Morpho-phonology without semantics? The roles of lexical memory and experience in influencing the nature of lexical representations in a rote learning context

Siti Syuhada BINTE FAIZAL and Ghada KHATTAB
School of Education, Communication, and Language Sciences, Newcastle University, NE1 7RU, UK
E-mail: s.s.bintra-faizal@ncl.ac.uk, ghada.khattab@ncl.ac.uk

Word learning is typically strengthened through building semantic representations alongside phonological ones, cementing meaning relations together with (morpho-)phonological forms and structures (e.g. McGregor et al., 2002). Rote Qur’anic memorisation by non-Arabic-speaking pupils presents an interesting challenge to that concept: first, word meanings are not typically provided for memorisers; and second, the non-concatenative nature of Arabic morphology presents a stark contrast with the L1 structure of learners. Arabic has a templatic morphology, which consists of word formation that is very different from the more linear affixation (prefixes and suffixes) that defines morphology in most European languages (McCarthy, 1981). Templates consist of phonological shapes (e.g. /kataba/) which can be broken into consonant roots (/k, t, b/ in this case), vowel melodies (/a, a, a/), and skeletal templates (CVCVCV), all of which arguably have different prosodic representations as well as linguistic functions. The last decade has seen major advances in research on the mental representation of Arabic morphology, particularly through work on Standard Arabic (e.g. Boudelaa & Marslen-Wilson, 2014; 2011; 2005), but more recently on dialects as well (e.g. Schluter, 2013, on Moroccan Arabic). These studies have shown that discontinuous consonantal root and vowel patterns are represented in Arabic speakers’ minds and play different roles in spoken and visual word processing. Their work further points to the importance of semantic relatedness in root families and its intricate relationship with morphological and phonological representations; this then raises the question of whether non-concatenative morphological representation can develop without semantic representation. One context that lends itself to investigating this question is that of rote learning of Arabic through Qur’anic memorisation with little semantic input. This is common in non-Arabic-speaking countries where speakers from Muslim communities learn how to recite the Qur’an but usually learn very little Arabic in the process.

The goal of this study was to investigate whether or not non-Arabic-speaking Qur’anic memorisers implicitly gain non-linear morpho-phonological representations while processing what they read or memorise in the Qur’an, and thus, are primed by Qur’an Arabic roots and word patterns. We also investigated whether the priming of roots interacts with Qur’an vocabulary knowledge and amount of Qur’an memorised, thereby informing us of the roles of semantics in morphological representation and of statistical exposure to the language in processing. A group of 153 participants (84 females; \(M_{\text{age}} = 15.32; SD_{\text{age}} = 1.07\) were sampled from a taḥfīz (memourising) school, two mādrasahs (religious school; non-memourising), and the general public in Singapore. All were at least Malay-English bilinguals in upper secondary or polytechnic. Participants were given a standardised Qur’an Vocabulary Test (QVT) in order to measure their Qur’an vocabulary knowledge, and self-reports of Qur’anic memorisation scores were elicited in order to measure the amount and fluency of Qur’anic memorisation.

Employing a visual unmasked priming paradigm for a lexical decision task, 26 orthographically and phonetically unambiguous words were selected from the Qur’an Lexicon (Binte Faizal et al., 2015) for use as targets. Each target was paired with three different primes to generate three experimental conditions each with 26 sets of prime-target pairs (see Table 1). In the +R+P condition, both primes and targets shared a root, and thus, the same phonology (consonants). The –R+P condition, in which both primes and targets did not share a root but shared the same phonology (consonants), served as a phonological control to ensure that any root priming effects are due to morphology and not shared phonology. The Baseline condition provided a standard unrelated baseline for the +R+P and –R+P conditions, where prime and target did not share any semantic, morphological, or phonological properties. All experimental trials and unrelated prime-target fillers were presented in random order.

Linear mixed-effects regression analyses using R were then conducted on the cleaned RT data, with participant and item as random effects, item frequency as a covariate, and condition, Qur’an Vocabulary...
Test score, and amount of memorization as fixed effects. Although preliminary results showed no statistical significance, there are interesting trends showing that the root priming effect is the largest in participants who have more Qur’an vocabulary knowledge and have memorised more of the Qur’an (see Figure 1), and minimal in participants with little vocabulary knowledge or memorisation. This supports the notion that root morphemes convey semantic information, and that semantic knowledge needs to be supported with statistical exposure to the language to strengthen morpho-phonological representations (and vice versa).

**Table 1: Sample stimuli used in the root priming experiment**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Prime</th>
<th>Target</th>
<th>Letters</th>
<th>Phonemes</th>
<th>Syllables</th>
<th>Item Frequency</th>
<th>Root Frequency</th>
<th>Root Family Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>+R+P</td>
<td>يَعْمَلْْ</td>
<td>عَمِلَْ</td>
<td>4.27 0.83</td>
<td>6.23 0.95</td>
<td>2.69 0.55</td>
<td>3.88</td>
<td>4.96</td>
<td>149.81</td>
</tr>
<tr>
<td></td>
<td>(he worked)</td>
<td>(he has done)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-R+P</td>
<td>يَعْلَمْْ</td>
<td>عَمِلَْ</td>
<td>4.27 0.83</td>
<td>6.23 0.95</td>
<td>2.69 0.55</td>
<td>7.12</td>
<td>13.00</td>
<td>113.62</td>
</tr>
<tr>
<td></td>
<td>(he knew)</td>
<td>(he has done)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>تَغْفِرْْ</td>
<td>عَمِلَْ</td>
<td>4.27 0.83</td>
<td>6.23 0.95</td>
<td>2.69 0.55</td>
<td>4.46</td>
<td>5.43</td>
<td>121.38</td>
</tr>
<tr>
<td></td>
<td>(you forgive)</td>
<td>(he has done)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1:** Mean reaction times (RTs) to root- and phonology-related primes as opposed to a baseline unrelated condition; results are presented as a function of high or low memorisation (Mem) and high or low Qur’anic vocabulary knowledge (QVT).

**References**


