L2 Idiom Processing: Figurative Attunement in Highly Idiomatic Contexts

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Abstract

Using cross-modal priming, we investigated the processing of idioms in non-native listeners in varying experimental contexts. As idiomatic processing models have presented evidence for an idiomatic mode of processing that can be activated for non-native speakers in highly figurative contexts (Bobrow & Bell, 1973), this experiment revisits those claims while also examining access to figurative meaning in addition to the literal meaning of individual words within an idiom. This experiment showed increased priming for visual targets related to the figurative meaning of an idiom when the experimental list contained a large proportion of idiomatic sentences compared to when the list contained only a small proportion of idiomatic sentences. Non-native speakers not only showed online access to figurative meaning but were also sensitive to highly idiomatic contexts; though, responses to the targets related to literal meaning of the final word of the idiom were faster in all instances than figuratively-related targets.

Keywords: cross-modal priming; L2 listening; figurative language; idioms; context; attunement

Introduction

While understanding idioms is *a piece of cake* for native speakers of English, non-native (L2) speakers often struggle to recognize and understand them. Not only is figurative language extremely prevalent in everyday English use, but idioms are among the most frequent figurative expressions used by native speakers and an integral part of non-native language competence (see e.g., Cieślicka, 2006; 2013). In defining idioms, researchers generally agree that 1) the meaning of an idiom often differs from the literal meaning of the words comprising the phrase, 2) idioms have fixed structures or structures with limited variation, and 3) idioms are multi-word expressions (Liu, 2008). Although the challenges that these expressions pose for L2 learners are well-documented (see e.g., Cooper, 1999), the underlying processes are still in need of research. While we know that highly proficient L2 listeners can have access to figurative meaning in some instances, it may not be the case for all idioms. The current experiment tested online processing of figurative and literal meaning for L2 listeners in two different contexts: a highly figurative and a less figurative context.

Native Idiom Processing

Idiom processing has been the subject of many L1 studies for quite some time. Idioms are a particularly interesting linguistic phenomenon since many allow for both figurative and literal interpretations. For instance, *a piece of cake* can refer literally to a slice of cake or it can be figurative and mean "easy." This aspect of idioms has been the basis of one of the most studied questions of idiomatic processing: How does the processing of figurative meaning compare to that of literal meaning? A number of models have been proposed to address this issue.

One of the first models of processing developed specifically to address idiomatic processing was proposed by Bobrow and Bell (1973). Like standard pragmatic models, the *Idiom List Hypothesis* assumes that figurative and literal meaning undergo separate processes and, in normal contexts, literal meaning has processing priority over figurative meaning. In the idiomatic mode of processing, idiomatic meanings are retrieved from a list and do not undergo the same composition that literal language does. Following contradictory psycholinguistic evidence, Swinney and Cutler's (1979) *Lexical Representation Hypothesis* proposed that simultaneous processing occurs; however, figurative meaning is accessed first due to lower processing costs. Both theories assume that idioms are stored as one unit and processed as long words; thus, figurative meaning need only be retrieved, while a literal phrase must be retrieved and composed. An alternative proposed by Cacciari and Tabossi (1988), the *Configuration Hypothesis*, assumes that literal word meaning is processed until an idiomatic key in the idiom is reached. At this point, the configuration of words is recognized as an idiom, and the figurative meaning is accessed, giving priority at that point to figurative processing.

Literal-first models have been widely discounted based on the mounting psycholinguistic evidence that figurative meaning is often faster than not only literal meaning in a non-biased sentential context (e.g., Cacciari & Tabossi, 1988; Swinney & Culter, 1979) but also comparative novel phrases (e.g., Tabossi, Fanari & Wolf, 2009). However, it is not clear whether processing occurs simultaneously as two separate processes, one process that differentiates at a recognition point, or even one process influenced by other individual idiomatic properties such as decomposability (see e.g., Gibbs, Nayak & Cutting, 1989), literal saliency (e.g., Cieślicka 2006), or frequency (e.g., Tabossi et al. 2009).

Non-Native Idiom Processing

Much research on non-native processing of idioms focuses on both the comparison of access to figurative and literal meaning in addition to the comparison of idiomatic

processing to novel language. Unlike L1 research, there is more variation in the access to figurative meaning and most L2 results focus on supporting or refuting the existing L1 models of processing. Researchers such as Conklin and Schmitt (2008) and Underwood, Schmitt and Galpin (2004) and Siyanova-Chanturia, Conklin and Schmitt. (2011) investigated access to figurative meaning in comparison to novel phrases using eye-tracking methods. Conklin and Schmitt (2008) found that idioms, examined in their research as a subset of formulaic language, were read more quickly than comparable novel phrases whether used figuratively or literally. Underwood et al. (2004) found a similar advantage based on the number of fixations, but not for total fixation length, suggesting a more complex picture of the processing of idioms and other formulaic language that also accounts for L2 disadvantages. However, neither make any claims about figurative access in comparison to literal access. Siyanova-Chanturia et al. (2011), on the other hand, found no advantage for idioms compared to novel phrases in proficient L2 users and also found that the figurative meanings of idioms required more time to retrieve than the literal interpretation, which seems to support a literal-first model of processing for L2 users.

Some L2-specific idiom processing models have been proposed in addition to the L1 models. The *Idiom Diffusion Model of Second Languages* (Liontas, 2002; 2015) proposes a two-stage comprehension model. The first stage involves prediction, eased by idioms which are the same in a learner's L1 and L2; the second stage is confirmation or replacement and/or reconstruction. Though a comprehension model, it suggests that processing is eased for translatable idioms, supported by an offline study from Irujo (1986) and a timed production task from Liontas (2002). In her *Model of Dual Idiom Representation*, Abel (2003) proposes that the important factor for L2 processing is decomposability, or the relation of the individual constituents to the idiomatic meaning. This model assumes that nondecomposable and frequently encountered idioms are represented by idiom entries in the mental lexicon, as in the *Idiom List Hypothesis*, while nondecomposable idioms are represented by lexical entries of the individual constituent words. Abel's model, however, is based solely on offline ratings. Finally, Cieślicka's (2006) *Literal Salience Model* directly addresses idiom processing and is based on online data. The model suggests that literal meanings remain most salient for L2 users, even for well-known idioms, as they are more likely to be used and encountered by learners. Based on ideas presented by Giora (1997), salient meanings are accessed more quickly than non-salient meanings. The model is based on findings from a cross-modal priming experiment that showed that access to literal meaning occurs prior to figurative meaning for L2 listeners. Using non-biasing sentences followed by literally- and figuratively-related targets, reaction times to literal targets were faster than figurative ones when compared to matched controls.

Research on L2 idiom processing is less developed than and lacks the quantity that L1 research has been afforded. While some evidence supports fast access to figurative meaning, the speed of access in comparison to novel or literal language is still inconclusive. And, like L1 research, it is unclear whether or not figurative language has its own mode of processing.

The Current Experiment

While the L1 *Idiom List Hypothesis* based on research by Bobrow and Bell (1973) has been dismissed, among other reasons (see e.g., Cacciari & Tabossi, 1988; Cacciari, 2014) based on false assumptions about slow access to figurative meaning in the absence of a biasing context, this model is not necessarily refuted by the literature for L2 users and still reflects some intuitions about the way we comprehend idioms. As Swinney and Cutler (1979) also observed, when an individual becomes aware of a highly idiomatic context, L1 listeners often become more attuned to figurative meaning occurring in natural communicative situations and might even fail to see the literal meaning of an idiom. The experiment from Bobrow and Bell (1973) presented idioms with the possibility of both literal and figurative interpretations following a biasing context containing several sentences with either literal-only or figurative-only interpretations. Participants were asked to note which interpretation—literal or figurative—they first perceived. Based on increased literal interpretations first following the literal-only contexts and figurative interpretations first following figurative-only contexts, Bobrow and Bell argued for two separate modes of processing. Following a highly figurative context, the figurative mode of processing becomes active and leads to deviation from a normal literal-first mode of processing. What Bobrow and Bell did not consider, and what Swinney and Cutler's observations suggest, is that the adjustment observed might be due to a contextual adaptation rather than a mode of processing unique to idiom or figurative language processing.

The ability of L2 listeners to adapt to their environment in language comprehension is well-documented, and there is evidence for rapid attunement to varying linguistic situations. Listeners can adapt, for example, to speech rate, surrounding noise and idiosyncrasies of a speaker both in their L1 and their L2 (see e.g., Sebastián-Galĺes et al., 2000). L2 listeners are also able to quickly attune to changes in their environment such as surrounding noise (McQueen & Huetting, 2012) and foreign accents (e.g., Weber et al. 2014). In addition, sequential effects of item presentation can influence the listening process. Perea and Carreiras (2003) found that listeners are able to shift their response criterion on a trial-by-trial basis to adjust to the lexical status and frequency of a previous trial. While an offline, even conscious, adaptation to the presence of figurative meaning is a common intuition, this phenomenon has not been examined in on online setting, and it warrants further research to determine if a context dependent shift based on the presence of figurative language occurs in L2 listeners—be it via a figurative mode of processing or a contextual figurative attunement.

The current experiment will revisit the idea of an idiomatic mode of processing for non-native listeners activated in a biasing experimental context using current psycholinguistic methods. We address the questions still left open in light of current research on idiom processing: Will a highly literal or idiomatic experimental context also affect online processing of figurative meaning in L2 listeners? If so, do the results support a unique mode of idiomatic processing or attunement to the figurative context?

Method

In the present English cross-modal priming study, we presented idioms with a medium degree of literal and figurative interpretation (neither highly literal nor figurative based on L2 ratings) in one of two experimental contexts to German learners of English (see Beck & Weber, 2014). Participants either encountered target idioms embedded in sentences among more sentences containing idioms and very few literal sentences or among only literal sentences.

Listeners were presented an auditory prime followed by a visual target. In a lexical decision task, German participants had to decide whether or not the visual target was a real word of English or not—reaction times (RTs) to targets are known to be faster when prime and target are semantically related compared to when they are unrelated. Facilitatory priming provides information about the processing of the auditory prime, and faster targets compared to their unrelated controls indicate the activation of meaning. For the current experiment, we were interested in both facilitatory priming for targets related to the figurative meaning of the idioms and targets related to the literal meaning of constituent words compared to matched controls. If the same kind of contextual attunement found by Bobrow and Bell (1973) applies to non-native listeners, then we would expect increased priming effects for figurative targets in an idiomatic experimental context compared to the non-idiomatic experimental context. Additionally, access to literal constituent words can give us more insight into non-native idiom processing.

Participants

Eighty-one native speakers of German were paid a small fee to participate in the experiment. Participants were University of Tübingen students who identified themselves as skilled speakers of English. One participant was excluded as she reported that she was unable to hear the stimuli.

Materials

Twenty-five target idioms were embedded at the end of non-biasing short sentences and presented in one of two varying experimental contexts containing 100 trials. The two experimental contexts differed only in 75 filler items, specifically the amount of sentences with idioms in the fillers (explained below). The target idioms had a VP syntactic structure and were controlled for familiarity, meaningfulness, literality, and translatability (English to German) as rated by L1 and L2 users (Beck & Weber, 2014). Each trial consisted of an auditory sentence prime followed by a visual target. Each sentence prime was paired with four different targets.

The four targets included literal or figurative targets and their respective unrelated control targets. Targets semantically related to the literal meaning were based on the last content word of the sentence and chosen from the Nelson et al. (1998) association norms database. For the idiom *to kick the bucket (*primed in the sentence *His uncle kicked the bucket.),* the literal target PAIL was chosen. The unrelated control word was matched for orthographic complexity and length (BOAT as a control for PAIL). Targets related to the figurative meaning of the idiom were chosen based on relation to the overall meaning of the idiom. For *to kick the bucket*, the target DIE was chosen, as the overall meaning is "to die." Similarly, figurative control targets were also controlled for orthographic complexity and length (ZOO as a control for DIE). The four lists of targets were also controlled for lexical frequency. See Table 1 for reference. The auditory sentence primes remained the same for all four lists. Targets were equally distributed across 8 lists (all four targets in two experimental contexts) and presented 400ms after the offset of the final word in each sentence.

Table 1: Sample of experimental items.

	Literal		**Figurative**	
Stimuli	Target	Control	Target	Control
His uncle *kicked the bucket*.	PAIL	BOAT	DIE	ZOO

The experiment was performed using Presentation® software (Version 17.2, www.neurobs.com). Experimental sentences were recorded by a female speaker of American English (first author) in an experimental lab setting. The eight lists were randomly distributed among participants. Each list began with four practice trials followed by 25 experimental and 75 filler trials (a total of 100 experimental trials) and was presented to an equal number of participants. Conditions were evenly distributed across lists.

High-idiomatic Context This variation included a highly figurative context by increasing the amount of idiomatic trials to a total of 75. In addition to the 25 critical trials, 50 filler sentences also embedded idioms into the end of neutral sentences. Only 25 filler trials did not include idioms.

Fifty of the filler trials contained non-word targets, and the other half contained word targets. The four lists in this variation differed only in experimental target words.

Low-idiomatic Context This variation kept the idiomatic context to the 25 experimental trials by including only literal filler items.

Half of the trials contained non-word targets, and the other half contained word targets. The four lists in this variation differed only in experimental target words.

Procedure

Participants were tested individually in a quiet room. First, participants were given instructions in English on the lexical decision task. Participants were instructed that they would hear sentences directly followed by the appearance of a word or non-word on the computer screen in front of them. Participants were told to listen to sentences and then decide whether the string of letters on the screen was a word or not. Subjects were asked to make their decision by pressing a green button with their dominant hand for 'YES' and a red button with the other hand for 'NO' as quickly and accurately as possible. Participants were also instructed that it was important both to listen and to respond to the visual targets, as they would be asked about what they heard after experiment.

Once participants understood the instructions and answered the instruction questions correctly, they could participate in the priming study. The participants listened over closed headphones, and the visual targets were presented on a laptop screen. The targets appeared on the screen 400ms after the offset of the auditorily presented sentence. The next trial began 1000ms later. Reaction times were measured from the onset of the presentation of the visual stimuli.

The experiment concluded with a short yes/no comprehension test on items and a language background questionnaire (see also Cieślicka, 2006). The entire experiment took about 15 minutes.

Analysis

Ten correct responses with RTs longer than 2000ms (0.5% of the total data) were considered outliers and were removed from these analyses. Additionally, three targets (*CHIME, SHRUB, YARN*) were answered correctly by participants only 50% or less of the total trials and were excluded from the results (29 responses or 1.5% of total data). In total, 2.0% of the data were not included in these analyses.

Table 2: Reaction times (in ms).

	Variation 1 (75% Idioms)		**Variation 2** (25% Idioms)	
	Figurative	**Literal**	**Figurative**	**Literal**
Related	749	709	737	674
Unrelated	813	739	740	711

Analyses of Variance (ANOVAs) were conducted on correct responses of the remaining RTs across participants (F_1) and across items (F_2) to examine the within-subject effects of *figurativeness* (with two levels *figurative* and *literal*) and *relatedness* (with two levels *related* and *unrelated*) and the between-subject effect of *experimental context* (with two levels *high-idiomatic* and *low-idiomatic*) between-participants and between-items. Table 2 reports the mean RTs measured from target onset for each condition, and the corresponding priming effects for RTs are shown in Figure 1.

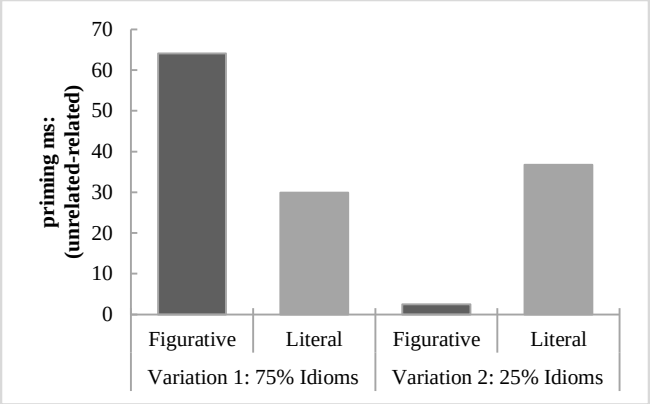

Figure 1: Priming effects (in ms).

Overall ANOVAS on RTs showed main effects of *figurativeness* (F_1[1,78]=20.29, p<.001; F_2[1,42]=11.41, p=.002), *relatedness* (F_1[1,78]=9.89, p<.01; F_2[1,42]=2.80, p>.05), and a weak interaction between *figurativeness*, *relatedness*, and *experimental context* (F_1[1,78]=4.02, p<.05; F_2<1). No other interactions were significant.

To further explore the interaction in the RT analysis, separate analyses for *figurativeness* were conducted. For *literal* targets, there was a main effect of *relatedness* (F_1[1,78]=5.88, p<.05; F_2[1,42]=2.37, p>.05) and no significant interactions. RTs for literally-related targets were faster than RTs for unrelated targets across both experimental contexts. Effects were more consistent across subjects than across items, suggesting variation between individual targets.

For *figurative* targets, there was a main effect of *relatedness* (F_1[1,78]=6.14, p<.05; F_2[1,48]=1.87, p>.05) and an interaction between *relatedness* and *experimental context* (F_1[1,78]=5.24, p<.05; F_2[1,48]=1.22, p>.05). Again, both effects are more consistent across subjects than items. RTs figuratively-related to the prime, as in the literal analysis, were faster than unrelated targets. Thus, we find facilitatory priming for relatedness in both figurative and literal targets.

In order to further explore the interaction in the *figurative* analysis, separate analyses were conducted for each *experimental context*. In the *high-idiomatic* context there was a main effect of *relatedness* (F_1[1,39]=10.58, p<.01; F_2[1,24]=2.75, p>.05). However, in the *low-idiomatic* context, no main effects were present. While facilitatory priming was present for figurative targets in the presence of the high-idiomatic context, this effect disappears in a more literal context for non-native listeners.

Results

Though there was no main effect of experimental context, our results show that the experimental context significantly impacted facilitatory priming for figurative targets. As shown in Figure 1, the facilitatory priming for figurative targets (dark grey bars) varies considerably from one variation to the other, while the literal targets (light grey bars) show no significant changes. In the high-idiomatic context, a facilitatory priming effect for figurative targets of 64ms is

observed compared to a non-significant 3ms in the low-idiomatic context. Figurative targets in this context represented the only condition in which relatedness was not a significant effect. These results provide evidence that even in a non-biasing sentence context, a highly figurative global environment can impact online processing of figurative meaning for idioms. This data is in line with the offline results from Bobrow and Bell for native participants (1973).

The priming effect for literally-related targets showed less variation—an increase of only 7ms—suggesting that while processing for figurative targets was impacted, the processing of individual literal constituents was not significantly impacted. In the case of the low-idiomatic experimental context, we can also argue that where figurative meaning is not facilitated, literal meaning is more dominant. This result also supports the L1 data collected by Bobrow and Bell (1973) as well as the L2 data from. Cieślicka (2006) and Siyanova-Chanturia et al. (2011).

Considering the impact of figurativeness, overall, literally-related targets were faster than figuratively-related targets. While this reflects the same results found by Cieślicka (2006), it does not necessarily imply a processing priority for literal meaning over figurative meaning. While the figuratively-related targets correspond to the overall meaning of the idiom, the literally-related targets correspond only to the literal meaning of the final constituent of the idiomatic phrase. It does, however, indicate that literal processing of constituents is present even when figurative meaning is processed. And, when figurative meaning is not facilitated by context, literal meaning appears to be dominant.

Our results are further supported by those gathered by Sprenger (2003), who also found strong literal constituent activation in production tasks. Our results differ, though, from Rommers, Dijkstra and Bastiaansen (2013). Rommers et al. collected EEG data from a top-down procedure which indicated that related literal targets were not activated in highly predictable idioms when the final word of an idiom was replaced with the related target. Thus, while hearing a word might activate the literal meaning of that word, the functionality of these literal words may be limited or even switched off in some cases.

The consistency of effects—generally stronger across subjects than across items—supports general knowledge of variation across idioms (see e.g., Titone & Connine 1994) and possibly varying association strength of our targets, as these were selected by this author rather than a database. While our idioms were controlled for much of this variation, the presence of remaining differences cannot be excluded.

Discussion

Based on the results of this study, we will briefly consider the fit of our data with L1 and L2 models of idiom processing.

L1 Processing Models

Our results are not compatible with the assumptions of stage models of processing. The *Idiom List Hypothesis* (literal-first) is problematic as our participants activated literal constituent meaning in addition to figurative meaning of the idiom in a high-idiomatic context. Additionally, while priming of figurative meaning increased in the high-idiomatic context, literal constituent meaning still precluded figurative meaning. This hypothesis predicts, however, that that literal meaning should not be activated at all in a high-idiomatic context. While our data does not rule out a second, idiomatic mechanism that might be primed by a global figurative context, we argue that attunement is a more suitable explanation for this phenomenon. The *Lexical Representation Hypothesis*, assuming that figurative meaning is retrieved faster than compositional processing of literal meaning, is likewise not supported by participants' RTs in our experiment. However, the tenant of this model suggesting that composition and idiom retrieval can occur simultaneously cannot and should not be dismissed.

Furthermore, our data cannot make strong claims for or against the *Configuration Hypothesis* as we included only highly familiar idioms, and this model focuses on predictable idioms based on the recognition point of the idiom. Though familiarity generally correlates with predictability (see e.g., Titone, Connine 1994), any further interpretation of compatibility would be far-reaching.

L2 Processing Models

We can make limited claims about the previously discussed L2 processing models, but it seems that our results showing online access to figurative meaning are not compatible with the challenges many of these models present. As we used only non-translatable idioms, we would expect processing difficulties for our participants based on the *Idiom Diffusion Model of Second Languages.* Although we cannot compare our results with translatable idioms to make a stronger claim, the access to figurative meaning makes a case against it.

Our data is generally compatible with the *Literal Salience Model*. Our participants responded faster to literally-related targets than to figuratively-related targets as predicted by this model. However, the results solely from this observation are not compelling enough to interpret that literal meaning has a priority over figurative meaning. Sprenger, Levelt and Kempen (2003) also found literal constituent priming in production tasks and claimed that, rather than a processing priority, activation of constituent word lemmas in addition to a superlemma, a phrasal representation of the idiom on a lexical-syntactic processing level, are activated. Though this production model does not clearly lay out a time course for processing, we assume that activation must spread to a superlemma from individual constituents, and it is possible that this activation occurs more slowly for L2 listeners than activation of an individual word lemma does.

Figurative Attunement

Our findings can generally be interpreted as compatible with current ideas on L2 listening adaptation. Based on the strong differences in processing of figurative language between the experimental variations, we argue that listeners are able to quickly adapt to a figurative context on the processing level.

Conclusion

Though our data does not provide strong evidence for or against idiom processing as its own mode of processing, separate from literal processing, it does provide strong evidence that proficient L2 listeners can have online access to figurative meaning. Additionally, the experiment supports the idea that figurative attunement is possible even in a very short amount of time, furthering evidence that L2 listeners can detect and shift their response-criterion in the presence of a highly figurative context.

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