Assessing primary grade children's lexical inferencing strategies while reading – A review

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Die Forschung zu lexikalischen Inferenzstrategien und -prozessen bei der Bedeutungserschliessung und damit beim Erwerb unbekannter Wörter konzentriert sich mehrheitlich auf zweitsprachliche Kontexte und interlinguale Hinweise. Zu lexikalischen Inferenzprozessen in der Erstsprache hingegen gibt es nur wenige und methodisch unterschiedliche Studien – insbesondere in der frühen Schulzeit. Ziel dieses Beitrags ist es, die Erkenntnisse zu Inferenzstrategien von Unterstufenkindern beim Lesen in ihrer Erstsprache in dieser begrenzten Zahl von Studien zusammenzutragen, zu untersuchen und unter methodischem Fokus zu diskutieren. Verschiedene Faktoren, besonders das Alter und die Lesefähigkeit, aber auch die Wahl der zu erschliessenden Wörter und des sie beinhaltenden Lesetexts scheinen nicht nur für den Erfolg der korrekten Identifikation eines unbekannten Wortes entscheidend zu sein, sondern auch in Bezug auf die für die Bedeutungserschliessung verwendeten Hinweise und die Art der Strategien im Umgang mit den unbekannten Wörtern. Es werden schliesslich Grenzen und Möglichkeiten dieser Methoden zur Erfassung lexikalischer Inferenzstrategien auf der Zielstufe diskutiert und weitere Forschungsperspektiven vorgeschlagen.

Stichwörter:
Inferenzstrategien, Erschliessungsprozesse, lexikalisches Inferieren, Leseerwerb, Wortschatzerweiterung beim Lesen.

Keywords:
inferencing strategies, deducing processes, lexical inferencing, reading acquisition, vocabulary acquisition while reading.

1. Introduction

In their first years of life, children learn new words through oral contexts. In mapping meaning onto unknown word forms, they take advantage of any clues available to them (Clark 2017: 396). When children learn to read, the main source of new vocabulary seems to gradually shift from oral to written contexts (Nagy et al. 1987; Anglin 2002; Bloom 2002). While the number and variety of unfamiliar words in oral contexts can dwindle, the variety of unfamiliar words encountered in written contexts increases[1].

[1] Although vocabulary learning through reading becomes important when children learn to read, we need to keep in mind that the oral modality may still be an important source when children frequently interact with older peers and adults. In the absence of empirical data, it cannot be guaranteed that written contexts become the most important source of new vocabulary and it

Nagy et al. (1987) assume that English-speaking children learn up to 3000 new words annually between the third and eleventh grade. These words are acquired incidentally through reading – without direct instruction or conscious efforts of memorisation. This observation can at least be traced back to Gray & Holmes (1938: 28), who note that "practically all pupils acquire many meanings from context with little or no help from teachers".

Processes of lexical inferencing are thus crucial not only for reading comprehension, but also for incidental vocabulary acquisition (Wesche & Paribakht 2009). Empirical investigations suggest that acquisition processes of new vocabulary and reading skills are reciprocal: larger vocabulary favours reading skills and better reading abilities favour vocabulary acquisition through inferencing (Wagner & Meros 2010; Verhoeven et al. 2011).

Most children have acquired the technical aspects of reading in the first and second grade. Consequently, cognitive capacities are set free to engage in reading comprehension and vocabulary plays an increasingly important role (Biemiller 2012). An investigation of inference skills in reading thus becomes particularly interesting from the third school year onwards. During the primary school years, the ability to infer meaning increases more and more (Fukkink et al. 2001). This ability mediates the relation between reading comprehension and vocabulary knowledge (Cain et al. 2003).

Research on lexical inferencing has become prominent in the early 1970s with a focus on English as a Second Language (ESL) (Wesche & Paribakht 2009). Building up on these early investigations, different lines of research focussed on L1 and L2 vocabulary acquisition through reading – lines of research that were independent, but still at least indirectly influenced by each other. The bulk of research on lexical inferencing, however, is rooted in a Second Language Acquisition (SLA) framework and has mainly focussed on English (ESL). Methodologies in studies on lexical inferencing vary and cover authentic and manipulated text materials, case studies and cross-sectional group comparisons (e.g., skilled vs. less skilled readers), and intro- and retrospective verbal reporting (Wesche & Paribakht 2009). In both, L1 and L2 contexts, inferencing and the use of cues is important for reading comprehension. The process of lexical inferencing is similar in L1 and L2 (Wesche & Paribakht 2009) and empirical approaches are comparable (Haastrup 2008). Many theoretical approaches as well as empirical findings in the domain of foreign language learning are comparable to first language contexts. However, to better understand the reciprocal relations between vocabulary and reading acquisition and to answer specific questions on what information children use and how they use it to infer the meaning of unfamiliar words in written L1

cannot be generalised beyond societies where literacy and schooling are paramount. However, when children enter school, they will encounter new and more sophisticated words in written texts (Schleppegrell, 2001) and eventually learn them through this modality.

contexts, empirical investigations in the specific domain of reading in a first language in early school years are required. This contribution aims to provide a basis for such empirical investigations. A variety of methods used to assess inferencing strategies in a first language are reported and the potentials and questions that arise from these methods, as well as the transferability to early school years and other languages than English, are discussed.

2. Reading as a source for vocabulary acquisition

For several decades in reading research, it has been well established that reading – especially extensive reading – is an important source for vocabulary acquisition (Nagy et al. 1985, 1987; Krashen 1989; Parry 1991; Pigada & Schmitt 2006; Verhoeven et al. 2011). However, neither the precise nature of the relation between vocabulary knowledge and reading ability, let alone the mechanisms of vocabulary acquisition through reading, can clearly be explained by research evidence (Paribakht & Wesche 1997).

Some researchers have argued that learning words that are embedded in a given context can foster the learning of their referential, syntactic, pragmatic, or even emotional information (Gu & Johnson 1996) and lead to better retention than when learnt in isolation (Nation 1982; Bialystok 1983; Nation & Coady 1988). The latter assumes that inferring or inducing the solution of a problem implies an increased mental effort than when the solution of a problem is given. This increase in mental effort leads to a better retention of the information than when learned with less mental effort (Hulstijn 1992; Laufer & Hulstijn 2001).

While Nation (2001: 233), similarly to Schmidt (1993), acknowledges that "all learning implies conscious attention", he nevertheless distinguishes intentional from incidental vocabulary learning. In general terms, intentional learning involves the intention of learning and committing to one's memory, while incidental vocabulary learning refers to vocabulary learned from a certain context – without the intention of doing so or the learning of a particular feature or word while intending to learn another (Richards & Schmidt 2002).[2] One of the most frequently cited examples of incidental learning is vocabulary learning being a by-product of reading (Krashen 1989). Goodman (1967: 127) describes the process of reading as "a psycholinguistic guessing game". What defines efficient reading is not the precise identification of all elements, but the skill in selecting the most relevant cues to produce guesses (Goodman 1967).

[2] The discussion on the distinction between incidental and intentional learning is characterised by a terminological fuzziness: while some scholars use the terms synonymously to implicit and explicit learning, others maintain a difference (Hulstijn 2003). According to Ellis (1994: 1), the most characteristic features distinguishing implicit from explicit learning are the presence or absence of "conscious operations". While incidental learning is always implicit, implicit learning entails more than incidental learning (Hulstijn 2003).

Several scholars (e.g., Nation & Coady 1988; Parry 1993; Huckin & Coady 1999) make a distinction between guessing the meaning of a word in a context by means of several cues and the actual retention of the word's meaning. Hence, it needs to be borne in mind that inferencing the meaning of a word in a text does not imply the actual acquisition of that same word (e.g., Laufer & Hulstijn 2001). What a reader actually does – particularly a young reader in early school years – i.e., which strategies she or he applies to infer the meaning of an unknown word in a text and which strategies eventually lead to a better retention of a word, remains a question that merits empirical attention.

3. Lexical inferencing

Inferencing has been described as guessing the meaning of an unfamiliar word (Haastrup 2008; Wesche & Paribakht 2009). While reading, inference can, on the one hand, refer to text comprehension or "sense creation" where meaning is created based on linguistic and situational cues from the text (Haastrup 2008). According to Haastrup (1991), it is presupposed that the two types of inference depend on each other and the understanding of the procedures of one type explains the procedures of the other type, i.e., the acquisition of a word is prototypic of accessing the meaning of a text and vice versa. The type of inference referring to word identification has become a prominent concept in SLA and is referred to as lexical inference and is defined as follows by Haastrup (1991: 13):

> The process of lexical inferencing involves making informed guesses as to the meaning of a word in the light of all available linguistic cues in combination with the learner's general knowledge of the world, her awareness of the co-text and her relevant linguistic knowledge.

Following this definition, which applies to all age groups including primary school children, lexical inferencing refers to much more than merely making random guesses. The process of "making informed guesses" comprises different cognitive processes such as analysing, extracting and integrating linguistic knowledge from context in combination with the existing knowledge of the learner. Hence, familiar attributes are used in recognising unfamiliar ones (Carton 1971). In Schmitt's terms (2010), lexical inferencing is thus best described as "qualified guessing of the meaning of lexical items in context, rather than guessing from context, as contextual cues are only one of several knowledge sources".

Lexical inferencing can thus be seen as a guessing procedure, promoted by a variety of cues, supported by different strategies and influenced by several factors.

3.1 Cues for lexical inferencing

Examining the types of cues to infer the meaning of a word in an L2, Carton (1971) establishes a categorisation of main cue-types: extra-lingual cues, intra-lingual cues and inter-lingual cues. This three-way distinction has largely been adopted and refined by scholars such as Haastrup (1991; 2008), Paribakht (2005) and Wesche & Paribakht (2009). In principle, this classification[3] can also be used for L1-speakers (interlingual cues[4], however, only if the speakers know other languages, which is often not the case with younger children).

Within the top-down category of extra-lingual or contextual cues, Haastrup (1991) distinguishes between cues from the co-text and knowledge of the world. The co-text may refer to only one or two words surrounding the test word; to the immediate co-text, i.e., the sentence the test word is embedded in; to a specific part of the co-text beyond the sentence containing the test word; or to an unspecific, more general part of the text. Knowledge of the world refers to factual knowledge, attitudes, beliefs, prejudices – knowledge that is not taken from the text containing the test word.

Intra-lingual cues comprise cues on the level of phonology, orthography, morphology, lexis, semantics, as well as syntax (Haastrup 1991)[5]. As for phonological and orthographic cues, a learner may, for instance, search for similarities to a familiar word and does not consider meaning. Word association studies have shown that younger children tend to give more phonologically based associations before shifting to syntagmatic and paradigmatic associations as they get older (Namei 2004). This suggests that the mental lexicon is primarily phonologically based in earlier stages of development. When it comes to lexical inferencing, it can therefore be supposed that younger children tend to use more phonological cues than older ones. Although an analysis at the phonological or orthographic level alone can be sufficient for successful inferencing for both younger and older children, it represents usually only a first step of analysis before switching to a lexical or semantic level for more advanced language users. Word inference by means of morphological cues involves the decomposition of words by morphological

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3 The cues described and referred to in this paper are delimited to verbal context and do not take into account visual aids.

4 Inter-lingual cues are relevant if a reader disposes of languages or language varieties in his or her repertoire that are similar to or remind her/him of the L1. In this case, as with intra-lingual cues, analyses at the level of phonology, orthography, morphology, lexis, collocation, semantics as well as syntax can be applied. This category is not further discussed since it goes beyond the scope of the present article where we focus exclusively on first language acquisition processes.

5 At a more advanced stage, intra-lingual cues such as part of speech or collocations can also play an important role for inferencing. In early primary grades however, these cues are less used.

rules. At the lexical level, the meaning is taken into consideration. Usually, this category is a starting point to the semantic level of analyses, where meaning is explicitly reflected on. As for syntax, the learner focusses on the sentence structure to infer the meaning of a given test word. These intra-lingual cues are used differently according to age and language skills. While Werner & Kaplan (1950) show that children at age nine rather ignore syntactical cues, the findings of McKeown (1985) suggest that fifth graders with lower verbal ability often misused or did not use contextual cues at all and findings of Bangel (2018) show for fifth-graders that morphological cues were more often used by pupils showing higher verbal skills. Following these results, younger children and poor readers often seem to stop somewhere in the process of this stepwise analysis and take the meaning of a phonologically similar sounding word as the solution even though it would not fit in the syntactic or semantic context of the sentence.

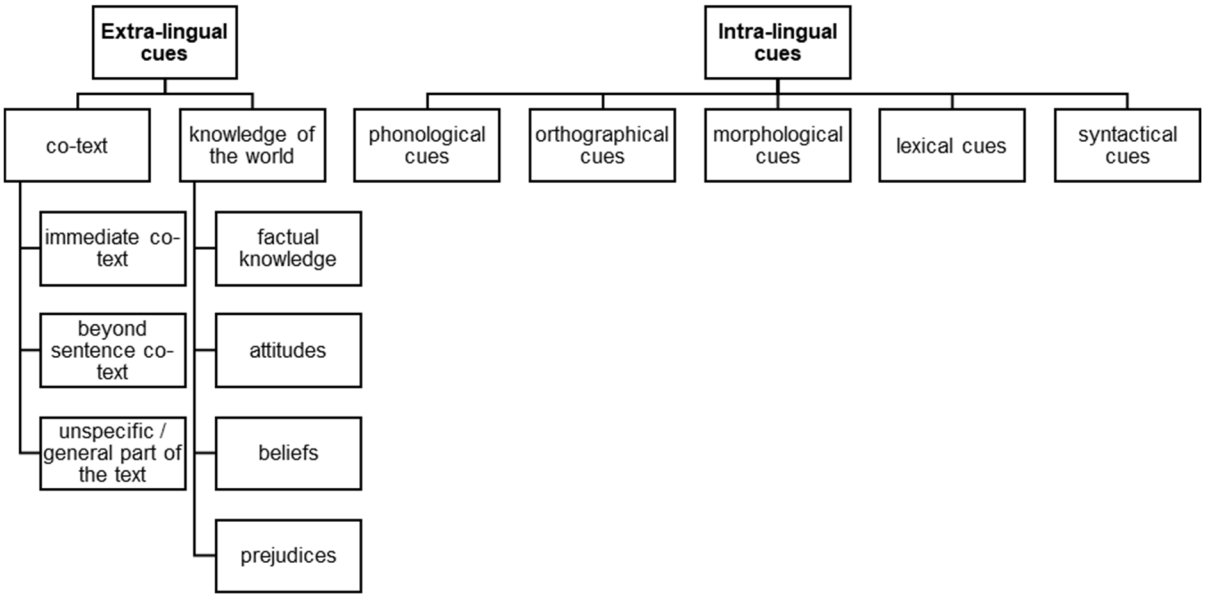

Figure 1: Cues for lexical inferencing according to Haastrup (1991). Figure created by the authors.

3.2 Lexical inferencing strategies

In the process of inferencing, a reader needs both different strategies and his or her background knowledge (Hu & Nassaji 2014). According to Kintsch's psycholinguistic model of text comprehension (Kintsch 2004), the reader builds a situation model in the process of inferencing, in which the information is given by the text and the schemata. The meaning selection can occur in a bottom-up manner and in a top-down manner where the schema acts as a filter, i.e., the context suppresses irrelevant information. Empirical research has shown support for both the top-down (Bensoussan & Laufer 1984) and the bottom-up manner (Schouten-van Parreren 1989) of meaning selection.

Refining the sources and strategies discussed in Nassaji (2003) and further addressing the question in how successful and less successful inferencers differ, Hu & Nassaji (2014) identify twelve types of inferencing strategies. These strategies are divided into four categories. The first category comprises form-focussed strategies such as analysing, associating and repeating. The second category refers to meaning-focussed strategies including the use of textual cues, prior knowledge and paraphrasing. The next category, termed evaluating strategies, refers to inquiry making, confirming or disconfirming and commenting. Finally, the fourth category refers to monitoring strategies including stating the failure or difficulty, suspending judgement, i.e. postponing the inference making, and reattempting.

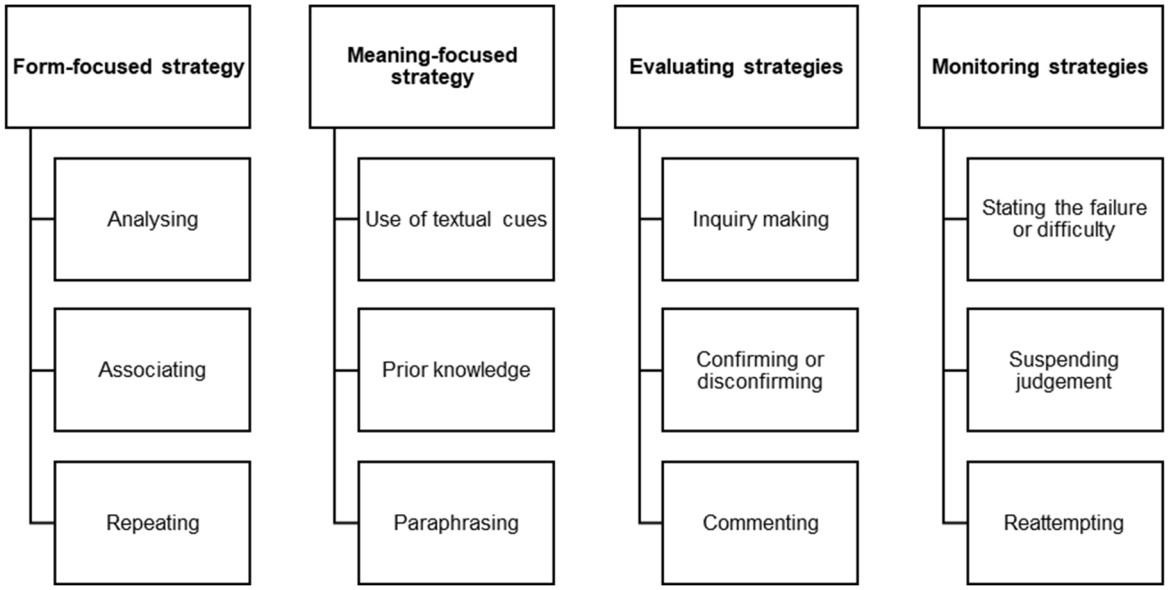

Figure 2: Lexical inferencing strategies according to Hu & Nassaji (2014: 68). Figure created by the authors.

Comparing the strategies used by successful and less successful inferencers, Hu & Nassaji (2014: 35) observe that it is not the quantity but rather the quality of strategies applied that differs:

> There appeared to be no one way of combining different strategy types by the successful inferencers. They used a wide range of strategies and used them flexibly, depending on the word and the context. They not only used multiple strategies, but they also relied on other knowledge sources. They did not judge words individually but always attempted to relate them to the broader context. These qualities were not observed as much in less successful inferencers.

Hence, successful inferencing seems to depend on an appropriate choice of strategies, which is shaped by several factors.

3.3 Factors influencing lexical inferencing

Focussing on the question of what is required for successful inferencing, some scholars have identified several factors influencing the process of lexical inferencing. Among these factors are sufficient linguistic knowledge (Haastrup 1991; Nassaji 2006; Wesche & Paribakht 2009), background knowledge (Pulido 2009), motivation (Laufer & Hulstijn 2001; Hu & Nassaji 2012) and constant cognitive effort (Fraser 1999; Laufer & Hulstijn 2001; Hu & Nassaji 2012) during the process of lexical inferencing. These factors can be categorised as learner factors, language factors and task factors (Haastrup 1991). Among the learner-related factors are age (Nagy et al. 1985; Fukkink 2005), intelligence (Bloom 2002), working memory capacity (Cain et al. 2004), breadth and depth of vocabulary (Cain et al. 2004; Geva et al. 2017) and reading skills (Costa 2010). Concerning the latter factor, Costa (2010) states that skilled readers more easily make use of the context, activate previous knowledge, note and connect different parts of the text to infer meaning, while poor readers more frequently tend to ignore gaps of knowledge. This observation is in line with prominent research on reading development stating that novice readers or poor readers read in a slow, laborious manner which tends to impair comprehension. In other words, a process of automatisation of basal reading skills is a prerequisite for additional cognitive demands induced by the process of deriving word meaning (Schwanenfluegel et al. 2006). This automatisation of decoding abilities or ‘fluent reading' is usually developed from the third grade onwards when decoding skills are confirmed through practice (cf. Biemiller 2012).

In terms of the task factors or context, the variability of context, the relevance and the frequency of unknown words may also play a crucial role. As for the quantity of unknown words, the learner needs to recognise most of the surrounding words at first sight (Huckin & Coady 1999) to successfully infer the meaning. The findings of several studies – albeit from SLA research – suggest that the quantity of unknown words should not be more than 5%, ideally about 2% (e.g., Hu & Nation 2000). If the quantity of unknown words exceeds 5%, it may hamper comprehension of the overall text (Hu & Nation 2000).

4. Methods to assess lexical inferencing in first language contexts

In first language contexts, methods to assess lexical inferencing strategies differ first and foremost in terms of participants, target words, the context they are embedded in, as well as methods of asking which strategies participants used and how (see subsections 4.1 to 4.3).

4.1 Participants

Most of the studies reviewed have been focusing on high school students (e.g., Quealy 1969; Sternberg & Powell 1983; Sternberg 1987; Albrechtsen et al. 2008) or PhD students (e.g., Ames 1966). Studies focussing on primary school children, are usually on upper primary grades such as fifth grade or above (McKeown 1985; Nagy et al. 1985; Neumann 1989; Van Daalen-Kapteijns & Elshout-Mohr 2001; Bangel 2018). We only found a few studies investigating lexical inferencing strategies of younger children (Werner & Kaplan 1950 and Nagy et al. 1987 with third-graders, Fukkink et al. 2001 and Fukkink 2005 with second- and fourth-graders). In studies with young participants from primary school, however, some methodological issues need to be considered. First, the quantity and quality of the text to assess inferencing strategies need to be adapted to novice readers. Secondly, the kinds of questions to be asked in the verbal protocol need to be adapted for this age group, given that even for advanced readers verbalising the thought processes is not an easy task.

Furthermore, there is also variation in terms of the number of participants and the profile of participants, such as linguistic background and literacy skills. The sample size varies considerably across studies. It is not uncommon to have a rather small sample size when verbal protocols in individual interviews are analysed (e.g., Van Daalen-Kapteijns & Elshout-Mohr 2001 or Bangel 2018, both with 16 participants). However, there are also studies with larger sample sizes (e.g., Werner & Kaplan 1950 with 125 participants or Nagy et al. 1987 with 352 participants).

Most studies on lexical inferencing focus on the English language with few exceptions (e.g., Van Daalen-Kapteijns & Elshout-Mohr 2001 on Dutch or Bangel 2018 on German). Several of the studies reviewed also emphasise basic differences between skilled and poor readers (McKeown 1985; Van Daalen-Kapteijns et al. 2001; Bangel 2018). These studies suggest that not only success or failure in deriving the meaning of a word, but also the type of vocabulary inferencing strategies depend on reading skills. Some scholars have explicitly taken the variable of "verbal ability" into account. This variable is operationalised differently: Van Daalen-Kapteijns & Elshout-Mohr (2001), for instance, used a Dutch vocabulary knowledge test called "Woordentoets Nederlands" consisting of lexical decision tasks; McKeown (1985) used a vocabulary subtest of the Stanford Achievement Test (Madden et al. 1973). Reading skills, however, have usually not been considered in the studies reviewed. An exception is the work of Bangel (2018) where a battery of different reading tests is used, such as ELFE 1-6 (Lenhard & Schneider 2006) to measure decoding ability and SLS 5-8 (Auer et al. 2005) to measure reading speed. Children who scored best on the tests showed a preference for an orientation on morphological cues, whereas children who scored less used

both context and orientation on morphological cues to the same degree to derive the meaning of a word.

4.2 Target words and contexts

The methods applied in studies exploring lexical inferencing strategies in L1 vary greatly. A basic distinction can be made between "naturalistic" studies in which readers recorded or recounted how they dealt with unknown words in a text and how they inferred meaning and situations where researchers deliberately manipulated inferencing contexts (Wesche & Paribakht 2009).

A manipulated situation, for instance, would be the use of a pseudoword in a given context. Pseudowords ensure that the target words are unknown to all participants. The method is used in a handful of studies with different approaches of embedding a pseudoword in a context (Werner & Kaplan 1950; Quealy 1969; McKeown 1985). Werner and Kaplan (1950), for instance, embedded 12 pseudowords for their third graders referring to objects or actions in six different sentences each. Pseudowords are constructed differently with regards to the manner they match an existing word they are intended to replace. In Werner & Kaplan (1950), for instance, length of the pseudoword was not the same as the word that was replaced and the pseudoword could be translated in multiple ways.

In some studies, target words are real, usually low-frequency words (Nagy et al., 1987; Fukkink et al. 2001; Van Daalen-Kapteijns et al. 2001; Fukkink 2005; Albrechtsen et al. 2008; Bangel 2018). Real words may have the advantage that they represent a more natural inferencing context as the new label does not necessarily match a known concept, but simultaneously involves the learning of a new label. This, however, does not guarantee that in an experimental situation, participants do not simply try to replace unknown words by known words.

Target words – pseudowords or real words – are usually content words, mostly concrete nouns. In some studies, however, other word types[6] such as verbs or adjectives (McKeown 1985; Fukkink et al. 2001) are investigated. While target words are mostly embedded in sentences (Werner & Kaplan 1950) or texts, some scholars have also presented target words in isolation (e.g., Bangel 2018) – usually in addition to a task where target words are presented in context. In contrast to context-bound inferencing, this approach allows to focus more closely on morphological inference strategies (Bangel 2018).

The type and length of texts that the target words are embedded in depend on participants' age and profile. While texts for adult speakers usually consist of authentic material, texts for primary grade children are often constructed for

[6] Function words such as prepositions and discourse connectors usually lack clear semantic referents, are more difficult to infer meaning and are therefore usually not used in studies focussing on lexical inferencing (Wesche & Paribakht 2009).

the purpose of the study and adapted to the world of children (e.g., McKeown 1985). Given that the density of unknown words can influence vocabulary understanding and learning, it is important to consider how many test words should be embedded in a given text. As mentioned above, it is common practice to adopt the numbers of <5% in terms of density of test words. While these numbers have been taken up in contexts other than ESL, it is open to doubt whether they are directly transferable to other languages. Moreover, it is questionable whether the quota of <5% can also be applied in FLA contexts or if FLA contexts allow for more unknown words. Hypothetically, however, cognitive capacity and thus age are factors that need to be considered when considering the quota of pseudowords.

4.3 Methods of questioning

There is not only a great deal of variation in how target words are presented, but also in how the derivation of meaning is asked and identified. The most prominent methodological approach to assess word inference strategies of older students or adults is the use of verbal protocols (e.g., Haastrup 1987, 1991; Paribakht & Wesche 1997; Nassaji 2003; Hu & Nassaji 2012, 2014). Verbal protocols can be used simultaneously or retrospectively and differ in terms of degree of metacognitivity (Heine 2005). Thus, verbal protocols showing a lower degree of metacognitivity – usually referred to as think-aloud protocols – comprise all kinds of mental processes including emotions and perceptions. The advantage of an introspective think-aloud procedure is that there is less interpretation or justification on the action as there is less time to reflect upon it. An obvious challenge, however, is to formulate questions that animate children to actually verbalise their thoughts. Verbal protocols showing a high degree of metacognitivity are characterised only by observations and reflections on thinking and doing (Heine 2005). Usually, these interview questions are conducted individually.

Depending on the particular aim of the study, the participants, the setting and the type of verbal protocols, interview questions can be more or less structured. As stated above, however, it is usually cognitively too demanding for primary school children to describe their thinking processes and alternative methods of questioning are required. Werner & Kaplan (1950) conducted individual interviews with 125 children (age range: 8.5 to 13.5 years). They were asked to provide meanings for the words and tell how and why the word fits into the sentence. In a second step, the same word was presented in another context and children were asked if and how the meaning could be applied to the second.

Further approaches such as multiple-choice format or definitions are also frequently employed. However, while these techniques may show whether a word is known and how well it is known, the results usually show little about the actual cues and strategies of inferencing the meaning of a word (e.g.,

Fukkink et al. 2001; Fukkink 2005). Nagy et al. (1987), for instance, have looked on how readers infer meaning from context by highlighting words and asking participants to provide definitions for these words. This method, however, does not show what cues and strategies a reader might use in a normal reading situation (*Id*.) and instead of learning from context, this scenario would rather be described as learning from definitions with examples (Gipe 1978).

5. Avenues for further research

In order to assess the vocabulary learning strategies in reading and to contribute to a deeper understanding of the processes underlying lexical inferencing strategies in early school years, there are several possible agendas following the literature review for further research to fill the gaps in the field. In the present section, the most important points are taken up and discussed: investigating young readers in first language contexts, assessing reading skills and vocabulary knowledge and creating adapted testing materials.

5.1 Studying young readers

As stated in the introductory part, the ability to inferencing is a crucial link between reading and vocabulary. In order to diagnose and eliminate difficulties at an early stage, it is important to investigate this ability. In the literature cited above, there are only a few studies investigating children in their early school years. The youngest children were in the second or third grade (Werner & Kaplan 1950; Nagy et al. 1987; Fukkink et al. 2001; Fukkink 2005). Provided that the critical age of the automatisation of decoding abilities or fluent reading is usually developed from the third grade onwards (Biemiller 2012) when decoding skills are confirmed through practice (see section 3.3) (Biemiller 2012), this particular age group is interesting to investigate. However, investigating children needs careful methodological reflections. First, texts need to be related to their age, interests and the topics of reading they are used to (Bailey 2017). This involves ruling out certain endeavours or materials such as long texts and therefore many target words. Second, children only start to develop a metalinguistic knowledge at this age so that introspective think-aloud procedures are often too demanding and interview questions to assess word deriving strategies should not be too complex (McKay 2006).

In all studies reviewed, these interview sessions are conducted individually. Pair and group interviews would be an interesting method for further research for several reasons. First, pair interviews have the potential to show consensus, may generate richer responses by allowing participants to challenge one another's opinions and may allow interesting insights in co-construction of knowledge (Lewis 2012). Second, talking to peers can help to stimulate a more natural interview setting and help to remove formal or

intimidating barriers that may exist between an unknown experimenter and primary school children. It is advisable that pairs or groups are carefully selected (Lewis 2012) which can, for example, be arranged with the help of the classroom teacher who knows how the children work in groups.

5.2 Skilled and less skilled readers

While in the majority of studies, the focus lies on skilled readers, some studies also underline the importance of having both skilled and less skilled readers in their sample given that they differ first and foremost in terms of word recognition (Bangel 2018). Reading skills, however, are hardly ever assessed in these studies. It is therefore important for further research to measure the different dimensions of reading skills systematically and comprehensively in order to explore children's inferencing strategies and drawing conclusions on their processes underlying the derivation of unknown words while reading. As for reading skills, it is also advisable to systematically assess vocabulary skills as both variables interact and influence each other. While this variable has been considered in certain studies (cf. previous section), there is still a lack of a multidimensional assessment of vocabulary knowledge which comprises both vocabulary depth and vocabulary breadth (see e.g., Binder et al. 2017 for a discussion of the relation between these variables and reading skills).

Furthermore, a lower level of reading skills or vocabulary knowledge often goes hand in hand with lower language skills in general. According to Namei (2004) then, it may be expected that children with a lower language proficiency level may significantly differ from children with a higher language proficiency level in terms of their strategies of lexical inferencing. Less skilled readers or readers with a lower vocabulary may more frequently turn to phonological cues, while their peers with better vocabulary knowledge or advanced readers may more frequently focus on semantic and syntactic relations of the target words (cf. intra-lingual cues in chapter 3.1).

Thus, the field of lexical inferencing research would benefit from large-scale studies connecting strategies with different dimensions of reading skills and vocabulary knowledge.

5.3 Target words and their density

As seen in the previous section, pseudowords vary considerably in terms of how they are presented and embedded in a context, how they are created and how many pseudowords in relation to real words are inserted. When creating pseudowords, it is important that the combination of syllables conforms to the language's phonotactic rules. Programs such as Wuggy (Keuleers & Brysbaert 2010) or WordGen (Duyck et al. 2004) help to simplify this task by automatically controlling for variables such as number of letters, orthographic relatedness and bigram frequency. When it comes to the question of how many pseudowords can be inserted in a text, the quota of <5% adopted from the SLA

literature is often taken as a point of reference. The quantity of pseudowords depends without doubt very much on the reader's linguistic profile. Given that text length is an important criterion when assessing inferencing strategies of children, it needs to be considered that keeping the quota of <5% pseudowords inevitably means that only few pseudowords can be inserted in a given text. Furthermore, there is no reason why the same quota should be adopted to FLA contexts or other languages than English. When studying primary grade children, including less skilled readers, however, too many pseudowords can also be overwhelming and result in a decrease of motivation.

5.4 Language

Finally, given that the vast majority of studies are on lexical inferencing strategies in English, research would benefit from insights in other languages than English. Languages such as French have a rich morphological system which may facilitate lexical inference (Saidane et al. 2020). German, for instance, also has many complex compound words (Bangel 2018). Studying inferencing strategies in these languages would give insights about how parts of words are recognised and how morphological cues are considered. In addition, nouns are marked by capitalisation. Therefore, the question whether parts of speech are recognised and considered while inferring unknown words can be adopted when studying inferencing strategies in German texts.

6. Conclusions & Outlook

In this paper, we aimed to show that several lines of inquiry are interesting to be explored in the domain of lexical inferencing strategies. For at least two decades, the trend in the field seemed to focus on lexical inferencing strategies in the domain of SLA. This domain is certainly worth being investigated and unquestionably yields interesting and important insights in how foreign language texts can be understood and words can be learned while reading. However, there are still some additional questions to be explored in FLA contexts in early school years. Lexical inferencing processes form the interface between vocabulary acquisition and reading comprehension and therefore serve as the basis for learning in all disciplines. They have an impact on all learners, be they L1 or L2. This has mainly been studied in L2 children. It is crucial to investigate these fundamental processes also for L1 children as soon as their focus is less on reading technique and more on reading comprehension such as in the third grade, when there is usually still an independence of the influence of other languages for many children.

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Appendix

Research on primary school children's lexical inferencing strategies while reading

Study	Method	Participants
Bangel 2018	Materials: Texts & isolated real words. Task & Procedure: Children were asked to read aloud texts and words, summarise them and verbalise their thoughts in deriving the meaning.	16 skilled readers, 11 poor readers (2 reading tests helped to categorize the readers), 5th grade
Fukkink, 2005 *And also:* *Fukkink et al. 2001*	Materials: Short narratives for 12 target words (6 abstract & 6 concrete real words of low frequency) Task & Procedure: Children were asked to read the texts aloud and to provide definitions of target words in interview questions.	30 primary school children in 2nd, 4th and 6th grade at four different schools in Amsterdam with varying cultural and SES backgrounds.
McKeown 1985	Material: 6 pseudowords (of different word types: 2 nouns, 2 verbs & 2 adjectives) in different contexts Task & Procedure: Different meanings for each word were provided and children were asked if the meaning was correct and why or why not.	30 5th graders with high and low verbal ability operationalized via the vocabulary subtest of the Stanford Achievement Test (Madden et al. 1973)
Nagy et al. 1987	Materials: an expository or narrative text with difficult but real words (evaluated by different raters before the experiment) Task & Procedure: vocabulary assessment tasks on 15 target words from each passage, an individual interview (defining target words and using them in a sentence) and a multiple-choice test, both designed to tap partial knowledge of word meanings	352 3rd, 5th and 7th graders
Neumann 1989	Materials: 2 mystery stories divided into 6 episodes each ending with a clue for resolving the case. Task & procedure: in individual think-aloud protocols children were asked to verbalize their thoughts about resolving the cases.	42 5th graders from 11 classes

Werner & Kaplan 1950	Material: 12 pseudowords embedded in 6 different contexts Task & Procedure: In individual interviews, children were asked to provide meanings for the words and tell how and why the word fit into the sentence. In a second step, the same word was presented in another context and children were asked if and how the meaning could be applied to the second	125 children in five age groups from 8.5 to 13.5 years
Van Daalen-Kapteijns, Elshout-Mohr & De Glopper, 2001	Material: 10 unknown words (Dutch low-frequency words) embedded in 3 different contexts. Task & Procedure: Think-aloud protocols on: decontextualizing, inferring meaning with subsequent contextual aid, providing definitions	16 children (11-12 years old), half of them with high, the other half with low verbal ability. Verbal ability was operationalized via a test for Dutch vocabulary knowledge "Woordentoets Nederlands" (p. 159).