Before you begin, please know that I've written this bonus chapter with the assumption that readers are comfortable with the ideas presented in the first seven chapters of my book *Beneath the Surface of Words: What English Spelling Reveals and Why It Matters*. I've tried to provide definitions and explanations where needed in order to allow all readers to understand the chapter (without duplicating the level of detail that's found in the book), but if you are new to these ideas, please don't be discouraged if some of what you read here makes your head spin a bit.

There are many ways to learn about the orthographic concepts that provide the foundation for this bonus chapter. At my website, LearningAboutSpelling.com, the Further Resources page has information on publications, trainings, webinars, and other resources—many of them free. Also take a look at this post that describes the contents of the book *Beneath the Surface of Words*, which I wrote to offer a logical explanation of written English with plenty of examples. I also wrote it so I could continue to share new material that enhances understanding of spelling—such as the information contained in this chapter—without starting at the beginning every time.

Given all that, we're about to launch right into some complex ideas, so fasten your seatbelt.

Beneath the Surface of Words: What English Spelling Reveals and Why It Matters

by Sue Scibetta Hegland

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Bonus Chapter One

Where Did That Letter Go?

S ocial media sites are great places to identify interesting spelling questions, and often the answers to those questions involve morphology—the study of the structural units that form words. Once we understand the morphological elements that build commonly misspelled words, their spellings begin to make sense. Consider, for example, *presidential*, *definite*, and *definition*. We can synthesize all three of these words from related words whose spellings are more straightforward.

$$\text{preside/} + \text{ent} + \text{i} + \text{al} \rightarrow \text{presidential}$$
$$\text{define/} + \text{ite} \rightarrow \text{definite}$$
$$\text{define/} + \text{ite/} + \text{ion} \rightarrow \text{definition}$$

Words such as these can be spelled by writing a related word—in this case *preside* or *define*—followed by additional elements. As you examine the word sums above, notice the slash marks on the left side. A slash mark in a word sum indicates that the final, unpronounced <e> that precedes it will be omitted when spelling the word on the right; the <e> is replaced by the vowel suffix that follows. This happens when we apply the E Convention, one of three suffixing conventions in English.[1]

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[1] Word sums are explained in chapter 2, and the suffixing conventions are explained further in Appendix A of *Beneath the Surface of Words: What English Spelling Reveals and Why It Matters*. Unless otherwise noted, the chapters and appendices mentioned in this bonus chapter refer to that book.

A growing awareness of morphology is helping us make sense of many other-wise frustrating spellings, but social media discussions often still puzzle over words such as *adhere* and *adhesion*, *multiply* and *multiplication,* or *decide* and *decision*. Each of these word pairs consists of a verb and a noun—words that are clearly re-lated yet can't be represented in a single word sum in the same way as the verb *define* and the related noun *definition*, shown on the previous page. Are there spell-ing conventions that allow us to go from <adhere> to <adhesion>, <decide> to <decision>, and <multiply> to <multiplication>? For years, I wrestled with similar questions, and I hope that this chapter will shed light on some of them.

> Angle brackets < > are used to refer to a spelled form of a word rather than its pro-nunciation or meaning.

But first I want to share a noteworthy response to a spelling discussion that took place on Facebook. The author of a post asked why *produce* is spelled with <c> rather than <s>, and in the replies that followed, different rules were offered to explain this spelling. Unfortunately, for every rule that was suggested, someone else could point to a word where that proposed rule wasn't followed. This prompted one teacher to comment that the rules being put forward had so many exceptions that it was frustrating even for her—presumably a literate, proficient speller. She wondered, "How must our students feel?"

This is precisely why it's so important to understand the overarching concepts that explain English spelling. Although a spelled word certainly includes signals of its pronunciation, it conveys much more information than just that. My book *Beneath the Surface of Words* begins with chapters on morphology for this very reason. From the beginning of instruction, students and teachers need to know that English words are built from structural elements (morphemes) that form the framework of written words.[2] Once this framework is understood, the logic of previously puzzling spellings—why *produce* is spelled <c> rather than <s>, for example—becomes evident. Morphology helps us to untangle the relationships between words such as *multiply* and *multiplication*. And although it may seem counterintuitive, explicit morphology instruction particularly benefits those students who need the most support in order to develop even basic reading and spelling skills. Morphology should be included in systematic instruction from the very beginning.

If you know about morphology, you will certainly be familiar with two of the morphological processes that help us make sense of many baffling spellings: compounding and affixation. In this bonus chapter, we'll discuss two additional processes that explain the spelling of many more words. This expanded understanding clarifies the morphological relationships between words such as *adhere* and *adhesion*, *decide* and *decision*, *multiply* and *multiplication*, and many others.

Sequential Morphological Structures: Compounding and Affixation

When students are first introduced to morphology, it's often with words formed by **compounding**. This is the process whereby two or more base elements come together to form a word. For example, the base elements spelled <break> and <fast> combine to form the compound *breakfast*, while the base elements spelled <cup> and <board> spell the word *cupboard.*

The compounds *breakfast* and *cupboard* illustrate a fundamental characteristic of English: the spellings of the elements <break>, <fast>, <cup>, and <board> are unchanged when written in sequence to spell *breakfast* and *cupboard,* even though their pronunciations do change. While many free base elements are pronounced the same

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[2] Marcia Henry. (2019). Morphemes matter: A framework for instruction." *Perspectives on Language and Literacy*, *45*(2), 23-26; Peter Bowers, John Kirby, & Hélène Deacon. (2010). The effects of morphological instruction on literacy skills: A systematic review of the literature. *Review of Educational Research, 80*, 144– 179.

after compounding (*snowflake*, *baseball*, *starfish*), the words *breakfast* and *cupboard* provide evidence that this is not always the case.

As children learn to speak, they naturally, without instruction, begin to use not only compounding but also another morphological process that forms words: **affixation**. This term refers to the process of adding affixes to a base or complex stem.[3] Three types of affixes are important for understanding written English: prefixes, suffixes, and connecting vowel letters. When we encounter the term *morphology*, the process of affixation is typically what comes to mind.

Affixation can be broadly divided into two categories: **inflection** and **derivation**. The distinctions between these two categories are discussed in chapter 10; but, briefly, inflectional suffixes such as <-s>, <-ing>, and <-ed>, when added to a particular word, create different forms of that word without changing its class (its part of speech). This next set of word sums provides examples of inflection.

$$\text{hen} + \text{s} \rightarrow \text{hens}$$
$$\text{stay} + \text{ed} \rightarrow \text{stayed}$$
$$\text{mix} + \text{ing} \rightarrow \text{mixing}$$

A derivational affix, on the other hand, may form a related word that is in a different word class (a different part of speech). Take a look at these examples of derivation:

$$\text{elect} + \text{ion} \rightarrow \text{election}$$
$$\text{cynic} + \text{al} \rightarrow \text{cynical}$$
$$\text{cool} + \text{ant} \rightarrow \text{coolant}$$

Notice the change in word class that results from this derivational process; but notice also the connections that are reflected in these spellings. *Elect* is a verb, and we elect people by holding an *election*, a related word that is a noun. We could call someone a *cynic* (a noun) or describe that person as *cynical*, expressing the same idea with a related adjective. Through derivation, verbs become related nouns, nouns become adjectives, and so on. The word *cool* can be a verb, an adjective, and even a noun (the cool of the evening), but it becomes a different noun with its own definition when the suffix <-ant> is added to get *coolant.*

As with *define* and *definition* as well as *president* and *presidential*, words such as *elect* and *election* or *cynic* and *cynical* can be placed into a single word sum that reveals their structural (morphological) relationships. We spell words such as these by simply writing, in sequence, the morphemic elements that form them, applying suffixing conventions as needed. We may apply the E Convention, the Doubling Convention, or the Y to I Convention. When synthesizing the following words, the E Convention is applied, and the final, unpronounced <e> is omitted when writing the completed word on the right.

$$\text{nerve/} + \text{ous} \rightarrow \text{nervous}$$
$$\text{create/} + \text{ive} \rightarrow \text{creative}$$

In this next set of word sums, we apply the Doubling Convention. The final consonant of the word on the left is doubled when the vowel suffix is added, as signaled by the consonant letter in parentheses.

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[3] For discussion of affixation, see *Language Files: Materials for an Introduction to Language and Linguistics*, 12th edition, p. 163 (Hope C. Dawson and Michael Phelan, editors, Ohio State University Press, 2016). For definitions and discussion of *complex* and *simple* words, see chapter 4 of *Beneath the Surface of Words*. The term *stem* is defined in Appendix A.

$$hop\ (p) + ing \rightarrow hopping$$
$$refer\ (r) + al \rightarrow referral$$

And with this final set of examples, when synthesizing the completed words on the right, we change a final Y to an I. The slash mark and the superscript <i> indicate this change.

$$try\ /^i + al \rightarrow trial$$
$$happy\ /^i + ness \rightarrow happiness$$

These three suffixing conventions operate predictably and consistently in our spelling system.[4] Once fluent with these conventions, students can spell thousands of words accurately by simply adding prefixes, suffixes, and connecting vowel letters to a related word. With an understanding of the ways in which words can be synthesized from related words, many spellings become clear and straightforward.

Diving Deeper Into Morphology

The examples we've looked at so far are probably not surprising. In all these examples, a single word sum can be used to show how one word can be formed from (synthesized from) another. But now we return to the question that introduced this chapter: what's happening in words where that doesn't seem to work, such as *adhere* and *adhesion*, *decide* and *decision*, *multiply* and *multiplication*? This is where an expanded understanding of morphology begins to clear away confusion about the spelling of many more words. It is, after all, quite common to encounter word pairs that are obviously related but don't seem to work together in a single word sum. Here are a few more examples.

fragrant, fragrance
permit, permission
suspend, suspension

With these pairs of words, we can't show the synthesis of the second word by starting with the first one— even using the three suffixing conventions—although we can come so very close! When I was first learning about morphology and its essential role in spelling, I wondered, "Can we teach students to spell *fragrance* by telling them to drop the <t> in *fragrant* and add a <ce>? When going from <suspend> to <suspension> or <permit> to <permission>, perhaps we replace a <d> or <t> with <sion> or <ssion>?"

Although at the time I didn't know the term *statistical learning*, that's what I was doing while I was mulling over these questions. Consciously or unconsciously, we all engage in statistical learning, described by Mark Seidenberg in *Language at the Speed of Sight*.[5] As we notice patterns in the language, we interpret them. We look for generalizations that can explain the spelling of words across the system. However, unless we are aware of the full range of morphological processes that form written words, we will remain confused about how to interpret the patterns in many spellings.

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[4] These conventions are explained further in Appendix A of *Beneath the Surface of Words*.

[5] Mark Seidenberg. *Language at the Speed of Sight: How We Read, Why So Many Can't, and What Can Be Done About It*. Basic Books, 2017. pp. 87–88.

This confusion is understandable because, for example, we can find many pairs of words with similar spelling patterns.

suspend, suspension	divide, division
conclude, conclusion	elide, elision
ascend, ascension	abrade, abrasion
evade, evasion	expand, expansion

Yet no suffixing convention allows us to go from the first word in these pairs to the second one using a single word sum. There's no "drop the <d> or <de> and change to <sion>" convention in English. While fascinating and enlightening patterns are indeed at work in these spellings, they result from morphological processes that are different from the sequential ones that we've been discussing so far. To make sense of the preceding word pairs, we need to know two additional ways that words can be formed in English. Let's start with words like *fragrant* and *fragrance*.

Paired Morphological Structures: Different Affixes

fragrant / fragrance
indifferent / indifference
adherent / adherence
equivalent / equivalence

The word pairs above are obviously related. Without an awareness of morphological processes other than compounding and simple affixation, we might wonder whether we change the final <t> in words like *indifferent* and *equivalent* to a <ce> when we spell the related nouns *indifference* and *equivalence*. However, a simpler explanation proves to be more universally applicable and structurally coherent. When we analyze the structure of each of the words above, noticing the elements that build them, we find that in each of the related word pairs, the first word uses one suffix and the second uses another.

fragr + ant ➡ fragrant	ad + here / + ent ➡ adherent
fragr + ance ➡ fragrance	ad + here / + ence ➡ adherence
in + dif + fer + ent ➡ indifferent[6]	equ + i + vale / + ent ➡ equivalent
in + dif + fer + ence ➡ indifference	equ + i + vale / + ence ➡ equivalence

We see a similar pattern in *variant* and *variance*; *abundant* and *abundance*; *exuberant* and *exuberance; resident* and *residence*; *prominent* and *prominence*. The spellings of the words in each pair involve a suffix change. With many words that we recognize as related to one another, the morphological connection between them cannot be represented within a single word sum. Instead, their formation can be shown with two words sums that include the same stem followed by different suffixes.

Also note that many of the base elements in the word sums and examples in this section are **bound bases**. A bound base does not form a word on its own. Instead, it forms words only when combined with at least one

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[6] This <dif> is an assimilated prefix—an assimilated form of <dis>. Assimilated prefixes are discussed in chapter 3.

additional element. To understand how morphology works throughout the system, we need to be on the lookout for bound base elements like the <fer> in *differ* and *different* or the <here> in *adherent* and *adherence*.[7]

   With the previous set of examples then, we've seen that some related words are formed by a change in an affix. In the final word formation process that we'll examine, there's another type of morphological change.[8]

Paired Morphological Structures: Alternating Base Elements

Take a look at the matrices in Figures BC1.1 and BC1.2. (Chapter 2 discusses the morphological matrix.)

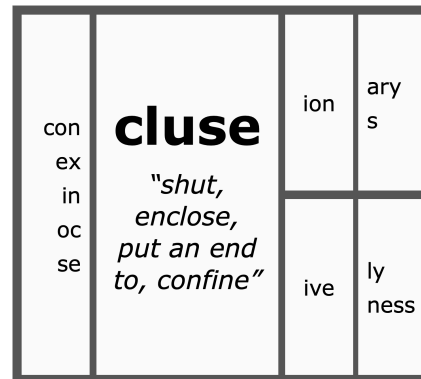| con ex in oc pre se	**clude** *"shut, enclose, put an end to, confine"*	ed ing s

Figure BC1.1

con ex in oc se	**cluse** *"shut, enclose, put an end to, confine"*	ion ive	ary s ly ness
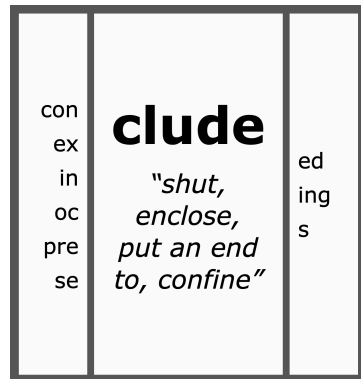
Figure BC1.2

We can represent some of the words formed from these base elements with the following word sums.

in + clude ➞ include	con + clude ➞ conclude
in + cluse/ + ive ➞ inclusive	con + cluse/ + ive + ly ➞ conclusively
se + clude ➞ seclude	ex + clude ➞ exclude
se + cluse/ + ion ➞ seclusion	ex + cluse/ + ion + ary ➞ exclusionary

   The first word in each pair listed above, a verb, is represented in the matrix where the base element is spelled <clude>. The <cluse> spelling, on the other hand, forms related nouns, adjectives, and adverbs. (Note that there is not always such a clear differentiation in the classes of words formed from two spellings of a base; at times the same spelling will form verbs as well as related nouns, adjectives, or adverbs.)

   The word formation process that we see in the words above can be described as **alternation,** a useful term for the process that occurs when two or more base elements toggle or **alternate** in the formation of related words.[9] With *conclude* and *conclusion* as well as *include* and *inclusive*, the alternation is between two spellings of an English bound base, <clude> and <cluse>, both of which ultimately derive from the same Latin verb and can be called,

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[7] Free and bound base elements are introduced in chapter 3, and clarifying examples are provided throughout the book.

[8] Not all morphological processes that occur in English are described in this chapter. I've focused on the ones most relevant to spelling.

[9] Many linguistic sources describe the alternation of morphemic units in spoken words, with a focus on changes in the phonemes that are internal to morphemes. (See, for example, *Language Files,* 12th edition, p. 169.) We can observe a similar alternation in the written forms of morphemes. By understanding the etymological histories of related words where written base elements alternate, we can also understand why and how these alternating base elements have come into English. See chapter 7 for a brief introduction to this topic.

colloquially, **twin base elements**. (A discussion of twin base elements and their evolution from Latin verbs can be found in chapter 7.)

The twin elements <clude> and <cluse> are both bound base elements in present-day English. We find the same alternation process occurring with the bound element <duce>, which spells *produce*, and its twin <duct>, a free element that forms the word *duct* (as in a heating duct). This same <duct> is the base of the word *production*. (See Figures BC1.3 and BC1.4.)
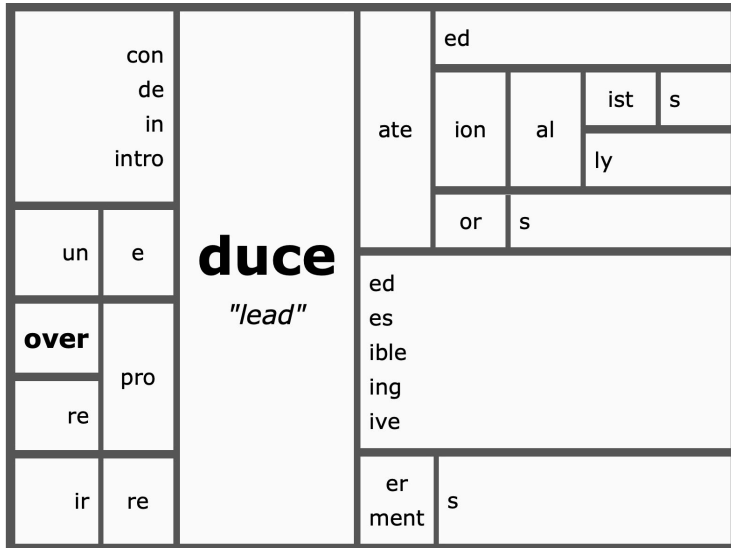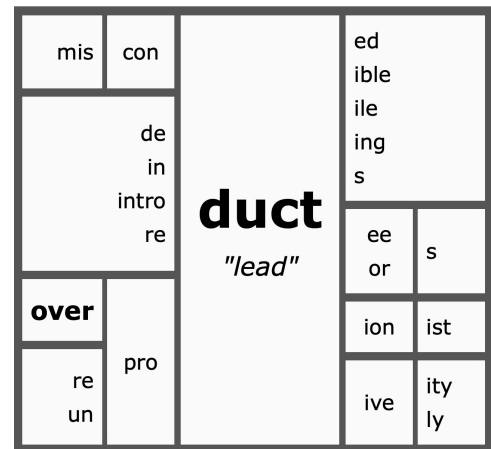

Figure BC1.3

Figure BC1.4

With an awareness of alternating base elements, we can resolve many spelling questions. To know why there is a <c> rather than an <s> in *produce*, one of the puzzling questions described at the beginning of this chapter, we, of course, want to examine how the pronunciation of *produce* relates to its spelling; but it's only when we broaden our perspective to include the spelling of the related word *production* that we can understand the <c> in *produce*.

After all, an <s> could also represent the /s/ in the pronunciation of *produce.* Think about the <s> in *use* and *excuse*. When used as nouns, these two words rhyme with *produce*. (*My feeble excuse was of no use.*) If spelling had only one purpose—to represent the pronunciation of an isolated word as directly as possible—then it would be impossible to explain why we spell *produce* with a <c> rather than an <s>. But while the spelling of a word certainly provides

> Remember that slash brackets around a symbol (for instance, /s/ or /k/) indicate a phoneme. For more, see chapters 2 and 8.

signals of pronunciation, it does more than that. One important function of a spelling is to make it easy to spot morphological elements in a written word. Even when base elements alternate in related words, as with the <duce> in *produce* and <duct> in *production*, similarities in their spellings provide a signal of the relationships between them. Thus it is morphology, not a spelling rule, that provides the explanation for the <c> in *produce*.

Although students need to understand all the ways to spell the phonemes in spoken English words, (which we perceive through awareness of the distinctive segments of pronunciation in those words), that may not be enough to spell a word accurately. Frequently, a student can make sense of the specific graphemes (the letters and combinations of letters) that spell a word only by examining related words. Happily, this can also strengthen their ability to remember the various pronunciations that a given grapheme can represent. For instance, students can be directed to think about connections in meaning and usage between words like *produce* and *productive* as well as *reduce* and *reduction* and to notice that they all contain the grapheme <c>, which can signal both the /s/

pronunciation in the word *produce* and the /k/ pronunciation in related words spelled with <duct> such as *production*. The grapheme <s>, on the other hand, wouldn't work in *production* because it never represents the pronunciation /k/.[10] Because English has many ways to spell most phonemes, students need to understand the various factors that have led to a grapheme being present in a particular word—including morphological consistency—so they can reconstruct spellings as needed.

It's also important to recognize that the <c> in <produce> is there because of the word's etymology: its origin and history. Yet offering that fact alone as an explanation will not help a student to remember the <c>. We need to go further and use etymological resources to identify related words that are memorable and concrete—words whose spellings, meanings, and pronunciations will explain and clarify a potentially confusing grapheme in a word. Once we find those words, as we've done with *production* and its relationship to *produce*, we can place them in paired matrices so that students can understand and remember their relationships.

The matrix and word sum concretely represent the framework of the English spelling system and are essential tools for accurate morphological study. In addition, a matrix will often represent many related words, helping students improve their spelling while organically building vocabulary and enhancing their comprehension.

What Are the Implications for Word Analysis?

Increasingly, educators are recognizing that morphology clarifies many aspects of spelling and that word sums are important tools for making sense of morphological structures and relationships. However, even with a good understanding of affixation and its role in written English, we may still be mystified by the morphological relationships between spellings like <demolish> and <demolition>; <multiply> and <multiplication>; <submit> and <submission>; or even <prove> and <proof>. We can't place pairs of words such as these within a single word sum with one written word appearing on the left side of the word sum and the other one on the right. Without an awareness of morphological processes beyond compounding and affixation, we may erroneously assume that morphology doesn't work consistently in these words and throughout the entire system.

On the contrary, morphological processes work very consistently, but morphology involves more than compounding and affixation. By expanding our understanding of morphology to include alternation of base elements and a change (rather than simply an addition) of affixes, we can make sense of many words that we might otherwise find confusing.

This, then, leads to the following conclusion: when analyzing the structural relationship between any two words that seem closely related, we start by identifying the morphological structure of each word on its own, using morphological analysis informed by etymological evidence. Even if two words are clearly related in meaning (such as *demolish* and *demolition, permit* and *permission,* or *multiply* and *multiplication*), we must first make sense of the structure of each individual word, considering which morphological processes may be at work in their spellings. Then, if we are not able to create a single word sum that shows a structural relationship between the two words, we may be able to figure out what's going on by working with two word sums.

Using this knowledge (and having looked at the etymological evidence), we might then propose this initial analysis of <demolish> and <demolition>.

<div align="center">

demolish ➡ demole/ + ish

demolition ➡ demole/ + ite/ + ion

</div>

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[10] It's also interesting to note that when *use* and *excuse* are verbs, the <s> is pronounced as /z/ rather than /s/: *Please excuse yourself and use the door on the right when you leave.* Students can use words such as these as concrete reminders of two pronunciations of an <s>.

Although it may be possible to further analyze these words, right away we see a change of suffixes at work in their spellings. In similar fashion, we can propose these analyses of <permit> and <permission>.

permit ➜ per + mit
permission ➜ per + miss + ion

These words are formed from twin base elements <mit> and <miss>, both having an orthographic denotation of "let go, send." (An orthographic denotation is a deep sense or nugget of meaning that's carried by a base; it is derived from the meaning of the etymons or ancestors of words containing that base.)[11] The base elements <mit> and <miss> alternate in the formation of many words. And for spelling, a wider view, once again, will bring into focus the relationships between *permit* and *permissive*, which can help a student remember that *permission* uses the <miss> element and is therefore spelled with <ss>. As you might imagine, incidental vocabulary growth is a wonderful benefit of this type of study.

Although English is complex, with many ways to spell phonemes and sequences of phonemes, morphology —including alternation of base elements—clarifies the complexity.

Also note that, in the spelling of *permission*, we have a bound base element that is homographic with a better known free base element. The bound element in *permission*, <miss> "let go, send" (also found in the spelling of *missile* and *submission*), is homographic with the well-known free base element that forms the standalone word *miss*, as in *I hope I don't miss my flight*. When two base elements are homographic, they are spelled the same but have different orthographic denotations, which means that they are different bases.[12]

What about *multiply* and *multiplication*? Here's one way to analyze the spelling of these words.

mult + i + ply ➜ multiply
mult + i + plice⁄ + ate⁄ + ion ➜ multiplication

Both <ply> and <plice> are ultimately derived from the same Latin etymon *plicare* and therefore have the same orthographic denotation: "lay, fold, twist." The two spellings of the base alternate in not only *multiply*⁄*multiplication* but also *imply*⁄*implication* and *apply*⁄*application*.[13] Note, however, that because these two spellings have not come into English directly from two principal parts of the same Latin verb (a process that is explained in chapter 7), they are not twin base elements. Instead, we can call them **associated base elements**, a broader, more general term that describes any two (or more) base elements that have descended from the same etymon and carry the same orthographic denotation, even if they've taken varying paths into English. In this case, many words containing the <plice> spelling came into English directly from Latin, while, often, those spelled with <ply> were adopted into English from French. Yet both base elements are ultimately derived from the same Latin etymon *plicare*, which means they have the same orthographic denotation and can alternate in related English words such as *multiply* and *multiplication*.

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[11] The term *orthographic denotation* is defined in chapter 2 and is discussed extensively throughout *Beneath the Surface of Words*. The basic process of identifying an etymon and an orthographic denotation of a base is described in Appendix B. Appendix C provides examples of verifying the morphological structure of a word. To learn more, see the Further Resources page at LearningAboutSpelling.com.

[12] To determine an orthographic denotation of a base element, we look at the etymology of words containing that base. This is why anyone who wants to understand morphology needs a basic understanding of how to use etymological references.

[13] The bound base <mult> has an orthographic denotation of "much, many" and can form a matrix of words on its own.

Awareness of the alternation of base elements is amazingly clarifying for spelling. It also leads to a deeper understanding of many familiar words. Even words such as *prove* and *proof* reflect an alternation of base elements, although no affixes are added to form either word. The base spellings <prove> and <proof> simply alternate in the verb *prove* and the related abstract noun *proof* (which can be used as a verb as well). Both *prove* and *proof* come from Latin *probare* "show, demonstrate, test."[14] If you watch "The Great British Baking Show," you might have noticed that the contestants often discuss how they *prove* bread dough in a *proving* drawer, while many Americans would talk about *proofing* that dough, possibly in a *proofing* drawer. This one unit of meaning in the English language—one abstract morpheme with the same deep sense—has two written forms: <proof> and <prove>. As is true throughout our writing system, these base elements form words of several different classes, with related but distinct present-day definitions.

The phenomenon of alternation also helps us categorize the morphology of verbs like *run* and its past tense form *ran*. Unlike words such as *play* and *played*, where the past tense is formed by adding a suffix, many very common verbs form the past tense through an alternation of base spellings: <run>, <ran>; <eat>, <ate>; <swim>, <swam>. Other relationships between clearly connected words make sense once we are aware of alternation as a morphological process in written English.

Morphology Is the Framework of the System

Morphology is widely understood to be important for literacy, yet the focus of morphological instruction is often limited to sequential word formation processes that can be represented within a single word sum, specifically compounding and affixation. In order to make sense of the spelling of many other puzzling words, we must expand our understanding of the morphological processes that operate in English and teach students about word formations that occur as affixes change and base elements alternate.

The more we learn about the morphological framework of our spelling system, the better we can understand and explain the reasons for the spellings of all words—and marvel at the flexibility, elegance, and vigor of our complex yet coherent morphophonemic spelling system.

This bonus chapter builds on the first seven chapters of *Beneath the Surface of Words: What English Spelling Reveals and Why It Matters*. You may find it useful to reread those chapters after having read this one.

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[14] Latin *probare* is also the etymon of the base element <probe> with the same orthographic denotation of "show, demonstrate, test."