

【論文】

Dual Coding Theory and the Teaching of Idiomatic Language

VASILJEVIC, Zorana

二重符号化説と慣用句的言語の指導

ワシレビッチ
鷺麗美知 ゾラナ

Abstract: The dual coding of input involves the presentation of both verbal and visual information. Research in cognitive semantics has shown that it promotes the formation of memory traces and consequently the retention of information. This study examines possible ways of integrating images and verbal descriptions so that both the comprehension and the production of idiomatic language are facilitated. The results of the study suggest that a combination of visual and verbal clues has a limited effect on retention of the meaning of fixed word combinations in the idiomatic language, but a positive effect on the recall of their linguistic form.

Keywords: idiom teaching, dual coding theory, student-generated pictures

Introduction

Formulaic language is a common feature of both written and spoken English. It is estimated that there are as many as 80,000 fixed expressions in modern American English (Jackendoff, 1995), roughly the same as the number of individual words. Fixed expressions include different types of multiword phrases such as compounds, clichés, quotes or proverbs. One of the largest and communicatively most important subsets of fixed expressions are idioms.

The word *idiom* has its origin in a Greek word *idios* which means “one’s own,

peculiar, strange”. Idioms were traditionally seen as frozen lexical phrases whose meaning is sanctioned by usage rather than the semantics of their compositional elements. They defy the standard view of language processing, which assumes that comprehension entails recognition of individual words and their context-specific meanings, and combining these meanings into meaningful units according to their grammatical functions. Idiomatic language also seems to violate Grice’s (1975) cooperative maxim, which presumes that during conversation speakers avoid obscurity and ambiguity and strive for clarity and concision.

Recent research in the fields of linguistics, psychology and philosophy, however, provides some evidence that idioms are neither false nor semantically deviant language creations. Furthermore, the links between idiomatic strings and their figurative meanings are not arbitrary. Motivated by conceptual metaphors, idioms have complex figurative interpretations and they are used to convey recurring situations of particular social interest, affective standpoints (Hung, 2010) and specific notions such as causality, intentionality or manner (Gibbs & O’Brien, 1990; Gibbs, 1992). Moreover, native speakers seem to be attuned to the perception of the figurative sense of idiomatic phrases (Glucksberg, 2001). Idiomatic usage does not typically lead to communication breakdowns; on the contrary, it allows more complex and nuanced interpretations of the intended meaning.

The processing of idioms and how people understand figurative meanings is still controversial. Generally, it is assumed that there are two processes involved in idiom comprehension: literal interpretation of the idioms constructed from the constituents of the phrases and retrieval of figurative meaning from memory. The models of idiom comprehension differ with regard to the order in which these processes are believed to occur. Earlier studies of idiomatic language have argued that idioms are represented in the memory separate from the normal lexicon.

According to the Idiom List Hypothesis (Bobrow & Bell, 1973) if the meaning cannot be generated based on grammatical analysis then people refer to the “idiom list” in the mental lexicon to find the correct interpretation. In other words, literal analysis always precedes figurative processing. Other studies (Swinney & Cutler, 1979; Glass, 1983) claimed that idioms are stored and accessed as lexical items and processed in much the same way as individual words. This means that when idioms are encountered both their literal and figurative interpretations are retrieved. Figurative interpretations, however, are retrieved more quickly than the literal meaning of the phrases, which require more computation of the relationships among the individual lexical items. The third model holds that idiomatic meanings are retrieved first and literal meanings are accessed only when the idiomatic interpretation of the lexical string fails to match the context (Gibbs, 1980, 1986). Finally, there is the Configuration Hypothesis model (Cacciari & Tabossi, 1988) which holds that idioms present memorized configurations of words, with their meaning encoded by the weight of connections between the lexical constituents of the phrases. Figurative meanings are accessed only when a sufficient portion of the string is recognized, and the configuration of a phrase becomes unique to the idiom, a point known as the *idiomatic key*. Up to the point when the key is activated idiomatic strings are processed only literally.

Whilst there is still a lot to be learned about how figurative language is understood, the results of experimental studies available to date do not indicate precedence of a literal interpretation over a metaphorical one. The development of a reliable model of idiom comprehension is difficult due to the fact that the nature of interaction between the literal and figurative idiom meanings often seem to depend on idiom type. Idiomatic phrases differ in a number of dimensions such as *familiarity* (the frequency with which they occur in the language), *transparency* (the strength of correlation between their literal and non-literal meanings),

decompositionality (the extent to which the meaning of an idiom can be generated from its constituents) and *syntactic flexibility* (the extent to which idiom strings can undergo syntactic transformations and still retain their figurative meaning). These properties affect the difficulty of idiom learning, the nature of comprehension process and the processing speed. Familiar idioms, for example, tend to be read faster (Schweigert, 1986; Cronk & Schweigert, 1992), interpreted more easily (Nippold & Taylor, 2002), and recalled better (Schweigert, 1991) than less familiar ones. They are also more likely to be processed like lexical units, while less familiar idioms tend to be approached as a string of individual words (Schweigert & Moates, 1988). Idiom transparency is another variable that affects how idioms are likely to be processed and recalled. While semantically opaque idioms tend to be learned holistically, transparent idioms are more likely to undergo semantic and syntactic analysis (Nippold & Rudzinski, 1993). Semantically transparent idioms were also reported to be easier to understand by both school-age children and adults (Cacciari & Glucksberg, 1995; Nippold & Duthie, 2003). Evidence regarding the effect of transparency on idiom production is still inconclusive. Some studies (Irujo, 1986) demonstrated a positive effect of semantic transparency on both comprehension and production of idiomatic expressions; however, other studies (Steinel, Hulstijn & Steinel, 2007) reported a facilitating effect of transparency on idiom recognition, but not on production. Idiomatic phrases also differ in their ability to be analysed and this degree of semantic decompositionality was found to be an important factor in the processing of idiomatic language (Gibbs, Nayak & Cutting, 1989). According to Gibbs and his colleagues, in a large number of idiomatic phrases the meanings of individual lexical items contribute to their overall idiomatic meaning. Therefore, a compositional analysis is part of the process of identifying the figurative meaning of idiomatic phrases. Decomposable idioms are processed faster than non-decomposable ones, because readers can assign individual meanings to phrase

components in a similar manner to processing of literal language. Finally, idioms also differ in the extent to which they can undergo syntactic transformation without losing their idiomatic meaning. While some idioms cannot undergo even the simplest transformations e.g. *by and large*, other phrases show a great degree of syntactic flexibility e.g. *throw in the sponge*. Syntactic flexibility was found to have an effect on processing and memory for idiomatic expressions. According to Gibbs and Gonzales (1985), syntactically flexible idioms are better retained than frozen idioms. This is because frozen idioms tend to be more lexicalized and therefore more easily accessible. Flexible idioms, on the other hand, are more difficult to process, which makes them more distinctive and memorable.

Despite the disparity in their intrinsic properties, different types of idiomatic phrases have often been grouped together which makes it difficult to both interpret the findings of different studies and to develop a more cognitively sound teaching methodology. As Popiel and McRae (1988) point out, a clear picture of the processes involved in the comprehension of idiomatic phrases can only emerge after all relevant variables have been taken into account; disregard for these differences will inevitably result in incomplete models of idiom comprehension. From the pedagogical point of view, failing to recognize the fundamental differences between different types of idiomatic expressions has led to a “one size fits all” approach to the teaching of idiomatic language. In EFL literature idioms have been approached as some kind of giant frozen lexical unit with rote memorisation seen as the only way to master them (Cooper, 1999). While memorisation may play an important role in the acquisition of all fixed expressions including idioms, disregard for the intrinsic differences among the phrases may create an unnecessary extra burden for the language learner.

Recent experimental research suggests that a large number of idiomatic phrases

undergo the same kind of linguistic (lexical, semantic and syntactic) and pragmatic operation as can be seen during the processing of literal language (Glucksberg, 2001). These findings have opened new possibilities for teaching idioms to second language learners by making use of general cognitive principles rather than rote memorisation. One subject of growing interest has been the role that mental imagery may play in the comprehension and production of idiomatic language.

Dual coding theory

In 1971 Pavio proposed that there are two cognitive subsystems in the human brain – visual and verbal. The two subsystems are independent, with visual and verbal information being processed along two distinct channels and separate representations coded in each channel. Depending on the nature of the input these representations can take the form of verbal associations or visual images with both types of codes facilitating organisation and retrieval of information. The two systems are interconnected and therefore, information that is presented through both visual and verbal codes will be stored and retrieved more easily than information presented through one modality only. This theory is known as dual-coding theory. It has provided a general framework for contemporary educational psychology with applications in a wide range of cognitive phenomena such as mnemonics, problem-solving, concept learning and language acquisition.

In language research support for dual-coding theory comes from a number of experimental studies that have evidenced the advantages that concrete words have over abstract language in terms of the speed of processing and accuracy of recall. There is a body of research literature that suggests that concrete and abstract words are processed in different parts of the brain (Jessen, Heun, Erb, Granath, Klose, Papassotiropoulos, & Grodd, 2000; Swaab, Baynes, & Knight, 2002).

While abstract words activate the left-brain hemisphere, which is normally associated with language function, concrete words tend to activate the right hemisphere which is associated with an imagery-based system. The additional activation of non-verbal resources results in superior encoding of concrete words (Jessen et al., 2000) and consequently their more efficient processing (Sadoski, Goetz, & Fritz, 1993; West & Holcomb, 2000).

Instructional methods that can be conceptualised in terms of image processes have been found to facilitate information processing and the acquisition of knowledge. Using visual illustrations or asking students to generate images for pairs of words was found to increase the likelihood that the imagery system would be activated and the input remembered (Clark & Paivio, 1991). Studies that examined students' performance on problem-solving questions found that simultaneous presentation of verbal and visual input enhanced students' comprehension more than either text or pictures alone (Mayer & Anderson, 1991; 1992).

Mental imagery and idiomatic language

In studies of the cognitive processing of idioms the role that mental images may play in idiom comprehension and production remains controversial. Gibbs and O'Brien (1990) compared mental images that adults create for different kinds of idiomatic expressions and found that they tend to be highly detailed and consistent. They attributed this regularity to the metaphorical motivation of idiomatic language, arguing that conceptual metaphors underlie the meaning of idiomatic expressions and provide the link between their literal and figurative senses. Gibbs' and O'Brien's (1990) interpretation of the findings, however, was questioned by Cacciari and Glucksberg (1995). Considering that abstract concepts are generally difficult to represent in a visual form, they proposed that visual images were more likely to reflect literal rather than figurative meanings of idiomatic phrases. After

conducting an imagery generation experiment they observed that the images were generated for the concrete literal meanings of the idioms rather than their figurative senses. They also pointed out that if concrete concepts were processed faster than abstract ones, as the dual coding theory postulates, then it was unlikely that visual images were automatically created during the interpretation of figurative meaning. In a follow-up experiment Cacciari and Glucksberg (1995) examined whether mental images facilitated or interfered with idiom comprehension by comparing scores on a paraphrasing judgment in imagery and non-imagery conditions. They found that generated images were more likely to reflect the literal rather than the figurative meanings of the phrases; as a result they prolonged the processing time, particularly in the case of less common idioms. Overall, Cacciari and Glucksberg's (1995) data does not indicate a strong connection between literal images and figurative meanings of idiomatic phrases, and it provides little evidence that mental imagery may facilitate idiom comprehension either in terms of reaction time or error rate.

Bortfield (2002) examined the role that mental imagery plays in idiom comprehension of native and non-native English speakers. The participants in the study were asked to make sentences for figurative meanings of the target idioms, then to generate mental images based on the literal meaning of the phrases, and finally to produce another set of example sentences for their figurative usage. The results showed that both native and non-native speakers created mental images that combined the properties of literal and figurative meanings and that the naturalness of the sentences they produced increased after the images were generated.

Janyan and Andonova (2007) proposed that the effect of mental imagery on the comprehension of idiomatic phrases might depend on their familiarity. They

examined whether generating a literal image of an unknown foreign idiom could facilitate its comprehension using the error rate, rather than the processing speed, as the standard of measurement. The findings of the study suggested that imagery did have a facilitating effect on the comprehension of unfamiliar phrases but not on familiar idioms. The effect was found to be stronger in the case of semantically transparent idioms. From the results of the study the authors concluded that there is a close link between figurative meanings of transparent unknown idioms and their literal mental images.

In his comprehensive study of mental imagery and idiom comprehension in adults, Hung (2010) found strong to moderate correlation between mental imagery and idiom understanding in all the age groups examined (20s, 40s, 60s and 80s age brackets). He also observed that mental imagery became more figurative as the age of participants advanced, until the age of 70 when the frequency of less accurate mental images began to increase. Finally, Hung also reported that when participants were not familiar with the idiom's meaning they tended to leave idiom definitions blank, rather than try to generate them based on the literal meaning of the phrase components. According to Hung, these findings suggest that concrete meanings are not always activated during the idiom comprehension process.

A number of experimental studies have also looked into the relationship between image generation and idiom learning. Steinel and her colleagues (2007) examined, among other variables, the effect of imageability (i.e. the capacity to evoke a mental image), on comprehension and the production of idiomatic phrases in L2. They found that the salience of images that idiomatic phrases evoked had a stronger effect on receptive learning (paired-associated idiom learning with L2 phrase in the stimulus position) than on productive learning (paired-associated

learning with L2 idiom in the response position). The authors suggested that one reason might be the emphasis on literal semantic word interpretation during the comprehension of unfamiliar idioms. In order to understand the meaning of a novel idiomatic expression learners typically analyse the syntax of the structure and examine the literal meanings of the phrase constituents. Figurative interpretation comes after the analysis of literal meaning. During the productive learning task (L1 to L2 idiom pairs) it is possible that more emphasis is placed on the conceptual representation of the L2 idiom than on its form. The authors cautiously acknowledge that more research is needed before any conclusions can be drawn about the representation of idiomatic language in the mental lexicon.

Boers, Lindstromberg, Littlemore, Stengers and Eyckmans (2008) conducted a series of studies on variables in the mnemonic effectiveness of pictorial elucidation. This is a process of stimulating an association between a language and an image through the use of schematic drawings or pictures. In the experiment, that specifically focused on idiom learning, they found that using pictures and verbal explanations had a positive effect on the retention of idiom meaning in L2, but a limited and sometimes even negative effect on the retention of idiom form, especially for learners who are high-imagers. Similar results were also obtained in a study by Boers, Piquer-Píriz, Stengers and Eyckman (2009). The addition of pictorial elucidation contributed little to learners' retention of linguistic form and had a detrimental effect on learners who showed a predisposition for processing vocabulary through imagery.

In summary, earlier studies have produced mixed results with regard to the role mental imagery may play in idiom comprehension and acquisition. The effect of imagery is likely to be influenced, at least to some extent, by variables such as idiom familiarity and imageability. With regard to idiom learning a facilitative

effect of imagery seems to be stronger when it comes to the comprehension rather than the production of idiomatic language.

The present study: the purpose and the hypotheses

This study has attempted to examine whether the potentially negative effect that the use of pictures has been found to have on the retention of linguistic form could be neutralized by means of using student-generated drawings instead of teacher-supplemented pictorials. Visual support provided by the instructor may prompt activation of the sensory attributes of the target items. This may help with the retention of their meaning, but it does not necessarily force learners to pay attention to the lexical make-up of the target expressions. The study asked learners to “illustrate” the literal senses of the idiomatic phrases in order that their attention would be focused on the constituent elements of the target phrases. Drawing requires students to visually articulate and externally represent the mental images they generate from the verbal input they are exposed to. The process was expected to strengthen the referential connections between the elements in verbal and visual representations, and in turn enhance the recall of the target phrases.

Participants

The experiment involved one group of 48 first-year university students. All participants were native speakers of Japanese. The students were non-English majors and their level of English was intermediate, with TOEIC scores of between 410 and 530.

Method and procedures

The study compared the acquisition of L2 idioms under two conditions: (a) verbal definitions only and (b) verbal definitions followed by learner-generated visual

representations of the literal meaning of the target phrases.

Thirty idioms were included in the study, 15 in each condition. An effort was made to ensure that all the idioms consisted of concrete words only, making them easy to visualize. Attention was also paid to the length of the phrases. In both conditions a set of target idioms consisted of three 3-word phrases, five 4-word phrases, two 5-word phrases, three 6-word phrases, one 7-word phrase and one 8-word phrase. The difficulty of the constituent words was also a consideration. It was assumed that the words of lower frequency would be less known to the learners, and therefore, that the phrases containing them would potentially be more difficult to master. Word frequency was established by using Vocabulary Profiler, free online software that categorizes words based on their corpus frequency. An effort was made to have approximately an equal distribution of lexical items from different frequency bands in the two conditions. In the dual-coding condition 93.1% of the content words in the phrases came from the list of the most frequent 2,000 words. In the verbal coding condition the same was true for 93.02% of the idiom constituents. A complete list of the target idioms is provided in Appendix 1.

The idioms were taught five at a time over six sessions and all students received the same materials and instruction. The sessions lasted approximately 35 minutes in the definition-only condition, and about 50 minutes when students were asked to generate the drawings. Each session consisted of the following stages:

First, in both conditions, at the beginning of each session the students were presented with a list of five target idioms and asked to write their meaning in English or Japanese, or to leave it blank if they were not familiar with the expression. They were instructed to circle the words they were not familiar with,

and they were given an opportunity to clarify the meaning of the unknown words with the teacher. This ensured that the literal meaning of each lexical item was known to the learners before the discussion shifted to their figurative usage. As Boers et al., (2009) point out, familiarity with the constituent words is necessary for learners to be able to establish the links between the literal and the figurative meaning of the idiomatic phrases. Furthermore, many constituent words may be polysemous or have homonyms, and learners may not always be familiar with the particular senses that motivate idiomatic usage. Therefore, the analysis of constituents was also expected to help learners expand their vocabulary knowledge at the level of single words.

In the second step the learners were asked to read the example sentences that included the target idioms, and then to write the idioms next to their corresponding definitions which were provided in the L2. At this stage the learners' attention was primarily focused on the meaning, but asking them to write an idiom next to its definition also ensured that they considered form.

In respect of the idioms that were taught through verbal definitions only, once the meaning of the target idioms had been confirmed the students were asked to complete sentences with a suitable idiom from the list. The purpose of this task was to measure whether they had acquired the meaning of the target idioms; this was the receptive knowledge test. The target idioms were presented in the neutral (dictionary) form for example: '*hold all the aces*'; '*play one's cards right*'; therefore, in order to complete the sentences correctly the students sometimes had to make modifications to the verb tense and the form of possessive pronouns. At the final stage, the students also had to complete the sentences with a suitable idiom, but the target phrases were not provided. This meant that the students had to recall both their meaning and the form; this was the productive knowledge test. After

the students' responses to the receptive and the productive tests were collected they were provided with the answers, and they could ask the teacher questions about the meaning or usage of the expressions.

In the dual-coding condition the verbal input served as a foundation for the generation of visual representations. After the second stage, where learners read the example sentences and wrote the target phrases next to their corresponding definitions, an extra step was introduced where the students were asked to illustrate the target idioms and then write the phrases below the corresponding pictures. The drawings were unsupported, no background or cut-out shapes were provided, and the learners had to generate illustrations with only verbal phrases as a guide. The stages that followed were the same as in the definitions-only condition: first, the students had to complete a gap-fill task with the target idioms listed, and then do another gap-fill activity for which they had to recall both the meaning and the form of the target expressions.

In the following week the learners were given a delayed post-test where they were provided with the definitions and asked to write the idioms that matched their meanings. (Samples of all activities are available in Appendix 2.)

Scoring. In order to ensure the consistency of scoring, the following grading criteria were adopted. In the receptive knowledge test, where idiom phrases were provided, the points were given if the students completed the sentence with the correct idiom. No points were deducted if the idioms were written in their dictionary form or if the phrases contained inflectional errors, wrong verb tenses or spelling mistakes.

In the productive knowledge test the students were given the points only when all

components of the target phrases were encoded correctly. The omission of an article or a preposition and spelling mistakes would result in no points being scored. Transformation of the constituents that are fixed, such as replacing the plural form with a singular form, was also treated as a wrong answer. No points were deducted for wrong inflectional forms of the items that allow for modification. Some sentences required learners to use particular verb tenses. Mistakes with inflectional forms were treated as grammatical errors, rather than lexical. Therefore, if a student recorded all the parts of an idiomatic expression in the right order, even if the verb form was incorrect, the sentence was marked as correct.

Results

The results of the study are reported in the following order: first, the students' familiarity with the target expressions is discussed; second, the students' performance on the tests of receptive idiom knowledge is examined; third, the scores on the productive tests are reported and finally, the students' performance on the delayed post-test is discussed.

1. Students' familiarity with the idiomatic language prior to the vocabulary treatment

None of the 48 participants in the study indicated familiarity with any of the target idioms. The students were familiar with most of the words within the target idiomatic phrases, but the following items had to be explained in class: *contention*, *stab*, *cart*, *worms*, *palm*, *burner* and *grapevine*. Another word that was given attention was *ace*. While some students were familiar with *ace* denoting a person good at a particular activity e.g. a tennis ace, few students associated this word with card games.

2. *Immediate receptive knowledge test*

The scores on the receptive knowledge tests showed that on average, the students recalled the meaning of approximately 55% of the target idioms in the dual-coding condition and about 63% of the phrases in the verbal coding condition. The results of the tests are presented in Table 1.

Table 1 Descriptive statistics of the receptive idiom knowledge test (N=48)

Condition	Mean	SD
Dual coding condition	8.21	3.20
Verbal coding condition	9.44	3.48

A paired samples t-test was conducted to examine the statistical significance of differences in the mean scores. The results of the analysis indicated that the differences between the two conditions were statistically significant [$t(47)=2.29$, $p<.05$]. The eta square statistic was (.10), which is considered a moderately large effect size.

3. *Immediate productive knowledge tests*

In both conditions the overall scores on the immediate productive knowledge test were lower than on the test of receptive knowledge. This can be attributed to both the more difficult nature of the task and the strict grading criteria applied. The mean values obtained were slightly higher in the dual-coding condition where the students mastered on average 7.5 out of 15 target expressions. In the verbal coding condition the students acquired on average 7.3 of the 15 target idioms. The results of the descriptive analysis are presented in Table 2.

Table 2 Descriptive statistics of the immediate productive idiom knowledge test (N=48)

Condition	Mean	SD
Dual coding condition	7.58	2.80
Verbal coding condition	7.38	3.39

The difference between the two conditions was not found to be statistically significant [$t(47)=-.49$, $p>.05$].

4. *Delayed post-test results*

A comparison of the mean values in the two conditions showed better performance in the dual-coding condition. The students who generated drawings for the verbal input were able to successfully recall on average 81% of the target phrases while for the students who were exposed to the verbal input only the average recall rate was 65.6%.

Table 3 Descriptive statistics of the delayed post-test (N=48)

Condition	Mean	SD
Dual coding condition	12.15	2.95
Verbal coding condition	9.85	3.66

A paired-samples t-test analysis showed that difference between the two conditions was statistically extremely significant [$t(47)=4.65$, $p<.0001$]. The eta squared statistic (0.31) indicated a large effect size.

Discussion

Based on the postulate of dual coding theory, the present study was designed on the assumption that presentation of the idioms through verbal and non-verbal

modes would enhance their subsequent recognition and recall. The results of earlier studies suggested that the meanings of individual lexical components in idiomatic phrases contributed to their overall figurative meanings; thus, illustrations of the target phrases were expected to help reinforce the connections between the abstract concepts and their underlying concrete structures, and consequently facilitate retention of idiom meaning. It was also anticipated that visualisation of the constituents of the idioms' strings would make individual words more salient and lead to a better recall of the formal properties of the expressions. The results of earlier studies by Boers et al., (2009) found that pictorial elucidation had a negative effect on the retention of linguistic forms. In view of this visual input was provided through learner-generated drawings rather than ready-made pictures selected by the instructor. Student drawings were expected to be closely linked to the verbal input and less likely to contain elements that could potentially distract learners from the target phrases.

The results of the study suggest that learner-generated pictorials can indeed be a useful tool in teaching the linguistic forms of idiomatic expressions, although not necessarily their meaning. In the test of receptive knowledge the students achieved higher scores when the target phrases were presented through verbal definitions only. These results suggest that imagery may potentially interfere with the comprehension of verbal input. One possible explanation for the findings may be the nature of the visual input. In this study the images that students generated were associated with the literal meanings of the idioms. Although research has shown that in many idiomatic phrases individual components contribute independently to the overall meaning (Gibbs et al., 1989), the links between the literal and figurative meanings are not always easily detectable. Visual representations of the constituents of idiomatic phrases may not necessarily facilitate idiom comprehension. On the contrary, the illustrations may focus learners' attention on the literal meaning of

the target expressions and make it actually more difficult for them to acquire the idiomatic usage. If idiomatic phrases are conceptually motivated and mental imagery is a central component of idiom meaning, as Gibbs and his colleagues claimed (Gibbs & O'Brien, 1990; Gibbs, 1992), then images that people generate during idiom comprehension should reflect the abstract-figurative interpretation of the phrases. It is possible that the visual representations that students were asked to generate, based on the literal meanings of the idiomatic phrases, interfered with mental images that students may have spontaneously created for the target phrases.

While induced imagery seems to have a limited effect on the retention of idiom meaning, the results are more encouraging when it comes to the effect that visual images have on the recall of the formal properties of the idiom strings. In both the immediate test of productive idiom knowledge and the post-test, students performed better when verbal explanations were accompanied by visual support. The advantages of the dual-coding treatment on the immediate productive test were, however, limited; on the delayed post-test they were clear and statistically significant. It is possible that the effect of the treatment upon the formation of memory traces did not show immediately. It is also possible that the test format itself may have had some influence on the results. The immediate post-test consisted of a sentence-completion task. In order to score the point the students first had to use the context to decide which idiom should be used, and then to recall its form correctly. On the delayed post-test the students were provided with the definitions for which they had to write the target idioms. Although this testing format required learners to recall both the meaning and the form of the target expression, the task did not require the processing of a specific context or syntactic transformation of the basic idiom form. This may be one reason why the scores on the delayed post-test were higher than the scores on the immediate

productive test in both conditions.

The substantial differences in the delayed-test scores between the verbal and the dual-coding group, however, cannot be explained by the test format as the assessment task was the same in both conditions. It seems more likely that the vocabulary treatment that students had received influenced their performance. A positive effect of pictorials on learner performance may have resulted from several factors: the processing advantages of dual coding, the stimulation of productive processing at both the learning and the testing stage, and the effect that task difficulty had on information retention.

As discussed earlier, there is a significant body of research in experimental psychology that has documented a strong mnemonic effect of the dual encoding of the input. Adopting the postulate of the dual-coding theory it can be assumed that illustration of the target idioms engaged the students in a generative process that stimulated integration of the two representational systems. The drawings ensured that mental images of concrete scenes were stored in the memory alongside verbal forms; this re-coding of verbal information into visual form provided an extra pathway for idiom recall.

Another factor that may have contributed to students' better performance in the productive knowledge test may be the way visual support was introduced. Illustration of the literal meaning of the idiomatic expressions focused learners' attention on the constituents of the phrases, knowledge of which is crucial for productive idiom usage. Earlier studies by Bransford, Franks, Morris & Stein (1979) and Hulstijn (2003) have demonstrated the positive effect that compatibility between learning and testing tasks has on performance. According to the notion of transfer-appropriate processing (TAP), memory is, among other factors, influenced

by the relationship between the types of processing engaged at the information encoding stage and the processes that take place at information retrieval. The greater the similarity between the initial and the subsequent processing of the stimuli, the better retention performance. Students who learn productively have been found to perform better in productive knowledge tests and students who learn receptively tend to have an advantage when receptive knowledge is required (Steinl et al., 2007). The analysis of psychological processes involved at the picture generation stage goes beyond the scope of this study. It is, however, possible that productive encoding of the individual words in idiomatic phrases, as required for the illustration task, facilitated activation of at least some elements of recall processing in the idiom retrieval task.

Asking learners to generate drawings for the target expressions increases the difficulty of the task. This is known to have a positive effect on information retention. Schneider, Healy and Bourne (2002) argued that more difficult learning tasks were likely to result in initially inferior performance, but less information loss across retention intervals than simpler learning conditions. The effect that task difficulty may have on information retention could explain the limited advantage that the dual-coding condition had over the verbal condition in the immediate post-test, and the substantial differences obtained in the delayed post-test.

The positive effect of the dual-coding treatment on the recall of linguistic forms is of particular significance for language teaching. The lack of productive knowledge tends to be the major deficiency in L2 proficiency. As the main goal of most learners is to be able to use the language in real life situations, it is important that treatments that foster productive retention are implemented as much as possible. When visual support is provided by the instructor learners are often drawn to the pictures themselves and pay little attention to the verbal input

(Boers et al., 2009). Self-generation of visual representation forces learners to examine the lexical properties of the target phrases and as a result they are more likely to remember their linguistic forms. The lack of effect that student-generated drawing had on the retention of idiom meaning, and the positive effect it had on the acquisition of idiom form, suggests that dual-coding treatment may be suitable for reinforcement of the linguistic form and the development of productive knowledge of the idiomatic expressions with which learners are already familiar.

In addition to reinforcing encoding of the input student-generated illustrations have several other potential pedagogical advantages. First, they ensure that visual information truly matches the target verbal input. In many published teaching materials pictures have a purely decorative function and as a result they often trigger disparate associations and do little to enhance learning (Mayer, Steinhoff, Bower & Mars, 1995). Moreover, pictures that are generated by the learners themselves will be understood by them. As Hewings (1991) points out, in many ELT materials illustrations intended to contextualize language or stimulate language practice are often culturally biased and as a result are incomprehensible to the learners. Self-generated illustrations help learners integrate the target expressions into their own meaning structures, and therefore they are more likely to facilitate learning.

Another potential advantage of student-generated illustrations is that they provide instructors with some insight into learners' understanding of the input. Pictures allow teachers to verify students' understanding and identify possible misconceptions in their internal representations of the input that may have resulted from the misunderstanding or omission of the key-words or confusion of lexical forms, and to provide appropriate intervention.

Picture drawing as a teaching strategy also has an affective value. The students who participated in the study seemed to enjoy the drawing activities. Their enthusiasm could be attributed to the novelty of the strategy and the low-stress nature of the task. Most students were able to produce the context-appropriate drawings quickly and effectively from the first teaching session. A sample of student-generated drawings is available in Appendix 3.

As in the case of other teaching strategies learner-generated illustrations should be used selectively. Whilst illustrations can provide a supplementary coding path that can facilitate phrase retrieval not all words or expressions are equally suited for pictorial elucidation (Hupka, 1989 cit. in Boers et al., 2008). Idiomatic phrases consist of words which differ in their concreteness and the phrases as a whole differ in the levels of their imageability. Teachers should be careful not to impose a particular strategy on their learners. They should make learners aware that illustrations could possibly help them to remember the fixed word combinations in idiomatic phrases; however, the final decision about the strategy use should be left to the learners. No learning strategy will be successful if it goes against learners' attitudes and beliefs.

The results of the study also highlight some general issues of concern with regards to teaching idiomatic language to L2 learners. The preview of the target phrases showed that none of the learners had any knowledge of the target idiomatic expressions. This was true even for the learners who were familiar with all individual words in the target phrases. Idioms constitute an integral part of vocabulary development and the ability to comprehend and use them correctly is the distinguishing mark of native-like proficiency (Cowie & Mackin, 1975:vi). The lack of learners' familiarity with the idioms highlights the need for this type of language to be incorporated in the syllabus and course materials. This may be

particularly important for those learners whose linguistic and cultural background is distant from that of the target language community. Idioms can be seen as part of heritage or history and products of a specific cultural environment. They reflect the customs, beliefs and thought patterns of the language community in which they evolved. Therefore, the distance between learners' native language and culture and the linguistic and cultural norms of the target language community affect acquisition patterns of idiomatic phrases. Insufficient knowledge of the relevant attributes that define the literal and the figurative meaning of idiomatic strings mean that few of those expressions will be noticed, interpreted correctly and retained for eventual productive use. Engel (1996, qtd. in Glucksberg, 2001), found that immigrants from Western American cultures such as Haiti and the Dominican Republic were familiar with a larger number of American idioms than immigrants from China although they had spent the same amount of time in the United States. This means that instructors who are working with learners' whose linguistic and cultural backgrounds are distant from that of the target community should devote particular attention to idiomatic language.

The results of the study also suggest that learners often have problems with production of syntactically flexible idioms. Sentences that required transformations of indefinite pronouns *one*, *somebody* and *something* resulted in a large number of erroneous phrases. There were also numerous instances of wrong verb tenses. These errors reflect primarily students' low linguistic proficiency and they also have important implications for the teaching of idiomatic language. Idioms that are compositional and transparent are more likely to be syntactically and semantically flexible (Gibbs, Nayak & Cutting, 1989). This means that more class time should be devoted to activities that stimulate structural elaboration such as activities that focus learners' attention on linguistic forms. In order to be able to comprehend and use idiomatic language correctly learners must be made aware of

the syntactic flexibility of idiomatic phrases, and have sufficient exposure to both their canonical and variant forms.

Future research

As outlined in the introduction to this study, there are several different lines of cognitive research on idiomatic language with a wide range of perspectives on issues as diverse as the nature of the interaction between the literal and figurative meanings of idioms, the role that conceptual metaphors may play in idiom interpretation and the effect that mental imagery has on idiom comprehension and production. Most of the research to date has been done with the participation of native speakers. At present little is known about how second language learners process idiomatic language and how sensitive they are to features such as transparency and compositionality or the syntactic flexibility of idiomatic phrases. The review of earlier research and the results of this study point to several possible directions for future studies of the acquisition of L2 idiomatic language.

One area of interest is the depth of processing of literal and figurative meanings of idiomatic utterances in L2. Earlier studies (Gibbs, 1980) suggest that memory for literal meaning of idiomatic phrases is better than the retrieval of their figurative meanings. Gibbs attributes these findings to the conventionality of the figurative idiom usage. When figurative meaning is dominant the processing of idiomatic usage requires less mental elaboration and as a result, memory for idiomatic meaning is less distinctive. On the other hand, utterances with a literal, unconventional meaning require more semantic elaboration; this leads to greater discrimination in the memory and subsequently better recall. It would be interesting to examine whether the same results would be obtained with the second language learners who are often not familiar with figurative meanings of idiomatic phrases. With their natural tendency to process all the constituents of the phrases individually

and literally, it is possible that encounters with the figurative usage would be perceived as “unconventional usage” and result in more elaborative processing and better recall of the figurative utterances.

It would also be interesting to examine the extent to which idiom transparency may influence the effect that pictorial elucidation has on the retention of form and meaning of figurative utterances. As discussed earlier, idiomatic expressions differ in their degree of transparency and compositionality. Some idioms are semantically opaque such as *by and large* or *to kick the bucket*, whilst others are more similar to metaphors in a sense that they refer to situations, actions or events (Glucksberg, 2001). For example, skating on thin ice is a prototypical example of a risky activity, and therefore can be used to denote other activities that are risky. More transparent idioms naturally have a closer connection between their literal and figurative meanings. It is, therefore, possible to predict that pictorial elucidation as a teaching method will be more effective with the transparent than with the semantically opaque idioms. It can be anticipated that the more the figurative usage of words is motivated by their literal senses, the more predictable idiomatic phrases are likely to be, and that consequently visual representations of the literal meaning of transparent idioms are more likely to guide the learner to an appropriate interpretation of their figurative usage. This hypothesis, however, needs to be experimentally verified.

In this study the participants were asked to illustrate literal meanings of the idiomatic phrases. It would be interesting to see whether a more open-ended task, where the participants are instructed to generate visual images for the target sentences, but are left free to decide whether those images will reflect the literal or figurative meanings of the target phrases, would produce different results in terms of idiom retention and recall. That kind of task could also shed some light

on the debate about whether conceptual metaphors underlie idiom comprehension (Gibbs & O'Brien, 1990; Gibbs, 1992), or whether images associated with idioms are more likely to reflect their concrete-literal meanings (Cacciari & Glucksberg, 1995). Parallel studies with the participation of native speakers and language learners could point out possible differences in the role that imagery plays in L1 and L2 idiom comprehension.

Finally, more experimental data are also needed with regard to the way in which pictorial elucidation may interact with variables such as cognitive styles and the timing of image generation. Earlier studies by Boers et al., (2009) found that the use of visual aids had a particularly distracting effect on learners who showed a predisposition for processing vocabulary through imagery. In Boers' study, however, the images were provided by the instructor. More research is needed on the effect that self-generated images may have on different types of learners. Another issue to consider is the timing of activities when images are generated. In the current study the learners were asked to produce the images immediately after the confirmation of idiom meanings. As the students were not familiar with the target phrases, it is highly likely that the focus on form came before the idiom meaning was fully consolidated in the learners' memory. It would be of interest to see whether the facilitative effect of learner-generated imagery could be increased by postponing picture generation until after learners have mastered the figurative meanings of the idiomatic phrases.

It is hoped that this study will encourage further research in the field of figurative language and image-based pedagogy, and prompt language instructors to look for novel and more engaging ways of teaching idioms to second language learners.

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Appendix 1: Target idioms

(* the numbers in brackets indicate the number of phrase constituents)

Dual coding condition

tighten one's belt (3)
bone of contention (3)
ring a bell (3)
skate on thin ice (4)
step on someone's toes (4)
race against the clock (4)
pull one's socks up (4)
feather in one's cap (4)
stab somebody in the back (5)
have egg on one's face (5)
put the cart before the horse (6)
open up a can of worms (6)
burn the candle at both ends (6)
bang one's head against a brick wall (7)
have someone in the palm of one's hand (8)

Verbal coding condition

food for thought (3)
at a crossroads (3)
cook the books (3)
hold all the aces (4)
go one's separate ways (4)
on the back burner (4)
play one's cards right (4)
flash in the pan (4)
hear something through the grapevine (5)
sink one's teeth into something (5)
have an ace up one's sleeve (6)
put one's foot in one's mouth (6)
put one's cards on the table (6)
leave a bad taste in one's mouth (7)
you scratch my back, I'll scratch yours (8)

Appendix 2: Task Samples (Abridged)

Task I (both conditions)

Instructions: Below you will find a list of five idioms that we are going to study in today's lesson. If you are familiar with them, explain their meaning in English or in Japanese. If there are any words you do not know in these expressions, circle them.

tighten one's belt:

race against the clock:

.....

Task II (both conditions)

Instructions: Read the following example sentences and then write the target idioms next to their definitions. Compare your answers with a partner.

I've had to **tighten my belt** since I stopped working full-time.

They **raced against the clock** to get the car accident victim to the hospital.

_____ to race with time; to be in a great hurry to get something done

_____ to spend less than you did before because you have less money

.....

Task III (dual-coding condition)

Instructions: Draw all the idioms that you have learned in this lesson. On the line below each picture write the idiom that you have illustrated.

1.



2.



Immediate receptive knowledge post-test (both conditions)

Instructions: Complete the sentences below with a suitable expression from the list. Pay special attention to the verb and pronoun forms.

tighten one's belt *race against the clock* ...

1. With her report due on Monday, she _____ to finish it.
2. The cost of living is getting higher and higher. It looks like we'll all have to _____.

Immediate productive knowledge post-test (both conditions)

Instructions: Complete the sentences below with a suitable idiom that you have learned today.

1. Times are hard, and prices are high. We will have to _____.
2. They were _____ to stay on schedule.

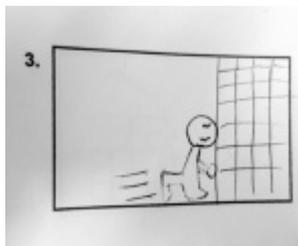
Delayed post-test (both conditions)

Instructions: Write the idioms that you learned in the last lesson next to their definitions.

_____ to race with time; to be in a great hurry to get something done

_____ to spend less than you did before because you have less money

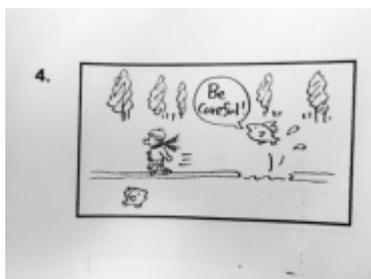
Appendix 3: Samples of Students' Illustrations



bang one's head against a brick wall



bone of contention



skate on thin ice



feather in one's cap