Ana Werkmann Horvat*, Marianna Bolognesi, and Katrin Kohl

The status of conventional metaphorical meaning in the L2 lexicon

https://doi.org/10.1515/ip-2021-4002

Abstract: This paper investigates how L2 speakers of English process conventional metaphorical expressions. While much of the literature on L2 processing of figurative expressions focuses on idioms only, the aim of this paper is to investigate how L2 speakers process conventional metaphorical expressions. The results of a cross-modal semantic priming task show that conventional metaphors have a special status in comparison to literal language in the L2 lexicon. The differences in reaction times show that L2 speakers are aware of the connections between literal primes and targets, resulting in slower reaction times, while this effect is not found in the metaphorical condition. This demonstrates that even when metaphorical language is very conventional, it can cause difficulties for L2 speakers. Furthermore, these results show that conventional metaphorical expressions can pose a semantic and pragmatic challenge for language learners, thus creating a need for explicit teaching of metaphorical meanings of polysemous words.

Keywords: conventional metaphorical meaning; figurative language processing; L2 lexicon; literal meaning

1 Introduction

Much of the research on second language (henceforth, L2) acquisition of figurative meaning focuses on how L2 speakers acquire idioms (Carrol and Conklin 2014; Cieślicka 2015; Siyanova-Chanturia et al. 2011). However, it has been previously shown in the literature (Bort-Mir et al. 2020; Cameron 2003; Holme 2004; Steen et al. 2010) that the most common type of metaphorical expressions in everyday speech of L1 speakers are conventional metaphorical expressions, such as *invest effort*, where the verb *invest* is used metaphorically. These expressions are often

***Corresponding author: Ana Werkmann Horvat**, Faculty of Humanities and Social Sciences, University of Osijek, Osijek, Croatia, E-mail: awerkmannhorvat@ffos.hr
Marianna Bolognesi, Department of Modern Languages, Literatures, and Cultures, University of Bologna, Bologna, Italy, E-mail: m.bolognesi@unibo.it
Katrin Kohl, Faculty of Medieval and Modern Languages, University of Oxford, Oxford, UK, E-mail: katrin.kohl@mod-langs.ox.ac.uk

based on polysemy. In the example above, the verb *invest* has a literal meaning, namely the activity of using money with the aim of making a profit from it, and a metaphorical meaning, namely the action of devoting time and energy to a project, an activity, or a person. The metaphorical meaning is typically so conventional that it is easy to access and understand for L1 speakers. In some cases, it can be even more prominent and frequently found in language, compared to the literal meaning. For instance, the metaphorical use of the verb *support*, namely the action of providing help or indicating approval of an idea, an organization or a person, is arguably more common in language use, compared to the literal meaning of this verb, namely the specific action of physically holding a roof or a structure, to prevent it from falling.

Littlemore (2001) and Littlemore et al. (2011) show that in the L2 classroom, students indeed have difficulties with understanding conventional metaphorical expressions, even when they are quite transparent, such as *the funds are drying up*. These results, based on comprehension during experimental sessions held in classroom settings, suggest that conventional and frequently encountered metaphoric expressions that in some cases might even appear with similar constructions in the L1 of the language learners, nevertheless require additional effort when they are processed by L2 speakers. While this data serves as a good indicator of potential differences between comprehension of literal and metaphorical meaning in L2, it does not provide a full picture of the phenomenon because it is based on indirect measurements of metaphor processing (based on students' perceptions of experienced difficulty), rather than direct measurement. To the best of our knowledge, Mashal et al. (2015) and Jankowiak et al. (2017) are the only two empirical studies that have tested L2 processing of conventional metaphorical expressions such as *invest effort*, or *cover a story* using direct measurements.

The current paper investigates whether the processing of conventional metaphorical expressions in comparison to their literal counterparts differs between L1 and L2 speakers. Our previous research (Werkmann Horvat et al. 2021) shows that with respect to meaning dominance, conventional metaphorical expressions do not pose any processing difficulties for L1 speakers by comparison with literal expressions. In this paper, we explore how L2 speakers process literal and conventional metaphorical expressions, and how their processing compares to the processing by L1 speakers. The results of our investigation will shed light on the structure of the L2 lexicon and, more specifically, on the status of conventional figurative meaning. This type of figurative meaning is the most frequently encountered type of figurative expressions and it can therefore pose significant semantic and pragmatic difficulties in everyday use of language for L2 speakers.

2 Theoretical background

2.1 Processing literal and figurative meaning in L1 and L2

The debate on the processing differences of literal versus figurative meaning in L1 speakers has initially generated two opposing views. The indirect access model suggests that L1 speakers access the literal meaning first and only then process the figurative meaning (Clark and Lucy 1975; Grice 1975; Searle 1979). This model assumes the primacy of the literal meaning and predicts that the processing of metaphorical meanings involves cognitive costs. Conversely, Gibbs (1984), Gildea and Glucksberg (1983), Harris (1976) and others suggest that figurative language processing in L1 speakers can be effortless and easy. The direct access model assumes that the same cognitive mechanisms are used to process figurative and literal meanings: if the context supports it, figurative language can be processed as quickly as literal language (Gildea and Glucksberg 1983).

Later accounts have offered further theories, notably the Graded Salience Hypothesis (Giora 1997) and the Career of Metaphor Theory (Bowdle and Gentner 2005). Giora proposes that the difference between literal and metaphorical meaning is strongly connected to the meaning's salience, rather than being a question of metaphoricity. In her view, the salient meaning is processed first, independently of its metaphoricity. The salience of a word meaning, in her view, is associated with four factors, namely: frequency of use, prototypicality, familiarity, and conventionality.

The Career of Metaphor Theory (Bowdle and Gentner 2005) is based on the idea that as new meanings enter the lexicon, they tend to become increasingly conventional with repeated use. Bowdle and Gentner propose that the first appearance of an A is B metaphor (e.g. *an obsession is a tumour*) establishes the similarity between the two concepts. As the metaphor is used more frequently, the relation between the topic and vehicle term becomes more salient. With use, this relation is extended to other topics in different contexts (e.g. *a doubt is a tumour*, *a grudge is a tumour*) and the new meaning becomes conventional. The differences in conventionality are assumed to affect processing: the more conventional metaphorical expressions become, the more their meaning is likely to be interpreted by categorization rather than comparison, and they consequently become easier to process.

Our previous research (Werkmann Horvat et al. 2021) contributes to the current discussions on L1 processing of figurative meaning from a methodological and empirical perspective. Our findings suggest that L1 speakers process literal and conventional metaphorical meanings with the same ease. This result supports both

the Graded Salience Hypothesis and the Career of Metaphor Theory. In discussing our findings, we emphasized the importance of using a uniform and balanced set of stimuli in which the contextual dominance of the literal and metaphorical meaning is controlled, in addition to the traditional lexical measures. The study we report on here uses the same methodology and stimuli as the L1 study.

Conversely, while the literature on L1 figurative language processing has not yet reached a consensus on whether metaphorical meaning has a special status in the L1 lexicon, most research agrees that figurative meanings of all types are processed effortfully by L2 speakers. However, when discussing figurative language comprehension in L2 speakers, most studies discuss *idiom* learning and comprehension (Carrol and Conklin 2014; Cieślicka 2015; Siyanova-Chanturia et al. 2011) and a strong consensus appears to be emerging that idiom comprehension poses substantial difficulties for language learners. This is largely due to the non-compositional nature of idioms and the possible interferences from L1 (Carrol and Conklin 2014).

The focus on idioms in the literature investigating figurative language in L2 learners is evidenced in the Common European Framework of Reference for Languages (Council of Europe 2001) as well. Nacey (2013) points out that for CEFR, metaphor is part of lexical competence, but with a focus on one particular kind of metaphor, namely phrasal idioms or frozen metaphors that are often opaque in meaning, such as *to kick the bucket, a long shot, hell to leather* (Council of Europe 2001: 111). However, it is important to remember that, as Nacey (2013: 46) puts it, "while most metaphors are not idioms (e.g. 'she saved some time'), many idioms are metaphorical (e.g. 'to skate on thin ice')" and metaphorical expressions that are not strictly idiomatic have also been proven to be challenging for L2 speakers.

A few notable studies focus on conventional metaphorical expressions in L2. Littlemore (2001) and Littlemore et al. (2011) show that in classroom settings, L2 speakers often misinterpret conventional metaphorical expressions such as *money flows* and *funds dry up*. Since students do not understand certain words that are used in their metaphorical meaning, this can sometimes lead to misunderstanding of the main points of what is being taught. Littlemore's (2001) study looks at offline comprehension by eliciting students' opinions on the difficulty of figurative expressions. The results indicate that students often misinterpret metaphorical expressions, which leads to misinterpretation of the speaker's communicative intentions. Littlemore et al. (2011) focus on L2 offline comprehension of conventional metaphors produced by the lecturer during academic lectures. The study found that students had difficulty interpreting 26% of the metaphorical expressions they heard during the lectures, and in many of those cases were not aware that they were misinterpreting them.

Other studies also consider indirect measurement (offline processing) of conventionalised metaphorical expressions. For instance, Kecskés (2001) investigated *situation-bound utterances*. These are formulaic expressions whose most salient meaning is usually the figurative one (e.g. *to stick around, to go out with someone*). Kecskés shows that both L1 and L2 speakers interpret these statements quite easily due to their high frequency of occurrence in both L1 and L2 linguistic input. Nevertheless, when both metaphorical and literal meanings are equally prominent, L2 speakers prefer the literal interpretation (e.g. the literal meaning of *to go out with someone* is *to leave a certain contained space with someone*). Interestingly, while the provided context helped the L1 speakers to arrive at a correct interpretation, this was not the case with L2 speakers, who struggled even when the figurative meaning was the most salient one. Kecskés (2001: 266) suggests that this might be due to not having "direct access to the most accessible information since it is not stored or coded in their L1-dominated mental lexicon".

However, there have not been many studies investigating online cognitive processing of conventional metaphorical expressions, especially as compared to the amount of research done on idiomatic expressions. Mashal et al. (2015) explores the involvement of the two brain hemispheres during the processing of conventional metaphoric expressions in both L1 (Hebrew) and L2 speakers (L1 English with L2 Hebrew). The authors used the divided visual field technique, an experimental technique that involves measuring task performance when the stimuli are presented on the left or right visual hemispheres. Their results show a left hemisphere advantage for processing of conventional metaphorical expressions in L1, and a right hemisphere advantage for the same kind of stimuli in L2. No such difference was found in the case of literal expressions. This suggests that for L2 speakers, conventional metaphorical meanings are less salient than for L1 speakers. The authors claim that in the L2 mental lexicon, metaphorical meaning is secondary, i.e. its access follows the preliminary access of the literal meaning. Similarly, Jankowiak et al. (2017) compare the cognitive processing of metaphorical expressions in L1 (Polish) and in L2 (English with L1 Polish). Their results suggest that L2 language processing requires effort with both novel (e.g. metaphorical meaning that is new, usually based on new or unexpected conceptual mappings) and conventional metaphoric expressions, and that proficient L2 speakers are less sensitive to levels of conventionality than L1 speakers.

These studies stand as evidence that figurative language processing is difficult for L2 speakers, especially when structures are idiomatic and semantically non-transparent, but also in the case of conventional and novel metaphorical expressions. However, it seems that when the figurative meaning is salient and frequent, L2 speakers can interpret it easily, even though, interestingly, they might prefer the literal meaning (Kecskés 2001).

2.2 The current study

Werkmann Horvat et al. (2021) tested L1 English speakers to investigate potential differences in processing conventional metaphorical expressions (*invest effort*) in comparison to their literal counterparts (*invest cash*). The results of this study showed that in L1, there is no observed primacy of the literal meaning in the case of conventional metaphorical expressions.

The aim of the current study is to investigate the L2 processing of conventional metaphorical expressions, and how it compares to L1 processing. We are interested in exploring the following research questions:

1. How does L2 processing of conventional metaphorical expressions differ from L1 processing?
2. Is there a primacy of the literal meaning, compared to the metaphorical one, for L2 speakers?
3. Are there differences in how intermediate-level and advanced-level L2 speakers process conventional metaphorical expressions?

If no processing differences are observed, then this data would suggest that metaphors can be easy to comprehend, even in the case of L2 speakers. On the other hand, if differences in processing are reported, this would stand as evidence that metaphorical expressions hold a special status in the L2 lexicon, even when such expressions have the same frequency and contextual dominance as their literal counterparts (as is the case with the stimuli used here from Werkmann Horvat et al. 2021). Furthermore, any differences between processing literal and metaphorical expressions observed when the stimulus is balanced regarding the dominance of literal and metaphorical meaning could be significant with respect to the difficulty of L2 acquisition of abstract, figurative items. Likewise, an absence of processing differences can provide important information about the nature of conventional metaphors and abstract meanings.

3 Experiment

3.1 Stimuli

The critical stimuli consisted of 48 verbs (targets) and 144 nouns (primes). The primes were divided into three conditions: first, nouns that prime the literal meaning of the verb; second, nouns that prime the metaphorical meaning of the

verb; and third, nouns that are semantically unrelated to the target verb. In total, the participants saw 48 target words, 16 fillers, and 64 pseudo-words (Rastle et al. 2002). The methodology and stimuli of this study were identical to Werkmann Horvat et al. (2021).

The stimuli consisted of triplets which included a verb that can have both literal and figurative meanings, such as *cut*, e.g., one can 'cut grass' (literal) but one can also 'cut the budget' (metaphorical). For examples of stimuli see Table 1 and Supplementary Material. The relationship between the target and the prime was verb – object.

Table 1: Examples of stimuli.

Target	Literal prime	Metaphorical prime	Unrelated prime
Break	Window	Promise	Uncle
Possess	Wealth	Strength	Sand
Hurt	Ankle	Pride	Cave
Drop	Bomb	Price	Birth
Cut	Grass	Budget	Beach
Feed	Pig	Ego	Dome
Open	Bottle	Account	Desire
Fight	Battle	Cancer	Mirror
Cover	Floor	Story	Church
Invest	Cash	Effort	Garden

The triplets were balanced for several different lexical measures. We conducted a single-factor ANOVA (frequency and length) and a *t*-test (collocation frequency and association score). There was no significant difference in CELEX corpus frequency [$F(2, 141) = 0.73$, $p = 0.48$], Kučera and Francis corpus frequency [$F(2, 141) = 1.97$, $p = 0.14$], length [$F(2, 141) = 2.11$, $p = 0.12$] (Davis 2005), association score ($t = -0.58$, $p = 0.56$) or frequency of the collocation ($t = 1.46$, $p = 0.15$) (Kilgarriff et al. 2014). Once the lists of triplets had been constructed, we normed the stimuli for naturalness, with L1 English speakers ($N = 30$) using Qualtrics. A two-tail paired *t*-test showed that the difference in norming values between the literal ($M = 6.09$) and metaphorical ($M = 5.92$) phrases was not significant ($t = 1.75$, $p = 0.09$). The difference between literal and unrelated expressions ($M = 2.08$) was significant ($t = 38.83$, $p < 0.001$), as was the difference between metaphorical and unrelated ($t = 35.42$, $p < 0.001$).[1]

1 For more information about the stimuli and the norming study, see Werkmann Horvat et al. (2021).

3.2 Participants

We recruited 54 L2 speakers of English who were L1 Croatian speakers: 27 participants with intermediate and 27 participants with advanced level of proficiency in English. The participants were recruited in Osijek, Croatia, aged 18–40, right-handed. Their participation was rewarded with a gift card.

The participants filled out a language questionnaire[2] and performed an additional task to determine their language proficiency. The lexical test called LexTale (Lemhöfer and Broersma 2012) is a quick and reliable vocabulary test to assess the linguistic knowledge for medium to highly proficient speakers of English. LexTale is a self-paced visual lexical decision task which takes on average 3.5 min to do and has 60 trials. LexTale scores are good predictors of vocabulary knowledge and give a good indication of general English proficiency.

LexTale scores of 100–80 are indicators of upper and lower advanced users of English, 80–60 is considered as upper intermediate, and below 59 % is considered lower intermediate and low. The advanced group had an average score of 89.81 (SD = 6.07), while the intermediate group had an average score of 61.81 (SD = 6.65). The average age in the intermediate group was 26 (min 18, max 38), and there were nine male and 18 female participants. Average age of acquisition (AoA) of English was 7.8 years old, and average daily use of English was 2.2 h a day. The average age of the advanced group was 25.1 (min 18, max 34), and there were nine male and 18 female participants. Average AoA of English was 6.5 years old, and average daily use of English was 5.5 h a day. There was not a significant difference between the AoA of the two groups ($t = 2.01$, $p = 0.16$). There was a significant difference in how many hours the groups spent using English ($t = 2.01$, $p < 0.001$).

3.3 Procedure

We used a cross-modal priming paradigm with a lexical decision task. Participants heard an auditory prime (noun), followed by a written target (verb), and had to decide whether the string of letters showing on the screen was an existing word in English. The experiment was conducted at the Faculty of Humanities and Social Sciences in Osijek, Croatia, in a quiet room. The experiment was conducted using the Presentation® software (Version 18.0, Neurobehavioral Systems, Inc., Berkeley, CA, www.neurobs.com), and the visual targets were shown on the screen of a

2 The questionnaire was adapted according to the questionnaire used in Laura Sabourin's ERPLing Lab at the University of Ottawa (Sabourin et al. 2016).

Dell Latitude 7480 laptop. The participants used a Logitech Gamepad F310 joystick to make their lexical decision.

The experiment lasted about 6 min. Latin Square design was used to create three lists of 48 targets, so each participant only saw each target in each condition once. The participants were given the following instructions: *As soon as the word appears on the screen as fast as you can, press YES if this is a word in English, and NO if this is not a word in English*. The participants first heard a beep, 300 ms before the presentation of each prime. The visual target, which was either a verb or a pseudoword, followed the prime and was displayed for 300 ms. The participants had 1,500 ms to press YES/NO, and they could press as soon as the word appeared on the screen, but before the next beep was heard. For instance, in the literal condition the participant would hear *cash*, and see INVEST; in the metaphorical condition, they would hear *effort* and see INVEST; and in the unrelated condition, participants would hear *garden* and see INVEST (see Figure 1). The participants had to decide whether the written word (e.g., *devour* [word] or *strear* [pseudoword]) was an existing English word. Participants performed a practice test (2 blocks of 12 trials). The experimental trials consisted of 8 blocks of 16 trials.

The cross-modal priming experiment combined with a lexical decision task was chosen for its demonstrated reliability in investigating language processing in both L1 and L2 speakers (see Jiang 2018 for an overview). Moreover, using this experimental design allowed us to compare the results to our previous study, in which L1 speakers were tested on a similar task (Werkmann Horvat et al. 2021).

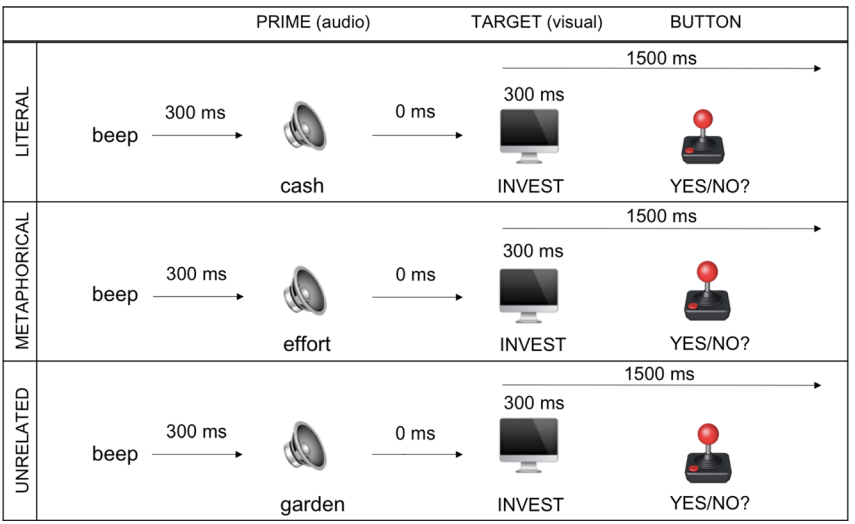

Figure 1: Experimental design.

3.4 Results

The data were analysed using a linear mixed-effects model with the lme4 (Bates et al. 2014) R package (R Development Core Team 2011). We fitted two LME models: the first model only included L2 participants, while the second model included the L1 data in addition to the L2 data (Werkmann Horvat et al. 2021). In both models, the fixed effects were Condition and Group with random effects of Participant and Item. The models included by-participant varying intercepts and by-participant varying condition slopes, and by-item varying intercepts and by-item varying group slopes (Winter 2019). Comparisons between conditions were run using the emmeans and multcompView R packages. No participants were excluded on the grounds of having made a high percentage of errors, but one participant was excluded due to a significant mismatch between reported proficiency and the LexTale result. One target word (*seize*) was excluded due to a high percentage of errors (>20%). Incorrect responses were not included in the analysis, and reaction times outside ±2 standard deviations from the mean were excluded as outliers. 18 reaction times (0.36% of the data) had to be excluded due to a technical error. As a result, a total of 11.09% of the data was excluded from the analysis in the combined model, and 14.74% of the data in the L2 model.

The second statistical model also included the data from a previous study (Werkmann Horvat et al. 2021). No participants were excluded based on the difference in the size of the groups since mixed-effects models are traditionally assumed to perform very well with unbalanced data (Baayen et al. 2008). The raw data files can be accessed here:

https://osf.io/mksb6/?view_only=024dc3dcd1e546a9b3c2781fe804fc62.

As can be seen from Table 2, the L2 model showed no significant main effects of Condition [$F(2, 2{,}113.80) = 1.33$, $p = 0.26$] and Group [$F(1, 52.69) = 0.10$, $p = 0.75$].

Table 2: Summaries of the two LME models of reaction time data.

		Sum Sq	Mean Sq	NumDF	DenDF	*F* value	Pr(>*F*)
L1 + L2 data	Condition	18,732	9,366	2	179.03	1.70	0.18
	Group	171,440	85,720	2	100.07	15.60	<0.0001
	Cond:Group	55,605	13,901	4	177.04	2.53	0.04
L2 data	Condition	16,649	8,324	2	2,113.80	1.33	0.26
	Group	614	614	1	52.69	0.10	0.75
	Cond:Group	21,333	10,666	2	2,111.37	1.70	0.18

There was also no significant interaction between Group and Condition [$F(2, 2{,}111.37) = 1.70$, $p = 0.18$*]. No additional post-hoc comparisons were run due to lack of significance.

The second model shows there is a significant main effect of Group [$F(2, 100.07) = 15.60$, $p < 0.0001$*] and a marginally significant interaction between Group and Condition [$F(4, 177.04) = 2.53$, $p = 0.04$*] with $R^2 = 0.55$. The post-hoc comparisons (Table 3) revealed that the L1 group is significantly different from the intermediate group ($z = 4.45$, $p < 0.0001$*) and advanced group ($z = 4.77$, $p < 0.0001$*); however, the difference between the latter two groups is not significant ($z = 0.30$, $p = 0.76$). With respect to the interaction of Group and Condition, for the L1 speakers the literal ($z = -2.70$, $p = 0.007$*) and metaphorical ($z = -2.77$, $p = 0.006$*) conditions are significantly different from the unrelated condition, but not from one another. This is in line with the initial L1 study (Werkmann Horvat et al. 2021). In the advanced group, there is a significant difference between the literal and the unrelated condition ($z = 2.19$, $p = 0.03$*). There are no significant differences between the conditions in the intermediate group.

Error rates were analysed using a generalized linear model with a binomial distribution for both sets of data. The analysis (Table 4) showed no effect of Condition in the combined model ($p = 0.67$) nor in the L2 model ($p = 0.64$).

Table 3: Least square means of reaction times for main effect of group and the interaction condition:group (combined model).

		LSMeans	SE	Significantly diff levels[a]			
Group	L1Speaker	465	10.3	a			
	Advanced	545	14.0		b		
	Intermediate	539	14.0		b		
Cond:Group	lit: L1speaker	461	10.6	a			
	met: L1speaker	461	10.6	a			
	unr: L1speaker	472	10.4		b		
	lit: Advanced	551	14.4			c	
	met: Advanced	544	14.4			c	d
	unr: Advanced	540	14.2				d
	lit: Intermediate	540	14.5			c	d
	met: Intermediate	535	14.5			c	d
	unr: Intermediate	543	14.3			c	d

[a]Confidence level: 0.95, significance level: alpha = 0.05.

Table 4: GLM of error data for L1 + L2 data and L2 data.

		Estimate	Std. error	*z* value
L1 + L2 data	(Intercept)	2.89	0.11	26.08
	Conditionmet	−0.01	0.16	−0.08
	Conditionunr	0.12	0.16	0.72
L2 data	(Intercept)	2.68	0.14	19.29
	Conditionmet	0.19	0.21	0.92
	Conditionunr	0.14	0.20	0.71

4 General discussion

4.1 The status of metaphorical meaning in the L2 mental lexicon

This study used a cross-modal semantic priming paradigm combined with a lexical decision task to test the processing of figurative language in L2 speakers of English and showed different processing patterns for L2 speakers in comparison to the L1 speakers (Werkmann Horvat et al. 2021), who process both literal and conventional metaphorical meaning with ease.

Our main research question was concerned with L2 patterns of processing but also with how they compare to L1 speakers' processing of conventional metaphorical meaning. While we acknowledge that cognitive mechanisms involved in L1 versus L2 processing are different, it was our aim to gain insight into how these patterns of processing differ in the case of conventional metaphoric expressions in these two groups.

To answer our research questions, we performed two different analyses, one including only the L2 data, and the other including the comparison between the L1 and the L2 data. While the main effect of the Condition was not significant in any of the models, as expected, the main effect of Group reached significance when L1 is compared to the two L2 groups. This comes as no surprise, since L1 speakers are expected to perform faster in most types of reaction time tasks. The combined model showed a marginally significant interaction, while this interaction was not significant in the L2 model. We acknowledge that this effect is marginal in the combined model and not significant in the L2 group. Nevertheless, the direction and tendencies in reaction times follow the same pattern which will be considered in data interpretation.

In the intermediate proficiency group, we found no significant differences between the three conditions, with very similar reaction times. This suggests that speakers of this level of proficiency are not proficient enough to be sensitive to subtle semantic cues that can produce a priming effect. While our previous study with L1 speakers showed that these cues, based on words that often occur together in verb + object constructions, are strong enough for the selected primes to prime both literal and metaphorical targets, it seems that these are not as strongly connected in the L2 lexicon of an intermediate proficiency English speaker. This is in line with studies such as Faust et al. (2012) and Midgley et al. (2009). Faust et al. (2012) show that coarse semantic coding (i.e. the diffused activation of broad semantic fields) is significantly weaker in L2 in comparison to L1. In relation to the activation of broad associations within the right brain hemisphere (RH), they suggest that "the unique role of the RH in activating and maintaining a larger range of word meaning and semantic features may be limited to native language, and does not fully extend to later acquired non-native languages" (Faust et al. 2012: 230). This observation, we argue, may also motivate the difficulties experienced by non-native speakers in processing metaphorical statements, especially in intermediate proficiency speakers.

Midgley et al. (2009), on the other hand, show that lexical and semantic association links might be weaker in non-advanced language learners, while these links seem to strengthen with increased competence in the L2. This is also in line with our results: while we find no differences across conditions for intermediate speakers, we report a marginally significant difference between the literal and unrelated condition for advanced L2 speakers in the combined model.

In the case of the advanced proficiency group, our results show no significant differences between the metaphorical and unrelated condition or between the literal and metaphorical condition, but there is a marginally significant difference between the literal and the unrelated condition in the combined model. A significant difference between the literal and the unrelated condition is seen in L1 speakers as well, but the pattern is different: while for native speakers the literal condition is faster than the unrelated one (due to the priming effect), for language learners it is the opposite: the literal condition is slower than the unrelated one. We interpret this as a negative priming effect (Frings et al. 2015; Shao and Meyer 2017; Tipper 2001), where the literal prime causes an interference effect that slows down the performance. These results raise several interesting points about L2 language processing in general, and about the processing of figurative language.

First, these findings can be taken as showing that even advanced L2 speakers process language differently to native speakers. While L1 processing tends to be automatic and effortless (as suggested by previous literature, by means of semantic categorization), it seems that L2 processing involves a heightened level of

linguistic awareness and constant monitoring, resulting in, arguably, a comprehension strategy based on comparison rather than on categorization. A variety of studies on language awareness seem to confirm this idea. For example, Schmidt (1993) points out that an essential requirement for linguistic input to become actual linguistic intake in L2 learning is the process of explicit, conscious "noticing". This is also a crucial idea in the distinction between processing by categorization, without accessing the literal meaning (or metaphor source) and processing by comparison, which requires the activation of the literal meaning, or metaphor source. Hawkins (1999) similarly emphasizes the role of language awareness in L2 learning, but also highlights differences in acquiring the L1 versus the L2. He points out that some of the mechanisms traditionally assumed to be present in L1 learning, such as an innate ability to acquire language, might not be available or might have a different role in L2 acquisition. This might be connected to the fact that by the time learners start learning their L2, they can already rely on their L1 knowledge. This awareness, we argue, might partially explain why L2 processing in our study differs from L1 processing. While L1 speakers might not consciously notice the relations between the primes and the targets, and therefore the effect of the primes is facilitating, the L2 speakers in our study appeared to use distinctive strategies for processing the primes and targets. The conscious awareness of a semantic link between the prime and the target may slow down the linguistic processing of these items, because L2 processing is based on "noticing" linguistic peculiarities. L2 speakers – especially advanced ones – may have developed a cognitive strategy that prompts them to notice semantic connections between different words more consciously than is the case for L1 speakers, and in this context the strategy interfered with the speed of the lexical decision, making them slower in the literal condition in comparison to the unrelated condition. Conversely, in the unrelated condition they do not notice any connection between the prime and the target, and therefore there is no interference.

With respect to the implications of our results for theories of L2 figurative language processing, we report a non-significant difference between the processing of the metaphorical and the unrelated condition, as well as for the processing of the literal and the metaphorical condition. The metaphorical condition appears to fall in between the literal condition, in which L2 speakers detected a semantic link between prime and target that slowed down their performance, and the unrelated condition, in which no link was detected and the performance was therefore faster than in the literal condition. If interference is what causes the difference in processing between the literal and the unrelated condition, then the reason why there would be no difference between the metaphorical and the unrelated condition should be a lack of interference: L2 speakers may not notice (yet) that there is a semantic relation between the prime and the target when this

relation constructs a metaphorical meaning. In this sense, conventional metaphorical expressions such as *invest effort* semantically seem to remain somewhere in between the recognized meaningfulness of *invest cash*, and the uninteresting meaninglessness of *invest garden*. We suggest that if language awareness can be assumed to be the principle that explains the interference effect observed for the literal condition, then our data shows a trend in which language awareness plays a role in processing metaphorical meanings, but this strategy remains underdeveloped in metaphorical meanings since they are processed similarly to unrelated word pairs.

In this respect, the metaphorical meaning has a different, *special* status in the L2 mental lexicon compared to the literal meaning. The special status of the metaphorical meaning can be partially associated with the special status of abstract meanings in general. Schwanenflugel et al. (1988) show that abstract concepts and concrete concepts differ in the strength of association, range and number of contexts they are associated with. While concrete concepts form strong connections to a limited number of contexts, abstract concepts form weaker connections with a wider range of contexts. In other words, the ties between abstract concepts and their possible contexts are looser than those of concrete concepts, which makes them more effortful to process. This strength in semantic connections of concrete concepts could also explain, at least partially, why the relationships between literal primes and targets seem to be more 'noticeable' than the ones between metaphorical primes and targets, even when their contextual salience does not differ. Interestingly, native speakers do not seem to be so sensitive to the weakness of this connection, since it seems that both literal and metaphorical primes facilitate the lexical decision in the same way. This is not the case with non-native speakers: while the connection between the literal prime and the target is strong, the connection between the metaphorical prime and the target is weaker, and therefore causes no interference, similarly to the unrelated condition. This is again in line with Faust et al. (2012) and Midgley et al. (2009). On a general level, these studies confirm that semantic links seem to be weaker for L2 speakers. In our intermediate proficiency group, these links are weak for all conditions. However, as Midgley et al. point out, it seems that semantic links strengthen with proficiency, which is also attested in our advanced proficiency group. However, this is only the case with literal meaning, which once again speaks in favour of the secondary nature of metaphorical links in the L2 lexicon.

With regards to the metaphor processing accounts, while the L1 results support the Graded Salience Model (Giora 1997) and are also in line with the Career of Metaphor Theory (Bowdle and Gentner 2005) (see Werkmann Horvat et al. (2021) for details), the L2 results are not as straightforward when it comes to the role which salience and conventionality play in figurative language processing in L2. In

other words, it is difficult to interpret these results with respect to the theoretical accounts based on L1 data, mainly because of different behavioural patterns of these two groups. While in the case of the L1 group salient, conventional expressions are easy to access, it seems that in the case of L2 speakers other factors might be at play too, for instance the abstractness of metaphorical meaning.

However, our task did not provide much prior context, which is an important factor in the Graded Salience Theory. On the one hand, a possible hypothesis is that more context could help to establish stronger salience of metaphorical meaning and therefore ease processing for L2 speakers. On the other hand, previous research has shown (Kecskés 2001) that even when they are provided with context, L2 speakers tend to prefer literal meaning over conventionalized figurative meanings.

To sum up, these findings support the idea that the status of conventional metaphorical meaning differs in the L1 and L2 mental lexicon. In the case of salient metaphorical conventional meanings, L1 speakers process both the literal and metaphorical meaning in the same way, i.e. directly and effortlessly. In the case of L2 speakers, literal and metaphorical semantic links seem to differ in terms of their strength, suggesting that the metaphorical meaning has a special status in the L2 lexicon, and that the literal meaning holds a strong primary status.

4.2 Application of results

The results of this study suggest that it is likely to be more difficult to create word associations that construct metaphorical meanings for L2 speakers than for L1 speakers during vocabulary acquisition, due to the special status of metaphorical meaning. It has been previously shown in the literature that the word connections formed by L2 speakers differ from those formed by L1 speakers. For instance, while one sense of a word can prime another sense of a polysemous word in L1 speakers, this does not happen in advanced L2 speakers, showing that the connections in the L2 lexicon are different from those in the L1 lexicon (Crossley and Skalicky 2017).

This is relevant for vocabulary acquisition, since it highlights the importance of teaching both literal and metaphorical meanings of polysemous words (e.g., *invest cash* vs. *invest effort*). Research has shown that teaching of lexis tends to focus significantly more strongly on literal meanings of such words since these are taken to be core meanings, whereas figurative meanings of such words can often be treated as peripheral or as not connected to the literal meaning (Makni 2014; Veliz 2018). Other researchers confirm this tendency, referring to polysemous words as *problematic* for learners (Csabi 2004; Thornbury 2002; Tyler and Evans 2004). Our study confirms the importance of addressing this tendency identified in

the classroom: even when a metaphorical meaning is as frequent as a literal meaning, and when the latter is not dominant in a certain context, metaphorical meanings have a different status in the L2 lexicon, compared to their status in the L1 lexicon. Owing to their abstractness (e.g., *effort*, instead of *cash*), and the fact that they therefore appear to L2 learners as secondary, more practice may be required to establish an appropriately strong connection.

Finally, the results of this study shed light on the variance in use of figurative language found in different levels of proficiency among learners. Littlemore et al. (2013) show that the number of figurative expressions L2 learners use increases with proficiency and that metaphor use has different functions at different levels of proficiency. One of the findings of the study by Littlemore et al. (2013) was that the use of open-class metaphors increases from level B2 onwards, while metaphor clusters appear at levels B1 and B2. In accordance with this, our study shows differences between semantic links in the L2 lexicon, and our online processing data shows that even in advanced L2 speakers, the status of conventional metaphorical meaning in the L2 mental lexicon differs from that of the literal meaning.

5 Conclusion

This study contributes to discussions about processing figurative language in non-native speakers of English. The results show that in the L2 lexicon, conventional metaphors have a special status in comparison to literal language. This is evident from the differences in reaction times: while advanced L2 speakers are aware of the connection between the literal prime and the target, which causes priming interferences and slower reaction times, metaphorical semantic ties are not as strong as they are for native speakers. This supports the view that figurative language has a special status in the L2 lexicon, even with respect to polysemous items in which the figurative meaning is very conventional. Moreover, it indicates that the semantic ties in an L2 lexicon differ in the case of literal verbs and their objects, and metaphorical verbs and their objects, even when their frequency and contextual saliency are the same. We take this as evidence of differences between the literal and metaphorical meanings in L2 language processing. These results also carry important implications for L2 learning and teaching. They show the need for explicit teaching of metaphorical meanings of words that are extensions of literal meanings since the evidence suggests that they are acquired in a more effortful way and can present a semantic and pragmatic challenge for L2 speakers.

Acknowledgements: We would like to thank the members of the Language and Brain Laboratory in Oxford for their assistance and advice, the Faculty of

Humanities and Social Sciences in Osijek for their support, and Steven Kaye for recording the auditory stimuli. We are especially grateful to Prof Aditi Lahiri for her comments and guidance during the development of this study.
Research funding: This research was funded by a grant from the AHRC (Creative Multilingualism).

References

Baayen, R. Harald, Douglas J. Davidson & Douglas M. Bates. 2008. Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language* 59(4). 390–412.

Bates, Douglas, Martin Maechler, Bolker Ben, Steven Walker, Rune Haubo Bojesen Christensen, Henrik Singmann, Bin Dai & Fabian Scheipl. 2014. *Package 'lme4'*. Vienna, Austria: CRAN. R Foundation for Statistical Computing.

Bort-Mir, Lorena, Marianna Bolognesi & Susan Ghaffaryan. 2020. Cross-cultural interpretation of filmic metaphors: A think-aloud experiment. *Intercultural Pragmatics* 17(4). 389–416.

Bowdle, Brian F. & Dedre Gentner. 2005. The career of metaphor. *Psychological Review* 112(1). 193–216.

Cameron, Lynne. 2003. *Metaphor in educational discourse (Advances in Applied Linguistics)*. London, UK: Continuum.

Carrol, Gareth & Kathy Conklin. 2014. Getting your *wires* crossed: Evidence for fast processing of L1 idioms in an L2. *Bilingualism: Language and Cognition* 17(4). 784–797.

Cieślicka, Anna B. 2015. Idiom acquisition and processing by second/foreign language learners. In Roberto R. Heredia & Anna B. Cieślicka (eds.), *Bilingual figurative language processing*, 208–244. Cambridge: Cambridge University Press.

Clark, Herbert H. & Lucy Peter. 1975. Understanding what is meant from what is said: A study in conversationally conveyed requests. *Journal of Verbal Learning and Verbal Behavior* 12. 335–359.

Council of Europe. Council for Cultural Co-operation. Education Committee. Modern Languages Division. 2001. *Common European Framework of Reference for Languages: learning, teaching, assessment*. Cambridge: Cambridge University Press.

Crossley, Scott A. & Stephen Skalicky. 2017. Making sense of polysemy relations in first and second language speakers of English. *International Journal of Bilingualism*. 23(2). 400–416.

Csábi, Szilvia. 2004. A cognitive linguistics view of polysemy in English and its implications for teaching. In Michele Achard & Susanne Niemeier (eds.), *Cognitive linguistics, second language acquisition, and foreign language teaching*, 233–256. Berlin/New York: Mouton de Gruyter.

Davis, Colin J. 2005. N-Watch: A program for deriving neighborhood size and other psycholinguistic statistics. *Behavior Research Methods* 37(1). 65–70.

Faust, Miriam, Elisheva Ben-Artzi & Nili Vardi. 2012. Semantic processing in native and second language: Evidence from hemispheric differences in fine and coarse semantic coding. *Brain and Language* 123(3). 228–233.

Frings, Christian, Katja Kerstin Schneider & Elaine Fox. 2015. The negative priming paradigm: An update and implications for selective attention. *Psychonomic Bulletin & Review* 22(6). 1577–1597.

Gibbs Jr, Raymond W. 1984. Literal meaning and psychological theory. *Cognitive Science* 8(3). 275–304.
Gildea, Patricia & Sam Glucksberg. 1983. On understanding metaphor. The role of context. *Journal of Verbal Learning and Verbal Behavior* 22. 577–590.
Giora, Rachel. 1997. Understanding figurative and literal language: The graded salience hypothesis. *Cognitive Linguistics* 8(3). 183–206.
Grice, Herbert P. 1975. Logic and Conversation. In Peter Cole & Jerry L. Morgan (eds.), *Syntax and semantics, 3: Speech acts*, 41–58. New York: Academic Press.
Harris, Richard J. 1976. Comprehension of metaphors: A test of the two-stage processing model. *Bulletin of the Psychonomic Society* 8(4). 312–314.
Hawkins, Eric W. 1999. Foreign language study and language awareness. *Language Awareness* 8(3–4). 124–142.
Holme, Randal. 2004. *Mind, metaphor and language teaching*. London: Palgrave Macmillan.
Jankowiak, Katarzyna, Karolina Rataj & Ryszard Naskręcki. 2017. To electrify bilingualism: Electrophysiological insights into bilingual metaphor comprehension. *PloS One* 12(4). e0175578.
Jiang, Nan. 2018. *Second language processing: An introduction*. New York and London: Routledge.
Kecskés, István. 2001. The 'Graded Salience Hypothesis' in second language acquisition. In Martin Pütz, Sussanne Niemeier & Rene Dirven (eds.), *Applied cognitive linguistics I: Theory and language acquisition*. Berlin: Mouton de Gruyter.
Kilgarriff, Adam, Vít Baisa, Jan Bušta, Miloš Jakubíček, Vojtěch Kovář, Michelfeit Jan, Pavel Rychlý & Vít Suchomel. 2014. The Sketch Engine: Ten years on. *Lexicography* 1. 7–36.
Lemhöfer, Kristin & Mirjam Broersma. 2012. Introducing LexTALE: A quick and valid lexical test for advanced learners of English. *Behavior Research Methods* 44. 325–343.
Littlemore, Jeannette. 2001. Metaphor as a source of misunderstanding for overseas students in academic lectures. *Teaching in Higher Education* 6(3). 333–351.
Littlemore, Jeannette, Phyllis Trautman Chen, Almut Koester & John Barnden. 2011. Difficulties in metaphor comprehension faced by international students whose first language is not English. *Applied Linguistics* 32(4). 208–429.
Littlemore, Jeannette, Tina Krennmayr, James Turner & Sarah Turner. 2013. An investigation into metaphor use at different levels of second language writing. *Applied Linguistics* 35(2). 117–144.
Makni, Fawzi. 2014. Applying cognitive linguistics to teaching polysemous vocabulary. *Arab World English Journal* 5(1). 4–20.
Mashal, Nira, Katy Borodkin, Omer Maliniak & Miriam Faust. 2015. Hemispheric involvement in native and non-native comprehension of conventional metaphors. *Journal of Neurolinguistics* 35. 96–108.
Midgley, Katherine J., Phillip J. Holcomb & Jonathan Grainger. 2009. Masked repetition and translation priming in second language learners: A window on the time-course of form and meaning activation using ERPs. *Psychophysiology* 46(3). 551–565.
Nacey, Susan. 2013. *Metaphors in learner English*, Vol. 2. Amsterdam: John Benjamins Publishing.
R Development Core Team. 2011. R: A language and environment for statistical computing. R Foundation for Statistical Computing Vienna, Austria. ISBN:3-900051-07-0.
Rastle, Kathleen, Jonathan Harrington & Max Coltheart. 2002. 358,534 nonwords: The ARC Nonword Database. *Quarterly Journal of Experimental Psychology* 55A. 1339–1362.
Sabourin, Laura, Jean-Christophe Leclerc, Myriam Lapierre, Michèle Burkholder & Christie Brien. 2016. The language background questionnaire in L2 research: Teasing apart the variables. In Lindsay Hracs (ed.), *Proceedings of the 2016 annual conference of the Canadian Linguistic Association*.

Schmidt, Richard. 1993. Awareness and second language acquisition. *Annual Review of Applied Linguistics* 13. 206–226.
Schwanenflugel, Paula J., Katherine Kipp Harnishfeger & Randall W. Stowe. 1988. Context availability and lexical decisions for abstract and concrete words. *Journal of Memory and Language* 27(5). 499–520.
Searle, John. 1979. *Expression and meaning*. Cambridge: Cambridge University Press.
Shao, Zeshu & Antje S. Meyer. 2017. Word priming and interference paradigms. In Annette M. B. de Groot & Hagoort Peter (eds.), *Guides to research methods in language and linguistics. Research methods in psycholinguistics and the neurobiology of language: A practical guide*, 111–129. Hoboken, NJ: Wiley-Blackwell.
Siyanova-Chanturia, Anna, Kathy Conklin & Norbert Schmitt. 2011. Adding more fuel to the fire: An eye-tracking study of idiom processing by native and non-native speakers. *Second Language Research* 27. 251–272.
Steen, Gerard J., Aletta G. Dorst, J. Berenike Herrmann, Anna A. Kaal & Tina Krennmayr. 2010. Metaphor in usage. *Cognitive Linguistics* 21(4). 765–796.
Thornbury, Scott. 2002. *How to teach vocabulary*. Malaysia: Pearson Longman.
Tipper, Steven P. 2001. Does negative priming reflect inhibitory mechanisms? A review and integration of conflicting views. *The Quarterly Journal of Experimental Psychology Section A* 54(2). 321–343.
Tyler, Andrea & Vyvyan Evans. 2004. The case of over. In Michele Achard & Susanne Niemeier (eds.), *Cognitive linguistics, second Language acquisition, and foreign language teaching*, 257–280. Berlin/New York: Mouton de Gruyter.
Veliz, Leonardo. 2018. A route to the teaching of polysemous lexicon: benefits from cognitive linguistics and conceptual metaphor theory. *International Journal of Applied Linguistics & English Literature* 7(1). 211–217.
Weiland, Hanna, Valentina Bambini & Petra B. Schumacher. 2014. The role of literal meaning in figurative language comprehension: Evidence from masked priming ERP. *Frontiers in Human Neuroscience* 8. 583.
Werkmann Horvat, Ana, Marianna Bolognesi & Aditi Lahiri. 2021. Processing of literal and metaphorical meanings in polysemous verbs: An experiment and its methodological implications. *Journal of Pragmatics* 171. 131–146.
Winter, Bodo. 2019. *Statistics for linguists: An introduction using R*. New York and London: Routledge.

Supplementary Material: The online version of this article offers supplementary material (https://doi.org/10.1515/ip-2021-4002).

Bionotes

Ana Werkmann Horvat
Faculty of Humanities and Social Sciences, University of Osijek, Osijek, Croatia
awerkmannhorvat@ffos.hr

Ana Werkmann Horvat is an assistant professor at the Faculty of Humanities and Social Sciences at the University of Osijek, Croatia. She was previously a postdoctoral researcher at the Faculty of

Medieval and Modern Languages at the University of Oxford within the Creative Multilingualism project (funded by the AHRC). Her research interests lie mainly within the subfields of semantics and psycholinguistics. Recently, she has been focusing on processing of figurative expressions.

Marianna Bolognesi
Department of Modern Languages, Literatures, and Cultures, University of Bologna, Bologna, Italy
m.bolognesi@unibo.it

Marianna Bolognesi is a senior assistant professor at the University of Bologna (Italy), working on metaphor in thought, language and images. Previously, she worked within the AHRC-funded project Creative Multilingualism (University of Oxford) and as an EU Marie Curie awarded postdoctoral fellow at the Metaphor Lab Amsterdam. Her research bridges empirical (behavioral) approaches and computational modeling based on distributional semantics, as well as quantitative, corpus-based analyses with qualitative observations.

Katrin Kohl
Faculty of Medieval and Modern Languages, University of Oxford, Oxford, UK
katrin.kohl@mod-langs.ox.ac.uk

Katrin Kohl is a Professor of German at the University of Oxford. Her research focuses on German poetry, and on poetics, rhetoric and the theory and practice of metaphor. She teaches German language and literature. As PI of the research project Creative Multilingualism she is lead editor of *Creative Multilingualism: A Manifesto* (Open Book Publishers, 2020) and author of *Modern Languages* (Polity, 2020). Other monographs include *Poetologische Metaphern* (de Gruyter, 2007) and *Metapher* (Metzler, 2007).