

RUNNING HEAD: Comprehension of figurative language

Understanding of idiomatic expressions in context in skilled and less-skilled comprehenders: Online processing and interpretation.

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Abstract

This paper reports a study in which good and poor comprehenders (in two age groups: 8- and 10-year-olds) read short passages containing phrases that could be interpreted as idiomatic or not, depending on the context. Familiarity was manipulated by including real (English) idioms and novel (translations of Italian) idioms. Reading times for the target phrases were measured and the children's understanding of the target expressions was assessed. The older children and better comprehenders were more likely to interpret idiomatic phrases correctly. In particular, there was an interaction between age and meaning condition: the younger children were less able to choose an appropriate interpretation of the figurative expressions. In general, children spent relatively more time reading the idiomatic expressions than the literal ones, with the exception of less-skilled comprehenders when presented with novel (Italian) idioms. They seemed not to appreciate that these expressions needed any particular effort for interpretation.

Understanding of idiomatic expressions in context by skilled and less-skilled comprehenders: Online processing and interpretation

Studies of the acquisition and comprehension of idioms have identified three main factors that influence the ease with which an idiom is understood: the familiarity of the idiom string (e.g., Laval, 2003; Levorato & Cacciari, 1992; Nippold & Rudzinski, 1993), the semantic analyzability of the constituents of the idiomatic sentence (e.g., Abrahamsen & Burke-Williams, 2004; Cain, Towse, & Knight, 2009; Gibbs, 1987, 1991; Levorato & Cacciari, 1999; Nippold & Rudzinski, 1993), and the context in which the idiom is encountered (Ackerman, 1982; Cain & Towse, 2008; Cain, Oakhill & Lemmon, 2005; Levorato & Cacciari, 1995; Nippold & Martin, 1989; Nippold, Moran & Schwarz, 2001). It has been shown that context is also important in explaining how idioms are acquired during development (Cain et al., 2005; Levorato & Cacciari, 1995; Nesi, Levorato, Roch & Cacciari, 2006). The present study was designed to investigate the role of context in idiom processing in greater detail by comparing skilled and less skilled comprehenders' ability to understand real and novel idioms embedded in supportive contexts.

Most idioms have a clear literal meaning, and so whether or not the intended meaning is literal or figurative depends entirely on the context in which the expression occurs. For example the expression 'to be in the same boat' has a literal meaning in the passage 'During the trip on the lake, Steve met John since they were in the same boat', whereas the same expression has a figurative meaning in the passage 'Steve and John lost their jobs last summer. They became true friends since they were in the same boat'.

The importance of context has been shown in studies comparing skilled and less skilled text comprehenders' understanding of idiomatic expressions (Cain et al.,

2005; Cain & Towse; 2008; Levorato, Nesi & Cacciari, 2004). In these studies, skilled comprehenders were better than less-skilled comprehenders in understanding the figurative meaning of idioms when they were presented in context: the advantage was not apparent for idioms presented in isolation. Other work has shown that younger children do not derive the same benefits from idioms presented in context as do older children, a finding that has also been interpreted in relation to differences in text comprehension skills (Cain et al., 2009; Levorato & Cacciari, 1995). The relation between text comprehension and understanding of idioms does not appear to be a simple correlation between different measures of language skill: a follow-up study of six-year-old children found that the ability to understand idioms was more highly related to text comprehension than to other linguistic abilities such as syntax (Levorato, Roch & Nesi, 2007), and Roch and Levorato (2010) showed that, in both children with Down syndrome and normally developing peers, ability to derive figurative interpretations was strongly associated with their reading comprehension skill, but not with sentence understanding. In addition, a study by Barnes and Dennis (1998) demonstrated that, even though their basic linguistic skills, such as semantic activation, were relatively intact, a group of children with comprehension difficulties related to early-onset hydrocephalus had difficulty interpreting novel figurative expressions.

The Global Elaboration Model (henceforth GEM) proposed by Levorato and Cacciari (1995, 1999) is a developmental model of figurative competence, which emphasises that successful idiom comprehension will depend on the ability to monitor one's emerging comprehension in order to assess that a literal interpretation is not appropriate in a particular context, and to infer an appropriate interpretation of the figurative expression from the context. This model can account for the context effects

found in both developmental studies and in populations with text-level comprehension difficulties. In particular, the GEM states that attention to the context in which the idiom is presented enables the comprehender to appreciate that a literal interpretation of an idiomatic expression is inappropriate and, further, it provides the necessary semantic information to derive an appropriate figurative meaning for the idiom. So, according to this hypothesis, even unfamiliar idiomatic expressions can be understood if they are embedded in informative contexts, which can be used to support inferences about likely meanings. More generally, readers and listeners generate inferences when they go beyond the literal meaning of a text to ensure adequate understanding of the information presented. More specifically, to derive an appropriate meaning for an unfamiliar idiomatic phrase, readers and listeners need to appreciate that a literal interpretation of the expression is inappropriate in that context and then derive a meaning that is contextually appropriate. Inference making in this instance involves going beyond the combined literal meaning of the string of words and deriving a contextually congruous alternative interpretation, which may involve metaphorical mapping about concepts from words in the phrase (Gibbs, Bogdanovich, Sykes, & Barr, 1997) in addition to explanations of why events, actions, and states occur (Graesser, Millis, Zwaan, 1997).

Significant developmental improvements in idiom comprehension are seen between seven and twelve years of age (e.g., Abrahamsen & Burke-Williams, 2004; Cain et al., 2009; Levorato & Cacciari, 1992, 1995, 1999). Levorato and Cacciari (1995) argue that younger children often fail to understand idiomatic expressions because they focus on a local interpretation of the text and do not derive a coherent and integrated model of the text as a whole. Thus, they fail to appreciate that a literal interpretation of an idiom does not fit with the context, an example of a failure to

monitor comprehension. Even if young children do appreciate that the literal meaning of an expression does not fit with the surrounding context, they may be unable to derive an interpretation that is contextually appropriate because of weaker word, sentence and discourse level language skills (see also Levorato, Nesi & Cacciari, 2004).

There will also be developmental effects in idiom comprehension because older children will have had greater exposure to these expressions and, therefore, opportunities to learn them, as explained in Nippold's Acquisition via Exposure hypothesis (e.g., Nippold, & Rudzinski, 1993). For older children, a highly familiar idiom may be lexicalised and, therefore, recognised and understood immediately. However, studies to date do not indicate lexicalised knowledge of idioms in the age group of interest in our current study even for idioms rated by teachers as being common (e.g., Levorato & Cacciari, 1992). Indeed, idioms undergo an extensive period of acquisition through adolescence and beyond (Nippold & Taylor, 1995, 2002). According to the GEM, when an unfamiliar idiom - one that has not been lexicalized or only partially lexicalized - is encountered in a text, the implausibility of a literal interpretation in the context triggers a search for a figurative meaning and enables the reader or listener to reject a literal interpretation. If a child does not recognize the inconsistency between an idiom's literal interpretation and the representation of the text constructed thus far, s/he might interpret the idiom literally even if such an interpretation does not make sense.

Research with idioms that are not lexicalised – novel idioms, which do not come from the child's native language – supports this view. Work by Cain and colleagues has included novel idioms, such as translations of foreign ones, in order to control for familiarity when investigating the role of context in idiom acquisition and

comprehension. Cain et al. (2005) found that good text comprehenders were better at explaining the meanings of both real (English) and novel (translations of European) idioms when presented in supportive contexts than when presented in isolation. An advantage for the real English idioms was apparent, perhaps because the meanings of these expressions were at least partly lexicalisedⁱ. These findings have been replicated using a different response format (multiple-choice, Cain & Towse, 2008) and also extended to comparisons between different age groups (Cain et al., 2009).

A limitation of these studies is that the real and novel idioms had different figurative meanings and, therefore, different supportive contexts were used, so the role of context was not completely controlled. It was possible that the contexts for novel idioms were not as helpful as those for real idioms, or that the former texts were generally more difficult than the latter ones. Thus, a particular strength of the present study was that, in contrast to previous studies, the roles of both familiarity and context were more tightly controlled. Thus, it is novel because exactly the same idiomatic phrase was presented (to different children) in a literal or figuratively biased context. We were able to do this by comparing English and translations of Italian idiomatic expressions with the same figurative meanings (but different literal meanings) so that the same context for novel (Italian) and real (English) idioms could be used, to verify whether children found it easier to understand familiar idioms than novel ones even when the contextual information provided was identical. This design, and the carefully controlled stimuli, enable us to better understand the conditions under which, and how, context supports idiom comprehension.

The previous studies on idiom comprehension have demonstrated that older children and skilled comprehenders are better able than younger children and less-skilled comprehenders in use of context to understand the figurative meaning of an

idiom (Cain & Towse, 2008; Cain et al., 2005, 2009; Levorato et al., 2004). These studies did not address the issue of whether context influenced idiom comprehension during text processing or later when prompted by a subsequent task (e.g., question answering). Context may influence idiom comprehension during text processing in two ways. First, if a reader is constructing an integrated and coherent representation of the text's meaning, s/he will be alerted to the mismatch between the literal meaning of the idiomatic expression and the meaning of the text, which will result in longer processing times for the expression (see Albrecht & O'Brien, 1993; Long & Chong, 2001, for examples from the adult literature). Second, when a reader attempts to derive a figurative meaning for an idiomatic expression from the context whilst processing the phrase, longer processing times for the expression will also be found. In the present study, in contrast to previous studies in this area, we recorded children's reading times to provide a more fine-grained account of their processing of figurative language.

The current study

The main aim of this study was to determine the influence of context on the interpretation of unfamiliar idioms in relation to children's age and comprehension skill. We controlled for context more tightly than in previous studies, by comparing the interpretation of real (English) and novel (translations of Italian) idioms presented in the same supportive story context. Two indices of idiom comprehension were taken. One was a measure of accuracy in selecting the correct interpretation of the phrase. This measure indicates whether or not a reader can correctly interpret the expression in relation to the context. The second was a measure of moment-by-moment processing: we compared the reading times of the expressions when used literally vs. figuratively, and when real (familiar) vs. novel (translations of Italian)

idioms. Reading time is a widely used indicator of processing ease. Longer reading times are associated with processing disruption, for example when the reader appreciates that a literal interpretation of the phrase is inappropriate, and also with inference making, for example when the reader uses the context to derive an appropriate meaning for the expression.

Thus, there were four independent variables in this study, namely: age (third vs. fifth graders), meaning of an expression (figurative vs. literal), familiarity (real English idioms, or translations of Italian idioms) and children's text comprehension skill (less skilled vs. skilled comprehenders), and we investigated their influence on two dependent variables, namely: success rate (i.e., number of correct choices) and reading times for the expressions.

For the interpretations of the expressions, the following predictions were made. The number of correct answers should be higher in the literal meaning condition (i.e., when the literal interpretation of an expression is correct) than in the figurative meaning condition (i.e., when the figurative meaning of the expression is correct) since the literal meaning of a sentence does not necessitate any inferential processing. As shown by previous studies, and in line with the predictions from the GEM, we assumed that skilled text comprehenders would provide a higher number of correct answers (especially in the figurative meaning condition) than less skilled comprehenders, and that older children would outperform younger ones. Moreover, if exposure to the idioms plays a role in their understanding, then a higher number of correct answers should be provided for English idioms than for translations of Italian (i.e. completely unknown) idioms.

For the reading time data, the following predictions were made. Since there will be a processing cost when the literal interpretation does not fit (i.e., for idiomatic

contexts), the processing (i.e. the reading time) of a sentence will be longer than the processing of the same sentence when it has a literal meaning. For this reason, if readers are monitoring their own comprehension and are able to identify the need for a figurative meaning and/or draw the inference as they read, their reading time for the sentence when it has a figurative meaning should be slower than when it has a literal meaning. We predicted that this would be the case for older readers and skilled text comprehenders.

An examination of the response accuracy data together with the processing time data in the idiomatic context condition will shed light on the most likely reason for any processing cost. A pattern of no preference for the idiomatic interpretation, together with longer reading times for a particular age or comprehension group, would indicate that the mismatch between the literal interpretation and text context was detected but not resolved. A pattern of a preference for the idiomatic interpretation, together with longer reading times, would indicate that the mismatch was detected and resolved, i.e. both monitoring and inferential processing took place.

Method

Participants

Seventy Year 3 children (mean age 8 years, 3 months; SD = 3 months) and seventy Year 5 children (mean age 10 years, 3 months; SD = 3 months) from two Brighton (U.K.) Primary Schools took part in the study. They were all native speakers of British English. We presented the following tasks to all children, but excluded from the analysis any children with dyslexia or with a serious reading or learning disability as reported by the teachers.

Based on the data from the Neale Analysis of Reading Ability (Revised: Neale, 1997), two groups of children who differed in reading comprehension skill

were selected. Less skilled comprehenders were children whose comprehension age was at least 6 months below their chronological age; skilled comprehenders were children whose comprehension age was at least 6 months above their chronological age. The resulting experimental sample comprised 30 skilled (mean age: 8 years, 2 months; SD = 3 months) and 26 less skilled Year 3 children (mean age: 8 years, 4 months; SD = 3 months) and 30 skilled (mean age: 10 years, 2 months; SD = 4 months) and 24 less skilled Year 5 children (mean age: 10 years, 3 months; SD = 3 months). The comprehension age criterion resulted in the following standardised scores: For Year 3, skilled = 112.80, less-skilled = 87.19; For Year 5, skilled = 109.10, less-skilled = 85.79). Because of the relatively small sample that was available, the skilled and less-skilled groups within each age group could not be matched for word reading skill, so reading accuracy was taken into account by including word reading accuracy as a covariate in the analyses that follow (in contrast to Cain et al., 2005).

Materials

Assessment of reading ability. Each child was presented with the Neale Analysis of Reading Ability (Revised: Neale, 1997), a standardised test that evaluates the comprehension, word reading accuracy and reading speed of the child. The raw scores were converted to comprehension-age, accuracy-age and reading rate-age scores, and also to standardised scores.

Assessment of figurative competence

Selection of idioms. Twenty English idioms (The Oxford Dictionary of Idioms, Siefring, 2000) and 20 Italian idioms were selected according to the following

criteria:

1. The literal meaning/interpretation of the idiomatic sentences had to be plausible and meaningful, that is idioms that did not have a clear literal meaning (e.g., to have time on your hands), were excluded.

2. Since Italian idioms had to be unfamiliar to the children, idioms that exist in both English and Italian (e.g., 'to be in the same boat' or 'to break the ice') were excluded.

3. Each selected English idiom had the same figurative meaning as a corresponding Italian idiom but a different literal meaning (e.g., the English idiom 'to be in the red' has the same figurative meaning as the Italian expression 'to be at the green'. Thus, the same context could be used for both the real (English) and the novel (translated Italian) idiom.

4. The English idioms chosen were considered to be sufficiently familiar to children within the target age group (as judged by their teachers), and did not contain difficult or obscure vocabulary items.

Appendix A shows the list of the 20 English Idioms selected in this way and the 20 corresponding Italian Idioms (translated into English). For each expression two stories were created (see Appendix B for some examples of the stories): one in which the literal meaning of the expression was correct (literal meaning condition, mean words = 50.4, SD = 12.3), the other one in which only the figurative meaning was correct (figurative meaning condition, mean words = 49.7, SD = 14.4). The stories in which only the figurative meaning of the expressions was correct (figurative condition) were the same for English and translations of Italian idioms, since, as mentioned before, the figurative meaning was the same in both languages. Thus, there were, in total, three story contexts for each pair of idioms. The target expression

was always the second-last sentence in the story. In order to evaluate the plausibility of the figurative interpretation of the translated Italian idioms in context, and the literal interpretations of the expressions, the task was administered to five adult English native speakers (mean age 35 years). These adults read all the stories and selected the correct answers: all the participants were able to select the right answer, even if in few cases (5 stories) they chose more than one answer. Changes were made in those five stories in order to make intended meaning clearer.

In order to ensure that the young readers were familiar with the idioms presented, thirty-three junior-school teachers (all of whom had taught children within the relevant age range) participated in an on-line questionnaire, in which they were presented with lists of familiar and unfamiliar idioms. There were two different versions of the questionnaire so that no teacher was presented with both the English and the Italian version of the same idiom (with 10 English and 10 Italian idioms in each version). In addition, within each version, there were two different random orders of the idioms. The teachers were told that the list comprised both real and made up idioms. They were asked to rate them on a 5-point scale to indicate whether or not children in the age range 8 to 10 years would have come across the idiom (either in conversations, books or television programmes or on-line). They were told that the aim of the questionnaire was to assess whether each idiom would sound “familiar” to children. They were asked to give a score of 1 if they thought that children would never have encountered the idiom and a score of 5 if they thought children would almost certainly have encountered the idiom. The first screen of the questionnaire provided the rating instructions, and asked for information about the teacher’s experience of teaching different age groups within the junior school age range.

An ANOVA on the questionnaire responses showed a main effect of familiarity which was highly significant: $F(1,31) = 158.70, p < .001, \eta_p^2 = .84$. The familiar (English) idioms were considered more familiar to children (mean = 2.8, i.e. near the mid-point of the scale) than the unfamiliar (Italian) idioms (mean = 1.1, i.e. almost all rated as never having been encountered by the children). There was no effect of the version of the questionnaire version and no interaction between version of questionnaire and familiarity level of the idiomatic expressions.

Procedure

The selected idiomatic expressions were the 20 English and 20 translated Italian expressions described previously. Each child was presented with 10 English Idioms and 10 translated Italian Idioms (with a figurative meaning different from the English ones). For each of the 10 English idioms, the child was presented with one story in which the expression had a literal meaning and one in which it had a figurative meaning (the order was randomised within and between the sessions). The same was true for the translated Italian idioms. Thus, each child read 40 stories in total, across two sessions (20 stories in each).

To ensure that children were not presented with the corresponding idiom from both languages in one session, the materials were selected from two blocks. The first block was comprised of the English expressions from number 1 to 10, and the translated Italian expressions from 11 to 20 (see Appendix A), whereas the second block was comprised of the English expressions from 11 to 20 and the translated Italian expressions from 1 to 10. Each child was presented either with the first block or with the second one: so if a child was presented with the English expression ‘to smell a rat’ s/he was not presented with the corresponding translated Italian expression ‘to eat a leaf’ (which has the same meaning).

The task was a self-paced reading task: the stories were presented sentence-by-sentence on the screen of a laptop computer and the child had to press the space-bar to make the next sentence appear. The children were asked to read the texts silently. On the rare occasions when they read out loud, they were reminded to read silently. When the child had finished reading the story, the whole story appeared on the screen with the question and four possible answers (labelled: a,b,c,d) below it. The criteria used to create the various response options were the same as those in previous studies (e.g., Levorato & Cacciari, 1999; Levorato, Nesi & Cacciari, 2004): a target idiomatic interpretation of the phrase (idiomatic); a non-literal interpretation that was plausible within the story context (associative); a literal interpretation of the phrase (literal). Because the children who participated in the present study were slightly older than those in previous studies, the task was made a little more difficult by including a fourth alternative, which referred to a mental or emotional state of a protagonist in the story, and which was compatible with the idiomatic interpretation (emotion). Children chose their answers by pressing the button corresponding to the letter. The children's reading times for each sentence and the correct answers chosen were recorded by means of the E-Prime program (Schneider, Eschman & Zuccolotto, 2002). Examples of the stories and question alternatives are shown in Appendix B.

The instructions were presented to each child on the screen of a laptop computer and the child was then presented with two examples. These were created in order to clarify that a sentence could have different meanings in different stories: so the child read a story where the literal meaning of the phrase breaking the ice was correct and another story where the idiomatic meaning was the correct one. The experimenter clarified that the same sentence could have a different meaning depending on the story in which it occurred.

Results

Response accuracy

For each child, the sum of the correct answers in each condition (English and translated Italian expressions in the Figurative meaning condition and English and translated Italian expressions in the literal meaning condition) was calculated. These data are shown in Table 1.

INSERT TABLE 1 ABOUT HERE

An ANCOVA was carried out on the numbers of correct answers with two between subjects variables: year (3 vs. 5) and level of comprehension (skilled vs. less skilled) and two within subjects variables: familiarity (real English vs. novel Italian) and meaning condition (literal vs. idiomatic) and the reading accuracy scores (assessed by the Neale-R) as the covariate. There was a main effect of age: the older children gave more correct answers than younger ones, $F(1,105) = 9.05$, $p < .01$, $\eta_p^2 = .08$, and comprehension level: the skilled comprehenders chose more correct answers than less skilled ones, $F(1,105) = 8.06$, $p < .01$, $\eta_p^2 = .07$. There was also a main effect of meaning condition: the correct answers were chosen more frequently in the literal meaning condition than in the idiomatic meaning condition, $F(1,105) = 4.86$, $p < .05$, $\eta_p^2 = .04$. There was no main effect of familiarity (real English vs. novel Italian), $F < 1.0$. When entered as a covariate, reading accuracy was significant, $F(1,105) = 13.06$, $p < .01$, $\eta_p^2 = .11$, that is the more accurate a child's reading was, the more correct answers s/he chose.

The only interaction that reached significance was Meaning Condition x Year: $F(1,105) = 5.96$, $p < .05$, $\eta_p^2 = .05$, because the younger children gave more correct answers in the literal than in the figurative condition ($M_s = 5.83$ and 4.22, respectively) whereas the older were not influenced by the meaning condition ($M_s =$

5.97 and 5.76).

Analysis of error choices

Since the different types of error are not independent, and we were primarily interested in the children's literal interpretations of phrases that were intended idiomatically, we conducted further analyses of the numbers of literal response choices in the idiomatic contexts.

INSERT TABLE 2 ABOUT HERE

Literal error choices in idiomatic contexts. The most frequent errors in this context were literal choices. An ANCOVA was carried out on these error choices with age group (Year 3 vs. Year 5), comprehension skill (skilled vs. less-skilled) as between participants variables, and familiarity (real English vs. novel Italian) as a between participants variable. Reading accuracy (raw scores) was included as a covariate.

In this analysis there was a main effect of age: the older children produced fewer literal responses ($M = 1.48$) than the younger ones ($M = 2.33$), $F(1,105) = 5.56$, $p < .05$, $\eta_p^2 = .04$. However, this main effect was qualified by the interaction between age and level of comprehension skill: $F(1,105) = 4.59$, $p < .05$, $\eta_p^2 = .04$. The pattern of interaction is shown in Table 2. As is apparent from the table, the number of literal responses produced in error is rather similar for the poor comprehenders, regardless of age, whereas the older good comprehenders make substantially fewer literal errors than the younger ones, regardless of level of familiarity.

Reading accuracy did not have a significant effect on number of literal error choices.

Reading times for target sentences

As suggested by Trueswell, Tanenhaus and Garnsey (1994), the reading times of the sentences were transformed to millisecond per character times. Because there

was substantial individual variation in reading rate, we calculated for each child, for each passage, the amount of time spent reading the target expression relative to their reading time for the passage as a whole. Thus, a time of 1 would mean that the reading rate for the target expressions was the same as that for the passage as a whole, whereas a time of 1.5 would mean that the child spent 50% longer reading the target sentences than they did reading the other sentences in the passage. This procedure controls for any individual differences in word reading speed. These data are shown in Table 3.

INSERT TABLE 3 HERE

An ANCOVA was carried out on the proportional reading times of the expressions with two between-subjects factors year (3 vs. 5) and level of comprehension (skilled vs. less skilled) and two within-subject factors familiarity (real English vs. novel Italian) and meaning condition (literal vs. figurative) and with reading accuracy score as the covariate. There was no effect of the covariate ($p = .14$), so it was not included in any further analyses (reading rate was not included in the first instance since it had already taken into account in the calculation of proportional reading times).

The results of an ANOVA with the same factors as above revealed a main effect of meaning condition, $F(1,106) = 36.90, p < .001, \eta_p^2 = .26$, because children spent relatively less time reading sentences that had a literal meaning than those that had a figurative meaning. The effect of meaning condition did not interact with comprehension skill or with age, showing that processing the figurative meaning of an expression was more time-consuming for all the children, regardless of age or skill level.

There was a significant 3-way interaction between Familiarity (real English

vs. novel Italian), Meaning Condition (idiomatic vs. literal) and comprehension level (skilled vs. less skilled), $F(1,106) = 7.96, p < .01, \eta_p^2 = .07$. The interaction arose because in the less-skilled group there was a significant interaction between Familiarity and Meaning Condition, $F(1,48) = 7.69, p < .01, \eta_p^2 = .14$, whereas there was no such interaction in the data of the skilled comprehenders, $F(1,58) = 1.36$. Pairwise comparisons showed that the main effect of meaning condition was apparent for both less skilled and skilled comprehenders in the case of familiar (English) expressions, $t(49) = 4.09, p < .001$ and $t(59) = 3.31, p < .01$ respectively: reading times were proportionately longer for the idiom condition. The same was true of skilled comprehenders for novel (translated from Italian) expressions, $t(59) = 5.23, p < .001$. In contrast, the less skilled comprehenders showed no increase in reading times for novel (Italian) idiomatic expressions, $t(49) < 1.0, ns$. This pattern of interaction is shown in Figure 1.

INSERT FIGURE 1 HERE

Relation between response accuracy and processing time

Correlations were computed to explore the relation between the number of answers correct and the relative amount of time spent reading the idiomatic phrase in the idiom contexts, to explore the most likely source of longer processing times. For only the unfamiliar (Italian) idioms, a moderate and significant correlation was found between the reading time (proportionate reading time data) and number of correct selections: ($r = .22, p < .01$). Thus, the additional time spent processing these expressions was related to successful selection of the idiomatic interpretation in this case.

Discussion

The present study, carried out with English native speakers, investigated the

relation between text and idiom comprehension using familiar and unfamiliar (Italian and English) idioms, which shared a figurative meaning and were embedded in the same stories. This choice was made in order to investigate whether the context could help children to understand the figurative meaning of idioms they had never come across before. Question-answering and reading time data revealed that older children and skilled comprehenders were more likely to use the context appropriately to realise that a non-literal interpretation is required when they are reading, and were better able to derive an appropriate one. We discuss the findings in relation to developmental theories of idiom competence and the knowledge and processes that underpin the acquisition of idioms and the development of figurative competence.

Previous research on the development of idiom comprehension has used off-line methodologies to assess idiom competence, including open-ended and multiple-choice questions, and phrase completion. In this study, we used multiple-choice questions, and included a range of erroneous distractor responses (literal, associative and emotion). The results from the number of correct answers confirmed the trend found in previous studies (Cain & Towse, 2008; Cain et al., 2005; 2009; Levorato & Cacciari, 1995; Levorato et al., 2004): older children outperformed younger ones and skilled comprehenders outperformed less skilled ones. Moreover, a literal interpretation was easier than a figurative one, presumably since the former does not require any comprehension monitoring or inferential processes. In particular, there was an interaction between age and meaning condition: the younger children were less able to grasp the meaning of the figurative expressions than literal ones, showing that they were less able to use the context or less able to draw the right inference from it.

Interestingly, the pattern of appropriate selections of figurative meanings in

the present study was the same for both familiar (English) and unfamiliar (Italian) idioms. Indeed, the means for the familiar and unfamiliar idioms are remarkably similar (see Table 1). This pattern of findings suggests that the understanding of the figurative meaning of an expression was not related to the extent of knowledge of that expression: the figurative meanings of completely new expressions, i.e. idioms taken from a foreign language (Italian) were understood as well as the figurative meanings of idioms from the child's native language. Thus, when the context provided for an idiom is controlled, as in this study, the ability to use that context to derive an appropriate (figurative) meaning of the expression was important for young developing readers.

These results cannot be explained by familiarity, for example as in Nippold's Acquisition via Exposure Hypothesis (Nippold et al., 1989). If exposure played a significant role in the comprehension process for the idioms in this study, the interaction between familiarity and meaning condition should have resulted in more correct answers for English idioms in the idiomatic context but this was not the pattern found. These results can, however, be understood in the context of the Global Elaboration Model (Levorato & Cacciari, 1995). According to this model (in common with more general models of skilled reading comprehension, e.g. Kintch, 1998), the ability to relate and integrate information within a text, to form an integrated and coherent representation of the text overall, is crucial to comprehension. The context in which an idiom is embedded (particularly an unfamiliar idiom) will help the reader to understand its figurative meaning. The context gives the semantic support, which allows understanding and integration of the figurative meaning of an expression within that context.

The results of the present study confirmed the importance of the use of context

in comprehension in general, since skilled comprehenders (i.e., children with good text comprehension skills) outperformed less skilled ones in understanding the meaning of an expression both when it had a literal meaning and when it had a figurative meaning. The better performance of skilled comprehenders, therefore, seemed not to be related only to the figurative interpretation of an expression but also to the correct interpretation of the expression in the story context more generally. They may also be better at using the potential semantics of unfamiliar phrases to infer meaning. We cannot distinguish the relative contributions of semantic analysis skills and derivation of the meaning from context as an explanation for our findings. Both have been proposed as explanations for the better comprehension of idioms by older children and better comprehenders (e.g., Cain et al., 2004; Levorato & Cacciari, 1992), and Cain and Towse (2008) showed that both children's ability to produce meaning based on semantic analysis of an unfamiliar (idiomatic) phrase (in isolation), as well as their ability to draw on the broader discourse context, were important to their performance. However, our use of the same expressions embedded in both literal and figurative supporting contexts enabled us to demonstrate the conditions under which context influences comprehension. There is substantial evidence to show that many inferences are drawn from information provided in the story context (e.g., Oakhill, 1984), and inference skill and comprehension monitoring are areas where poor comprehenders have consistently been shown to be lacking (see, e.g., Cain & Oakhill, 1999; Oakhill & Cain, 2012). Hence, the relation between poor understanding of idioms, and especially unfamiliar idioms, and poor reading comprehension more generally might be attributed to poor monitoring and inference skills, but more evidence is needed to establish the relative contributions of different sources of information that support such skills: for example, the meanings of words in

the phrase, the ability to make metaphorical mappings and context based inferences.

Importantly, the analysis of incorrect responses supports the conclusions that context is an important source of information for the interpretation of idioms during acquisition and that comprehension skill is related to the use of contextual support to interpret unfamiliar idioms. When selecting the meanings for figurative expressions, the older good comprehenders were least likely to select the literal response option in error. The younger and poor comprehenders tended to make wrong selections of the literal responses in the literal contexts in the case of both familiar and unfamiliar idioms. Together with the poor comprehenders' good levels of performance in the literal condition, these findings indicate that they are making a high number of literal choices regardless of context, which sometimes happen to be correct, and taking relatively little notice of the context to guide their interpretation.

Since the understanding of the figurative meaning of an unfamiliar idiom would not be known to the children, and was assumed to be derived via time-consuming comprehension monitoring and inferential processes, the reading times of children were measured. It was predicted that it would take relatively longer to read expressions with figurative meanings than those with literal meanings. The results support our prediction: the reading time of an expression was slower when it had a figurative meaning than when the same expression had a literal meaning. This time difference could reflect the fact that comprehension monitoring processes alerted the reader to the fact that a literal interpretation was not appropriate in the context, and an inference was drawn to aid comprehension.

Both explanations fit within the GEM: when an idiom that has not been lexicalized, or only partially lexicalized, is encountered in a text, the implausibility of

a literal interpretation in the context triggers a search for a figurative meaning and enables the reader or listener to reject a literal interpretation. If a child does not recognize the inconsistency between an idiom's literal interpretation and the representation of the text to that point, s/he might interpret the idiom literally even if such an interpretation does not make sense. The literal interpretation of idioms can be rejected if the child is aware that sometimes what is said and what is meant do not coincide. This awareness of the say/mean distinction is likely to be developmentally intertwined with comprehension abilities.

Closer examination of the reading time data and their relation with the question-answering scores provide greater support for the inferential explanation for the longer reading times. Most of the time, the children spent relatively more time on the idiomatic expressions than on the matched literal phrases. However, the exception was the group of less-skilled comprehenders when presented with novel (translated from Italian) idioms. These children seemed not to recognise that the translated Italian expressions required more interpretation when they had a figurative meaning than when they had a literal one. A further indication that level of comprehension skill was particularly important in the interpretation of novel (translated Italian) idioms was apparent in the correlations between reading ability, comprehension skill, and relative reading times in the four conditions: only the correlation between comprehension ability and reading times for the novel idioms was significant. In that case, too, the relative amount of time spent on the idiomatic phrase was positively related to subsequent comprehension. So, in the case of the novel idioms at least, relatively longer reading times do seem to reflect attempts to interpret these expressions, and not simply some sort of 'surprise effect'. Note that we controlled for overall differences in word reading speed, so any such differences cannot account for the reading times

effects that were found. In sum, the pattern of results taken overall indicates that it was the better comprehenders who spent relatively longer on the novel (translated Italian) idioms, and tended to come up with idiomatic interpretations of them. The pattern of results does not seem to be simply a developmental lag. Both the younger and older poor comprehenders showed a remarkably similar pattern of (relative) reading times, and the older poor comprehenders' pattern was much more similar to that of the younger poor comprehenders than to that of younger good comprehenders.

The overall results of this study therefore demonstrate that a good semantic representation of a text allows children to understand the figurative meaning of an idiomatic expression, and that this result seems to depend on both monitoring strategies and inferential skills which are probably applied during the integration phase of text comprehension. Although most of the children in the study spent longer reading the idiomatic than the literal expressions, longer reading times do not necessarily indicate that they were understanding these expressions figuratively when they first read them, and might, rather, indicate that they found a particular expression anomalous in the context. The data from the good comprehenders, however, did indicate that they were more likely to attempt to interpret the idiomatic expressions as they were reading: they took longer to read them in the first instance, and were subsequently as good at interpreting idioms as they were literal expressions. These results indicate that better comprehenders are more likely to use the context appropriately, realise that a non-literal interpretation is required, and are better able to select an appropriate one.

It should be noted that, in the present study the groups of skilled and less-skilled comprehenders were not matched for word reading accuracy. Different procedures for selection have been reported in the literature. Some studies match for

word reading accuracy (e.g. Cain & Oakhill, 1999) and some do not (e.g. Nation & Snowling, 1998). In the present study, we were not able to match for word reading accuracy because of the small sample size. However we are confident that our findings reflect differences in comprehension skill rather than word reading because of the strong differences that we found when we included word reading skill as a covariate in the analyses, and also because we excluded very poor readers.

The finding that poor comprehenders have difficulty in using text context appropriately to support their understanding of idiomatic expressions is also in line with findings from studies of other groups of children with atypical linguistic and communicative development. For instance, a study by Norbury (2004) included children aged 8 to 15 years with autism, with or without language impairment. Both groups were able to benefit from context to understand idioms, but were less able (especially those with language impairment) than the control group of typically developing children to use context appropriately. Similarly, Barnes and Dennis (1998) found that children between 6 and 15 years of age diagnosed with hydrocephalus (who are characterized by discourse-related deficits including poor reading comprehension and poor inference skills) did not have particular problems in understanding idioms when they could access the idiomatic meaning from memory, compared with age-matched peers. However, those with hydrocephalus were impaired compared to typically developing children in deriving the meaning of idioms presented in context. These studies indicate that the ability to interpret idioms in children with atypical linguistic and communicative development is poorer than that of typically developing peers, and that this disadvantage is particularly notable when the children need to use context to derive a figurative meaning.

Although we have focused on the role of comprehension monitoring and

inference skills, there may be more to solving idiomatic expressions than making inferences from the surrounding context. Recently, research in this area has begun to explore the relevance of children's developing Theory of Mind and conversational perspective taking in understanding figurative language. Children need to understand not only that some expressions can be given distinct meanings, depending on the context, but also need to understand that the writer or speaker may wish to convey a meaning other than the literal one. Caillies and Le Sourn-Bissaoui (2013) have shown that understanding of (non-decomposable¹) idioms is predicted by performance on a Theory of Mind task, and Le Sourn-Bissaoui, Caillies, Bernard, Deleau and Brule (2012) showed a relation between conversational perspective taking and decomposable (but not non-decomposable) idioms. An unresolved question is whether poorer comprehenders, like younger children, are also poorer at double-perspective taking tasks and, if so, how such abilities are related to their appreciation of figurative language.

The present study is, as far as we know, the first to use reading times to explore children's comprehension of figurative language, and has demonstrated that such measures can be used to shed light on children's real-time processing. We suggest that longer reading times are indicative of comprehension monitoring and inference processing. However, the current data do not enable us to be more explicit about the relative roles of these processes in idiom comprehension. Longer reading times might occur because the figurative meaning may be interpreted as a kind of inconsistency (which would then trigger the need for resolution, perhaps, but not necessarily, requiring inference processes). An explanation in terms of inconsistency

¹ Decomposability of an idiom refers to the extent to which the literal meaning of the individual words in the string contribute to the overall figurative meaning of the idiom. Thus, the idiom "play with fire" is decomposable whereas "kick the bucket" is non-decomposable.

detection could be plausible, since all the children spent longer reading phrases in the figurative meaning condition than in the literal meaning condition, whereas not all the children were able to understand the figurative meaning (i.e. to draw the appropriate inference). Thus, a limitation on the interpretation of the reading time data is that longer reading times could arise as a result of inference processes, or as a result of comprehension monitoring processes (or some combination of the two, for instance the detection of a comprehension issue is likely to be the first stage of an inference process, even if not all the attempts at an inferential solution are successful). This issue (inference vs. inconsistency detection) needs further investigation.

Whatever the precise interpretation of the differences in reading times in the present study, they indicate little change in the pattern of reading times in the poor comprehenders between Years 3 and 5, and suggest that those who are identified as poor comprehenders early on will continue to have problems unless they are remediated. Thus, training in the identification and interpretation of figurative expressions and, in particular, some training in how to deal with previously unknown figurative expressions, could be a helpful addition to training programmes designed to improve comprehension skills. Indeed, the training programme developed by Clarke, Snowling, Truelove and Hulme (2010) does include a component of training in the understanding of figurative language. The training programme overall has been shown to improve reading comprehension, but as the different components were combined in one training package it is not clear from that study whether the training in figurative language was a crucial component.

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ⁱ An out of context definitions task revealed that few children could provide the meanings of any of the idioms in the study.