Constructing Word Sums:

Teaching and assessing understanding of the written word by announcing word structure

[L]earning to read is learning how to use the conventional forms of printed language to obtain meaning from words...This view implies that the child learning how to read needs to learn how his or her writing system works [emphasis added].

Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg (2001) How psychological science informs the teaching of reading, *American Psychological Society,* vol. 2, 34.

Why teach word sums?

Word sums reveal how the underlying meaning-bearing building blocks of words (morphemes) combine to form words.

According to "backwards design" from *Understanding by Design* (Wiggins & McTighe, 2005) instructional planning should not begin until it is guided by:

- · Clearly established goals for intended learning outcomes
- A means of assessing achievement of those goals

If ensuring that children learn how their writing system works is a fundamental goal of literacy instruction, teachers need a means of assessing students' understanding of the conventions that drive English spelling. Since word sums represent the structure of written words, student construction of word sums provides a clear assessment of that understanding. Using word sum construction to teach and assess understanding of the writing system is thus perfectly aligned with the recommendations of backwards design.

Word sums: A self-correcting mechanism

Using word sums to tie instruction to the existing structures of the written word provides teachers with a self-correcting mechanism for their own learning and instructional practice. Word sums bring flawed assumptions about underlying word structures to the surface where they can be inspected and reconsidered. They then also provide the appropriate tool to test alternative hypotheses. In this way, systematic understanding of English spelling (and the skills for analysis) continually moves forward in ever greater alignment with the actual conventions that drive English spelling.

Is there a "right way" to teach word sums?

Like a sum in math, a finished word sum is either correctly or incorrectly resolved. However, the process of constructing a word sum allows for multiple opportunities for representing the structures within words in the way they are "announced" orally and in writing. The instructions provided in this document

are guidelines based on the principle that instruction of how the written wrod works should take advantage of every opportunity to focus the leaner's attention the underlying structures of words.

The left side of a word sum captures the underlying full written form of the constituent morphemes of complex words.¹ It also marks conventions for how these written morphemes are synthesized into complex words as they appear in text -- which is resolved on the right side of the word sum².

Announcing word structure

The guidelines for announcing word structure described here are supported with the worked examples of word sum construction on the following pages.

In the process of constructing a word sum, letters are named out loud -- and are simultaneously written -- in morphemic and graphemic groups. As soon as the rewrite arrow is completed, the constructor of the word sum says "check the joins!" to highlight the fact that there might be a change to the end of a base and/or suffix.

Announcing word structures (orally and in writing) is a practice in accordance with recommendations of cognitive load theory (Schnotz & Kürschner, 2007). for fixing representations of these structures in long-term memory. See the references on <u>this page</u> for more on cognitive load theory (after you've tried your own spelling out challenge on <u>this page</u>!) I strongly encourage schools to integrate <u>handwriting instruction</u> for this purpose as well.

Morphemic structure: Any plus sign marking a morphemic boundary on the left of the arrow is represented with a pause on the right. All morphological suffixing changes are announced ("*no <e>*", "*double* __", or "*change the <y> to <i>*"). The letter sequences for affixes may be announced together quickly to signal these common morphemic units.

Graphemic structure: In the *base*, the constituent letters of digraphs or trigraphs are named together quickly to signal its graphemic structure.

Footnotes

- 1. These written morphological forms provide a concrete representation of what <u>Carol</u> <u>Chomsky (1970)</u> described as a 'lexical spelling.'
- 2. This page describes the process of constructing fully analyzed *synthetic word sums*. These begin on the left with distinct morphemes, mark suffixing changes and synthesize those morphemes into a resolved complex word as it appears in print on the right. Another type of word sum is the *Analytic word sum* (or "reverse" word sum). Analytic word sums begin with a resolved complex word on the left. That word is then analyzed into constituent morphemes on the right of the rewrite arrow, again complete with the marking any morphological suffixing patterns.

Steps for constructing word sums that include marking and announcing of dropped single, silent <e>s



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Steps for constructing a word sum that includes marking and announcing double letters



Steps for constructing a word sum that includes marking and announcing <y> / <i> changes



- Grade 1 student announces the structure of a sum for <wonderfully> http://www.youtube.com/wordworkskingston#p/u/14/lyhHCCWTa2A.
- A scene from a teacher workshop on teaching word sums. http://www.youtube.com/wordworkskingston#p/u/22/qoeyGZDstkl
- Using "spelling out" during reading with a 5-year-old. http://www.youtube.com/wordworkskingston#p/u/24/8zyKrlnLSXY
- A <u>Skype tutoring session</u> with a Grade 2 student with word sums and the matrix.

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