Understanding the Spelling-Meaning Connection: Structured Word Inquiry

*struct* matrix from *Real Spelling*

<table>
<thead>
<tr>
<th>re</th>
<th>de</th>
<th>con</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>de</td>
<td></td>
</tr>
<tr>
<td>struc</td>
<td>“build”</td>
<td></td>
</tr>
<tr>
<td>ive</td>
<td>ly</td>
<td>ity</td>
</tr>
<tr>
<td>ness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ure</td>
<td>ed</td>
<td></td>
</tr>
<tr>
<td>ing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>al</td>
<td>ly</td>
<td></td>
</tr>
<tr>
<td>ism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ist</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**struct + ure/ + ed → structured**

**in + struct + ion → instruction**

*Instruction* which *builds* understanding of word *structure* as a tool for investigating the interrelation of spelling and meaning.

...[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]” (p. 34).


Booklet of Lessons & Resources
2015
by Peter Bowers
Two Guiding Principles of Structured Word Inquiry

- The primary function of English spelling is to represent meaning.
- The conventions by which English spelling represents meaning are so well-ordered and reliable that spelling can be investigated and understood through scientific inquiry.

Scientific inquiry is necessary to safely guide spelling instruction and understanding.

- Scientific inquiry is the only means by which a learning community can safely accept or reject hypotheses about how spelling works.

Click here for a full draft document expanding on these ideas, including definitions of key concepts and terms.

Process of “Structured Word Inquiry”

1) Catch learners with an interesting spelling question. (e.g., why <g> in <sign>?)
2) Strategically present a set of words that makes the relevant pattern more salient.
3) Help learners hypothesize a solution from carefully presented evidence.
4) Guide testing of learners’ hypotheses and identify the precise pattern.
5) Practice the identified pattern with appropriate tools (e.g., word sums, flow charts).

See more on structured word inquiry, and the difference between “teacher-led inquiry” and “inquiry-led teaching” at this link.
What is crazy -- the English spelling system, or our typical systems for teaching spelling?

Consider the frustration experienced by the student in this story. The teacher does the best his training allows as he tries to help his student deal with yet another “irregular” spelling. Imagine the consequences for learning when such experiences are repeated over and over.

Cursing our crazy spelling system seems like a natural response to Robb’s story about the struggle to learn and teach reading and spelling in English. It would be so much easier if we just had a reliable, logical spelling system! Ironically, it turns out that our spelling system does meet these exact criteria. Unfortunately this assertion seems absurd in light of the instruction most of us have received. It is important to recognize, however, that the common assumption of English spelling as an unreliable, exception-riddled system is a hypothesis that can be tested.

The science of spelling: Scientific inquiry of the conventions of English spelling provides plenty of evidence that our spelling system is an extremely reliable and ordered system for representing the meaning of words to English speakers. (e.g. Carol Chomsky, 1970).

There is obviously much more to spelling than morphology. However, scientific analysis of English spelling makes it clear that we cannot make sense of our spelling system without morphological understanding.

Orthographic morphology is the conventional system by which spoken morphemes are written. Instruction can direct the attention of learners to this concrete representation of the meaning structure of words. Students can use morphological knowledge gained through instruction to define words they were not taught, but which are morphologically related to words they were taught. (Bowers & Kirby, 2010). However, teaching morphology is not only about showing learners how bases and affixes can be used to learn new vocabulary.

Click here for lessons investigating the spelling of <know> inspired by Robb’s story.
Touching on the Research
Research has long emphasized the importance of letter-sound knowledge for literacy development (e.g., Adams, 1990; Rayner et al., 2001). There is an enormous amount of research showing that instruction which explicitly teaches grapheme-phoneme correspondences and phonemic awareness is more effective that “whole word” based instruction which does not emphasize the internal structures of words. That evidence, however, says nothing about the effect of teaching about morphology, or the interrelation of morphology and phonology. Nevertheless, many researchers and research models recommended not addressing morphology until later years. In her seminal 1990 book, Adams wrote,

“There is no research evidence showing that phonology needs to be taught before morphology. The best evidence is that we should teach how the writing system works from the start. See a teacher friendly review of the research here.

It makes sense that learning letter-sound correspondences would be facilitated by a fuller understanding of how they operate within the morphological frame. As linguist Richard Venezky pointed out long ago, "the simple fact is that the present orthography system is not merely a letter-to-sound system riddled with imperfections, but, instead, a more complex and more regular relationship wherein phoneme and morpheme share leading roles" (Venezky, 1967, p. 77).

Teachers need to know about more than morphology to explain these spellings, but establishing the morphological structure of a word is a necessary part of that process, even for base words.
Is <does> really an irregular spelling?
Typically instruction leads children to believe that <does> is one of many irregular spellings they have to memorize. In contrast, the word <goes> is treated as regular.
See how the matrix and word sums below make sense of these spellings by providing a concrete representation of the interrelation of structure and meaning of the <do> and <go> word families.

**A morphological matrix for <do> and <go>**

<table>
<thead>
<tr>
<th>do</th>
<th>ing</th>
</tr>
</thead>
<tbody>
<tr>
<td>go</td>
<td>es</td>
</tr>
<tr>
<td>ne</td>
<td></td>
</tr>
</tbody>
</table>

**Word Sums for <do> and <go>**

- do + ing → doing
- do + es → does
- do + ne → done
- go + ing → going
- go + es → goes
- go + ne → gone

With these linguistic tools, children can be introduced to <does> as an ingenious spelling because it marks its meaning connection to its base <do> with a consistent spelling. The spelling structure of these word families is a brilliant opportunity to show children why it is useful that most letters (graphemes) can represent more than one pronunciation. Only in this way could the spelling of <do> and <does> use the same spelling of the base!

Instead of adding it to a list of irregular words, teachers who understand morphology can use the spelling of a word like <does> to introduce children to the ordered way their spelling system works.

“Teachers who consider English a chaotic and unprincipled writing system likely foster a similar view among their students. Such pupils may not look for patterns in the system because they believe that few exist to be discovered. Teachers who appreciate the writing system can help students find its patterns, fostering a positive attitude about spelling”

Treiman and Kessler (2005, p. 133)

---

### Links to Structured Word Inquiry Videos

- Click [here](#) for a tutorial video showing how beginners can use the Word Microscope to guide an investigation through a stud of the word <discovery>.

- Click [here](#) for a video of a tutoring session with a 7-year old investigating the meaning-spelling connections between words with the matrix and word sum.

- Click [here](#) for an inspiring video on Lyn Anderson’s “Beyond the Word” Blot. It shows 5-year-old students investigating the word <carnivore> and some of its surprising relatives in Etymonline.

- Click [here](#) to learn about twin and bound bases through a video of a classroom investigation.

- Click [here](#) for a Grade 7 student explaining his understanding of the political world through linguistic analysis of the word <dissent>.

- **Explore a large bank of videos of structured word inquiry in classrooms at this [YouTube page](#).**
Learn more about etymology and how it helps understand the spellings of the words from the slide above from the Real Spelling Tutorial films at this link.

See the Real Spelling Tutorial film on “The Homophone Principle” at this link.

Find a tutorial film on function and content words and additional resources on this topic here.

The slide at left illustrates the structure of a morphological family as revealed by a matrix and word sums and how that structure interrelates with phonology. Note the varied pronunciation of the base <struct> depending on the word and how the pronunciation shift of the <t> grapheme is shown with the grapheme chart. We also see that all of the words in this family share the Latin Root struere for “to build”. Not only does working with matrices and word sums help us make sense of the morphology and meaning of words -- it helps us understand the grapheme-phoneme correspondences.

Latin root: struere "to pile, build, assemble,"

struct + ure + ed → structured
Structured Word Inquiry: Developing literacy and critical thinking by scientific inquiry about how spelling works

The word matrix (www.realspelling.com)

The word matrix marks the only feature of an orthographic morphological family that is stable - the underlying orthographic representation of its morphemes. These representations correspond to what Carol Chomsky (1970) called “lexical spellings.”

The pronunciation and connotation of a morpheme can vary across members of a family. The lexical spelling of a morpheme -- that is captured by word sums and matrices -- remains stable.

The morphological matrix is a map of the interrelation of structure and meaning of written word families

The word matrix represents members of an orthographic morphological word family. Such word families share a connection in both structure and meaning. (Real Selling tutorial films on morphology here.)

• structure: common underlying spelling of the base
• meaning: common ultimate etymological origin of the base

Inclusion of a word in a matrix is tested with a word sum. The word sum isolates the constituent morphemes (bases and affixes) on one side of the rewrite arrow (marking all morphological suffixing conventions) and on the other, the realized surface structure of the word.

An “echo” of the denotation of the root meaning of the base of any word represented by a matrix can be detected in the connotation of that realized word. The denotation of the root meaning of a word is checked with an etymological reference (e.g. etymonline.com).

Word Sums (examples listed by pronunciation of base)

<table>
<thead>
<tr>
<th>base spelled</th>
<th>base pronounced</th>
<th>Word Sums (examples listed by pronunciation of base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;quest&gt;</td>
<td>/kwɛstʃ/</td>
<td>quest + ion → question</td>
</tr>
<tr>
<td></td>
<td>/kwɛst/</td>
<td>quest + ion + able → questionable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in + quest → inquest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>con + quest → conquest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>re + quest + ed → requested</td>
</tr>
<tr>
<td>do</td>
<td>ing</td>
<td>do + ing → doing</td>
</tr>
<tr>
<td></td>
<td>es</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ne</td>
<td></td>
</tr>
<tr>
<td>&lt;do&gt;</td>
<td>/duː/</td>
<td>do + es → does</td>
</tr>
<tr>
<td></td>
<td>/dʌ/</td>
<td>do + ne → done</td>
</tr>
</tbody>
</table>

Interrelation of graphemes and morphemes

Graphemes comprised of single letters or 2- or 3-letter teams that represent a phoneme. They occur within morphemes. Possible phonological representations of a grapheme are signaled by circumstances. The diagram above shows three of the possible phonological representations of the <t> grapheme. Two of these are realized in the words of the <quest> matrix shown on this page.

Note that since the <o> and the <e> graphemes in <does> are not in the same morpheme, there is no <oe> digraph in this word.

www.wordworkskingston.com
Structured Word Inquiry Activities...

See next page for a description of how to use the “structured and meaning test” to see clarify this task and for links to related resources.
Activity: 3 Word Families & The Structure & Meaning Test

1) Semantic word families -- a general meaning connection
The words in the “Semantic Family” section of the diagram were selected because they can be considered to share a common general sense and meaning. The “structure and meaning test” allows us to study the orthographic structure of these words to analyze and categorize the nature of that meaning connection scientifically.

2) Words in the same etymological family pass the “meaning test”
Words in the same etymological family share more than a general semantic connection. They share a common history that is marked by a common etymological root that can be researched in an etymological reference (e.g. Etymonline). The denotation of a historical root is echoed in the meaning of its descendants -- current English words. Words that share a root can be placed within the area of the circle in the diagram.

Example Investigation:
- <happy> and <pleasing> have no historical connection, so they do not fit anywhere within the circle.
- <pleasing>, <plead> and <pleasurable> share the Latin root ‘placere’ so they belong within the area of the circle. But which of these words fit within the square of the “morphological family” inside that circle?

3) Morphological Families (structure test):
To determine if words are of the same orthographic morphological family -- and could therefore be represented in the same matrix -- we need to show that they pass BOTH the structure and meaning tests.

1) Meaning test: The words in question must share a root.
2) Structure test: The words in question must share a base element as demonstrated through analysis with a coherent word sum.

For a word scientist to determine that a word sum is coherent, they must be able to show a) evidence that each morpheme is used in another words, and b) that the word sum is in coherence with suffixing conventions.

Example Investigation Continued:
- <happy> and <pleasing>: Clearly no word sum could link <happy> and <pleasing>, so they cannot be in the same morphological family.

The lack of any spelling connection gives no reason to hypothesize an etymological connection. By chance, however, some words seem to share a base, but turn out not to share a root (e.g., <playful> and <display>). Such words “pass the structure test” but cannot be placed on the same matrix because they do not pass the meaning test -- they share no root.

- <pleasing>, <plead> and <pleasurable>:
All of these words share the same Latin root ‘placere’ for “to be acceptable, be liked, be approved”. Thus these words “pass the meaning test”. They belong in the circle (same etymological family).

Which of these words also pass the structure test (coherent word sum) and therefore also belong in the square for words of the same morphological family?

please/ + ing ➔ pleasing
please/ + ure/ + able ➔ pleasurable
plead ➔ plead

Additional hypothesis: Can all these words to a common base <plea>?
Test this hypothesis with a word sum: plea + se ➔ please

There is no evidence of an <-se> suffix, so we much reject this hypothesis.
The words <pleasing> and <pleasurable> can be analyzed to show the same underlying base element <please>, so they are of the same morphological and etymological family.

There is no word sum that can link <plead> to the base <please>, so <plead> is of the same etymological family of <please> but not the same morphological family. Similarly, <plea> shares the same root, but no base, so it can be included in the etymological family circle.

Note! We can see that one root can grow into multiple bases.

Why categorize words this way?
The process of analyzing words according to these categories forces us to inspect the history and structure of words carefully. In this way we build not only our vocabulary, but our understanding of our writing system, and thus our curiosity motivation to notice and spelling-meaning connections, and our skill for analyzing and understanding those connections.

Computer tools to make your own matrix with word sums
- Mini-Matrix-Maker (Basic Tool - Free, for both Mac & PC)
- Word Microscope (More involved tool that guides your investigation, includes banks of morphemes, saves and organizes data from investigations and more. Currently for PCs only. The video at this introductory page offers a good review of the process of the structure and meaning test.)
Structured Word Inquiry Challenges

1) Roots growing into multiple bases

Review the information above from page 37 of THTWWW to guide an work on the following challenges:

a) Find the 8 members of the etymological family with the Latin root ‘placere’ identified by www.etymonline.com when you type that root in the search engine.

b) Use word sums to do morphological analysis those words to identify the distinct written bases that can be found in those words. The diagram above shows two (<please> and <plea>). How many more can you find?

c) Construct at least one matrix that represents at least 5 words built from one of the bases. You might want to use the Word Searcher, and/or Mini-Matrix-Maker to help you. Feel free to to the matrix by hand also.

d) Work with your group to find a way to present your research, discoveries and any questions that remain.

e) Make a similar investigation with any of the following: Latin roots: “aster”, “caedere”, “rumpere”

Greek roots: “hydr”, “morphe”, “khronos”

(Remember that just because one root can grow into multiple bases is not evidence that it must!)

2) From RS Theme 5L: An etymological project on words to do with stars

3) Use word sums to identify the common base and root for these sets of words and construct a matrix.

a) <conductor>, <abduct>, <seductive>, <reduction>

b) <science>, <unconscious>, <prescience>, <omniscient>

c) <stable>, <instant>, <contrast>, <stature>
Alternate investigations of the same word family.

Grade 4s investigate the structure of <knowledge>!

Circle the base <know>

Write out the word sum for each word. Spell it out-loud as you write it! Remember to announce the <kn> and <ow> digraphs, and pause at the plus signs!

known
knows
knowable
knowing
unknown
knowingly
unknowingly
knowledge
knowledgeable

Investigate the structure of <knowledge>!

1. Analyze these words with word sums according to the hypothesis that they share the base <know>. (Can you prove all the affixes?)
2. Represent analyzed words in the Matrix.

known
knows
knowable
knowing
unknown
knowingly
unknowingly
knowledge
knowledgeable
unbeknownst
**Structured Word Inquiry: Developing literacy and critical thinking by scientific inquiry about how spelling works**

---

### Activity Sheet #1

**Word Building: Using a Real Spelling™ Word Matrix**

A WORD MATRIX USUALLY ONLY SHOWS SOME POSSIBLE WORDS. YOU CAN OFTEN FIND MORE IF YOU TRY!

**Rules for reading a word matrix:**
- Read a matrix from left to right.
- Make only single, complete words from a matrix.
- Only build words you can use in a sentence.
- You don’t have to take an element from every column of a matrix – BUT...
- You must not ‘leapfrog’ over a column.
- WATCH THE JOINS! Sometimes changes happen where you add a suffix.

Build words with your cut out prefixes and suffixes on the base `<sign>`. Once you have built a word, write the word sum as modeled in 1 and 2.

**Part A:**

<table>
<thead>
<tr>
<th>Prefix(es)</th>
<th>Base</th>
<th>Suffix(es)</th>
</tr>
</thead>
<tbody>
<tr>
<td>re as sign</td>
<td>al ing ed er ment</td>
<td></td>
</tr>
</tbody>
</table>

1) \( \text{sign} + \text{al} \rightarrow \text{signal} \)

2) \( \text{as} + \text{sign} + \text{ment} \rightarrow \text{assignment} \)

3) ____________________ → ____________________

4) ____________________ → ____________________

5) ____________________ → ____________________

6) ____________________ → ____________________

7) ____________________ → ____________________

8) ____________________ → ____________________

9) ____________________ → ____________________

10) ____________________ → ____________________

---

**Real Spelling Tool Box™ Connection**

3A - Revisiting Suffixing (Learn many roles of the single, silent `<e>`)

---

**Lesson #2: Spelling Detectives**

When does Suffixing Cause Changes at the Joins?

### A) Investigation: Developing a hypothesis

Study the matrix for `<move>` and the word sums created from it to see if you can discover a consistent suffixing pattern.

#### Word Sums from `<move>` Matrix

(Draw a line through silent `<e>`s replaced during suffixing as shown in the second sum.)

<table>
<thead>
<tr>
<th>re de un move</th>
<th>s ing ed er ment</th>
</tr>
</thead>
<tbody>
<tr>
<td>move + s</td>
<td>moves</td>
</tr>
<tr>
<td>move + ing</td>
<td>moving</td>
</tr>
<tr>
<td>move + ed</td>
<td>moved</td>
</tr>
<tr>
<td>move + er</td>
<td>mover</td>
</tr>
<tr>
<td>move + ment</td>
<td>movement</td>
</tr>
<tr>
<td>re + move + ed</td>
<td>removed</td>
</tr>
<tr>
<td>re + move + er</td>
<td>remover</td>
</tr>
<tr>
<td>un + move + ed</td>
<td>unmoved</td>
</tr>
</tbody>
</table>

1. What is the change that sometimes occurs at the suffix join?

2. List the suffixes that cause the change: ______ ______

3. List the suffixes that cause no change: ______ ______

4. How are these suffixes different from each other?

5. Our class’ hypothesis to explain how you know which suffixes may force a change at the join:
Lesson #2 Continued...

B) Testing our Hypothesis:
These matrices build on base words (a one morpheme word - no prefix or suffix) that end with the letter ‘e’.
- Create word sums from a variety of the matrices to test our class hypothesis. (You don’t need to build every possible word from each matrix to test the hypothesis.)
- Be ready to share interesting discoveries with the class. Any surprising findings, or words whose pronunciation changes when you add affixes?

<table>
<thead>
<tr>
<th>dis</th>
<th>please</th>
</tr>
</thead>
<tbody>
<tr>
<td>un</td>
<td>hope</td>
</tr>
<tr>
<td>re</td>
<td>take</td>
</tr>
<tr>
<td>mis</td>
<td>be</td>
</tr>
<tr>
<td>en</td>
<td>large</td>
</tr>
<tr>
<td>be</td>
<td>ing</td>
</tr>
</tbody>
</table>

Real Spelling Tool Box Connections

1D - The effect of suffixes on a single, silent ‘<e>’
1E - Making plurals - 1- whether to use <-es> or just <-s>
1G - ‘long’ and ‘short’ vowels and the single, silent ‘<e>’
1I - Homophones -1- (Make sense of the silent ‘<e>’ in ‘please’)
1H - Compound words -1- (Does “takeaway” break suffixing conventions?)

Real Spelling Tool Box Connections

Activity #3
Flow Chart for Dropping the Single, Silent ‘<e>’ During Suffixing

Instructions:
- On a separate page, rewrite the beginning of the word sum provided.
- Use the flow chart to identify the correct spelling when fixing the suffix to the base.
- When a silent ‘<e>’ is replaced by a vowel suffix, cross it out on the left or the “rewrite arrow” before completing the spelling on the left side of the arrow.

Example: date + ing → dating

Word Sums
1. cave + ed → 11. laze + y →
2. create + or → 12. rule + er →
3. require + ment → 13. imagine + ary →
4. smile + ing → 14. pure + ly →
5. rude + ly → 15. please + ure →
6. brave + est → 16. operate + ion →
7. brave + ly → 17. smile + s →
8. include + ing → 18. amaze + es →
9. lone + ly → 19. amaze + ment →
10. close + ness → 20. ice + y →
The Word Sum and the Matrix

The word sum is the basic linguistic tool for revealing the structure of any word. We need to learn how to write and spell out loud word sums with our students. Here one example:

Complete these word sums, by writing and spelling them out loud. Make sure to show any changes.

See Real Spelling Theme 1D “effects of suffixes on the single, silent <e>”

Click here for more resources and films on spelling-out word structure.

un + help + ful → _______________  rupt + ure + ed → _______________
hope + ing → _______________  re + play + ing → _______________
fight + er → _______________  pass + ion + ate → _______________
state + ion + ary → _______________  image + ine + ate + ion → _______________
Spelling Out & Writing Out Word Structure

<table>
<thead>
<tr>
<th>Synthetic Word Sums</th>
<th>Analytic Word Sums</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Substructure</strong></td>
<td><strong>Surface Structure</strong></td>
</tr>
<tr>
<td>spring → spring</td>
<td>reach → react</td>
</tr>
<tr>
<td>care + ful + ly → carefully</td>
<td>does → pliers</td>
</tr>
<tr>
<td>spell + ing →</td>
<td>duckling →</td>
</tr>
<tr>
<td>cute + er →</td>
<td>spilling →</td>
</tr>
<tr>
<td>cut + er →</td>
<td>rightfully →</td>
</tr>
<tr>
<td>act + ive + ity + es →</td>
<td>logically →</td>
</tr>
<tr>
<td>busy + ness →</td>
<td>disruptive →</td>
</tr>
<tr>
<td>busy + body →</td>
<td>assistance →</td>
</tr>
<tr>
<td>graph + eme + ic →</td>
<td>sisterhood →</td>
</tr>
<tr>
<td>phone + o + log + y →</td>
<td>bookkeeper →</td>
</tr>
<tr>
<td>un + heal + th + y + ly →</td>
<td></td>
</tr>
<tr>
<td>nate + ure + al + ly →</td>
<td></td>
</tr>
</tbody>
</table>

**Synthetic word sums:**
1. Mark suffixing changes on left. (See tools for suffixing conventions here and here.)
2. Spell out and write out your word structure hypothesis in the right side of the re-write arrow following the conventions in the “Constructing Word Sums Booklet”.

**Analytic word sums:**
1. Spell out your hypothesis of the structure of the given word without the scaffolding of a completed word sum with a partner.
2. Test your hypothesis (or hypotheses) by writing out the substructure on the right of the word sum.

**Note:** To spell out the word structure in the “Analytic Word Sums”, you need to identify whether the starter word is a base, or if it is complex.

Videos of teachers and students spelling out word structure with word sums and working with matrices
- The word sum is the basic linguistic tool for analysis of morphological word structure. See Real Spelling tutorial films on this topic here.
- Visit the WordWorks YouTube page for many videos illustrating and integrating spelling-out word structure into everyday instructional practice.
- See a Skype tutoring session with a Grade 2 student using spelling out of word structure with word sums and the matrix.
From the Matrix to the Word Sum

The starting point of making sense of English spelling, and thus the foundational strategy for structured word inquiry is gaining practice building word sums from matrices.

All of these matrices are taken from the 70 matrices DVD. You can copy and paste any of those matrices to build lessons in minutes.

Some Challenges
Write your word sums that come from these matrices on a separate page. Investigate the matrices to build word sums that...

- Produce compound words.
- Show each of the suffixing changes.
- Force a change in the pronunciation of the base.
- That produce complex words that have ‘long vowel sounds’.

Some Questions
- Can you find a base with a digraph that can represent more than one phoneme?
- What base uses a trigraph?
- What base uses a <t> to represent /t/ in one derivation, but /ʃ/ in another derivation (the same phoneme commonly associated with the <sh> digraph).
- What questions challenges could you give your class from these matrices?
Word Detectives Activity: Finding Word Families

Word families are words related in spelling structure and meaning to a common base.

1) Finding a family of words related to <imagine> with the Word Searcher.
To find the Word Searcher:
- Type the words Neil Ramsden Word Searcher into Google
- Click on the first hit “Word Searcher”
- You’re there!

Background for Finding the Family: Testing for structure and meaning
The Word Searcher does not know about bases, prefixes and suffixes. If we are looking for words in the same word family as <imagine>, we first have to analyze this word to see if it is a simple base word (one morpheme word) or a complex word (a base with at least one other morpheme).

One hypothesis is that <imagine> has the base <image> and the suffix <ine> with this word sum:

\[\text{image/} + \text{ine} \rightarrow \text{imagine}\]

To be confident this hypothesized analysis is correct, we test the word sum to make sure it makes sense in terms of meaning and spelling structure. (See confirmation of that analysis in box below.)

Warning about Word Searcher searchers!
Typing the letters <image> in the “Search Pattern” field will not bring up the word <imagine> because the Word Searcher just pics words with the same letter sequence. The word <imagine> uses the base word spelled <image>, but it does not have the letter sequence <image>.

To get a list of words that are likely related to the base <image>, we need to type the letter sequence <imag>.

Starting the Search...
Step 1: Finding potential family members
Type the letters <imag> in the “search pattern” field and press the “go” button.
You should get 20 matches.

Step 2: Refining the list to the <image> family
Look for connections of structure and meaning.
Some of the words in this list might not use the base <image>. Copy and paste the words that you think are built on <image> into a word processing document. With a partner, try to make word sums that could use the base <image> and which have a connection in meaning to that word.

Step 3: Building the <image> matrix
Use the prefixes and suffixes from the word sums that work to build the matrix that is started for you. The suffixes you need to build <imagine> and some other words are already included. See what else you can get in this matrix for the word family of <imagine>!

2) Use the same process and tools to find a family of words that links these words <bankruptcy>, <disruption> and <eruption>! Can you build a matrix on your own?

Finish the Word Matrix!

<table>
<thead>
<tr>
<th>image</th>
<th>ably</th>
<th>ine</th>
</tr>
</thead>
<tbody>
<tr>
<td>ate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

After you’ve identified which of the 20 words below do use the base <image>, build word sums to find affixes needed to build the <image> matrix.

Search Results for "imag" (20 matches)

<table>
<thead>
<tr>
<th>image</th>
<th>imagined</th>
</tr>
</thead>
<tbody>
<tr>
<td>imagery</td>
<td>imaging</td>
</tr>
<tr>
<td>images</td>
<td>imagining</td>
</tr>
<tr>
<td>imaginable</td>
<td>imaginings</td>
</tr>
<tr>
<td>imaginary</td>
<td>imagination</td>
</tr>
<tr>
<td>imagination</td>
<td>pilgrimage</td>
</tr>
<tr>
<td>imaginings</td>
<td>pilgrimages</td>
</tr>
<tr>
<td>imaginatively</td>
<td>unimaginable</td>
</tr>
<tr>
<td>imagine</td>
<td>unimaginative</td>
</tr>
</tbody>
</table>

www.WordWorksKingston.com
Identifying words that share a written morphological relatives by testing structure AND meaning (working with bound bases)

Example investigation question:
Are concussion and repercussion part of the same written morphological family?

Step 1: Structure Test -- Can a coherent word sum be constructed linking these words with a common base with the same spelling?
(Each morpheme in the word sums must be proven to have a coherent word sum.)

con + cuss + ion → concussion
re + per + cuss + ion → repercussion

Note: Each of these affixes <re->, <per->, <con-> and <-ion> affixes can be proven by testing the example words a dictionary lists in entries with these affixes. Finding an affix listed in a dictionary is not evidence that it is an affix. But a dictionary can help us narrow down words we can use as data to test!

Conclusion: These words pass the structure test, so they could share the bound base element <cuss> -- but only if they also pass the meaning test!

Step 2: Meaning Test -- Do the words share a common ROOT origin?
Use Etymonline <www.etymonline.com> and/or other etymological references to show that the two words share the same root. For example here is what I find on Etymonline when I investigate concussion and repercussion:

concussion (n.)  c.1400, from Latin concussionem (nominative concussio) "a shaking," noun of action from past participle stem of concutere "shake violently," from com- "together" (see com-) + quaterere "to shake" (see quash). Modern brain injury sense is from 1540s.

repercussion (n.)  c.1400 (implied in repercussive) "act of driving back," from Middle French répercussion (14c.), from Latin repercussionem (nominative repercussio), from past participle stem of repercutere "to strike or beat back," from re- "back" (see re-) + percute + quaterere "to strike or thrust through" (see percussion). Meaning "reverberation, echo" first recorded 1590s; the metaphoric extension is recorded from 1620s.

I follow the link to ‘percussion’ and find...

percussion (n.)  early 15c., "a striking, a blow; internal injury, concussion," from Latin percussionem (nominative percussio) "a beating, striking; a beat as a measure of time," noun of action from past participle stem of percuteere "to strike hard, beat, strike through and through," from per- "through" (see per) + quaterere "to strike, shake" (see quash). Reference to musical instruments is first recorded 1776.

Conclusion: Both words share the common Latin root ‘quatere’ for “to shake, strike, beat”. I can conclude that these words share the same written base because they pass both the structure and meaning test.

In groups use the structure and meaning tests to find at least 3 other words that share the bound base element <cuss> from the Latin root ‘quatere’ for “to shake, strike, beat”. Write their word sums in your book.

Step 3: Collect more members of this written morphological family.
Using the Word Searcher <http://www.neilramsden.co.uk/spelling/index.html> I find more potential members of this family by typing <cuss> into the search field. Here’s what we find:

<table>
<thead>
<tr>
<th>Search Results for “cuss” (27 matches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cuss</td>
</tr>
<tr>
<td>cussed</td>
</tr>
<tr>
<td>cusses</td>
</tr>
<tr>
<td>concussed</td>
</tr>
<tr>
<td>concussion</td>
</tr>
<tr>
<td>concussedness</td>
</tr>
<tr>
<td>discussing</td>
</tr>
<tr>
<td>discussion</td>
</tr>
<tr>
<td>percussion</td>
</tr>
<tr>
<td>percussive</td>
</tr>
<tr>
<td>unfocussed</td>
</tr>
<tr>
<td>focussed</td>
</tr>
<tr>
<td>focusses</td>
</tr>
<tr>
<td>focussed</td>
</tr>
<tr>
<td>focussing</td>
</tr>
<tr>
<td>focussing</td>
</tr>
</tbody>
</table>

Step 4: Use the Mini-Matrix Maker to construct a matrix from our word sums:
<http://www.neilramsden.co.uk/spelling/matrix/temp/index.html>

A) Follow the steps above to prove the connection between any of these word pairs.
Making a Matrix with Bound Bases

Below is a starter matrix for the <cuss> bound base with pre-chosen affixes that can be used to build on the previous lesson.

To the right is a bank of words collected from the Word Searcher in the process of investigating the structure of the word <responsibility>.

Conduct the structure and meaning test (previous page) to identify which of these words share a base with <responsibility> When you are finished, construct a matrix with the Mini-Matrix-Maker, the Word Microscope or by hand that represents <responsibility> and any of the other words from this list that belong.

Did you discover any affixes that were new to you?

To prove an affix it must be a letter sequence that...
1) You need a letter or letter sequence that can be fixed to a proven base or stem.
2) That same letter or letter sequence must be used for the same purpose in more than one word.

Also, remember that you can use a dictionary to help you check affixes that are new to you. And, never analyze deeper than you can prove!
A good dictionary will list prefixes as separate entries

<table>
<thead>
<tr>
<th>Prefixes and their variations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a- (OE)</strong></td>
</tr>
<tr>
<td><strong>a- (Gk)</strong></td>
</tr>
<tr>
<td><strong>an-</strong></td>
</tr>
<tr>
<td><strong>ab-</strong></td>
</tr>
<tr>
<td><strong>abs-</strong></td>
</tr>
<tr>
<td><strong>ad-</strong></td>
</tr>
<tr>
<td><strong>a-</strong></td>
</tr>
<tr>
<td><strong>ac-</strong></td>
</tr>
<tr>
<td><strong>af-</strong></td>
</tr>
<tr>
<td><strong>ag-</strong></td>
</tr>
<tr>
<td><strong>al-</strong></td>
</tr>
<tr>
<td><strong>an-</strong></td>
</tr>
<tr>
<td><strong>ap-</strong></td>
</tr>
<tr>
<td><strong>ar-</strong></td>
</tr>
<tr>
<td><strong>as-</strong></td>
</tr>
<tr>
<td><strong>at-</strong></td>
</tr>
<tr>
<td><strong>al- (OE)</strong></td>
</tr>
<tr>
<td><strong>amb-</strong></td>
</tr>
<tr>
<td><strong>amphi-</strong></td>
</tr>
<tr>
<td><strong>ana-</strong></td>
</tr>
<tr>
<td><strong>an-</strong></td>
</tr>
<tr>
<td><strong>ante-</strong></td>
</tr>
<tr>
<td><strong>ante-</strong></td>
</tr>
<tr>
<td><strong>anti-</strong></td>
</tr>
<tr>
<td><strong>ant-</strong></td>
</tr>
<tr>
<td><strong>apo-</strong></td>
</tr>
<tr>
<td><strong>be-</strong></td>
</tr>
<tr>
<td><strong>bene-</strong></td>
</tr>
<tr>
<td><strong>bi-</strong></td>
</tr>
<tr>
<td><strong>bin-</strong></td>
</tr>
<tr>
<td><strong>by-</strong></td>
</tr>
<tr>
<td><strong>extra-</strong></td>
</tr>
<tr>
<td><strong>for-</strong></td>
</tr>
</tbody>
</table>

Many elements claimed as "prefixes" are not necessarily so. For instance, <mid> and <fore> are bases, so <midday> and <forecast> are actually compound words.
### Consonant letter doubling

**The <i / y> relationship**

**Part 1**

- The <i / y> relationship
- The trigraph <igh> 2: vowel letter + <igh>

**The plural suffix -(e)s**

- The basic pattern
- Grapheme alternatives <ck> / <k> and <tch> / <ch>?

**Consonant letter doubling with monosyllables**

- The letter <n> and graphemes that contain it
- Constructing plurals: When the base or stem changes

**The functions of final single non-syllabic <e>**

- Homophones 2: Single-element homophone pairs

**The trigraph <igh>**

- The trigraph <ugh> and other graphemes for the phoneme /f/

**The phonology of the graphemes <c > < k > and < ck >**

- Two important families: the ‘wh-words’ and them / they / their

**The orthographic phonology of 'long A'**

- The orthographic phonology of 'long U'

**Compounding and its components**

- Letters <w> and <x> their place in English orthography

**The orthographic phonology of 'long E'**

- Free base elements with final <f> / <l> / <s> or <z>

**The lessons of the suffix -ed**

- The suffixes <-er> <-est> <-ist>

**Learning from the spelling of <love>**

- Learning from the spelling of <was>

**The phonology of 'long I' and 'long O'**

- Naming the days of the week

---

### Kit 5

- The digraph <ui> The variable suffix <-able / -ible>

### Kit 6

- Words with unexpected <e> Prefixes that have variable forms

---

These Tool Kits are in TBox2 multimedia format

www.WordWorksKingston.com

These Themes are being re-written for the Tool Box 2 multimedia format
Links & Resources

Wordworks: www.wordworkskingston.com
Free resources, images, video clips and descriptions of this instruction in action around the world.

- YouTube videos of structured word inquiry in practice.
- WordWorks Newsletter: Email us at wordworkskingston@gmail.com to receive our free Newsletter with updates, Word Detective Episodes and frequent extra resources. See a recent example here.
- Teaching How the Written Word Works (Bowers, 2009). This book builds on the 20 session intervention study I conducted (Bowers & Kirby, 2010) in Grade 4 and 5 classes. The lessons with the <sign> and <move> matrices are the first lessons in that book. Email Pete to order a copy.

Real Spelling www.realspelling.com
This is not a spelling program or teaching approach. It a reference that explains how English spelling works. Find many free resources and also excellent resources for sale.

LEX: Linguist-Educator-Exchange (Get LEX grapheme cards here) This excellent blog by Gina Cooke for educators who trying to make sense of the linguistic structure of words.

On-line Structured Word Inquiry Tools:

The Word Searcher:
A key free tool for collecting words according to surface patterns so that word scientists can investigate the substructure of words. This is an invaluable tool for your spelling investigations.

Mini Matrix Maker
A basic tool for typing word sums and turning them into matrices. See a “how to video” at this link.

The Word Microscope:
This software allows the user to construct matrices from word sums, search for likely members of morphological families and much more. It guides learners in their quest to make sense of English spelling. See a short user’s manual and “how to video” here.

Real Spellers: www.realspellers.org
This website by Matt Berman (Grade 4 teacher at Nueva School in Hillsborough, California) is an excellent site for resources and spelling discussions from teachers around the world.

Teacher Blogs with Videos, Investigations etc:

- Dan Allen’s Grade 5 Blog
- Ann Whiting’s Grade 7 Blog
- Skot Caldwell’s Grade 4/5 Blog
- Mary Beth Steven’s Grade 5 Blog
- Lyn Anderson’s blog for SWI in the early grades
- Jen Munnerlyn’s Literacybytes Blog (See Jen teach from the Real Spelling Theme “Learning From Love” in K-5 classes at this link www.yahoo.com)

References

Kirby, J.R., Bowers, P.N., & Deacon, S.H. (2009, August). Effects of instruction in morphology on reading. Paper presented at the biannual meeting of the European Association for research in Learning and Instruction, Amsterdam, the Netherlands.