

Morphological Approach to Morphologically Complex Word Acquisition:
Transferring Morpho-orthographic Segmentation
And Morphological Problem Solving Strategies

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Abstract

The topic of this essay of literature review falls in the broad spectrum of morphological awareness. To be specific, it talks about processing morphologically complex words by applying morphological problem solving strategies (Anglin, 1993). This essay unfolds in the following manner: first, background information is reported to explain the interest on this topic; second, the general development of morphological awareness is carefully addressed following the definition of morphological awareness; third, the relationship morphological awareness and vocabulary acquisition is examined briefly; fourth, the essay talks about various forms of morphological awareness assessment tasks, giving readers a grasp of what aspects are normally investigated and how; fifth, the essay specifically choose upper elementary students as its targeted learners, and discusses the specialty of this student body in the perspective of morphological awareness development; after that, the framework of morphological problem solving (Anglin, 1993) is discussed in detail, providing the theoretical reference for the proposed intervention; and, in the last part, implications to classrooms are discussed by unfolding a proposed Chinese word formation instruction, examined the theoretical understanding of the effectiveness of such instruction and the meaningfulness in the reality. Finally, a conclusion briefly ends this essay, tapping on the cross-language morphological awareness and looking forward to the transferring between non-cognates such as Chinese and English.

Background

One notorious barrier of learning English as a second language is the effort of learning words. Also, this is neither always easy for native speakers. What is the standard of knowing a word? Being able to pronounce and spell it? Or being able to read smoothly when it appears in text? Or being able to produce sentences with it? As a living language, English has countless words. Since it is quite obvious to see the impossibility of teaching each and every one of them, which ones of these words should be and need to be taught to our students? It is natural for teachers to think about this question. And the underlying assumptions for this question is that either students will live by with only the words taught or students are able to extend their possessed word knowledge to the unknown ones thus broaden their vocabulary amount. I can't deny the possibility of the first assumption, but the latter one seems to fit more students' situation. This assumption falls into the spectrum of MA (MA). This capstone project taps on (number) much smaller aspects: a) MA and vocabulary acquisition; b) MA assessment forms; c) MA development of upper elementary students (3rd to 5th graders); d) MA instruction; e) morphological problem solving framework; and f) transferring of MA between Chinese to English.

The inquiry project I conducted in EDUC 3390: Literacy Development generally touched the topic of MA and its difference of applications in two languages systems. The research proposal discussed in PSY-360: Developmental Psychology presented an idea of how to actually carry out an intervention on Chinese character formation knowledge to help students with their MA and a pre-/ post-test, post-test to assess such improvement. While I had originally planned to use my research findings to prove the effectiveness of the intervention, I finally decided to build a sturdier theoretical support in a paper instead of in a project and discuss the pros and cons of the intervention in both U.S and Chinese school settings. I spoke with Professor Neal and Dr. Pray who approved the change from project to

paper.

Morphological Awareness Definition and Development

Morphemes are the smallest units of meaning in a language—units that can serve as freestanding words (also known as free morpheme, e.g., *deep*) or that are “bound” to such words (e.g., *-en* in *deepen*) (Carlisle, 2010). Morphological awareness (MA) refers to the ability to reflect on and manipulate morphemes and word formation rules in a language (Kuo & Anderson, 2006). Researchers (e.g., Carlisle, 2000; Kuo & Anderson, 2006) have investigated the three aspects of the multidimensional constructed MA (i.e., inflectional, derivational, compounding) and have proved the divergence of their development trajectories.

Reflecting the three aspects of MA, research on children’s acquisition of morphology and MA has focused on the acquisition of three types of morphology: inflections (e.g., Berko, 1958; Casalis & Louis-Alexandre, 2000; Cazden, 1968), derivations (e.g., Ku & Anderson, 2003; Lewis & Windsor, 1996; Tyler & Nagy, 1989), and compounding (e.g., Berko, 1958; Ku & Anderson, 2003). Inflectional morphemes typically mark syntactic or semantic relations between different words in a sentence without altering the meaning or the part of speech of the stem (e.g., *apple*→*apples*). Derivational involves the addition of a morpheme to change the part of speech or the meaning of a base morpheme (e.g. *explain*→*explanation*). And compounding refers to the formation of new words by combining two or more words or roots (e.g. roommate). Right-headed compounding rule is shared by both Chinese and English, which means the right head word is modified by the left one (Ramirez et al., 2011).

By age 2, monolingual English-speaking children have been proven their dawning knowledge of inflectional morphemes. By early elementary grades children have already acquired basic regular inflectional rules (e.g. Akhtar & Tomasello, 1997; Anisfeld & Tucker, 1968; Berko, 2004; Carlisle, 1995; Kuczaj, 1977; Marcus et al., 1992).

Relatively few studies put interest in the development of compound morphological awareness. One of the exceptions was Clark and her colleagues' (Clark, 1981; Clark, Gelman, & Lane, 1985). They managed to reveal that the modifier-head relation in compounds described earlier was appropriately understood by children as young as age 2;6. Even so, children process familiar transparent compound words as unanalyzed wholes by kindergarteners. And by 4th grade children have known the meanings of morphological components play a part in the meaning of the entire compound word (Silvestri & Silvestri, 1977).

Among the three types of morphological awareness, derivational awareness emerges later and continues its maturing over a much longer period of time. Not until early adulthood are the more advanced derivational awareness possibly fully developed (Carlisle & Fleming, 2003; Carlisle & Nomanbhoy, 1993; Derwing & Baker, 1979; 1986; Tyler & Nagy, 1989; Windsor, 1994).

Overall speaking, the knowledge accumulation of complex relations of form and meaning causes the gradual development of MA (Carlisle, 2010). Many studies have found that lower graders perform less well on tasks of MA than higher graders (e.g., Anglin, 1993; Carlisle & Fleming, 2003; Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). Development of MA during upper elementary school years will be discussed in the *Learners: Before Entering the Middle School* part to back up the necessity of MA instruction in such age group.

Morphological Awareness and Vocabulary Acquisition

In the language of English, as concluded by Carlisle (2010), results of the analysis of 16 selected studies indicate that MA has the potential to contribute to students' literacy development in all three key components based on Adams' (1990) model (i.e., phonology, orthography, word meaning)—most notably when it deepens students' understanding of the

morphemic structure, spelling, and meaning of written words.

Nevertheless, instead of covering the broad topic of the relationship between MA and literacy development, this essay discusses only the relationship of MA with one aspect of literacy development, which is vocabulary acquisition or word learning. Morphology plays a central role in vocabulary acquisition ever since early childhood (Carlisle, 2010). Many studies have presented the contribution of MA to school-age students' performance of reading and spelling words or pseudowords in English (e.g., Carlisle & Stone, 2005; Deacon & Kirby, 2004; Fowler & Liberman, 1995; Goodwin, Gilbert, & Cho, 2013; Nunes, Bryant, & Bindman, 2006; Singson, Mahoney, & Mann, 2000; Templeton & Scarborough-Franks, 1985; Treiman & Cassar, 1996). Similar findings have been found also in Chinese (e.g., Chung & Hu, 2007; Ku & Anderson, 2003)

Bowers and Kirby (2010) conducted a 20-session intervention targeting morphological word structure on vocabulary knowledge in four 4th and 5th classes, and they came to the conclusion that performance on the treatment word set, not the control set, shown better use of pre-test vocabulary knowledge in learning new vocabulary. However, hierarchical regression analyses controlling for initial vocabulary showed significant instructional effects on morphological analysis and vocabulary with words that were taught directly and novel words built on bases that were taught in the context of other derivations, but not for words with untaught bases. In Chinese, Li et al. (2011) tested 130 children from first year to third year of kindergarten in China and also confirmed MA's central role in children's vocabulary acquisition.

Multiple Forms of Morphological Awareness Assessment Task

Despite its documented importance to language and literacy success, no standardized or consistently used tasks are available to analyze MA thoroughly (Apel et al., 2013; Wotler &

Gibson, 2015). Researchers developed various ways to assess MA according to their own investigation needs. This part of the essay assembles some forms of MA assessment that were adopted by researchers to test on participants including but were not limited to upper elementary students.

One major form is analyze participants' word production, or we can call it a production task, as what Berko (1958), Carlisle and Nomanbhoy (1993), and Carlisle (1995, 2000) did in which children were required to transform a base word according to fit a specific syntactic context, normally in sentences. Berko (1958) focused on inflectional suffixed for representing plurals and past tense of oral pseudowords, while Carlisle (1995, 2000) tested derivational knowledge in two different subvarieties—derivation and decomposition. A derivation task gives a child a base word (e.g., humor) and asks for its transformation to fit a syntactic context (e.g., The story is quite ____). A decomposition task (recognition of word structure), working backwards to some extent, provides a child with a suffixed word (e.g., humorous) and requires a base word to fluent the syntactic context (e.g., The man has a sense of ____). Apel & Lawrence (2011), McCutchen et al. (2008), and Wolter, Wood, & D'zatko (2009) are some other researchers who conducted assessments of this type. This major form includes inflections and/or both transparent and opaque derivations.

Another major form of task, a judgment task, was used by, for example, Berninger et al. (2010), Derwing (1976), Ku & Anderson (2003), Mahony et al. (2000), and Tyler and Nagy (1989), in which students were asked to make judgments about the semantic relatedness of word pairs. Word pairs such as builder/build are semantically related, while word pairs such as earth/ear are not. This major form is also used to include inflections and/or both transparent and opaque derivations.

The last major form is word analogies, or an analogy task. One subvariety was typically presented orally when students were asked to complete analogies such as: anger/angry::

strength/___ (e.g., Bryant, Nunes, & Bindman, 1997; Kirby et al., 2012; Tsesmeli & Seymour, 2006). Other researchers (e.g., Bryant et al., 1997; Deacon & Kirby, 2004) required students to complete sentence analogies (e.g., Peter plays at school./Peter played at school.: Peter works at home./ ___). Word analogies cover inflections and/or derivations, while sentence analogies only include inflections so far.

Another task worth mentioning here is giving definitions of new morphologically complex words (Auglin, 1993; Carlisle, 2000; Lewis & Winder, 1996; Pacheco & Goodwin, 2013; Tsesmeli & Seymour, 2006). Auglin's (1993) study will be further discussed in the *Learners: Before Entering the Middle School* part to illustrate the growing MA of upper elementary children.

Many studies used several forms of assessment task to test different aspects of MA. For example, Ku & Anderson's (2003) study was about MA development in both Chinese and English. They, except for the judgment task mentioned above, gave us another three forms of assessment. They were (a) discrimination task in which students were asked to choose the odd word part in a set of three that shared the same orthography but not meaning (e.g., classroom, bedroom, mushroom); (b) definition task which involved selecting the proper interpretation from multiple choices of what an affixed word means (also used by Tyler & Nagy, 1989); and (c) another kind of judgment task to assess the knowledge of word formation process for longer, more complex but less frequent words by deciding the plausibility of pseudowords. However, if we try to figure out what exactly Ku & Anderson were testing for, we can find that (a) discrimination task actually still assessed semantic relatedness, which was similar to the major form judgment task; and the difficulty level of (b) multiple choice definition task was somewhere between the level of major form production derivation task and Anglin (1993) and other researcher's giving definition task. Only (c) task was new.

The diversity in forms of MA assessment tasks used makes it difficult to compare results across studies. And it is relatively hard to make an agreement on which one or several forms can better explain children's performance. Taking tasks which ask for definitions as examples, which form is better: to make children provide definition completely by themselves or to make them select from the given choices? If researchers choose the former one, there will be a problem of how to interpret children's various answers and how to score these answers. If the latter one is adopted, will there be a possibility that children might simply apply test strategies and guess their way out? We need to consider more than testing prompts, procedures, aspects of MA, and children's age or grade levels.

Learners: Before Entering the Middle School

Learners targeted in this essay are upper elementary school-age children, normally from 3rd to 5th grade (age 9 to 11), who are (1) English monolingual speakers in U.S. classroom settings; (2) Chinese speaking English language learners in Chinese classroom settings; and (3) English (L1)-Chinese (L2) (spontaneous) bilingual speakers in U.S. classroom settings. The consideration of covering English and/or Chinese speakers in U.S. and in China led to these three types. Another language, Chinese, gets involved in this essay because I consider transferring Chinese character formation knowledge as well as Chinese MA to English MA as a possible way of MA instruction in classroom settings aforementioned. The transferring will be discussed in later part as implication to classrooms. The emphasis of learner analysis should lay on this group of upper elementary school-age children themselves and their English MA only. This student body deserves some examination from the perspective of MA development.

Rather than examining this age group as a whole, studies of MA chose students from one or two grades and put them in the comparison of their performance to other younger

and/or older children in most cases. Yet, an increasing amount of evidence reveals that morphological knowledge maintains its development across the upper elementary years (Berninger, Abbott, Nagy, & Carlisle, 2010) and beyond (Tyler & Nagy, 1989). Green et al. (2003) found in 3rd and 4th graders that their production of morphology in their writing mirrored that in their oral language: inflectional morphology was largely mastered by age 9 or 10 while derivational MA continued its development in middle childhood. As indicated by Carlisle (2000) and Green et al. (2003), around 4th grade happens the important shift from phonological to morphological skills. Chen (2011) assessed Chinese elementary school children's Chinese MA, and came to the conclusion that children's capability of manipulating morphology knowledge grew through their grades. She stated that by grade 3 the ability of morpheme identification was performed stably well, while homophonic and homomorphic MA as well as the ability of morpheme explanation developed throughout the elementary years. 4th grade year appeared to be the most important time period for the development of homophonic MA.

Although in these two studies different aspects of MA were investigated in two language systems, making a direct comparison rather impossible, we may still get the sense that by grade 3 or 4, children's MA has passed the rudimentary stages and is moving forward to more advanced levels: for English, it usually means that derivational MA comes into play. It is a good news since the growing amount of morphologically complex words (particularly derivatives) children know becomes the main cause of the vocabulary explosion that appears around 4th grade (Anglin, 1993; White, Power, & White, 1989).

This soaring trend goes along with Anglin's (1993) study of morphological development on 1st, 3rd and 5th graders. He found that 1st graders knew fewer derived forms than root words and inflected forms. This relationship reversed already at the third-grade level. The gap kept growing and became much more pronounced for 5th graders. Between 4th and 8th grade (upper

elementary to middle school years) developmental changes in comprehending the semantic and grammatical roles of affixes may be a prerequisite for inferring or decoding the unfamiliar words in reading (Tyler & Nagy, 1989; Wysocki & Jenkins, 1987). From all these study results, it seems that time around 4th grade, which is the upper elementary years this essay targets, are crucial in the whole development of MA.

Framework: Morphological Problem Solving

If I were to talk about the framework of morphological problem solving prompted by Anglin (1993), I should first introduce another earlier *morphological generalization hypothesis*. As defined by Wysocki and Jenkins (1987), children who “draw upon knowledge of a familiar word to aid them in deriving the meaning of an unfamiliar, but related, word” (P69) participated in the morphological generalization. On the other hand, Anglin said this about morphological problem solving: “the very act of figuring out a word through morphological analysis might contribute substantially to its learning since such analysis exemplifies the type of deep processing that has been shown to facilitate remembering” (P148). He described morphological problem solving as a process by which the meaning of unknown morphologically complex words can be deciphered by morphological analysis. Also he found that it is ordinary for elementary students to use root word knowledge frequently to problem solve morphologically complex words.

Pacheaco & Goodwin (2013) investigated the morphological problem solving strategies described by Anglin (1993). A “part-to-whole” strategy is to deal explicitly with only one morphological component to get to know the whole word. A “parts-to-whole” strategy is to deal explicitly with more than one morphological component in the process of knowing the meaning of the whole word. An “analogy” strategy is to explicitly use analogy to another word of similar morphological form so as to comprehend the new morphologically complex

word. The last strategy is “whole-to-part” strategy, as described by Anglin (1993) as a variation on the more typical “part-to-whole” strategy. Children have a sense of the meaning of the whole word and then work backwards to get the meaning of morphological component within.

Pacheco & Goodwin (2013) got some inspiring findings: a) more than one morphological problem solving strategies might be used when students approach a word; b) cross-language scaffolding exists (at least between the investigated languages Spanish and English). This well brings out the transferring I strongly advocated. Since Spanish and English are cognate, traces of cross-language scaffolding should be found much more easily than between two different writing systems Chinese and English. Pacheco & Goodwin (2013) further suggested how instruction should look like to best support problem solving. They thought that instruction should emphasize on two parts: one is morphological knowledge (i.e., knowledge of the meaning of roots and affixes) and morphological awareness. Obviously, morphological knowledge acquired in Chinese is not quite possible to be used directly in morphological problem solving of English words. Thus, it left us the MA part to work on.

In the *Curriculum: Existed Morphological Awareness Instructions* part, applying this morphological problem solving framework, let’s see how the framework was embedded in these instructions.

Curriculum: Existed Morphological Awareness Instructions

Nagy & Anderson’s (1984) estimated that there were an average of one to three additional related morphologically complex words that should also be comprehensible to the child for every word a he or she learns, the exact number depending on the child’s ability of utilizing context and morphology to induce meaning. White, Power and White’s (1989) study results directly supported the practice of morphological awareness instruction at Grade 4 and

above. The application of MA instruction seems to be promising to this point. However, interestingly, Reed (2008) found only 7 qualified (to her selection criteria) studies to be included in her literature review on the topic of how MA instruction would influence several aspects of literacy development. Unsurprisingly, Reed suggested an early stage of the development and study of MA instructional programs.

Since in the 7 included MA instructions there were also phonology and other content involved, to avoid unrelated information, I extract only MA related part of MA instructions I content n the following list:

- Structural analysis using common affixes and roots based on word origins (Abbott & Berninger, 1999);
- Reading and spelling common affixes
 - By chunking of multisyllable words (Vadasy, Sanders, & Peyton, 2006)
 - By vowel flexing in practice with affixed words (Vadasy, Sanders, & Peyton, 2006)
- Word stems, grammatical categories of inflectional affixes, derivational affixes, morphological analogies, blending stems and affixes (Nunes, Bryant, & Olsson, 2003)
- Integrated instruction in affixes, and analysis of word part clues (breaking word into parts and putting meanings together) (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003)
- Instruction on 8 frequently occurring prefix families, use of 10 lesson words as instructional examples, use of 20 transfer words for morphemic analysis practice (Baumann et al, 2002)
- Instruction on 12 high frequency root words (6 stimulus and 6 transfer words), defining words through morphemic generalization (from a stem to a suffixed

derivative, from a suffixed derivative to another suffixed derivative, from a suffixed derivative to a stem) (Wysochki & Jenkins, 1987)

Various instruction content and methods were used by these studies. However, all instructions were around the teaching and learning of the morphological knowledge of affixes and stems. Instructions also included morphological analysis skills. It seems that instructions on morphological knowledge and morphological analysis skills go together in a sense. Among the 7 studies, the intended outcome knowledge of Baumann, Edwards, Boland, Olejnik, & Kame'enui (2003), Baumann, Edwards, Font, Tereshinski, Kame'enui, & Olejnik (2002), and Wysocki & Jenkins (1987) were vocabulary.

Not only in the analyzed instructions used by researchers, real classroom MA instruction or morphology curriculum usually provide the teaching of meaning of Greek and Latin affixes and roots and the blending exercise of putting word parts together (re- plus build plus -ing equals rebuilding). Some proposed to learn words while reading. Though this is another totally different topic, embedded MA instruction while reading is tough and may not be able to applied to all situations.

While examining the studies, we can see traces of morphological problem solving strategies. Taking the intervention conducted by Nunes et al. (2003) as an example, the aim of the study was to promote explicit understanding either of morphological rules or the phonological rules. Let's spare the part of phonological rules aside since it is not the focus of this essay. As introduced by Nunes et al. (2003), the main activities were classification, segmenting, blending, and analogy. In other words, segmenting is an pre-action, consciously or consciously used by students for applying morphological problem solving. Blending is also one step of meaning process especially in part-to-whole and parts-to-whole strategies. Analogy is obviously similar to the analogy strategy. Classification, although doesn't have a

direct pairing, is somehow in the same position as segmenting, serving as a pre-step for other meaning-making morphologically complex word meaning processes.

In Adams view, morphology contributes to understanding of spelling–meaning connections only after children acquire basic reading skills and reach the point where they encounter morphologically complex words in their reading. Lessons on MA might be most appropriate for “later grades of schooling when the students’ knowledge of frequent spelling patterns has been thoroughly established and automated” (p. 156). It is also in the late elementary years that most of the unfamiliar words students encounter in written texts are morphologically complex (Nagy & Anderson, 1984); at that time, morphological analysis should be useful in making sense of unfamiliar words during reading.

Implication for Classroom: Transferring from Chinese to English

According to Mihalicek & Wilson (2011), writing systems in the world are divided into two major sub-systems, phonographic systems and morphographic systems. The former ones rely predominantly on the representation of sound (e.g., English), while the latter ones refer to the composition of the morphemes (e.g., Chinese). Reed (2008), however, defined English as a morphophonemic language, in that words are represented in both units of sound (i.e., phonemes) and units of meaning (i.e., morphemes). Deduced from these two definitions of the natures of languages and their orthographies, English, compared with Chinese, has a relatively opaque representation of morphemes, hiding behind the alphabetic letter strings. No matter to what extent morphemes seem to be obvious in the two languages, MA, the ability to reflect on and manipulate morphemes and word formation rules in a language (Kuo & Anderson, 2006), is important to reader of both languages.

Since the cross-language scaffolding is more outstanding between cognates, what is point of linking Chinese and English who don’t share such convenient quality? The largest

group of beneficiaries might be Chinese speaking ELL students. They possess Chinese language knowledge but lack the proper guidance of how to transfer their Chinese MA to English word learning. The same condition applies to English (L1)-Chinese (L2) (spontaneous) bilingual speakers. More and more K-12 American schools open Chinese classes from beginner level to AP level to make students meet the requirement of learning a foreign language. According to Chinese course descriptions and the standard of AP test, the Chinese education in K-12 schools operates in a similar way as the English education does in China. When teaching a foreign language, teachers focus only on L2 without noticing any cross-language benefits for native monolingual English speakers

The ideal instruction of transferring includes two major parts. The first part that I will discuss in detail focuses on Chinese characters formation and the decomposition practice within single characters. This part of instruction should be practical even with monolingual English speaking upper elementary kids for there's no Chinese language knowledge required beforehand. For this part, I borrow the conceptual theory of part-whole relations introduced by Gerstl & Pribbenow (1996) here, since 3 of the 4 morphological problem solving strategies deal with the relationship between part(s) and whole. Limited studies have researched the roles of MA within single Chinese character. But according to MA definition, word formation rules are included as one big aspect to be manipulated and morphemes do exist and shouldn't be ignored within Chinese character; thus the investigation of MA within Chinese character is actually necessary and theoretically practical. Another part should come after the first part, however it might be well suitable for Chinese speaking ELL students. This part focuses on the direct MA transferring from Chinese to English on word base so that deeper Chinese MA is required to be able to analyze Chinese word meaning. The second part will not be discussed in this essay since it doesn't cover all learner types.

Now, let's discuss the first part of proposed intervention.

Under the constructive approach of partitions based on the compositional structure of the whole, morphemes are decomposed as components, a permanent part-whole relation resulting from the (conceptual) knowledge of the entity, i.e., the (English) word or the (Chinese) character. Although this partition approach well explained the morpheme-word relations, it fails to differentiate the divergence of morphological segmentation and spurious segmentation.

Another constructive approach, partitions of the whole which are arbitrary, or driven by internal features or external criteria, however, might be able to shed light on this unsolved question. The corresponding parts of this partitioning are pieces, segments, and portions. Pieces result from an arbitrary subdivision of an entity into parts, independent of any inherent properties or external criteria. Segments are derived by the application of an external scheme. Portions are maximal parts with a certain intrinsic property defined by an external criterion (Gerstl & Pribbenow, 1996). One English word “archaeoastronomer” and one Chinese character “屋” is used here to illustrate the application of this partition approach.

Piece partition is arbitrary, so we have a relatively larger result pool. But, most of the results are meaningless. The rest, since the partition process is arbitrary, means nearly nothing to the reader or someone who wants to find out the meaning of the word.

Segment partition is based on schemes, which has different results due to the application of various schemes. To partition English word “archaeoastronomer” into segments, we can based on some external schemes, such as syllable/sounding schemes (under which we shall get one result) or one-dimensional path scheme (beginning-middle-end, under which we shall get multiple results). To partition Chinese character “屋” into segments, we can based on the external structure schemes; so we can get (1) upper-lower segmentation: “尸” and “至”; (2) upper-middle-lower segmentation: “尸”, “云” without the upper “一”, and “土”. Based on these two results, if we want, we can isolate the left “丿”.

To partition word or character into portions, we identify meaning or morpheme as the intrinsic property to use. So, English word “archaeoastronomer” could be partitioned as (1) archaeo-astronomer, in which archaeo- means origin, ancient, and/or primitive, and astronomer is an independent word; (2) archaeo-astro-nom-er, in which the independent word “astronomer” is subdivided into –astro- (star and/or outer space), -nom- (not a morpheme here) and –er (a suffix meaning a person or thing that does something or is something). Chinese character “屋” could be partitioned as (1) “尸”, an independent character but serving as a radical here, which related to shelter or building, and “至”, an independent character, which means arrival; (2) “尸”, “云” without the upper “一”, which is a deformation of a head-down bird or an sharp-point-down arrow, and “土”, an independent character, which means the earth or the ground. “土”, although it is an independent character, is undividable. And it can also serve as a radical in other characters but not in the character “屋”.

As we can see here, the outcomes of the segment partition and portion partition of the Chinese character “屋” have a higher possibility of coincidence than the ones of the English word “archaeoastronomer”. If we spend more time calculating the possibility of this coincidence, we would probably find that the result we have here is no accident.

Because the portion partition of words or characters is based on the intrinsic property of meaning or morphemes, it is termed as morphological segmentation to differentiate from the spurious segmentation, which refers to the interferential partition based on wrong morpheme identifications.

Chinese characters, if selected thoughtfully, are able to provide such opportunity-rich environment for students to experience the relationship between morphological components and the whole character or word. Among the 4 morphological problem solving strategies, part-to-whole, parts-to-whole, and analogy strategies are easier to be embedded in the

Chinese character formation instruction. Since this instruction, unlike the existed morphological awareness instructions, has nothing to do with the English morphological knowledge (of affixes meanings etc.) and only emphasize analysis skills of morphological awareness. By isolating these two parts, we can confirm the effectiveness of the morphological analysis only and might be able to solve the mystery that students had limited instruction outcome and didn't perform well on words untaught word bases Bowers and Kirby (2010).

Conclusion

Many new words middle school children encounter in books they read are relatively transparent derived forms whose meanings are possible to be understood through analysis of the components of words. Whether students can not only recognize the structure of these morphologically complex words but also find out their meanings (Carlisle, 2000).

Although it was not new to see cross-language studies (e.g., Ku & Anderson, 2003; Lam et al., 2012; Pacheco & Goodwin, 2013; Ramirez et al., 2011; Wang et al., 2006), studies mostly stopped in front of the finding or confirming the existence of correlations between Chinese MA and English MA (compounding in many cases). Transferring is not often discussed. The study conducted by Pasquarella et al. (2011) was the first study to examine and did reveal the existence of the transferring of morphological awareness between English and Chinese in bilingual kids (1st to 4th graders in Canada).

As recommended in the last section of the essay, the Chinese character formation instruction is the first part of an ideal intervention. The second part is exactly tapping on the direct MA transferring on word bases. The morpho-orthographic segmentation now moves from within characters to within words, which is widely investigated by researchers in assessments but not in interventions. The future of the study and analysis of instructions on

cross-noncognate languages is not only promising but also necessary.

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