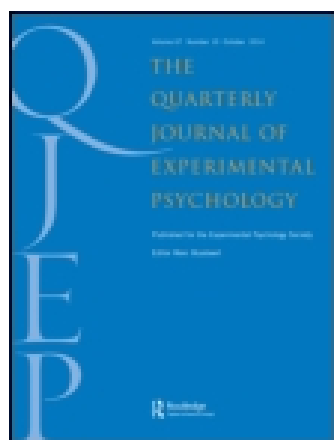


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Commentary

Reading segments is not reading words: Comment on Kawamoto et al. (2014)

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Word production involves computing the sound of a word from its concept or visually presented form. To perform such a process, multiple operations are required, including lexical access, word form encoding, and articulation. With regard to articulation, a critical issue is understanding which is the *minimal planning unit* (henceforth MPU) to address articulatory programmes and start motor implementation. Kawamoto, Liu, Lee, and Grebe (2014, henceforth K&Al) have recently proposed that the MPU consists in the word initial segment. This conclusion follows from the results of two reading-aloud experiments in which the authors primed the initial segment of monosyllabic words.—In their Experiment 1, participants were presented with blocks of words either sharing or not sharing the first consonant and were told in advance which was the shared initial consonant; in Experiment 2 participants were first presented with the initial letter of the word and then the full word. The experiments showed that readers started articulation relying on the first phoneme only.

The segment as MPU hypothesis is an attractive one, but it is difficult to substantiate. In what follows, we argue that, in addition to some methodological concerns, at least three issues may challenge this hypothesis. K&Al suggested the segment

as the MPU in speech production. However, they conducted two experiments of word reading. Accordingly, we will refer exclusively to reading aloud, i.e., a print-to-sound mapping process, in which the encoding of the unit to be uttered is strictly conditioned by the properties of the written input.

A first challenge to the segment as MPU hypothesis is how to reconcile it with the typical articulatory behaviour shown by readers: K&Al suggest that the phonology-to-phonetics interface operates as a segment-by-segment conversion in which one segment is planned and immediately articulated. However, there is much evidence that the mapping from phonological representations to sounds occurs through units larger than the single segment. Co-articulation phenomena show that the articulatory realization of a phoneme depends not only on the proximal, but also on the distal phonetic context (e.g., Fowler, 1981; Goldstein, & Fowler, 2003; Zsiga, 1994). This being the case, how can a word segment be correctly articulated without considering its phonetic context?

A second issue casting doubt on the generalizability of the segment as MPU hypothesis is the phonetic realization of stress in polysyllabic words that, in many languages, constitute a great part of the lexicon. Stress is a contrastive feature: A syllable

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is stressed only with respect to an unstressed one. Thus, in the Italian word a.BA.te (“abbot”),¹ the first unstressed “a” cannot be correctly articulated unless the second-stressed “a” has been articulatorily planned. (This is even more evident in English, in which some unstressed vowels are reduced to *schwa*, as the first vowel in “objective”.) If the start of articulation is linked to the first segment alone, how can the system correctly produce the contrast between stressed and unstressed units?

A third issue deals with the opacity of orthography-to-phonology mapping. In English, several letters have no one-to-one letter-to-phoneme mapping. For example, the letter “c” is often mapped onto /k/, but it may become /s/, /tʃ/, or /Ø/, depending on the following letter (e.g., city, chair, cnidarian). Thus, motor implementation of the sound corresponding to “c” is a function of the following item. In Experiment 2, K&A1 found that articulation could start immediately at the presentation of the first letter, even before the full word was displayed. However, the initial letter always occurred in unambiguous consonant-vowel sequences that made its mapping onto sound constant and fully predictable.² How might such a fast articulation occur in the case of not univocal letter-to-sound mapping?

Other concerns for the K&A1’s hypothesis follow from their methodological choices. The authors argue that strong evidence for the segment as MPU hypothesis is: (a) the presence of very fast responses (Experiments 1 and 2); (b) the increase of first segment duration as a function of the magnitude of the priming effect (Experiments 1 & 2); (c) the faster start of articulation in long than in short SOA conditions (Experiment 2). However findings (a) and (b) were obtained mostly with stimuli beginning with non-plosive phonemes (e.g., /f/), whose articulation can start and continue in isolation or in the absence of any subsequent sound. Thus, the first phoneme can be articulated independently of its context, before planning the full word. Finding

(c) is particularly interesting: The authors state that “the large number of trials with negative articulatory latencies is evidence that many of the participants were initiating articulation before the complete target was presented” (p. 28). This means that participants started to move their articulators immediately once the first letter had been presented, before seeing the full word. Thus, the question becomes: What are the readers articulating? In our view, the reported finding simply indicates that, when the letter-to-sound correspondence is univocal (e.g., “m”→[m]), readers prepare articulation of a phoneme as it were presented in isolation. However, articulating single sounds does not mean reading words.

Overall, the above observations suggest that the segment-as-MPU hypothesis represents more of an exception than is the behaviour that usually occurs at the phonology-to-phonetics interface of the reading system. The issues we discussed suggest that the MPU may not be as small as the first phoneme alone. Some studies suggest that in reading, the MPU is either the full word (e.g., Rastle, Harrington, Coltheart, & Palethorpe, 2000) or a smaller unit spanning the stressed syllable (Sulpizio, Arduino, Paizi, & Burani, 2013). The latter proposals share the assumption that the phonology-to-phonetics interface adopts units larger than the segment; thus, they can account not only for the empirical data on which they are grounded, but also for additional phenomena such as those related to orthography-to-phonology opacity, stress assignment, and co-articulation.

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¹Capital letters indicate stress, dots syllabic boundaries.

²Initial letters had unambiguous phonological translations also in Experiment 1.

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