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DEVELOPMENT OF NONLITERAL INTERPRETATIONS IN TYPICALLY DEVELOPING SPANISH SPEAKING CHILDREN: LIGHT VERB CONSTRUCTIONS AND FIGURATIVE EXPRESSIONS

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Abstract. In this paper we present a study about the typical development of the comprehension of expressions that exhibit an ambiguity between a literal and a nonliteral interpretation in Spanish, and whose most frequent use is nonliteral. Such expressions include light verb constructions (LVC) such as *to make the bed* and expressions in a metaphor-hyperbole-idiom continuum (MHI) such as *to sleep with angels*. We ran a forced-choice experiment where children aged 3 to 9 (N = 143) heard an ambiguous expression and had to choose the correct picture on the face of three options: one target item and two distractors. There were two counterbalanced lists, so that each critical item would be present in either the literal or the nonliteral condition. We collected accuracy data as well as reaction times. We encountered different developmental trends for LVC than for MHI, observing a literalist stage in MHI which we did not observe in LVC.

1. Introduction

There is a renewed interest in the development of pragmatic abilities in children (see Deamer 2013; Di Paola et al. 2020; Pouscoulous 2011, 2014; Pouscoulous & Tomasello 2020; Falkum 2022 and references therein). In this paper we explore the development of compositional/ literal readings and of nonliteral readings of expressions in Spanish that are more often than not used with a nonliteral interpretation. The expressions we talk about include, *inter alia*, hyperboles, (1a), metaphors, (1b), idiomatic expressions, (1c), and light verb constructions, (1d). They are expressions that we assume are frequently used also in the language that children are exposed to, (almost) always expressing a nonliteral meaning, if by

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'nonliteral' we understand non-compositional, i.e., not built on the basis of specific stable meaning assignments of words and fixed rules of grammar.

(1) a. Sergio se muere de aburrimiento.

Sergio SE dies of boredom

'Sergio is dying out of boredom.'

b. Unax es una tortuga.

Unax is a turtle

'Unax is a turtle.'

c. Tania se parte de risa.

Tania SE breaks of laughter

'Tania bursts out laughing.'

d. Juan hace la cama.

Juan makes the bed

'Juan is making the bed.'

However, the expressions we focus on also have a literal interpretation in the sense mentioned above (i.e., applying compositional rules to stable 1-to-1 mappings between words and meanings), because such expressions include lexical pieces that can be interpreted in a literal way in the context of the expression. That is, the expressions have a possible interpretation given by composing individual stable meanings according to the rules of grammar. Thus, *to make the bed* may mean opening the Ikea box and building the bed one is going to use. Likewise, *to die out of boredom* may mean dying because your boredom kills you. In this respect, the expressions that are the focus of our study are ambiguous, as they admit two different readings that cannot be entertained simultaneously. One of the readings attends to the most frequent meaning of certain lexical pieces when appearing in the context provided by the expressions; the other reading attends to the literal meaning of such lexical pieces and to the way such literal meaning composes with the rest of the elements in the expression. As we say, the nonliteral use of the expressions that form part of the experiment is more frequent than its literal use, which in some

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cases may have a very low frequency – to the point of sounding odd (see Section 3.2.).

Our motivation to test children on this kind of expression is to explore (a) the development of the literal and nonliteral interpretations of them, and (b) the development of a kind of literal vs. nonliteral ambiguity. To our knowledge, developmental researchers have not studied expressions whose nonliteral meaning is much more frequent than its literal meaning. Instead, previous work has mainly focused on the skills a child needs to develop to fully comprehend novel nonliteral expressions. In fact, there is some debate as to whether children go through a "literalist stage" (Vosniadou 1987; Pouscoulous & Tomasello 2020). According to defenders of such a literalist stage (Winner et al. 1976), for a long time, young children tend to interpret nonliteral expressions literally. According to the opposite – "early birds" – view, children as young as 3 are able to understand some instances of novel figurative language (Poscoulous 2011 for metaphors, Falkum et al. 2017, for metonymies). Our study can shed light on the existence and scope of the alleged literalist stage, since if young children were literalist across the board, we should observe that they also interpret our expressions in a literal way. That is, in early stages of development we should be able to spot some tendency to interpret our expressions literally because such interpretation would be the first one young children would entertain.

To discuss these issues, in this paper we collect data from an experimental study with Spanish-speaking children, ages ranging from 3 to 9, in which they were asked to choose the picture correctly describing the aforementioned ambiguous expressions. Our hypothesis is that we can expect that children will perform better at the nonliteral than at the literal conditions even at the younger ages, since the nonliteral condition is more frequent and salient. According to the graded salience hypothesis of Giora (1997, 2002), the preferred interpretation of an ambiguous utterance is the most familiar one. So, while, in general, literal meanings may be favored in interpretation, especially in young ages, the pattern should be reversed when the nonliteral use of a given expression is more frequent than its literal use. The hypothesis that access to the *nonliteral* interpretation of our expressions will be easier holds across ages. However, we also think that access to the *literal* interpretation will improve with age, especially given that metalinguistic awareness in general improves with age, and in particular around 5 years of age (Levorato & Cacciari 2002; Nippold & Duthie 2003; Nippold 2006). We take it that attending to the literal interpretation of highly conventionalized nonliteral uses of expressions is favored by metalinguistic awareness, usually defined as "the ability to distance oneself from the content of speech in order to reflect upon and manipulate the structure of language (Ramirez et al. 2013)."

The paper is structured as follows. In Section 2, we discuss the distinction between literal and nonliteral uses of language. In Section 3, we present our study with 143 Spanish-speaking children, ages ranging

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from 3 to 9. After describing the methods and the procedure, we present the developmental results and then we provide a by-item analysis in which a clear-cut divide between the performance on the items emerges. Finally, we discuss and interpret the results in light of the previous literature. Contrary to our hypotheses, we argue that while nonliteral interpretation progresses linearly, literal readings remain stable for quite a while until they start to get rejected. It seems that it is around the age of 4 when both interpretations become accessible. Section 4 concludes by opening new directions for empirical research.

2. Distinguishing the literal and the nonliteral meaning

There are several ways to define *literal* and *nonliteral* uses of language. The literal meaning of expression *e* (a) may stand for the first kind of use of *e* that children familiarize with, (b) it may stand for what is conventionally associated with *e*, or (c) it even may stand for the original use of *e* (Recanati 2003). For instance, it is possible to raise the question of which is *the* literal meaning of polysemous terms like *rabbit*, which are subject to the mass/count polysemy. In a community where children rarely see animals, the literal meaning of *rabbit* may well be its meat sense (according to criterion (a)). However, according to criterion (c), *rabbit* would literally mean animal, while according to criterion (b), it may be undecided, since it is unclear what the conventional meaning of *rabbit* may be in such a community.

Now, when we move from words to complex expressions, we have to also consider a fourth way of characterizing literal interpretations, according to which the literal meaning of an expression *e* is that meaning of *e* that is derived from composing the literal meaning of words following grammatical rules (Chahboun et al. 2021). There will be some indeterminacy as to what is the literal meaning of any expression thus considered, since it will depend on what we take to be the literal meaning of constituent expressions. For present purposes, we only want to make clear that when we speak about the literal meaning of our expressions, we will not be referring to their conventional meaning or to the meaning children first know about, but to the meaning that is derived by applying composition rules to stable meaning assignments to constituent terms. We further take it that the literal meanings of such constituents are specific notions rather than underspecific or abstract notions (see Taylor 2006, for the general point, Wittenberg 2016, Fleischer 1997; Fellbaum et al. 2006, for light verbs, Nunberg et al. 1994, for idioms, and Wilson & Carston 2007, for hyperboles and metaphors). That is, we assume that the literal meaning of *hacer* ('to make') entails generating something, and that the literal meaning of *morir* ('to die') entails ceasing to exist.

In regard to our use of *nonliteral*, we have to clarify that we do not take nonliteral language to be identical to figurative language. Some of the

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expressions that we use in the materials of our study are clear cases of figurative uses of language, such as *X is a turtle* (a metaphor), or *to die out of boredom* (a hyperbole). However, *to lay the table* or *to make the bed*, for instance, may not qualify as pieces of figurative language. *Lay the table* and *make the bed* involve light uses of *lay* and *make*. While these expressions may not qualify as figurative, depending on how the notion of figurative is understood[1], at the same time their most frequent use does not coincide with their literal meaning in the way we propose to understand the notion.

Though there is much work done on the processing and acquisition of metaphors and idioms (see Chaboun et al. 2021 and references therein), there is comparatively little research on the processing and acquisition of hyperboles (Deamer 2013; Colston 2007, 2015) and light verb constructions (He & Wittenberg 2020).

3. Our study

3.1. *Research questions and hypotheses*

As said in the introduction, our main research question concerns the development of literal interpretations of our target expressions. By observing when children have access to compositional but infrequent meanings of such expressions, we will also be able to contribute to answering the question of how the perception of the literal/ nonliteral ambiguity develops, i.e., when children are particularly apt at understanding certain expressions in two different ways: one literal, and the other nonliteral.

Our hypothesis is that even young children will prefer nonliteral readings over literal readings, and that performance at the literal reading will improve with age. As mentioned, the hypothesis can find support in Giora's "graded salience hypothesis". However, Giora's hypothesis is not the only source of support for the hypothesis. Recently, Falkum (2022) has proposed that children as young as 3 show a flexible attitude towards language. According to Falkum (see also Köder & Falkum 2020), 3-year-olds can understand metonymies if enough context is provided. This is in line with some other studies that show that very young children are able to comprehend simple visual metaphors (Pousculus & Tomasello 2021). All this suggests that young children may not experience particular difficulties grasping the meaning of our nonliteral expressions directly (i.e., without having to compute their literal meaning first). Once they

[1] The notion of figurative language is not clearly defined. On a narrower view, it applies to figures of speech: metonymies, metaphors, idioms, personification, etc. On a broader construal, it applies to words and phrases that are not used with their literal meaning. We assume that light verb constructions are not figurative in the first, narrower, and probably more usual, sense. This is why, in order to avoid confusion, we will talk about nonliteral language instead of figurative language.

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have settled for that kind of understanding, which will be refined and reinforced by subsequent uses, the problem for them will be to understand such expressions in some other way (in this case, literally).

We also expect to observe some change around 5 years of age. We hypothesize that, as metalinguistic awareness grows, spotting the literal/compositional meaning of our expressions will be facilitated. We thus think that accuracy in the literal interpretation condition will be much improved around that age.

Note that we predict that, overall, young children will experience more problems (longer reaction times and more non-accurate responses) with the literal reading of the expressions we use in our study than older children. However, we are aware that the items that we expose the children to belong to different "families" of the nonliteral (i.e., have different syntactic-semantic properties). We do not expect that all expressions will behave in the same way. We provide an item-by-item analysis, so that differences can be observed and studied in future work.

3.2. *Norming study*

To confirm that our materials were frequent in their nonliteral sense, we ran a norming study. Specifically, we interspersed the 16 experimental items of our study (two of which were later on discarded, see Section 3.4) with 20 items in Gavilán et al.'s (2021) database of idiomatic expressions in Spanish. Importantly, the items that we selected from this database were of different degrees of frequency (not frequent, medium, and very frequent), (2). The total number of items in the norming was 36.

(2) a. romper moldes — not frequent

break moulds

'behave in an innovative way'

b. ser un pato — medium frequent

be a duck

'to be clumsy'

c. ponerse morado — very frequent

put.SE purple

'to eat a lot'

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The study was an online questionnaire, created and distributed through PCIbex Farm (Zehr & Schwarz 2018). Following Gavilán et al.'s paradigm, items were organized in sections, one concerning knowledgeability and one concerning frequency. Participants were trained about how to judge the sentences in each section. In all cases, they had to choose a value on a 7-point Likert scale, but in the knowledgeability section, 1 meant that they did not know the meaning of the figurative sense of the expression, while 7 meant that they knew it very well. In the frequency section, 1 meant that they had never used/heard/read the expression, whereas 7 meant that they often used/heard/read the expression. Participants were instructed to say whether they did not know the nonliteral meaning of the expression, and to provide a definition. Items were randomized within each section. We expected our target sentences to be on the higher end of the frequency scale, and we planned on using the results of the knowledgeability section as filters for the frequency data. Criteria for inclusion were being 18 years old or above, being a native speaker of Peninsular Spanish, and not being a linguist. Participants were 63 adults (ages ranging from 18 to 66 years old), who volunteered to participate in the study. We collected a total of 882 responses in the frequency section for the 14 items finally analyzed in the experiment. The results showed that for most experimental items, the median was above 6 (Table 1). Figure 1 presents the mean values for each target item.

These results were obtained after filtering 147 responses. Since some of our items are not strictly speaking figurative (especially those that fall within the category of light verb constructions), some participants looked for a figurative interpretation of such expressions, which they could not easily find. We know this was the case because several participants gave definitions of made up interpretations (e.g., for *cortar el agua*, '*lit*. to cut the water', they gave a definition similar to the idiomatic understanding of *cortar el grifo* 'to stop giving money'), and because we can also infer that they were looking for alternative interpretations when they were asked about their knowledge of the expression, and they would give a 1 to, e.g., *hacer pesas* ('to do weights, lift weights'). Still, even after the filtering, we think that the frequency of some expressions was underrated (especially *cortar el agua*) for the above reasons. There was an item that we kept even though the rated frequency score was 4 and even though we do not think that participants gave misleading ratings: *ser una tortuga*

Table 1. Number of items per rating in the familiarity norming

Median Likert score	1	2	3	4	5	6	7	
N	0	0	0	2	1	2	9	14

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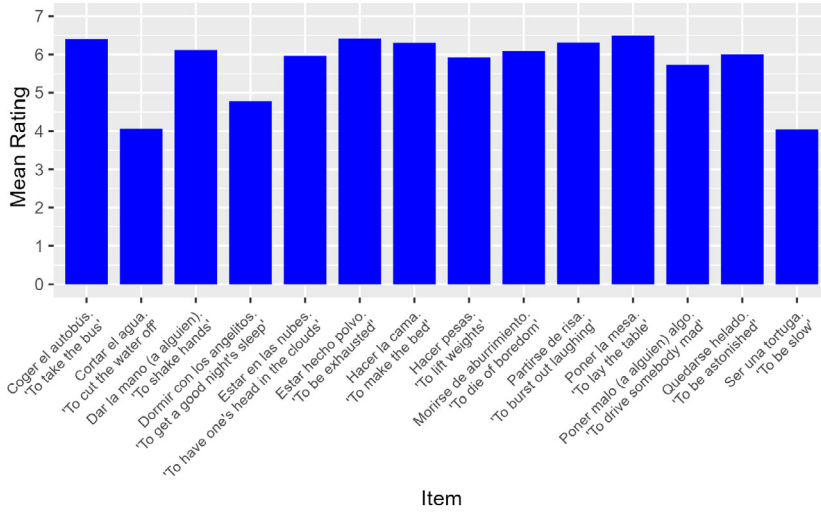

Figure 1. Results per item of the norming study

('*lit*. be a turtle'). We kept it because we wanted to have a more or less frequent clear case of a nominal predicative metaphor (*x* is *y*) and we did not want to use more frequent but possibly distracting animal-based metaphors such as *John is a pig*.

3.3. *Participants*

We recruited 143 typically developing children. 19 were excluded because some were in the process of receiving or had a diagnosis of Generalized/Pervasive developmental disorder (PDD-NOS) or Autism Spectrum Disorder (ASD), and others were either absent from the testing sessions or did not perform above chance in the filler items. The final group consisted of 124 Spanish-speaking children (55 boys and 69 girls) between the ages of 2;11 and 9;11 (year; month) (M_{age} = 72 months; SD = 22.87 months; $N_{3y.o}$ = 21; $N_{4y.o}$ = 20; $N_{5y.o}$ = 23; $N_{6y.o}$ = 19; $N_{7y.o}$ = 14; $N_{8y.o}$ = 20; $N_{9y.o}$ = 7). The children were all recruited from mainstream public schools in Portugalete and Santurtzi, Spain. Written informed consent was obtained from parents/caregivers prior to children's participation in the study. Ethical approval was issued by University of the Basque Country's (UPV/EHU) Ethics Committee for research with human beings (CEISH), code M10_2019_205.

3.4. *Materials*

As anticipated, the stimuli are Spanish ambiguous expressions whose nonliteral interpretation is highly frequent, but whose literal reading is

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possible. Participants were tested on their interpretation of expressions involving hyperboles (*to die out of boredom*), metaphors (*to be a turtle*), idioms (*to break from laughter*), and light verbs (*to make the bed*) (see (1) above).

16 experimental items[2] and 16 control items were created, yielding a total of 32 trials. For each experimental sentence, two experimental conditions were created, a literal and a nonliteral one. The two experimental conditions were designed to assess participants' ability to access each meaning (frequent non compositional or infrequent but compositional) independently. Each expression (contained within a sentence) was linked to three possible pictures (see Figure 2). One reflecting the literal/nonliteral target meaning of the expression, and the other two were distractors.

Going back to the stimuli, in (2)–(3) we present the alternative images for three sample items (the answer tagged as adequate in each condition is underlined):

Figure 2. Examples of screenshots of the literal and nonliteral conditions, respectively

(2) Juan hace la cama.

'Juan is making the bed.'

a. Juan lying on his bed,

b. Juan looking at his bed,

c. <u>Juan building a bed</u> (literal),

d. <u>Juan arranging the sheets</u> (nonliteral).

[2] 1 experimental item out of the aforementioned 16 contained a polysemous expression: *comerse un segundo plato* ('lit. to eat a second plate'), featuring a container-for content regular polysemy (e.g., *to drink the bottle*). There is little work on the development of regular polysemies in general (Srinivasan and Snedeker 2014). We included this type of nonliteral expression for exploratory purposes, so we did not include the results in the analysis. Another item (*meter la pata* 'to screw up') was removed after data collection, because it was observed that the picture was difficult to interpret. Therefore, we had a total of 14 experimental items that were further analyzed in the Results section.

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(3) Pedro está hecho polvo.

Pedro is done dust

'Pedro is exhausted.'

a. Pedro watching TV,

b. Pedro smiling,

c. Pedro turned into dust (literal),

d. Pedro being exhausted (nonliteral).

Two counterbalanced lists were created. Thus, participants did not see both target meanings in the same visual display. It is worth pointing out that the reason for not including both meanings at the same time (as in Chaboun et al. 2016) was to be able to tell apart whether or not children realize (or struggle to realize, by having longer reaction times) that some nonliteral uses of some expressions that are heavily conventionalized, also have a literal interpretation. For each participant, order of presentation of the material was randomized. Expressions were counterbalanced between conditions and participants. We used E-prime 3.0 stimulus presentation software (Psychology Software Tools) to build and run the experiment.

3.5. *Procedure*

We tested participants' interpretation of sentences containing ambiguous expressions using a sentence-picture matching task. First, participants saw a cartoon character appearing on the computer screen together with our target sentences. The stimuli were presented orthographically and auditorily twice (via a pre-recorded female voice). The reason for hearing the stimuli twice was motivated by the need to ensure that the youngest children had enough opportunities to engage with the task and we wanted to make sure that they did not have trouble with their inattention and/or impulsivity. Then, participants saw a visual arrangement with three pictures. The position for presenting the images was counterbalanced between participants and between items and the order of the expressions. The participants' task was to click on the picture that they considered most appropriate for the meaning of the sentence or that they considered that best matched the sentence they had previously heard. Participants had to tap for a quick selection on the touch-screen display.

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The children were tested individually at their school in a quiet room away from the class. Each child was shown first four pretest trials and if they could answer those appropriately, they were then given the complete experimental package which consisted of a total of 32 items. Measures of accuracy and reaction times were collected to determine ease of processing. Reaction times (RTs, in ms) were calculated from the time the pictures appeared, right after the sentences were played, until the moment the participant touched the screen. Only RTs for accurate responses were included and reported.

3.6. *Results*

As mentioned, of the 15 experimental items (see footnote 2) completed by each participant, one was removed due to high rates of inaccuracy across the board. The trial for each participant was not included in the analyses below, so the number of trials that was analyzed for each participant was 14.

Starting with the descriptive statistics, children were fairly accurate in the tasks in both conditions, with around 85% of success; see Table 2 and Figure 3 below.

Table 2. Mean accuracy by condition

Literal	0.834 (SD 0.372)
Nonliteral	0.837 (SD 0.369)

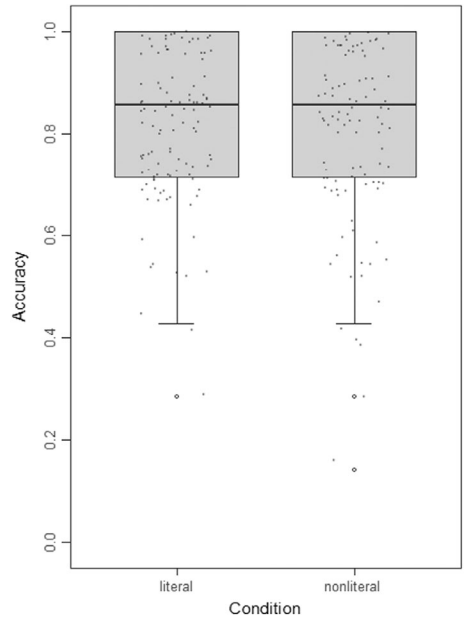

Figure 3. Boxplots for accuracy by condition

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As one can observe, both the mean accuracy and the distribution are almost identical.

3.6.1. *By age*

From a developmental perspective, as shown in Figure 4, 4-year-olds exhibit a borderline difference ($t(272) = 1.66$, $p = .09$) in accuracy between the literal and nonliteral conditions in favor of the literal one. There seems to be a turning point at 5, where accuracy rates are almost identical and from that age onwards, accuracy rates are high in both conditions. By contrast, the 9-year-olds seem to exhibit a stronger bias towards nonliteral understanding.

These properties of development more or less match the RT measures obtained by age, as shown in Figure 5. In both cases we observe a linear development, whereby older children take less time to decide on one option. As will become clear below, a deeper understanding of these data requires a closer look of the types of items that were tested.

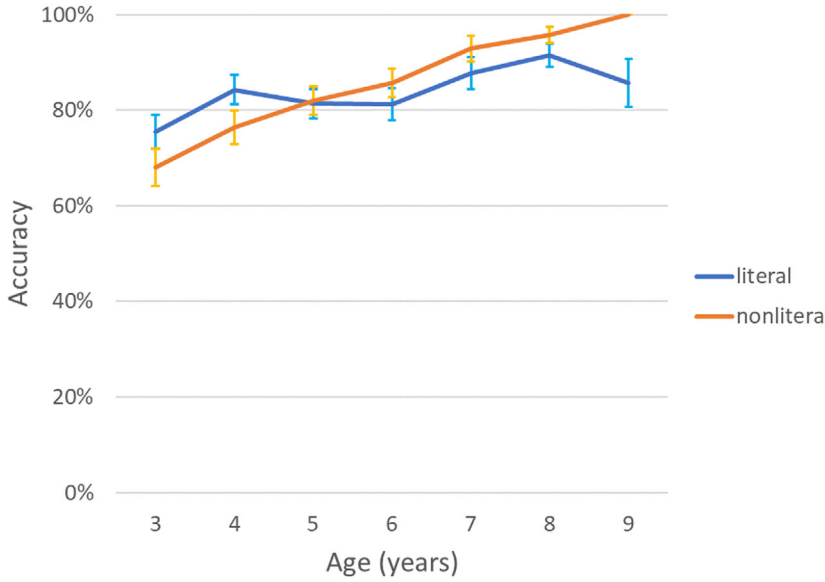

Figure 4. Line graph by condition and age

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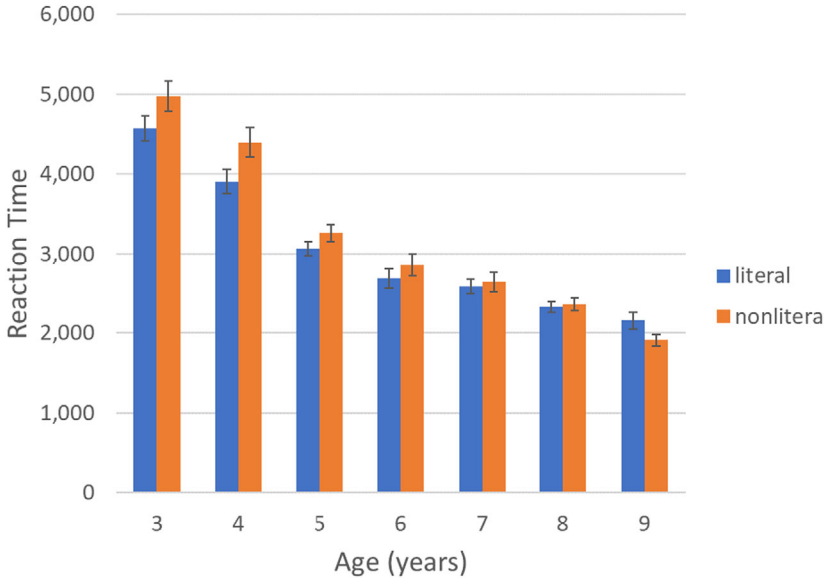

Figure 5. Reaction Times by age and condition

3.6.2. *By item*

A remarkable fact about the by-item analysis presented in Figure 6 concerns the divide between those items for which there is a higher accuracy in the literal condition, (4), as opposed to those for which there is a higher accuracy in the nonliteral condition, (5) (we indicate stronger contrast with an asterisk, and provide the nonliteral translation everywhere, since the literal one is straightforward from the glosses).

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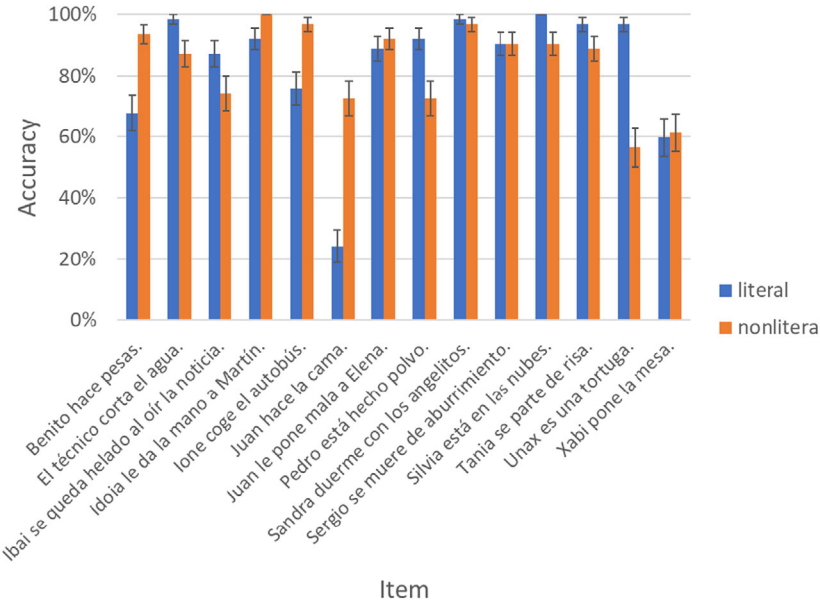

Figure 6. Bar plot of accuracy by item and condition[3]

[3] Here are the nonliteral translations of the items, along the lines of those in Figure 1: 'Benito lifts weights', 'The technician cuts the water off', 'Ibai will be astonished with the news', 'Idioa has shaken Martín's hand', 'Ione takes the bus', 'Juan makes the bed', 'Juan drives Elena mad', 'Pedro is exhausted', 'Sandra gets a good night sleep', 'Sergio dies of boredom', 'Silvia has her head in the clouds', 'Tania bursts out laughing', 'Unax is slow', 'Xabi lays the table'.

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(4) Literal > nonliteral

a. Cortar el agua*

cut the water

'To cut the water off'

b. Quedarse helada

stay frozen

'To be astonished'

c. Estar hecho polvo*

be made dust

'To be exhausted'

d. Partirse de risa

break SE of laughter

'To burst out laughing'

e. Ser una tortuga*

be a turtle

'To be slow'

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(5) Nonliteral > literal

a. Hacer pesas*

make weights

'To lift weights'

b. Dar la mano

give the hand

'To shake hands'

c. Coger el autobús*

pick.up the bus

'To take the bus'

d. Hacer la cama*

make the bed

'To make the bed'

e. Poner la mesa

put the table

'To lay the table'

Notice that the items in (5) are light verb constructions (LVC), whereas (6) include metaphors, hyperboles and idiomatic expressions (MHI). In view of this divide, we were also interested in knowing the overall developmental trajectory in these two groups, especially the LVC group, whose developmental trajectory has been scarcely explored. This is shown in Figures 7 and 8. Observe how different the graphs are for these different groups of items: MHI shows a linear development in both conditions (a bit clearer in the case of nonliteral interpretations), with a clear advantage of the literal condition until the older age. In fact, the literal vs. nonliteral difference in accuracy is significant at ages 3 ($t(166) = 3.57$, $p = .00047$), 4 ($t(131) = 3.58$, $p = .00049$), and 5 ($t(175) = 2.69$, $p = .0077$) in favor of the literal one. In LVC, we observe an advantage of the nonliteral condition from the very beginning, as well as

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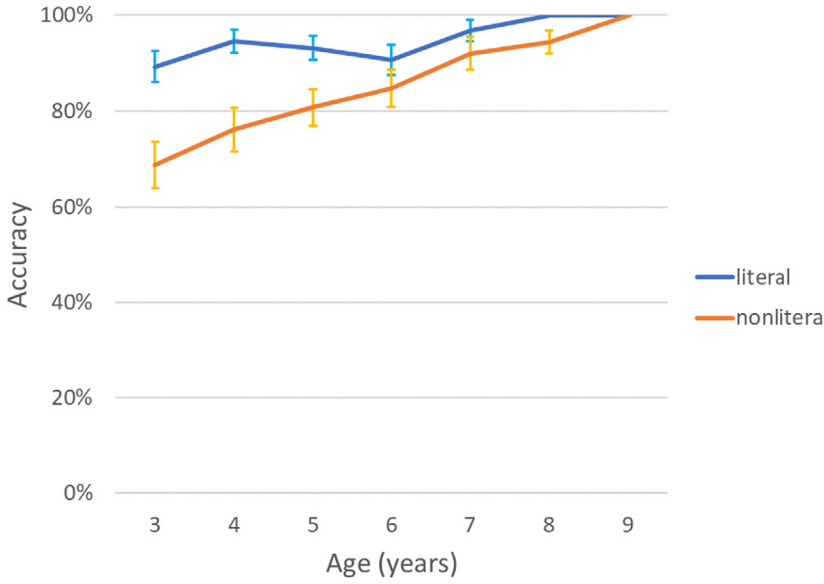

Figure 7. Accuracy in MHI by age group and condition

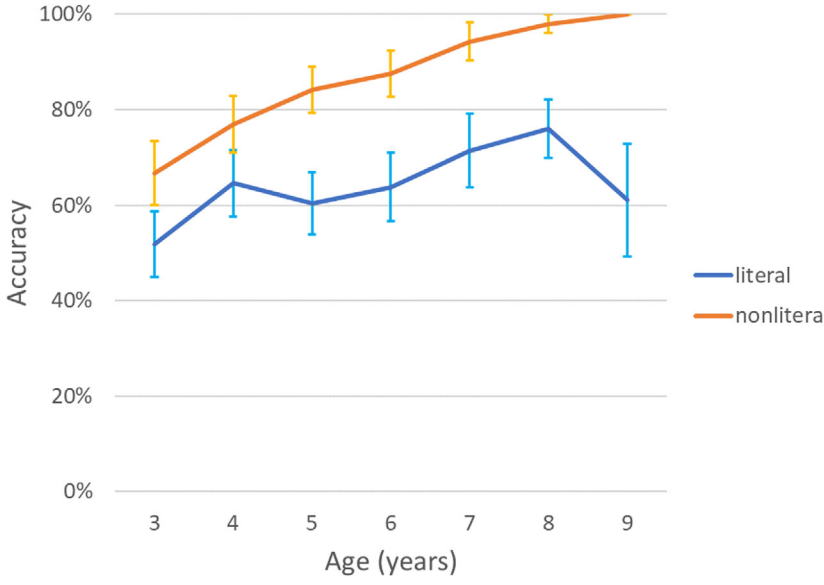

Figure 8. Accuracy in LVC by age group and condition

a split between both conditions at the older age. In this category, pairwise comparisons give rise to significant differences in favor of the nonliteral interpretation at ages 5 ($t(105) = -2.94$, $p = .004$), 6 ($t(81) = -2.76$,

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p = .0071), 7 (t(51) = −2.62, p = .011), and 8 (t(59) = −3.43, p = .0011). Accuracy rates for the nonliteral condition are similar in both cases (MHI and LVC): what is remarkably different is accuracy rates in the literal condition (much higher in MHI than in LVC, which remains around 60% until age 7).

3.7. *Analysis*

To model the data that we collected, we took into consideration Age (as a categorical variable), Condition (literal vs. nonliteral interpretation of items), and also Category (MHI vs. LVC), which were promising in view of the representations in Figures 7 and 8. Table 3 shows the best logistic regression model obtained for accuracy. We fitted a logistic mixed model (estimated using ML and Nelder–Mead optimizer) to predict Accuracy with Age (in years), Condition and Category as fixed factors, with an interaction term between Condition and Category. The model also included Participant as random effect with Condition as random slope:

$$\text{Accuracy} \sim \text{Age} + \text{Condition} * \text{Category} + (1 + \text{Condition} \mid \text{Participant})$$

The model's total explanatory power is substantial. The proportion of variance explained by both the fixed and random factors is 38% (conditional $R^2 = 0.38$), and the part explained by the fixed effects alone is 27% (marginal $R^2 = 0.27$). According to this model, the effect of Age on Accuracy is statistically significant and positive ($b = 0.38$, $p < 0.001$), showing that the accuracy/error ratio increases by 46% for each year increase in Age (for the reference level Condition = literal and Category = LVC).

In addition, the nonliteral Condition also has a statistically significant and positive effect over and above the effect of the base Condition

Table 3. Mixed-effects logistic regression for Accuracy

Reference levels: Condition = literal & Category = LVC

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	−1.4464	0.333	−4.34	1.4E-05	***
Age_y	0.381	0.0545	6.99	2.7E-12	***
Condition = nonliteral	1.2556	0.2358	5.32	1.0E-07	***
Category = MHI	2.7176	0.2648	10.26	< 2E-16	***
Condition = nonliteral: Category = MHI	−2.8595	0.3341	−8.56	< 2E-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.

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(literal) (b = 1.25, p < 0.001). In this case, the accuracy/error ratio is 2.5 times higher for the nonliteral Condition than for the literal Condition (for the baseline level Category = LVC) (see Figure 8). Similarly, the MHI Category also showed a statistically significant and positive effect over and above the effect of the baseline Category (LVC) (b = 2.71, p < 0.001) for the literal Condition (see blue curves in Figures 8 and 9).

Next, we fitted a mixed-effects linear regression model for the log-transformed RTs, to predict the log-transformed RTs by means of Age, Condition and Category as fixed factors, and with an interaction term between Condition and Category. The model had Participant as random effect with Condition as random slope:

$$\log(\text{ReactionTime}) \sim \text{Age} + \text{Condition} * \text{Category} + (1 + \text{Condition} \mid \text{Participant})$$

Table 4 shows the best linear regression model obtained for RTs.

Table 4. Mixed-effects linear regression for Reaction Times

Reference levels: Condition = literal & Category = LVC

	Estimate	Std. Error	df	t value	Pr(>|t|)	
(Intercept)	8.8019	0.0689139		127.78	< 2E-16	***
Age_y	−0.1355	0.0113123		−11.95	< 2E-16	***
Condition = nonliteral	−0.1687	0.0269621		−6.27	6.6E-10	***
Category = MHI	−0.1173	0.02291436		−5.11	3.6E-07	***
Condition = nonliteral: Category = MHI	0.3173	0.03241418		9.8	< 2E-16	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1.

As in the case of accuracy, the model for RTs also has considerable overall explanatory power. The proportion of variance explained by both fixed and random factors is 55% (conditional $R^2 = 0.55$) and the part explained by fixed effects alone (marginal R^2) is 32%. The model's intercept, corresponding to Age = 0, Condition = literal and Category = LVC, is at 8.8 (i.e., 6,646 milliseconds).

According to this model, the effect of Age on RT is statistically significant and negative (b = −0.13, p < 0.001]), that is, children become faster at selecting the correct target with age, at a rate of 13% per year for the reference level (Condition = literal and Category = LVC). However, such decrease is mediated by condition and category. On the one hand, with respect to the effect of Condition, children were faster overall for nonliteral targets than for literal ones. This effect is statistically

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significant ($b = -0.17$, $p < 0.001$), showing that RTs in the nonliteral condition were 16% lower than in the literal one (for the LVC Category). On the other hand, with respect to the effect of Category, children were faster overall for MHI than for LVC. The effect was statistically significant ($b = -0.12$, $p < 0001$), proving that RTs in the MHI Category were 11% lower than in LVC (for the reference literal Condition). However, things are different in the case of the nonliteral targets, where children were 22% faster for LVC than for MHI.

3.8. *Discussion*

3.8.1. *Ambiguity*

This paper sets out a discussion on an ambiguity between literal and nonliteral interpretations of certain linguistic expressions whose nonliteral reading – as we have defined it above – is frequent, unlike what is done in other empirical studies that test novel nonliteral expressions in order to gauge pragmatic competences. As we discuss in what follows, our results concerning the early acquisition of nonliteral meanings contributes to this overall debate from an interesting perspective. This said, the experimental design we proposed cannot give a direct answer concerning when children realize that certain expressions are ambiguous. Recall that participants in our experiment see an image of only one of the two readings of interest in each trial. Hence, we only have group data about access to one interpretation and group data about access to the other, i.e., we lack data concerning access by one same individual to one interpretation of one particular item and then to the other. We also lack data concerning how costly it may be to switch from one interpretation to the other. However, we can observe a progression towards easy access to both interpretations, starting at age of 5. Yet, we can observe a difference between both groups of items (see 3.8.2. below). The accessibility of the literal interpretation of light verb constructions (LVC) is always low in terms of accuracy, which suggests a difficulty in perceiving them as ambiguous. This is probably due to the fact that these expressions are much more frequently used nonliterally than literally, and that the key terms in them (the light verbs) appear in many other more or less idiomatic constructions. It is interesting to note that access to the literal interpretation of LVC construction improves with age, but that from the age of 5 there is a significant difference between conditions. On the other hand, by the age of 6, children seem to be particularly sensitive to the fact that metaphors-hyperboles-idioms (MHI) are interpretable in a literal way, that is when the difference in accuracy begins to be non-significant, suggesting a peak in access to their ambiguity.

Taking into account that the 5-6-year age range coincides with the age period at which metalinguistic awareness (i.e., the set of skills that allows the child to focus on structure and form of the language, see e.g. Duncan

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et al. 2009 or Bialystock et al. 2014) typically emerges, our overall results might suggest that such a metalinguistic awareness facilitates accessing both kinds of meanings of our expressions once children have incorporated such expressions into their linguistic repertoire (Figure 4). However, this reading of our results would be misleading: when the expressions are split in two groups (LVC and MHI), we do not observe any interesting effect at 5, at least with respect to accuracy rates. In this regard, we do not observe any U-shaped development of nonliteral meaning interpretation at 5 (contrary to what is reported by Falkum et al. 2017) or any other remarkable developmental point.

3.8.2. *Early birds or literalism?*

We observe a linear progression across ages in *nonliteral* readings. The progression starts with around 68% of accurate responses at age 3 and reaches at ceiling performance in the oldest group (age 9). The development of *literal* interpretations is less straightforward: 3-year-olds exhibit an accuracy of around 75%, and performance remains at that level until they become 5. From 5 to 8 they become more accurate. Concerning RTs, we observe that access to literal interpretations is easier than access to nonliteral interpretations for 3- and 4-year-olds, that both kinds of interpretations begin to be equally accessible at around 5 years, and that the pattern may be reversed again at 9.

Any discussion of the results concerning the 14 items as a whole would not make sense, as such results emerge from the combination of two clearly different patterns. As said, our items included 5 expressions involving light verbs (*coger el autobús* 'to take the bus', *dar la mano* 'to shake hands', *hacer la cama* 'to make the bed', *hacer pesas* 'to lift weights', *poner la mesa* 'to lay the table'), 3 hyperboles (*morirse de aburrimiento* 'to die of boredom', *quedarse helado* 'to be astonished', *poner malo* 'to drive somebody mad'), 3 metaphors (*estar en las nubes* 'to have one's head in the clouds', *ser una tortuga* 'to be slow', *cortar el agua* 'to cut one's water off'), and 3 idioms (*dormir con los angelitos* 'to get a good night's sleep', *estar hecho polvo* 'to be exhausted', *partirse de risa* 'to burst out laughing'). Actually, we have been speaking about a metaphor-hyperbole-idiom continuum, which would include 9 items, since it is difficult to disentangle hyperboles from metaphors (see, e.g., Wilson & Carston 2007) and idioms based on metaphors from metaphors themselves.

Now, once we make two classes within our items, LVC, and MHI, we can observe that each class has its own distinctive profile. In general, children find the literal meaning of LVC harder to access than their nonliteral meaning (significant differences appear from age 5 onwards), while the reverse holds for MHI. According to several authors (e.g. Fleischer 1997; Fellbaum et al. 2006), light verb constructions are

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essentially not different from idioms. However, we observe that they behave differently from our idiomatic expressions in the MHI group.

It may be thought that the different behavior of LVC may be simply due to the fact that our LVC are more frequent than the rest of expressions. Children may be hearing those expressions, used with their nonliteral meaning, from early on, and may experience difficulties switching to a different interpretation. Such a hypothesis is questioned by the results of our norming study, where our LVC do not appear to be particularly frequent with respect to MHI, and it can be supposed that they will not be particularly more frequent in young children's linguistic input. Also, accuracy in the LVC nonliteral condition is not better than accuracy in the MHI nonliteral condition. The difference between LVC and MHI concerns the *literal* condition.

Another possible explanation for the attested difference is that light verbs themselves, and not so much our particular examples of LVC, have a very high frequency in the input (He and Wittenberg, 2020), to the extent that children store the meaning of a light verb in a separate lexical entry. While typical idiomatic expressions involve constituents whose more frequent use is their literal use (e.g., *quedarse helado* 'lit. to freeze up; nonlit. to be astonished'), LVC make use of an element, the verb, that is recurrently used nonliterally in various different expressions. This might explain why children do not access the literal interpretation of LVC with the ease they access the literal interpretation of MHI, even though they do not master their nonliteral meaning.

Colston (2020) holds that children begin to understand hyperboles when they are 3, with metaphor and idiom understanding emerging later, at around 4–5. As mentioned, except in some clear cases (such as *ser una tortuga* 'lit. to be a turtle; nonlit. to be slow'), it is difficult to build a neat classification of our items in terms of the hyperbole, metaphor, and idiom categories. We can observe some differences between items within the broad category MHI, but we cannot know whether such differences are due to frequency effects or to the weirdness of the literal interpretation. In any event, unlike in the case of LVC, in most cases literal interpretations receive a higher score than nonliteral interpretations.

When we look at developmental data for the different classes of items, we see that there is no literalist stage (i.e., preference for the literal interpretation) for LVC, while we can talk about a literalist stage in the case of MHI. In the first developmental studies about metaphor, the literalist stage was taken to last around 10 years (see Vosniadou 1987). However, the evidence was mostly based on explanation/paraphrasing methodologies (Asch & Nerlove 1960; Cometa & Eson 1978; Smith 1976; Winner, Rosenstiel, & Gardner 1976), which have been later criticized (see Pouscoulous 2011, for a review of this criticism).

What we observe in our results is a short-lived MHI (3 to 5) literalist stage with some peculiarities, since children do not perform badly on the

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nonliteral condition. Usually, literalism is taken to imply that individuals do not access nonliteral meanings of expressions, going instead for a literal understanding of such expressions (Vicente & Falkum 2021). The group of younger children in our study does not display that kind of literalism. They show some level of nonliteral meaning comprehension of the target items. Yet, they are significantly better at literal interpretations of such expressions, which is also attested by their RTs. These results prima facie seem to question the two views that grounded our hypothesis: Giora's graded salience account, and Pouscoulus and Falkum's early birds' view.

The graded salience approach predicts that expressions will be understood in their most frequent and familiar interpretation, which, in the case of our items, such a frequent and familiar interpretation is their nonliteral interpretation. However, we do not see the effect of frequency in the case of MHI. As a reviewer points out, it is not obvious that for children of 3 to 5 the expressions tested in this study are indeed familiar. That is, our results would question Giora's view (at least regarding younger children) only if young children had been exposed to these expressions used nonliterally with some frequency but had turned out to prefer their literal interpretation. Yet, it is difficult to know how frequent expressions can be in the input the child is exposed and attuned to.

In any case, it is again interesting to compare LVC and MHI. Under the hypothesis that the expressions we tested are not that frequent in children's input, the younger children would have responded to the items as if they were novel uses. If this had been the case, it would be surprising that there is such a big difference between LVC and MHI, given that LVC are arguably less transparent than MHI (in terms of being "calculable" from literal interpretations). If indeed our items were not frequent inputs in the younger ages, our general results suggest a frequency/familiarity effect: the more exposed children are to the expressions, the better they are at spotting their nonliteral meaning. However, it would remain to be explained why LVC are preferentially understood nonliterally since the very beginning (that is, why e.g., *coger el autobús* 'to take the bus' would be better understood as getting on the bus than picking up a toy bus).

4. Conclusions and Future Work

The purpose of this paper was to explore the comprehension of expressions which exhibit a literal vs. nonliteral ambiguity, from a developmental perspective. Unlike in other studies, which focus on the difficulties triggered by nonliteral meanings, our focus was on reversing the effects of nonliteral meaning and frequency. Specifically, given that some familiar expressions seem to be more frequent in their nonliteral

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interpretation, we designed an experiment to test the hypothesis that there would be a preference for nonliteral readings over literal readings, and that performance at the literal reading would progress with age. The results show an interesting divide emerging from the behavior of the items. While the youngest groups display a literalist behavior with respect to MHI, being more accurate in the literal than in the nonliteral condition, the pattern is very different in LVC: all groups are better at the nonliteral than at the literal condition, although the access to the nonliteral meaning is similar in both cases (MHI and LVC). In light of these results, we think it would be interesting to study in more depth the development of LVC *vis a vis* the development of MHI in expressions similar to ours, i.e., expressions whose conventional meaning is their nonliteral meaning.

As mentioned in footnote 2 above, we included an item exhibiting container-for-content polysemy (*comer un plato* 'lit. to eat a plate; nonlit. to eat a dish'). We observed that even our youngest group of children were 100% accurate in the nonliteral condition and that they had a small error rate (accuracy of around 70%) in the literal condition. Older groups performed well on both conditions. This suggests that development of regular polysemies may be prior to development of other forms of nonliteral meanings. We consider that the study of the development of ambiguities induced by regular polysemies deserve further exploration.

We have not discussed the data concerning 9-year-olds because the group is small (N = 7). However, from the data collected, we observe a possible trend towards an increasing difficulty in accessing the literal meaning of LVC, and thus towards an increasing difficulty in spotting ambiguities in that case. It would be interesting to test older groups, because this kind of data suggest that with time, the lexical entries for literal meanings and for light meanings of light verbs may be stored separately (being homonyms rather than polysemes).

Finally, pending further research, the data concerning LVC adds to the acquisition studies in Wittenberg (2016), and He and Wittenberg (2020), which support the idea that LVC – at least the idiomatic ones – are somewhat hard to process. Overall, it may be interesting to study the implications of these findings for the analysis of LCV at the lexicon-syntax interface (Mateu & Espinal 2007; Espinal & Mateu 2010).

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