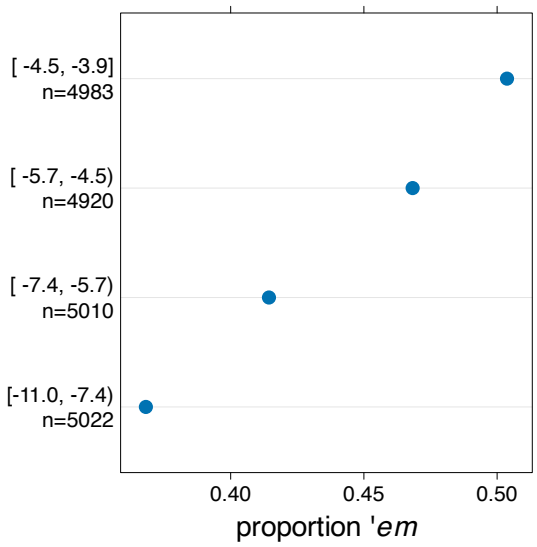


Figure 9: Proportion *'em* in four bins of Fisher verb-*them* bigrams ordered by average cooccurrence probability

The unique *monosyllabic uninflected* verbs in each of the four Fisher cooccurrence probability bins were selected as relatively feasible for visual inspection. The unique verbs in each bin were visually inspected and online dictionaries were consulted for special pragmatics and senses with *(th)em* as object. Special pragmatics and meanings had to be primarily associated with the pronoun object, rather than with the verb itself used with any object. Three out of the eight verbs from the highest bin were found to have possible special pragmatics or semantics with *them*. The special pragmatics or meanings of these verbs, boldfaced in (17), are already defined in (14).

(17) highest-bin verbs:
get give *have let see* ***take*** *tell watch*

In contrast, four out of the 380 verbs from the lowest bin have possible special pragmatics or meanings associated primarily with *them*. The four are boldfaced in (18) and examples are given in (19).

(18) lowest-bin verbs:
add aim air arm back bail bait bake ban bank bar bash bathe bend bet bit bite bless block blow blurt board boil bomb boo book boost bounce branch bread break breed broil brush build built bump bunch burn bus bust buys can care cash cause chain charge chase cheat cheer chew choose claim claw clean clear clip close clothe coach comb cook cost count court crack cram crave crawl crull crush dare date deal dig dish dole dope draft drag dragged draw dress drew drink drive dump end fault faze fear feel fight file fill film fine fix flash flip flop flunk flush fly fold fool force form free freeze frisk front fry **fuck** gear glaze glue grab grade greet groom gross group grow guide gut hand hang harm haul head heat hem hide hike hook host hug hunt hype join judge kick kid kiss knit knock lack last launch lay lead learn lick light line link list live load lock log long look lose lost mail map mark match mate melt mess milk mind mix mock move mow nail name nudge nuke owe own pack paint pan park part pass pat pause peck pet phase phone pile pin piss pitch place plague plant please plop plug ply point poke poll pop post pour praise pray price print punch push quit quote race raised ram ran rank rat rate razz reach rest rid ride rig ring rip roast roll rouse rub run rush sand say scale scan scare school scoot scratch screen **screw** search seek seem serve sew shake share shave shift ship shoo shop **shove** shun shut sic sign sing sit size skip slap slide slip slot slow smack smell smoke snap sneak soak sock solve sort space spank spay spill spit split spoil spray spread squeeze stab stack stand stare starve steal steer step stick stiff stir stomp store stretch strike string strip stroke stuck **stuff** sue suit swap swat sway sweep switch tag talk tame tap tape taste tax tear tempt tend test thank think tick tie tilt time tip toss trace track trade trap trash trick trim trip try tuck tune type vibe view vote wand warn wash waste wave wax wear weed whack whip will win wind wipe wish work wrap yank zone

(19) a. *fuck'em* ("A term directed toward an unspecified group of people, used to combat deep feelings of rejection due to repeated failure that is perceived to be the fault of that group" https://www.urbandictionary.com): *"Who needs a G.E.D anyway? Fuck 'em."*

b. *screw'em* ("a derogatory remark used by a person or group to another party they do not get along with" ibid.): *People say I have a bad attitude. Screw'em!*

c. *shove'em* (expresses refusal to accept them): *Take these jobs and shove'em*

d. *stuff'em* ("used in the imperative to express contempt" https://www.merriam-webster.com/dictionary/stuff): *if they didn't like it, stuff'em—Eric Clapton*

Table 4 shows a trend in the proportions of monosyllabic uninflected verbs with special pragmatics or meanings across the bins.[19] The downward trend from the top to the bottom bin corresponds to the decrease in their average cooccurrence probabilities. (See Appendix I for more data.)

Table 4: The downward trend in the proportions of unique monosyllabic uninflected verb-pronoun bigrams having possible special pragmatics/meanings corresponds to the average cooccurrence probabilities of the bins, as predicted.

	log P(verb | pron)	tokens	unique verbs	proportion special
highest bin:	$[-4.46, -3.89]$	4,983	8	$\mathbf{3/8}$ **(0.38)**
2nd highest bin:	$[-5.69, -4.46)$	3,441	14	$\mathbf{3/14}$ **(0.21)**
2nd lowest bin:	$[-7.42, -5.69)$	2,535	41	$\mathbf{2/41}$ **(0.07)**
lowest bin:	$[-11.03, -7.42)$	1,400	380	$\mathbf{4/380}$ **(0.01)**

This correspondence is surprising because it has not been reported before, to our knowledge. Yet it is straightforwardly implied by the underlying theory of enclisis present here: higher cooccurrence probabilities strengthen syntactic co-lexicalization, and syntactic co-lexicalization strengthens independent usage profiles and departures from compositionality.

5 Conclusion

In sum, the underlying theory of syntactic co-lexicalization in the mental lexicon explains why enclitics and their host verbs are syntactically independent in c-structure but show classic evidence of shared lexical representations:

- allomorphy of the enclitic in the context of the host,

[19] The trend is significant under a test for trend in proportions, $\chi^2(1) = 53.231, p = 2.966 \times 10^{-13}$.

- prosodic wordhood with the host,
- the existence of special pragmatics and meanings.

And it also explains why the cooccurrence probabilities of verbs and their adjacent pronoun objects predict

- the probability of their enclisis and
- the probability of their special pragmatics and meanings.

Diachronically, the enclitic English pronoun forms are said to be at the beginning of the cycle of grammaticalization of full object pronouns into clitics, pronominal affixes, and beyond on the timescales of language change and typology (cf. Van Gelderen 2011; Haig 2018). What has not been recognized is the converging evidence they provide—both categorical and probabilistic—for lexical syntax, and in particular for syntactic co-lexicalization as a living part of the synchronic grammar of English.

The present analysis of the English object pronoun enclitics brings them closely in line with the contracted English auxiliaries studied by Bresnan (2021a,b), even though the syntactic constituency and prosodic wordhood of the auxiliary enclitics, unlike the object pronoun enclitics, diverge in direction. What the English contracted auxiliaries and onsetless object pronouns have in common is that they are phonological enclitics (respectively forming the final syllable coda or syllable of the preceding word), are optional morphological variants of full forms, and share in the syntactic distributions of their corresponding full forms. They are what Zwicky (1977) designates as "simple clitics".[20]

In many other languages clitic object pronouns and auxiliary verbs display a higher degree of grammaticalization and functional differentiation from their corresponding full forms; compare for example the object pronouns of Romance (Pescarini 2021) or Bantu languages (e.g. Givón 1976; Bresnan & Mchombo 1987; Bresnan 2001). The optionality of the English enclitics, their shared syntactic distribution with the full forms, and the availability of suitably transcribed corpora of spoken English make it relatively straightforward to study their probabilistic patterns of cooccurrence with their adjacent hosts. The very simplicity of English encliticization thus plays a key role in revealing the synchronic effects of cooccurrence probabilities on syntactic co-lexicalization, in line with the underlying theory of the mental lexicon.

[20]The directional divergence of English auxiliary enclitics has been observed elsewhere in typological studies (e.g. Klavans 1985; Cysouw 2005). In his survey of directionally divergent, or 'ditropic', clitics Cysouw (2005: 32) suggests that those in Djinang (Pama-Nyungan), Kwakwala/Kwakiutl (Wakashan), Ancient Greek, and Yagua (a language of Peru) are all simple clitics, being optional and having the same syntactic distribution as the corresponding full forms. To this list can be added English contracted *is*, which is both enclitic on the leftward host and metrically dependent on the rightward phrase with which it forms a syntactic constituent (Bresnan 2021a,b). Within the relatively strict word order of English, contracted *is* also allows variable leftward hosts, like the main verb in *Who do you think's coming to town?* (Baker 1971; Bresnan 2021a: 109, 127–8).

Appendix I

These are the verbs in the second-highest and second-lowest bins totaled in Table 4. Note that a few possible additions of overlooked verbs with special pragmatics or meanings are not likely to undermine the results of the test for trend in proportions, because of the large differences in counts of unique words in each bin, which constitute the denominators of the proportions.

(20) second-highest bin verbs:
buy call **do** find help keep know love **make pay** send teach use want

(21) a. *do'em in* (kill someone): *This lonely bottle has done'em in*—song lyrics by Johanna Divine

b. *make'em pay* (punish or get revenge on an unspecified group of people): *The man that "makes them pay"*, a punning registered trademark of an Ohio injury lawyer

c. *pay'em back* (get revenge on an unspecified group of people): *Get my weight up with my hate and pay 'em back when I'm bigger*, rap lyrics by Tupac Shakur

(22) second-lowest bin verbs:
ask beat blame **bring** catch change check cut drop eat feed hate hear hit hold hurt **kill** leave meet miss need pick play pull raise read rent sell set shoot show start stop throw touch train treat trust turn walk write

(23) a. *bring'em on* (speaker's aggressive challenge to a group of people): *There are some who, uh, feel like that, you know, the conditions are such that they can attack us there. My answer is: bring 'em on.* — George W. Bush

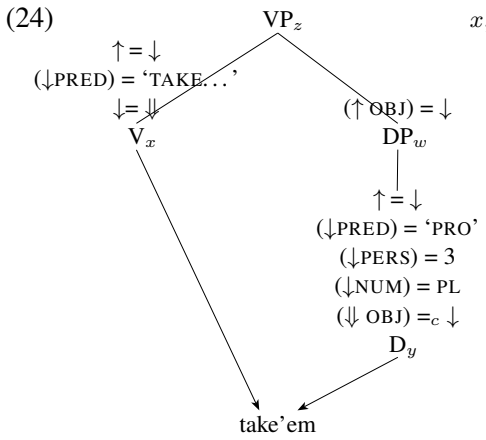
b. *kill'em*: see (14)

Appendix II

(24) shows how the mappings of Figure 3 are instantiated in the formal grammar. Both the syntactic annotations expressing the structure-function mapping principles for English and the lexical annotations from (3) collect on the c-structure tree nodes together. The subscripted labels x, y on the syntactic nodes and the f-structures show their correspondences. The up arrow $\uparrow$ is instantiated by the variable on the mother node and the down arrow $\downarrow$ by that on the daughter (annotated) node. The double down arrow $\Downarrow$ represents the f-structure of the shared entry, which allows annotations of the atomic elements V and D to refer to the same f-structure (Wescoat 2005).[21]

[21]Thus in (23) the annotation $\downarrow = \Downarrow$ below the atomic constituent V identifies the f-structure of the shared entry *take'em* with that of the V, and the constraining equation $(\Downarrow \text{OBJ}) =_c \downarrow$ annotated below the atomic constituent D checks that the f-structure associated with the D is the OBJ of the f-structure associated with the shared entry *take'em*.

(24)

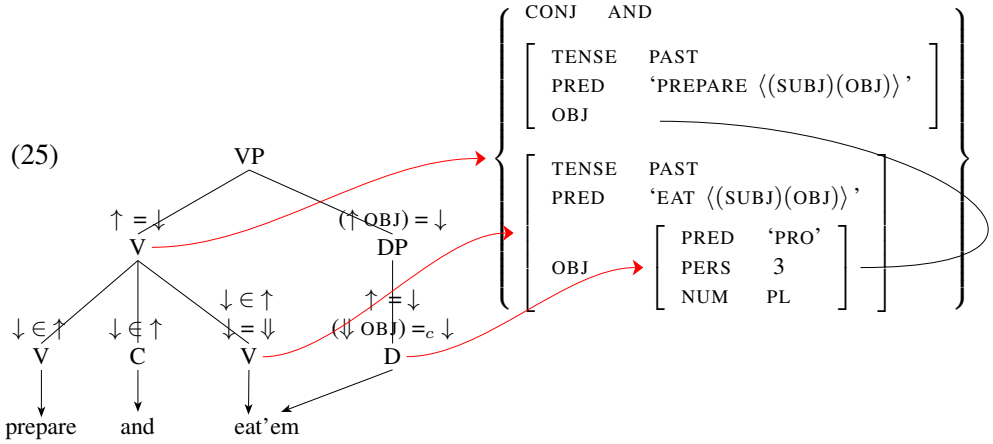


$$x, z \left[\begin{array}{ll} \text{PRED} & \text{'TAKE } \langle (\text{SUBJ})(\text{OBJ}) \rangle \text{'} \\ \text{OBJ } y, w & \left[\begin{array}{ll} \text{PRED} & \text{'PRO'} \\ \text{PERS} & 3 \\ \text{NUM} & \text{PL} \end{array} \right] \end{array} \right]$$

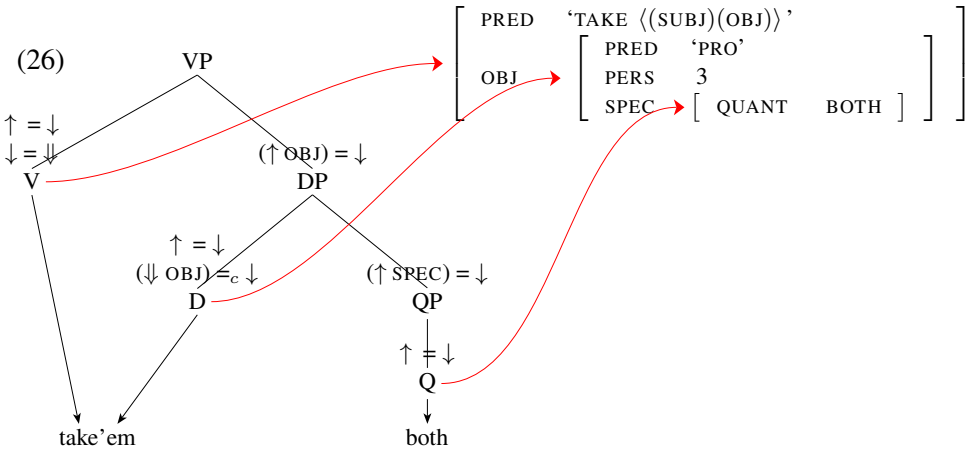
The detailed LFG analyses of the structures in Figures 5 and 6 are given in (25) and (26). In both cases the syntactic independence of the components of *eat'em* does not interfere with the co-lexicalization of the enclitic with its adjacent verb, so long as the enclitic functions as the object of the adjacent verb, as required in the shared lexical entries (cf. (3) or (4)).

In (25) the OBJ function is an attribute of the VP's f-structure, which is identified with the f-structure of its head V. When the head V is a conjunction of V's, as it is in (25), it is mapped to the set of the f-structures of its conjuncts, and grammatical functions that are attributes of a set are distributed over its member f-structures by structure sharing (reentrancy) (Peterson 2004).

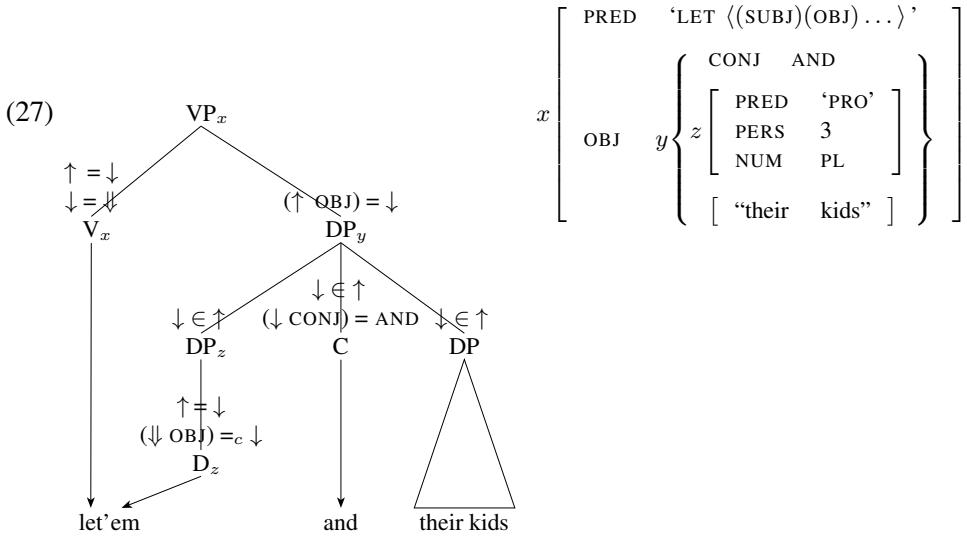
(25)



In (26) the object pronoun is the head of the flipped quantified DP. Hence, its features will be identified with the f-structure of the DP phrase, and it will satisfy the lexical entry of *take'em* (3) by the general structure-function mapping principles of Bresnan et al. (2015).



In (27), in contrast to (26), *'em* is not the head of object DP *'em and their kids*. The constraining equation (⇓ OBJ) $=_c \downarrow$ from the atomic constituent D_z of the shared entry for *let'em* requires the OBJ f-structure of the verb labeled x to be identified with the f-structure of the leftmost DP conjunct, labeled z. But the the c-structure annotation on the top DP_y requires the object of the verb to be y by (x OBJ) = y. These conflicting identities violate the CONSISTENCY principle of LFG since $y \neq z$: the left conjunct's f-structure and the set of which it is a member conflict and cannot be identified. The associated lexical string is therefore ungrammatical under this analysis: **let 'em and their kids play*, in contrast to *let them and their kids play*.



References

Abeillé, Anne & Danièle Godard (dir.). 2021. *La Grande Grammaire du Français, 2 volumes*. Arles: Actes Sud imprimerie nationale éditions edn.

Abercrombie, David. 1964. Syllable quantity and enclitics in English. In David Abercrombie, D.B. Fry, P.A.D. MacCarthy, N.C. Scott & J.L.M. Trim (eds.), *In Honor of Daniel Jones. Papers contributed on the occasion of his eightieth birthday, 12 September 1961*, 216–222. London: Longmans, Green, and Company, Ltd.

Baker, Carl L. 1971. Stress level and auxiliary behavior in English. *Linguistic Inquiry* 2(2). 167–181.

Bresnan, Joan. 1982. The passive in lexical theory. In Joan Bresnan (ed.), *The Mental Representation of Grammatical Relations*, 3–86. MIT Press.

Bresnan, Joan. 2001. The emergence of the unmarked pronoun. In Geraldine Legendre, Jane Grimshaw & Sten Vikner (eds.), *Optimality-theoretic Syntax*, 113–142. The MIT Press.

Bresnan, Joan. 2019. On weak object pronouns in English. Unpublished paper presented at Lfg19, July 8–10, 2019, Canberra, Australia.

Bresnan, Joan. 2021a. Formal grammar, usage probabilities, and auxiliary contraction. *Language* 97(1). 108–150.

Bresnan, Joan. 2021b. A hybrid model of auxiliary contraction: Evidence in children's speech. In *Proceedings of the LFG21 Conference*, 26–50. Online: http://web.stanford.edu/group/cslipublications/cslipublications/LFG/.

Bresnan, Joan, Ash Asudeh, Ida Toivonen & Stephen Wechsler. 2015. *Lexical-Functional Syntax, (2^{nd} ed)* Blackwell Textbooks in Linguistics. John Wiley & Sons.

Bresnan, Joan & Sam A. Mchombo. 1987. Topic, pronoun, and agreement in Chicheŵa. *Language* 741–782.

Bybee, Joan. 1985. *Morphology: A study of the relation between meaning and form*. Amsterdam: Benjamins.

Bybee, Joan & Paul J. Hopper (eds.). 2001. *Frequency and the Emergence of Linguistic Structure*. John Benjamins Publishing.

Bybee, Joan & Joanne Scheibman. 1999. The effect of usage on degrees of constituency: The reduction of *don't* in English. *Linguistics* 37(4). 575–596.

Cardinaletti, Anna & Michal Starke. 1999. The typology of structural deficiency: A case study of the three classes of pronouns. In H. van Riemsdijk (ed.), *Clitics in the Languages of Europe*, 145–233. de Gruyter.

Chomsky, Noam. 1970. Remarks on nominalization. In Roderick A. Jacobs & Peter S. Rosenbaum (eds.), *Readings in English Transformational Grammar*, 184–221. Ginn.

Cieri, Christopher, David Miller & Kevin Walker. 2004. The Fisher corpus: A resource for the next generations of speech-to-text. In *LREC*, vol. 4, 69–71.

Culbertson, Jennifer. 2010. Convergent evidence for categorial change in French: From subject clitic to agreement marker. *Language* 86(1). 85–132.

Cysouw, Michael. 2005. Morphology in the wrong place: A survey of preposed enclitics. In Wolfgang U. Dressler, Dieter Kastovsky, Oskar E. Pfeiffer & Franz Rainer (eds.), *Morphology and its Demarcations: Selected papers from the 11th morphology meeting, Vienna, February 2004*, 17–37. Benjamins.

Davies, Mark. 2008–. Word frequency data from The Corpus of Contemporary American English (COCA). Data available online at https://www.wordfrequency.info.

Gelman, Andrew & Yu-Sung Su. 2018. *arm: Data analysis using regression and multilevel/hierarchical models*. R package version 1.10-1.

Givón, Talmy. 1976. Topic, pronoun and grammatical agreement. In Charles Li (ed.), *Subject and topic*, 149–188. Academic Press.

Godfrey, John J. & Edward Holliman. 1997. *Switchboard-1 release 2*. Philadelphia: Linguistic Data Consortium.

Haig, Geoffrey. 2018. The grammaticalization of object pronouns: Why differential object indexing is an attractor state. *Linguistics* 56(4). 781–818.

Harrell Jr., Frank E. 2001. *Regression Modeling Strategies: With applications to linear models, logistic regression, and survival analysis*. Springer.

Harrell Jr., Frank E. 2021. *rms: Regression Modeling Strategies*. https://CRAN.R-project.org/package=rms. R package version 6.2-0.

Harrell Jr., Frank E. 2022. *Hmisc: Harrell Miscellaneous*. https://CRAN.R-project.org/package=Hmisc. R package version 4.7-2.

Inkelas, Sharon. 1991. *Prosodic Constituency in the Lexicon* Outstanding Dissertations in Linguistics. Garland Publications. Original PhD dissertation 1989, Stanford University.

Inkelas, Sharon & Draga Zec. 1993. Auxiliary reduction without empty categories: A prosodic account. *Working Papers of the Cornell Phonetics Laboratory* 8. 205–253.

Ito, Junko & Armin Mester. 2018. Matching light elements. In Jason Merchant, Line Mikkelsen, Deniz Rudin & Kelsey Sasaki (eds.), *A Reasonable Way to Proceed. Essays in Honor of Jim McCloskey*, 168–190. Santa Cruz, Berkeley, Chicago: https://escholarship.org/uc/item/7z29n70x.

Ito, Junko & Armin Mester. 2019. Match as syntax-prosody Max/Dep: Prosodic enclisis in English. *English Linguistics, Journal of the Linguistic Society of Japan* 36(1). 1–28.

Kaisse, Ellen M. 1985. *Connected Speech: The Interaction of Syntax and Phonology*. New York: Academic Press.

Kiesling, Scott, Laura Dilley & William D. Raymond. 2006. *The Variation in Conversation (ViC) Project: Creation of the Buckeye Corpus of Conversational Speech*. Dept. of Psychology, Ohio State University, available at http://www.buckeyecorpus.osu.edu.

Klavans, Judith. 1995. *On Clitics and Cliticization. The interaction of morphology, phonology, and syntax* Outstanding Dissertations in Linguistics. New York: Garland Publishing, Inc. Original PhD dissertation 1980, University College, London.

Klavans, Judith L. 1985. The independence of syntax and phonology in cliticization. *Language* 95–120.

Krug, Manfred. 1998. String frequency: A cognitive motivating factor in coalescence, language processing, and linguistic change. *Journal of English Linguistics* 26(4). 286–320.

Maling, Joan M. 1976. Notes on quantifier-postposing. *Linguistic Inquiry* 7(4). 708–

718.
Pescarini, Diego. 2021. *Romance Object Clitics: Microvariation and linguistic change*. Oxford University Press.
Peterson, Peter G. 2004. Coordination: Consequences of a Lexical-Functional account. *Natural Language & Linguistic Theory* 22(3). 643–679.
Pierrehumbert, Janet B. 2001. Exemplar dynamics: Word frequency, lenition and contrast. In Bybee & Hopper (2001).
Pierrehumbert, Janet B. 2002. Word-specific phonetics. *Laboratory Phonology* VII. 101–139.
Pierrehumbert, Janet B. 2006. The next toolkit. *Journal of Phonetics* 4(34). 516–530.
Pierrehumbert, Janet B. 2016. Phonological representation: Beyond abstract versus episodic. *Annual Review of Linguistics* 2. 33–52.
Pitt, Mark A., Keith Johnson, Elizabeth Hume, Scott Kiesling & William Raymond. 2005. The Buckeye Corpus of Conversational Speech: Labeling conventions and a test of transcriber reliability. *Speech Communication* 45(1). 89–95.
R Core Team. 2023. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing Vienna, Austria. https://www.R-project.org/.
Sarkar, Deepayan. 2008. *Lattice: Multivariate data visualization with R*. New York: Springer. http://lmdvr.r-forge.r-project.org. ISBN 978-0-387-75968-5.
Selkirk, Elisabeth O. 1972. *The Phrasal Phonology of English and French*. MIT: PhD dissertation.
Selkirk, Elisabeth O. 1984. *Phonology and Syntax*. MIT Press.
Selkirk, Elisabeth O. 1996. The prosodic structure of function words. In J. Morgan & K. Demuth (eds.), *Signal to Syntax: Bootstrapping from speech to grammar in early acquisition*, 187–214. Lawrence Erlbaum.
Stevenson, Angus & Christine A. Lindberg. 2010. *Oxford Dictionary of English (3rd ed)*. Oxford University Press, USA. Online: https://www.oxfordreference.com, current online version 2015.
Szmrecsányi, Benedikt. 2005. Language users as creatures of habit: A corpus-based analysis of persistence in spoken English. *Corpus Linguistics and Linguistic Theory* 1(1). 113–150.
Todd, Simon, Janet B. Pierrehumbert & Jennifer Hay. 2019. Word frequency effects in sound change as a consequence of perceptual asymmetries: An exemplar-based model. *Cognition* 185. 1–20.
Turton, Danielle. 2014. *Variation in English /l/: Synchronic reflections of the life cycle of phonological processes*. The University of Manchester: PhD dissertation.
Turton, Danielle. 2016. Synchronic stratum-specific rates of application reflect diachronic change: Morphosyntactic conditioning of variation in English /l/-darkening. *Papers in Historical Phonology* 1.
Turton, Danielle. 2017. Categorical or gradient? An ultrasound investigation of /l/-darkening and vocalisation in varieties of English. *Laboratory Phonology* 8(1).
Tyler, Matthew. 2019. Simplifying MATCH WORD: Evidence from English functional categories. *Glossa: A Journal of General Linguistics* 4(1).

Van Gelderen, Elly. 2011. *The Linguistic Cycle: Language change and the language faculty*. Oxford University Press.

Wallenberg, Joel. 2009. *Antisymmetry and the Conservation of C-Command: Scrambling and phrase structure in synchronic and diachronic perspective*. University of Pennsylvania: PhD dissertation.

Wescoat, Michael T. 2002. *On Lexical Sharing*. Stanford University: PhD dissertation.

Wescoat, Michael T. 2005. English nonsyllabic auxiliary contractions: An analysis in LFG with lexical sharing. In *Proceedings of the LFG05 Conference*, 468–486. Online: http://web.stanford.edu/group/cslipublications/cslipublications/LFG/.

Zwicky, Arnold M. 1970. Auxiliary reduction in English. *Linguistic Inquiry* 1(3). 323–336.

Zwicky, Arnold M. 1977. On clitics. Unpublished paper reproduced in 1977 by the Indiana University Linguistics Club.