Bilingual dual coding and L2 idiom acquisition

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二言語二重符号化とL2の慣用句の習得

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本研究の目的は、学習者L1が、同等の意味を持つL2の慣用句を習得する場合における、二言語間のインプットの効果を検証することである。日本語で同じ意味を持つが、語彙の構成が異なる英語の慣用句を、３群の中級レベルの日本人英語学習者に学習させた。インプットは、対象となる慣用句と同じ意味を持つL1、L2の例文、学習者が次のうちひとつを条件としてL1と一致するL2の慣用句を選ぶ記憶カードゲームで構成される。(1) L1 慣用句のイラストとL2 慣用句の文、(2) L1 慣用句の文とL2 慣用句のイラスト、(3) L1 慣用句のイラストとL2 慣用句のイラスト。２回目のセッションの１か月後、学習者にL1とL2の慣用句を一致させる理解力テストと、日本語で同じ意味を持つ英語の慣用句を書く筆記テストを受けさせた。その結果、内容語については、視覚的なインプットによって記憶は促進されるが、機能語と正字法の習得については、限られた効果しかないということが、判明した。

キーワード：L2慣用句の習得、比喩的な表現、二言語 二重 符号化

１．Introduction

We have the ability to speak in riddles. These riddles are neither constructed nor interpreted in the normal way. Yet we

use them so readily that we are usually unaware of their special character–unless we have the misfortune not to be a native speaker. We call these special riddles idioms（Johnson-Laird, 1993, p. x）.

The quote above succinctly captures the complexities that idiomatic language presents for second language learners. On the one hand, idiomatic expressions are used so frequently that native speakers often fail to even notice them. Idioms are a subclass of a large group of fixed expressions that also include proverbs, phrasal verbs, lexical compounds, collocations, irreversible binominals, clichés etc. According to some estimates, the English language contains over 25,000 fixed expressions（Jackendoff, 1997）and over 10,000 idioms alone（Brenner, 2003）. Some data suggest that the number of idiomatic expressions in a native speaker's mental lexicon approaches that of single words（Jackendoff, 1995）. Idioms are common in both spoken and written discourse（Irujo, 1986a）and are considered to be one of the hallmarks of native-like proficiency（Cowie & Mackin, 1975）. On the other hand, idiomatic expressions seem to defy the laws of logic and the principles of normal sentence processing. Idiomatic meanings cannot be readily inferred from the constituent elements of the phrases, making idioms more difficult to comprehend than other forms of non-literal language such as metaphors. Furthermore, idioms exhibit lexical co-occurrence restrictions that do not follow the regular rules of syntactic or semantic restrictions（Everaert, van der Linden, Schenk, & Schreuder, 1995）, posing challenges in terms of their use. Although research in cognitive linguistics over the last thirty years has shown

that the meaning of a large number of idioms is either conceptually motivated (Lakoff & Johnson, 1980; Gibbs, 1990, 1992; Gibbs & O'Brien, 1990; Nayak & Gibbs, 1990), or can be explained by the historic or cultural context in which the phrases originated (Boers, 2001; Boers, Demecheleer, & Eyckmans, 2004), these links are not immediately discernable. As a result, non-native speakers often try to interpret the phrases literally. They resort to the compositional analysis of the utterances, which frequently results in misinterpretation of idiomatic expressions (Cieślicka, 2006). The problems also occur at the production level. The lack of correspondence between the linguistic form and figurative meaning, as well as unpredictable syntactic behaviour often lead to "idiom phobia", where the fear of making a mistake causes learners to avoid using idiomatic language altogether (Irujo, 1986b; 1993).

The acquisition of L2 idioms has also been impeded by insufficient attention being given to figurative language in the ESL instructional materials. Thirty years ago, Irujo (1986a) rightly observed that the majority of English textbooks did not include any idioms and those which did rarely went beyond a mere listing of the expressions without any activities that could help learners commit the phrases to memory or master their usage. Regrettably, these concerns are still valid today. Idioms remain a major stumbling block for the second language learners. With the exception of phrasal verbs, figurative expressions such as metaphors, idioms and proverbs receive only marginal attention in current ELT publications and, as a result,

learners' knowledge of L2 idioms tends to lag significantly behind their general L2 vocabulary knowledge (Kecskés & Papp, 2000; Steinel, Hulstijn & Steinel, 2007).

However, considering the pervasiveness of idioms in the natural language and the important stylistic and pragmatic functions that they have, there is little question about the need to help learners to acquire idiomatic language competence. The question that remains open is: How can idioms be presented so that the learners' burden is reduced, but their forms and figurative meanings are retained?

2. Dual Coding Theory and L2 idiom teaching

One subject that has received considerable attention in recent years is the mnemonic effect that imagery may have on the acquisition of L2 idioms. Imagery based pedagogy has been largely inspired by the Dual Coding Theory (DCT), which was first proposed by Allan Paivio of the University of Western Ontario in 1971. The theory holds that cognition consists of two systems or modalities: verbal and non-verbal. The verbal system specializes in the processing of language-based input, while the non-verbal system deals with non-linguistic input (primarily visual, but also auditory and tactile information). The two systems are believed to be independent but partially interconnected, which means that they can function either independently or together. When the systems function independently, non-verbal images are remembered without any verbal descriptions and verbal input is processed without mediation of images. When the systems function

together, activity in one modality initiates activity in the other. Thus, images can be described verbally and verbal descriptions can arouse images of the situations that are being described.

The representational units of the two systems are assumed to be modality specific. This means that verbal stimuli result in the formation of verbal representations, which Paivio (1978) named *logogens*, while non-verbal stimuli generate imaginal representations, or *imagens*. Functional independence of the two systems and their interconnectedness imply three possible levels of cognitive processing. *Representational* processing refers to the activation of the cognitive representations in the long-term memory by same-modality stimuli. Thus, words activate *logogens* and pictures and objects activate *imagens*. *Referential* processing denotes activation of cognitive representations in one system by a stimulus from the other system (*logogens*⇔*imagens*). This type of processing takes place during tasks, such as picture naming, image descriptions or generation of mental images in response to verbal input. *Associative* processing refers to connections between representational units in one modality, that is, connections between linguistic units or between images (*logogens*⇔*logogens* or *imagens*⇔*imagens*).

One important implication of the DCT is the additive effect of verbal and non-verbal codes on information recall. According to Paivio (1971), input that is encoded both verbally and visually is likely to be recalled more easily than information that is represented through

one code only. Empirical evidence in support of the DCT comes from numerous studies, which have shown that pictures are retained more easily than words (McBride & Dosher, 2002; Paivio & Csapo, 1973; Wippich, Melzer, & Mecklenbrauker, 1998). The mnemonic superiority of the visual input has been attributed to the fact that pictures are more likely to elicit both verbal and image codes, while for words, processing tends to be limited to verbal coding only (Paivio, 1986; 1991).

In 1980, Paivio and Desrochers proposed a model of dual-input coding in bilingual memory. The model can be seen as an extension of the unilingual model and assumes that cognitive activity of bilinguals is mediated by two verbal systems (L1 and L2) and one imagery system (Figure 1). The three systems are thought to be functionally independent but interconnected and developed to allow information encoding, storing, organization and retrieval. Like the monolingual version of the DCT, the model postulates three types of connections: (1) from external stimuli to corresponding *logogens* or *imagens*; (2) between *logogens* and *imagens*; (3) between representational units within each coding system (*logogens*⇔*logogens* or *imagens*⇔*imagens*). The links between L1 and L2 *logogens* are viewed as a special class of verbal associative connections, which are activated when the task requires code switching. The connections between entries across the two verbal systems are believed to be stronger than the associative links between synonyms within one language, due to the additive memory effect of the two verbal codes

(Paivio & Lambert, 1981).

The DCT further postulates that both verbal systems are connected to a non-verbal *imagen* system. The referential connections can be either shared or independent, depending on the context of L2 acquisition. If L1 and L2 were learnt in the same context (e.g., at the same time, in the same country) referential *imagens* are likely to be shared. On the other hand, if the two languages were learnt in different contexts (e.g., at different ages or in different countries), *imagens* may be language-specific (Paivio, 2014; Paivio & Desrochers, 1980).

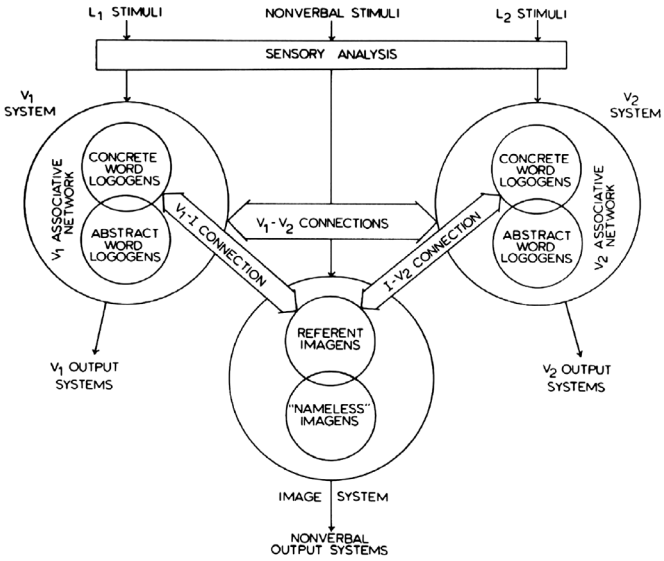

Figure1. The bilingual dual-coding model (Paivio & Desrochers, 1980, p. 391)

If L1 and L2 idioms are stored in a language-specific format as bilingual DCT postulates, then phrases with idiomatic equivalents across the two languages should be recalled more easily than phrases with idiomatic meaning in only one language due to their dual representation in the mental lexicon. Some support for this hypothesis comes from the studies by Irujo (1986b) and Pritchett, Vaid & Tosun (2016). Irujo (1986b) compared the comprehension of 45 English idioms, of which: 15 were identical in form and meaning to their Spanish equivalents, 15 were similar and 15 were different from the corresponding Spanish idioms. She found that idioms that had an identical lexical structure in L1 and L2 were interpreted and produced more easily than the idioms with different lexical forms, while for lexically similar phrases, cross-lingual transfer facilitated comprehension but interfered with production. Idioms without lexically similar counterparts in L1 were found to be the most difficult to comprehend and produce. Pritchett et al. (2016) examined phrase recall when the target expressions were idiomatic equivalents in English and Russian, when the phrases had idiomatic meaning in only one language (English or Russian), and when the target phrases had no prior idiomatic meaning in either language. They found that phrases that had a shared figurative meaning in both languages were recalled more readily than the phrases with the figurative meaning in only one of the languages.

While these studies provide support for the DCT, the observed effects can primarily be attributed to the existence of multiple verbal

codes. One issue that has not received sufficient attention is whether cross-lingual, visual and verbal coding of input can facilitate the acquisition of L2 figurative language. The present experiment is an attempt to provide some insights in this respect.

3. Present Study

3.1. Purpose of the study and research hypotheses

The theoretical assumptions of the DCT suggest that the presentation of input in multiple modalities will result in better information recall due to an additive effect of different codes. The purpose of the current study was to examine the effect that bilingual dual input coding might have on acquisition of L2 idioms with semantically equivalent, but lexically different, counterparts in the learners' L1. The study compared L2 idiom learning under three different learning conditions: (1) L1 idiom illustrations matched with L2 idioms in their verbal forms; (2) L1 idioms in their verbal forms matched with L2 idiom illustrations; (3) L1 idiom illustrations matched with L2 idiom illustrations. The prediction of the study was that recognition and recall rates for the target idioms (i.e., receptive and productive idiom knowledge) would increase with the increase in the number of codes that were available at the encoding stage. Thus, Condition 3 was expected to have the highest retention and recall rates due to the additive effect of bilingual verbal and non-verbal codes. Similarly, idiom recognition and recall in Condition 2 were expected to be better than in Condition 1, as a result of the presence of visual codes for L2 idioms.

3．2．Participants

The study was conducted with three groups of first year Japanese university students (N_1 = 26, N_2 = 22, N_3 = 19) at an intermediate level of proficiency, with the average TOEIC scores of M_1 = 558 (SD = 52.1), M_2 = 542 (SD = 44.3) M_3 = 571 (SD = 72.7), (approximately B1 level on the CEFR scale). The study was integrated in the regular coursework. The main objective of the course was the development of the students' communicative competence. The class met once a week for 90 minutes over a period of 15 weeks.

3．3．Materials

Twenty-four Japanese-English idiom pairs were selected from the book '*101 Japanese Idioms*' by Michael Maynard and Senko Maynard (2009). The criterion for selection was that phrases had semantic equivalents in Japanese, but that their lexical make-up was different (e.g., *goma suri* (*sesame grinding*) = *apple polishing*). A complete list of target idioms, their L1 equivalents and L2 definitions can be found in Appendix 1.

3．4．Procedures

3．4．1．*Treatment sessions*

The experiment was conducted over two 50-minute sessions with twelve idioms covered in each session. The treatment consisted of four stages. Samples of all instructional tasks can be found in Appendix 2.

At the beginning of each session the students were presented with a list of twelve target idioms and asked to explain their meanings in either English or Japanese. They were also instructed to circle any new words, which were then explained by the instructor. The purpose of this stage was twofold: 1) to assess the learners' knowledge of the target idioms prior to the treatment; (2) to ensure that they understood the literal meanings of all the lexical components before the figurative meanings of the phrases were discussed.

Next, the learners were presented with short texts in a dialogue or a narrative form that illustrated the usage of the L2 idioms. All the examples came from the '*101 Japanese Idioms*' book and were provided in English only. The students were asked to try to infer the idiom meanings from context and then write the target phrases next to the labeled illustrations of their Japanese idiomatic equivalents (Condition 1), below their L2 illustrations provided next to their Japanese equivalents (Condition 2), and below their L2 illustrations provided next to labeled illustrations of their L1 idiomatic equivalents (Condition 3). This main purpose of the inference task was to draw the learners' attention to the figurative meanings; the writing component was introduced to help them to establish the links between these meanings and the surface forms of the idiomatic expressions. Therefore, the correct answers were confirmed in class and the students' were given an opportunity to ask questions about the idiom meanings or usage.

Stage three of the treatment was the same for all conditions and consisted of a pair-work activity, which was designed to strengthen the associative links between L1 and L2 idiomatic equivalents. The twelve target idioms were divided into two sets of six. The students were asked to work in pairs, in which one student was assigned the role of the "coach", while the other student started as the "answering partner". The coaching partners were instructed to read the Japanese idioms aloud, to which the answering partners were supposed to respond with their L2 idiomatic equivalents. If they made a mistake, the coaches would correct them. For the second set of six idioms, the students switched the roles.

The final stage of the treatment was a memory card game in which the learners had to match either L1 or L2 idiomatic equivalents in one of the three conditions: (1) L1 idiom illustrations and L2 idioms in their verbal forms; (2) L1 idioms in their verbal forms and L2 idiom illustrations; (3) L1 idiom illustrations and L2 idiom illustrations. The images on the cards were the same as those used in Stage 2. To help them remember the form of the target idioms, the students were instructed to vocalize the cards with idiom illustrations, and read aloud the cards in which L2 idioms were provided in their verbal forms. This format of instruction was selected on the grounds that memory card games require observation and concentration, and typically involve multiple encounters with the target items, all of which was expected to facilitate the formation of memory traces for the L2 idioms. In addition, the game-like nature of the instruction was expected to have

a positive affective value, which is also known to benefit learning (McPherron & Randolph, 2014).

3.4.2. *Post-treatment evaluation*

The effects that the three instructional treatments had on learners' long-term retention of L2 idioms, was measured in a post-test, which was given one month after the second treatment session. Attention was paid to ensure that none of the target phrases appeared in the class materials used during this period.

Format

The post-test consisted of two parts: (1) idiom recall test (i.e., a test of productive idiom knowledge) ; (2) an idiom comprehension test (i.e., a test of receptive idiom knowledge). In the idiom recall-test, the learners were presented with the list of L1 idioms, for which they were instructed to write the corresponding L2 phrases. In the idiom comprehension test, the students had to match the Japanese and English idiomatic equivalents. The list of Japanese idioms included eight phrases, which the students did not study in class and for which there were no matching English phrases. The number of premises and responses was made uneven to discourage the use of response elimination strategies.

Scoring

In the idiom recall test, the students were awarded 1 point for completely correct answers. Half a point was awarded for the

phrases, which had one spelling error or an omission of a function word. Phrases with multiple spelling errors, multiple omissions of function words, or omissions of a content word received zero points. In the idiom comprehension test, the students received 1 point for each correct answer.

4．Results

4．1．*Pre-test results*

The results of the pre-test pointed to the problems in the target set selection that resulted from the availability of multiple L1 equivalents for the L2 target expressions. The analysis of learners' responses revealed that three of the target idioms had alternative surface forms in Japanese, with the same compositional make-up as their English counterparts. 'Love is blind' was found to match the Japanese expressions あばたもえくぼ (abata mo ekubo = pockmarks (are seen) as dimples), as well as 恋は盲目 (koi wa momoku = love is blind). '*Pearls before swine*' was found to correspond to both 猫に小判 (neko ni koban = a gold coin before the cat) and 豚に真珠 (buta ni shinju = pearls before swine), while 'silence is golden' was found to be equivalent with both 言わぬが花 (iwanu ga hana = not saying is the flower) and 沈黙は金 (chinmoku wa kin = silence is golden). Therefore, these three idioms were excluded from further analysis. There were also three idioms ('*under the table*', '*time flies like an arrow*' and '*a piece of cake*') that a relatively large number of students were found to be familiar with and these phrases were also excluded from further analysis. Therefore, the comparison of the three learning conditions

was conducted, based on the pretest-posttest differences in the subset of 18 idioms.

There were six words within this subset that the learners were not familiar with and their meanings were clarified in class. The items in question were *pod* ('two peas in a pod'), *folks* ('different strokes for different folks', *laurels* ('rest on one's laurels'), *tacit* ('tacit understanding'), *bumpkin* ('country bumpkin') and *grapevine* ('hear something through the grapevine').

4.2. *Students' performance on the recall post-treatment test*

In the recall posttest, the students were asked to produce the English equivalents of the Japanese idioms. The results showed that the pretest-posttest knowledge gain was larger in the two conditions in which the target idioms were presented visually. Descriptive statistics for the three conditions are shown in Table 1.

Table1. Descriptive statistics for the pretest-recall posttest differences by treatment condition

Condition	N	Mean	Std. Deviation
1 (L1 visual－L2 verbal)	22	7.34	2.29
2 (L1 verbal－L2 visual)	19	9.26	2.40
3 (L1 visual－L2 visual)	26	9.12	1.07

A one-way analysis of variance (ANOVA) was calculated to explore the impact of the input condition on idiom recall in L2. The analysis showed that the effect was significant at $p<.05$ level [F

(2, 64) = 6.59, p = .002]. The effect size, calculated using eta squared, was large [η^2 = .17]. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Condition 1 (L1 visual－L2 verbal) was significantly different from the mean scores in Condition 2 (L1 verbal－L2 visual) and Condition 3 (L1 visual－L2 visual) (p = .007). The difference between Condition 2 and Condition 3 had no statistical significance (p = .966).

In order to get a better understanding of the mnemonic effect of the three input conditions, an analysis of learners' errors in the phrases that had been judged as partially correct was conducted. Errors were classified in four groups: (1) *function word errors*, which included omission and commission errors in the use of articles and prepositions, (2) *content word errors*, which included omissions of content words and word-choice errors, (3) *word form errors*, which included inflectional and derivational errors and (4) *spelling errors*. Descriptive statistics for the three conditions are shown in Table 2.

Table2. The average number of errors by error type and treatment condition

	Treatment condition	N	Function word errors		Content word errors		Word form errors		Spelling errors	
			M	SD	M	SD	M	SD	M	SD
1	(L1 visual－L2 verbal)	22	0.59	0.66	0.77	0.86	0.64	0.79	0.73	0.82
2	(L1 verbal－L2 visual)	19	0.89	0.93	0.37	0.76	0.74	0.73	0.79	0.78
3	(L1 visual－L2 visual)	26	1.00	0.69	0.31	0.54	0.65	1.12	1.69	1.19

A one-way MANOVA analysis showed that there was a

statistically significant difference in the performance of the three groups [F (8, 122) = 2.488, p = .037; Wilks's Λ = 0.739, partial η^2 =.14]. However, when the results for the dependent variables were considered separately using the Bonferroni adjusted alpha level of .013, the only error category to reach statistical significance was spelling [F (2,64) = 6.492, p = .003, partial η^2 = .17].

4.3. *Students' performance on the idiom comprehension test*

The students' performance on the comprehension test indicated a positive effect of the instructional treatment in all conditions. In fact, the test responses showed a ceiling effect, with almost all learners achieving between 90% and 100%. In Condition 1 (L1 visual－L2 verbal), the students remembered the meaning of 93.9% of the target idioms on average (M = 16.91, SD = 1.26). In Condition 2 (L1 verbal－L2 visual), the average meaning retention rate was 91.8% (M = 16.53, SD = 1.07), while in Condition 3 the test average was 88.2% (M = 15.88, SD = 3.12). The one-way ANOVA test did not indicate that the differences between the groups' mean scores were statistically significant at $p<.05$ level [F (2, 64) = 1.38, p = .259].

5. Discussion

Despite the well-documented mnemonic effects of dual-input coding and a large body of literature on bilingualism, research on the effects of dual-input coding on the bilingual figurative language memory is scarce. The present research was conducted to help fill that gap. The study examined the acquisition of L2 idioms which

were semantically equivalent, but structurally different from the corresponding idiomatic expressions in the learners' L1. Based on the postulates of the DCT, it was predicted that presentation of visual input at the instructional stage would promote idiom learning, due to the fact that pictures were more likely to be encoded both as images and as verbal traces. Furthermore, the facilitative effect of imagery was expected to be larger when both L1 and L2-based illustrations were present in the input due to cumulative effect of multiple codes.

The obtained results provide partial support for the hypotheses above. As predicted, exposure to visual input improved the recall rates for the target phrases. In both picture-based conditions, the average number of correctly produced idioms was higher than in the condition where L2 input was limited to verbal information only. Contrary to the expectations, however, the presentation of visual input in both L1 and L2 (Condition 3) did not produce better results than matching L2 idiom illustrations with the verbal forms of their L1 idiomatic equivalents (Condition 2). Furthermore, the additive effect was observed on the production test only, as the ceiling effect on the comprehension test did not allow for discrimination between the three conditions.

The findings are interesting for a number of reasons. As discussed before, the bilingual extension of the DCT assumes that L1 and L2 verbal systems have referential connections to a single imagery system, and that some of these connection are shared and

that some are language-specific. Considering that the L1 and L2 visual stimuli used in the study were perceptually different, it can be assumed that they also had different image representations in the long-term memory. That means that if picture coding had been limited to images, idiom illustrations could not have facilitated the encoding of the cross-lingual verbal forms. However, as the data obtained showed higher recall rates in the conditions with visual input, it seems plausible to conclude that pictures were encoded as verbal traces as well. This hypothesis is consistent with the general principle of the DCT, which attributes superior retrieval of pictures to the fact that they are more likely to generate image and verbal codes, while word stimuli often generate verbal codes only. The results of the present study suggest that verbal coding of pictorial stimuli may not be limited to literal interpretations only, but can also take place with figurative interpretations as well.

The students' slightly worse performance in the *L1 picture-L2 picture* condition, compared to the *L1 text-L2* picture condition may reflect the separation of L1 and L2 idiom *imagens* in semantic memory. Considering the perceptual differences between L1 and L2 visual stimuli at the encoding stage of the present study, it can be assumed that the connections between idiom *imagens* across the two languages will be weak and that their activation will require *logogen* mediation. While activation of links between L2 idiom *imagens* and their corresponding *logogens* can strengthen the referential links within between the two representational systems, activation of L1

imagen-L1 *logogen* links does not directly contribute to the formation of memory traces for L2 phrases. This means that compared to Condition 2 (L1 text-L2 picture), Condition 3 (L1 picture-L2 picture) might have involved an extra processing step, which might have increased the cognitive burden for the learners without necessarily providing additional retrieval channels for L2 idioms. However, considering the small sample size and the fact the difference between the two conditions was not found to be statistically significant, a possibility that the observed differences reflected some within-group variables cannot be excluded. Therefore, further studies are needed to empirically verify whether L1-based pictures interfere with encoding of L2 figurative meanings.

A qualitative analysis of the learners' errors also revealed some interesting patterns in the development of L2 idiom knowledge. In the conditions where the input was primarily visual, a higher number of function word errors were recorded. The students often omitted the articles and prepositions, or used the wrong function words. Some examples include: '*to rest one's laurels*', '*to throw on the towel*', '*to hear from the grapevine*' and '*different strokes, different folks*'. The deviations above are likely to be developmental errors, indicative of the students' current level of grammatical competence. As illustrations typically depict content words only, it can be assumed that they contribute little to the acquisition of structural properties of idiomatic phrases.

However, pictorial support seemed to have had a positive effect on the students' recall of the content words. Although the mean differences did not reach statistical difference after a Bonferroni correction, a comparison of the descriptive data shows that the frequency of content word errors was twice as large when the target idioms were presented without pictorial support. These findings are in accordance with the results of earlier studies that uphold the picture superiority effect and the DCT hypothesis about the additive effect of multiple codes. However, a possibility that lower scores resulted from shallow processing of the verbal phrases may not be excluded. In the L2 verbal condition, the majority of content word errors were omissions, which often occurred in the second half of the phrases. The examples include '*bad things come many*', '*you can hear a pin*', '*two heads are better than a head*' and so on. It is possible that the students paid attention to the lexical components of the phrases only for as long as it took them to recall the corresponding L1 forms. Further studies in experimental conditions with eye-tracking technology are needed to empirically test this hypothesis.

Although, overall, content word errors in the L2 visual conditions were less frequent, it is possible that some images distracted learners' attention from the verbal input. For example, two students wrongly recalled '*partners in crime*' as '*a couple in crime*' and it is possible that the close proximity of the figures in the image below may have evoked associations of 'a couple' in the minds of some students.

（Image source: http://media-cache-ak0.pinimg.com/736x/7a/17/75/7a17750984e809520cb1395b6addb03d.jpg）

No significant differences were observed in the frequency of word form errors across the three groups. Most instances were omissions of ～s in plural noun forms. Typical examples include: '*two head are better than one*', '*two pea in a pod*', '*to split hair*' '*bad thing come in three*'. Some derivational errors were observed (e.g., '*tacit understand*', '*jam-packing*', '*to be kick upstairs*'). The fact that these types of errors were evenly distributed among the three conditions seems to suggest that they reflect the students' level of interlanguage, rather than the effect of instructional treatments.

Spelling errors were the only category in which the differences between visual and verbal treatments reached statistical difference. The number of spelling errors was found to be higher in the picture-based conditions. Misspellings of the word '*laurels*' were particularly common, accounting for almost 70% of spelling errors. Other problem words were '*strokes*' and '*folks*', which were often misspelled as

'stroks' and 'folkes'. Considering the design of the present study, it is difficult to tell whether the errors resulted from the interfering effect of the pictures, or whether they simply reflected the limited exposure that the learners had to the verbal forms of the target expressions. For example, in case of words like '*laurels*' and '*folks*' that the learners had reported to be new to them, it can be assumed that multiple exposures to the verbal cards facilitated consolidation of memory traces for word orthography. Furthermore, problem words like '*laurels*' or '*strokes*' include /l/ and /r/ sounds, which are difficult for Japanese learners. While in English /l/ and /r/ are two distinctive sounds, Japanese has only one consonant, a flap which varies between lateral [ɺ] and central [ɾ]. For this reason, Japanese learners of English often experience difficulties in distinguishing and producing the two sounds accurately. Finally, errors in the spelling of '*strokes*' and '*folks*' can be attributed to the rhyme in the phrase 'different strokes for different folks'. While the repetition of the sound is likely to have had a positive mnemonic effect on the recall of the phrase as a whole (Linstromberg & Boers, 2008), it is possible that the rhyme interfered with memory consolidation for orthographic forms of the two words. It is important to remember that, although the spelling errors were more frequent in the visual input conditions, misspellings like the above also occurred when the instructional treatment emphasized the verbal forms of the target phrases. In short, taking into account the study design and the nature of learners' errors, it is unclear whether pictures really had a distracting effect on acquisition of L2 idiom forms, as proposed by earlier studies (e.g.,

Boers, Lindstromberg, Littlemore, Stengers, & Eyckmans, 2008; Boers, Piquer-Piriz, Stengers & Eyckmans, 2009）or whether the observed differences simply reflected the uneven amount of exposure to the verbal forms and individual variation in the levels of L1 interference.

Finally, although the ceiling effect on the comprehension test made it impossible to capture possible differences in the mnemonic effectiveness of the three procedures, the high test scores across the learning conditions could be taken as additional evidence of the importance that exposure and repetition have in L2 vocabulary learning.

6．Conclusion

Given the ubiquity of figurative expressions in everyday language and the difficulties that learners experience in comprehension and production of idiomatic phrases, an essential issue for vocabulary learning research is the development of a teaching paradigm that can make instructional practices more effective. The present study makes a contribution to this end by examining the application of bilingual dual coding theory（Paivio & Desrochers, 1980）to the acquisition of figurative idioms by late, non-balanced bilinguals in the classroom environment.

While the small sample size and exploratory nature of the experiment make it difficult to draw generalizations, the results are encouraging. The findings suggest that visual input can promote

the formation of memory traces, not only for individual concrete or abstract words as shown in earlier research, but also in the acquisition of multi-word phrases with figurative meanings. While multiple exposures may be sufficient for learners to retain the meanings of L2 idiomatic phrases, the inclusion of L2-based visual stimuli in the input seems to have had a positive effect on their ability to produce the target phrases. Descriptive data point to the mnemonic effect of pictorials on the recall of the content words where the pictures seem to have helped the learners recall the compositional elements of the figurative idioms. However, higher error rates in the use of function words and spelling highlight the need for additional activities that would prompt structural elaboration and draw learners' attention to the syntactic and orthographic properties of the phrases. Finally, the findings suggest that L1-based imagery may interfere with the formation of memory traces for L2 figurative phrases, possibly due to activation of L1-specific *imagens*, with which L2 *logogens* do not have direct referential links.

In the current study, the effect of pictorial and verbal stimuli was examined by analyzing learners' performance on offline tasks, which required conceptual processing (idiom recall and recognition). These types of tasks are important as they indicate the level of learners' language competence. However, offline tasks cannot explain how language processing is carried out. In the memory card game, no control could be taken with regard to the number of instances in which the students encountered verbal or visual input or the order

of the input languages. Depending on the card the student selected, the target phrase recall could start from L1 or L2, visual or verbal memory, which could have affected the nature and the strength of the associative links. Therefore, the findings should be taken as tentative and further studies with more controlled stimulus situations and online task measurements, such as response speed, are needed in order to gain a more thorough understanding of the cognitive processes in bilingual figurative language memory. It is hoped that the results of this study will prompt further research in that direction, and encourage teachers to try to integrate the experimental research findings into their classroom practices, improving the effectiveness of the instruction.

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Appendix 1: Target Idioms

(Note: * indicates the phrases that were excluded from data analysis)

1. *apple polishing* = ごますり (goma suri = sesame grinding)
2. **silence is golden* = a. 言わぬが花 (iwanu ga hana = not saying is the flower)
   b. 沈黙は金 (chinmoku wa kin = silence is golden)
3. *two peas in a pod* = 瓜二つ (uri futatsu = two halves of a cucumber)
4. *you can／could hear a pin drop* = 水を打ったよう (mizu wo utta yoo = as if scattered water)
5. *different strokes for different folks* =十人十色 (juu nin to iro =ten people, ten colours)
6. **pearls before swine* = a. 猫に小判 (neko ni koban = a gold coin before a cat)
   b. 豚に真珠 (buta ni shinju = pearls to swine)
7. *to be up to one's eyeballs in work* = 猫の手も借りたい (neko no te mo karitai = willing to accept even the helping hand of a cat)
8. *partners in crime* = 同じ穴の狢 (onaji ana no mujina = badgers

from the same hole)

9. **love is blind* = a. あばたもえくぼ (abata mo ekubo = pockmarks are [seen as] dimples)
   b. 恋は盲目 (koi wa momoku = love is blind)
10. *to rest on one's laurels* = あぐらをかく (agura wo kaku = to sit cross-legged)
11. *to take (one's) hat off to* = 頭がさがる (one's head is bowed)
12. *tacit understanding* = 以心伝心 (ishin denshin = reading each other's heart)
13. *two heads are better than one* = 三人寄れば文珠の知恵 (san nin yoreba monju no chie = three people together have the wisdom of a Buddha)
14. *jam-packed* = すし詰め (sushizume = packed like sushi)
15. *country bumpkin* = おのぼりさん (onobori san = one who journeys to the capital)
16. **a piece of cake* = 朝飯前 (asameshi mae = before the morning meal)
17. *to split hairs* =重箱の隅を「ようじで」つつく (juubako no sumi wo [yooji de] tsutsuku = to pick at the corners of a food-serving [box with a toothpick])
18. **time flies like an arrow* = 光陰矢のごとし (kooin ya no gotoshi = light and darkness fly like an arrow)
19. *to be kicked upstairs* = 窓際族 (madogiwa zoku = the window tribe)
20. **under the table* = 袖の下 (sode no shita = under one's sleeve)
21. *to throw in the towel* = サジを投げる (saji wo nageru = to throw away the spoon)
22. *bad things come in threes* = 泣き面に蜂 (naki tsura ni hachi = the bee [stings] when you're already crying

23. *a drop in the bucket* = 焼け石に水（yake ishi ni mizu = water on a red hot stone）
24. *to hear through the grapevine* = 風のたよりに聞く（kaze no tayori ni kiku = hear through the wind）

Appendix 2: Sample activities

Task Ⅰ

Instructions: Below you will find a list of twelve 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 that you do not know, circle them and ask your teacher to explain them.

1．*apple polishing* means:
2．*two peas in a pod* means:

Task Ⅱ

Instructions: Read the following example sentences and then write the target idioms next to their Japanese counterparts.

1．A: What kind of food did you order for the party?
B: Since there are *"different strokes for different folks"*, we had a hard time deciding, but we finally came up with the menu that offers a lot of variety.

2．Those brothers are two years apart, yet they're as alike as *two peas in a pod.* The other day I mistook one for the other, and I

was embarrassed.

Condition 1 (L1 visual-L2 verbal)

Japanese Idioms	English idioms
 十人十色	

(Image source: Maynard, & Maynard, 2009)

Condition 2 (L1 verbal -L2 visual)

Japanese Idioms	English idioms
十人十色	 _____

(Image source: http://www.infosysblogs.com/infytalk/images/different-strokes.jpg)

Condition 3 (L1 visual -L2 visual)

Japanese Idioms	English idioms
 十人十色	 _____

Task Ⅲ

Student A

Part One

Instructions: Read the following Japanese idioms to your partner and ask him/ her to give you a corresponding idiomatic expression in English. Check your partner's answers against the model answers below.

Japanese idioms	*English idioms（Model Answers）*
ごますり	*apple polishing*
瓜二つ	*two peas in a pod*

Part Two

Instructions: Listen to your partner and provide English idiomatic equivalents of the idioms your hear.

SWITCH

Student B

Part One

Instructions: Listen to your partner and provide English idiomatic equivalents of the idioms your hear.

Part Two

Instructions: Read the following Japanese idioms to your partner and

ask him/ her to give you a corresponding idiomatic expression in English. Check your partner's answers against the model answers below.

Japanese idioms	*Model Answers*
猫の手も借りたい	*be up to one's eyeballs in work*
同じ穴の狢	*partners in crime*

SWITCH!

Task Ⅳ

Memory card game

The images on the cards were the same as those used in Task 2.

Post treatment evaluation

Idiom recall posttest

Instructions: Write English idioms next to their Japanese counterparts.

Japanese idioms	English idioms
ごますり	
瓜二つ	

Idiom recognition posttest

Instructions: Match English idioms with their Japanese counterparts.

There are EIGHT Japanese idioms which do not have English counterparts in this list.

同じ穴の狢　____	1．*two heads are better than one*
水に流す　____	2．*to split hairs*
焼け石に水　____	3．*partners in crime*
猫も杓子も　____	4．*to throw in the towel*