Prosodic structure affects processing: The case of English past inflection

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Introduction: In the literature on lexical access, there is much debate about whether or not inflected forms are stored in the mental lexicon. Some have argued that all inflected forms are stored (e.g., Bybee, 1995; Rumelhart & McClelland, 1986). Others have argued that irregulars are stored while regularly inflected forms are built by rule; this distinction is based in part on the relative speed at which these different types of inflected forms are accessed (e.g., Pinker & Prince, 1994). More recent work under the latter approach admits that regularly inflected forms *can* be stored under certain conditions (e.g., Pinker & Ulmann, 2002). In this paper, we explore the possibility that the prosodic representation of regularly inflected forms affects their processing, which may suggest that prosodic shape impacts storage.

We assume, following Goad and White (2006), that regularly inflected forms in English correspond to recursive prosodic words (PWds): inflection attaches to a base, which is itself a PWd, as shown in (1a-b). Evidence for this is that regularly-inflected forms can violate the phonotactic and length constraints that hold of monomorphemic PWds. Concerning phonotactics, stop clusters must be voiceless in single PWds: [tækt] 'tact' (*[tægd]$_{\text{PWd}}$), in contrast to in inflected words: [tæk-t] 'tacked', [tæg-d] 'tagged'. Concerning length, final rhymes in monomorphemic PWds are maximally 3 segments long, VXC (unless XC is a coronal cluster): [striːk] 'streak', [strɪkt] 'strict' (*[striːkt]$_{\text{PWd}}$); whereas rhymes in inflected words are not so constrained: [striːk-t] 'streaked'.

Hypothesis: A comparison of (1b) and (1c) shows that some inflected forms, those whose bases end in short (VX) rhymes, can fit the prosodic shape of monomorphemes and so their structure is potentially ambiguous: they could be built using a recursive structure or they could be stored as single PWds. Inflected forms that have a long (VXC) base, as in (1a), are unambiguously recursive. We hypothesize that forms that are unambiguously recursive are retrieved faster, as they are invariably decomposed prosodically. In contrast, forms that are inflected but whose profile could fit the lower (non-recursive) PWd structure in (1c) are retrieved more slowly, even though these words are shorter in terms of segment count than their unambiguously recursive long counterparts.

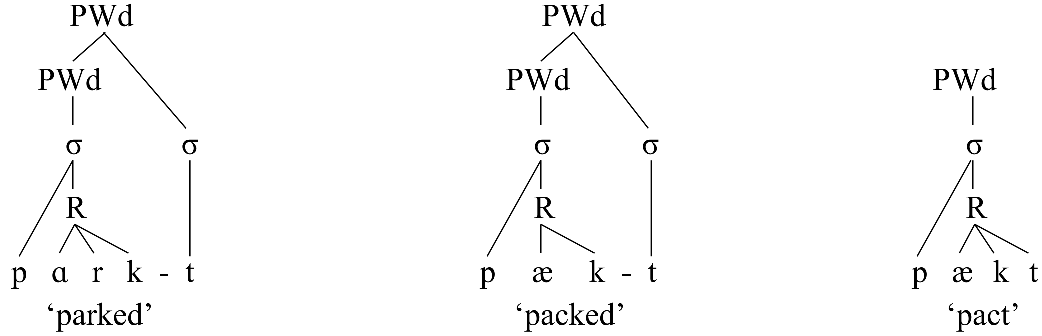
Methods: To test this hypothesis, 17 native speakers of North American English performed a lexical decision task with auditory stimuli in OpenSesame (Mathôt *et al.*, 2012). The experiment included 522 monosyllabic items. The target items were real or nonce verbs, inflected or uninflected, with short or long rhymes. The experiment also included quasi-inflected real and nonce words, i.e. uninflected words that end in /t, d/ (e.g., *flat*, *round*), which were also coded as short or long. Nonce words were generated by changing the onset of a corresponding real word (e.g., *save* → *tave*). Items were coded for frequency through a script that counted rhyme frequency in the SUBTLEX corpus (Brysbaert *et al.*, 2012), based on phonetic transcriptions available in the CMU Pronouncing Dictionary (Weide, 1993).

Results: Participants' response times (RTs) were modelled using linear regressions with random intercepts for item, participant and frequency of the rhyme in R (R Core Team, 2019). RTs that were two SDs above or below each participant's mean were excluded. The model comparing inflected and uninflected words reveals that responses are faster with inflected items ($\hat{\beta}$ = -0.06, p = 0.01) and real words ($\hat{\beta}$ = -0.17, $p < 0.01$), and slower with short rhymes ($\hat{\beta}$ = 0.08, $p < 0.01$); see Figure 1. The model comparing long and short quasi-inflected and inflected forms indicates that responses are faster for long than for short inflected forms ($\hat{\beta}$ = -0.07, p = 0.02). RTs for both long and short inflected forms are faster than for long and short quasi-inflected forms (ps < 0.02); see Figure 2. Faster RTs for inflected items are consistent with listeners decomposing inflected forms instead of searching for them in the mental lexicon. Faster RTs for long inflected forms suggest that their prosodic representation is unambiguous to listeners: while such forms involve recursive PWds, short inflected forms may or may not be structured recursively.

(1) a. Regularly-inflected long base (VXC-final rhyme):

b. Regularly-inflected short base (VX-final rhyme):

c. Monomorphemic (single) PWd:



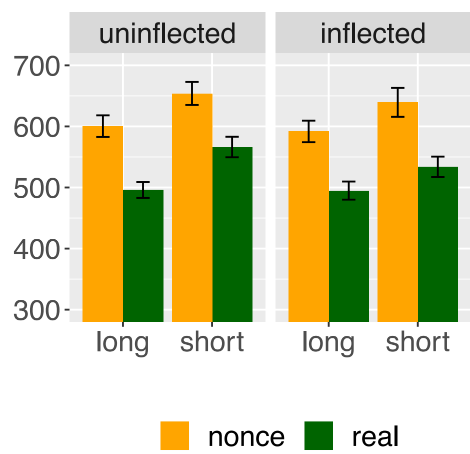


Figure 1. RTs for long and short uninflected and inflected roots.

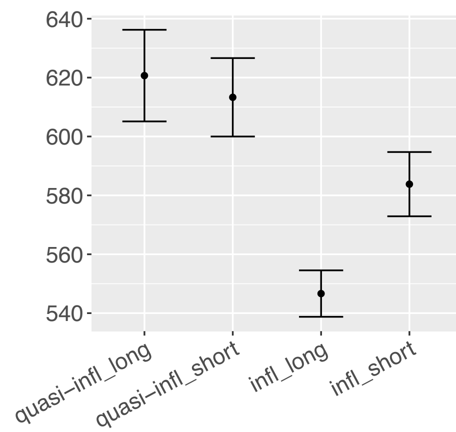


Figure 2. RTs for long and short inflected and quasi-inflected items.

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