

## **LEXICAL ACQUISITION IN THE EARLY SCHOOL YEARS<sup>i</sup>**

Julie E. Dockrell

Psychology and Human Development

Institute of Education

20 Bedford Way

London WC1A 0AL

[j.dockrell@ioe.ac.uk](mailto:j.dockrell@ioe.ac.uk)

David Messer

Psychology Department

London South Bank University

103 Borough Road

London SE1 0AA

[messerdj@lsbu.ac.uk](mailto:messerdj@lsbu.ac.uk)

## **1. Introduction**

- 1.1 What needs to be acquired?
- 1.2 Fast mapping and constraints in early lexical acquisition
- 1.3 Beyond fast mapping and constraints

## **2. The Assessment of Vocabulary**

- 2.1 Comprehension and production in assessment
- 2.2 Alternative methods of investigating word knowledge

## **3. School-based Lexical Development**

- 3.1 Oral language input
- 3.2 Written language input

## **4. Challenges of Later Vocabulary Learning**

- 4.1 Phonological processes
- 4.2 Semantic factors
- 4.3 Morphological factors

## **5. Difficulties in Vocabulary learning**

- 5.1 Vocabulary learning in Children with Language Difficulties
- 5.2 Lexical Acquisition and phonological representations
- 5.3 Lexical Acquisition and semantic representations
- 5.4 Summary

## **6. Conclusions**

## 1. Introduction

Children's first words mark the beginning of a lifelong lexical journey. During this journey they move from apprentice word learners to competent vocabulary users at a remarkable rate. The apparent ease of this process has led to the suggestion that "learning vocabulary is a relatively simple affair" (Plunkett and Wood, in press). However, we adopt a different stance, to argue that lexical acquisition is a complex and extended process involving the integration of phonological, semantic, and morpho-syntactic knowledge with cognitive and social processes. Vocabulary knowledge is a strong predictor of academic success, and it plays a central role in cognitive development especially in relation to literacy and learning (Cunningham and Stanovich, 1997; Stanovich and Cunningham, 1993). The lexicon provides a unique domain for studying the interaction between context and cognition, and the ways in which this interaction changes with development. We address these issues by considering the factors that are important in early lexical development (Section 1), examining the ways in which different assessment procedures provide contrasting views of children's abilities (Section 2), considering the support for vocabulary learning in school (Section 3) and the challenges of (Section 4) and the difficulties that occur in (Section 5) later vocabulary learning.

### *1.1 What needs to be acquired?*

When children acquire a new word, they must identify the sound in the speech stream to encode a phonological representation and then establish a mapping between the word and world; ultimately a detailed semantic representation is developed for the new term with knowledge of its morpho-syntactic features. Inaccurate phonological representations reduce the accuracy of children's lexical productions and may also hamper the initial establishment of semantic representations (Section 4.1).

Learning a new word also involves the formation of or links to a conceptual domain. A child must learn that 'sheep' denotes a specific set of animals, and that 'happy' denotes a particular class of emotions. The key to lexical acquisition is the mapping between world, meaning, and form. The question of how children establish a word-world mapping has been the subject of considerable research (Bloom, 2000). Many of the studies imply that this is a simple process, where all that is needed is the

selection of the referent from an array of stimuli. However, a match between an object or set of objects and a form is insufficient on its own to develop a semantic representation; children must also integrate the new term with their existing lexicon (Anglin, 1993; Clark, 2003; Dockrell and Campbell 1986).

As yet we have no clear understanding of the ways in which word learning in young children differs from word learning in older children and adults. Answers to these questions require more sophisticated evaluations than those commonly applied with younger children. The word learning skills of older children depend on both the exposures received and the children's cognitive and linguistic competence.

### *1.2 'Fast mapping' and constraints in early lexical acquisition*

In experimental settings, young children acquire information about the meaning of a novel term after a single exposure to its use (Carey, 1978; Heibeck and Markman, 1987). This process, often described as 'fast mapping' or 'quick incidental learning' (QUIL; Rice, 1990) has led researchers to focus on the cognitive factors that underlie such learning (Markman, 1989; Markman and Hutchinson, 1984). These investigations generally involve word learning in situations where contrasts are drawn between a named and an unnamed object, and in which the novel term is contrasted with a known term. One prominent explanation of children's early success in these mappings is that inbuilt constraints restrict the hypotheses that children entertain (Golinkoff, Mervis, and Hirsch-Pasek 1994). Some of these constraints may eventually be relinquished, but it is never specified when and why such constraints cease to operate. Clark (2003) presents a careful analysis that questions the viability of each of these constraints in turn (see also Nelson, 1988)

Various proposals have been made about constraints on early meaning assignment, but there is little agreement on (1) where they come from, (2) when they start to apply and how long they last, and (3) why they are abandoned. (Clark 2003: 138).

Later vocabulary acquisition poses further challenges for such accounts. Much of later vocabulary learning involves terms for entities and relations that are not definable using explanatory mechanisms derived from studies with concrete vocabulary terms. Older children encounter words that are abstract, low in frequency, domain-specific and domain-general, and involve non-literal meanings (Nagy, Diakidoy, and Anderson, 1993; Nippold, Cuyler, and Braunbeck-Price, 1988).

Furthermore, no single set of semantic relations or organizational structure is adequate for the entire lexicon (Miller and Fellbaum, 1991). As children mature, these different aspects of semantic representation become increasingly important, but are not easily explained by the presence of constraints (section 4.2).

### *1.3 Beyond Fast Mapping and Constraints*

Conceptual distinctions influence the meanings of some words (Soja, Carey, and Spelke 1991). However there is increasing evidence that in some lexical domains the construction of categories occurs under linguistic guidance (Bowerman and Choi, 2003). Children as young as 17 months of age talk about spatial events in language-specific ways (Choi and Bowerman, 1991) and language-specific patterns are also evident in comprehension (Choi, McDonough, Bowerman, and Mandler 1999). These differences are consistent with differences in the way target languages partition the semantic domains. Thus, the word to world mappings that children begin to establish are sensitive to the semantic and statistical properties of the target language (Bowerman and Choi 2003: 402). By corollary, specific linguistic input may direct children's hypotheses about the intended referent of a novel term. Preschoolers, who were exposed to objects labelled with a novel word where the objects were described in vignettes as having properties typically associated with artefacts, generalized the term on the basis of similarities in shape. In contrast, children extended the same labels on the basis of similarities in both shape and texture when the same objects were described as having properties typically associated with animate kinds (Booth and Waxman, 2002). Only the conceptual information provided in the vignettes could be responsible for the differences in extension patterns that were observed since the same objects were presented in both conditions. Thus, the conceptual distinctions that guide children's interpretations of new terms are affected by both the language they are learning and the ways in which the new term is introduced.

The wider social context is an important source of information to guide to word learning and provides a more complex range of information than is implied by constraints. Building a vocabulary depends on hearing words and interpreting the meaning of the term in a specific setting (but see Hoff and Naigles, 2002, for a re-analysis of research that casts doubt on the sufficiency of social approaches to word learning). Infants as young as 18 months actively gather social information to guide their inferences about word meanings (Bloom, 2000) and this process continues to

serve as an important source of information about the meanings of new terms as children develop (Clark and Wong, 2002). For example, children learn a new verb best if it is introduced when the event is impending rather than when it is already ongoing (Tomasello and Kruger, 1992). This points to the importance of match in timings of exposure, which varies for different word classes. It also relates to young children's reliance on the intentions of their interlocutors (Baldwin, 1991) and their ability to understand the knowledge that others possess to guide their word learning (Sabbagh and Baldwin, 2001).

Another problem with studies of fast mapping is that they generally fail to consider how semantic representations are established, particularly in the case of abstract terms. There is more to learning the meaning of a word than pairing it with an observable referent, since words clearly refer to a range of entities, only some of which are observable. This is demonstrated by a simulation study of vocabulary learning (Gillette, Gleitman, Gleitman, and Lederer, 1999) where adults were presented with different types of linguistic and non-linguistic information about a mother-child interaction that introduced either a noun or a verb as a target word. A key factor in the accuracy of identifying the target word was its 'concreteness' or 'imageability'. The authors interpret this as revealing an advantage for nouns over verbs in the early vocabulary of children (Gillette et al 1999: 154) and conclude that that only a limited stock of nouns can be identified solely in terms of reference to their standard extra-linguistic contexts of use (that is, by 'word-to-world pairing'); verb identification, in contrast, also requires inspection of the standard linguistic contexts of use ('sentence-to-world pairing'). These findings are consistent with the fact that syntactic complexity in the input appears to support lexical learning (Hoff and Naigles, 2002).

Fast-mapping studies illuminate important aspects of early strategies for establishing reference, but they fail to provide in-depth insight into the nature of semantic representations and how these change over time. Children's initial hypotheses about word meanings arise from a range of factors including the initial cognitive strategies that are used to limit possible referents, pragmatic factors, extra-linguistic context, and features of the input and target language typology. Consideration of this range of factors is critical as, with increasing age, vocabulary becomes both more extended and more detailed, and children encounter the same word in varying circumstances. To provide adequate descriptions of acquisition

processes it is also important to consider the ways in which lexical competence is evaluated.

## **2. The Assessment of Vocabulary**

There is a general consensus that significant vocabulary gains are made in childhood, yet there is considerable debate about both vocabulary size and the rate of learning 'new lexical items' (Anglin, 1993). Estimates of vocabulary size depend on a number of factors, specifically on the criteria for establishing that a child 'knows' the meaning of a word. A basic distinction can be made between measures of comprehension and measures of production. Younger children take much longer to establish accurate representations for production (Clark, 1993), and this asymmetry between production and comprehension appears to be particularly marked for verbs (Gillette et al, 1999). However, initial representations for comprehension may not be detailed and in some cases differential understanding lags behind productive use (Nelson 1996: 306-307). Below we review some of the problems involved in assessing children's growing vocabulary in relation to the asymmetry between comprehension and production (Section 2.1), and we propose alternative methods for coping with these difficulties (Section 2.2).

### *2.1 Comprehension and production in assessment*

Comprehension measures aim to tap children's semantic representations. They may be used to establish the word boundaries for later acquired vocabulary or the relationships within semantic domains. Comprehension is needed for the recognition of words and to provide templates for production.

Clark (1993) argues that representations from comprehension consist of an acoustic template to which children then add progressively more information; so one aspect of understanding vocabulary development is to consider the way in which information is progressively associated with the acoustic template (Section 4.1). Measures of comprehension have the potential to contribute to our understanding of semantic structures.

Appropriate production draws on a wider range of skills than comprehension including selection of the appropriate semantic representation for the item, instantiation of a phonological representation, and use of the word in its appropriate linguistic form and context. It has been argued that production based measures of

vocabulary size may underestimate what the child actually knows (Dapretto and Bjork, 2000), because such measures rely on phonological accuracy in addition to semantic and linguistic knowledge.

In addition, when considering production it is important to realize that children practice new words prior to the establishment of detailed accurate semantic representations (Clark, 2003; Nelson, 1996) and there are situations where words may be produced with little or no understanding of their meaning. Indeed it is argued that, for abstract terms, children initially engage in “use without meaning” in specific contexts (Nelson, 1996; Levy and Nelson, 1994).

Production is also vulnerable to other task demands. There may be a range of alternative and acceptable labels for an item or action. A picture of a poodle can be labelled as a ‘poodle’, but ‘dog’ or ‘animal’ are equally correct. Actions can be labelled with general all-purpose verbs, such as ‘do’, and while these are less precise than specific verbs, they are often acceptable productions. Thus, the pragmatic context in which productions are assessed will direct the types of lexical items that children produce and this is particularly evident in conversation. Nonetheless, one might view the ability to produce a word in the appropriate context as the ‘gold standard’ of lexical knowledge and errors of production as particularly revealing about a child’s semantic representations (Braisby and Dockrell, 1999; McGregor and Waxman, 1998). As we outline below, vocabulary knowledge can be assessed in a range of ways so that comprehension and production data offer complementary insights about lexical representations.

## *2.2 Alternative methods of investigating word knowledge*

A typical way of measuring word knowledge is by means of a multiple-choice format, in which the child selects a picture for a target word from among several pictures (for younger children) or written words (for older children). These procedures are problematic, since they are open to guessing or the use of non-linguistic strategies to identify items, particularly when the distracters are not selected by clear criteria (Anglin, 1993).

It is also the case that children’s choices in such tasks may not provide useful information about the nature of their semantic representations. As early as 1942, Cronbach pointed out the need to determine how complete a student’s understanding of a word was. Forced-choice comprehension tasks give a ‘flat’ view of vocabulary,



as if all the words are either unknown or known to the same level, to the extent that such measures can be viewed as “useless at best and dangerous at worst” (Kameenui, Dixon, and Carnine 1987: 138). Ideally, word knowledge should be assessed by a range of different measures (Beck and McKeown, 1991), and these should take into account both the quality and the quantity of children’s lexical knowledge.

*Definitions* are a way of assessing children’s explicit knowledge about a word’s semantic attributes. Prior to age seven, children’s definitions are simple, and tend to focus on perceptual or functional information (Benelli, Arcuri, and Marchesini, 1988; Storck and Looft, 1973), lacking in superordinate terms (Watson, 1995). In contrast, older children produce definitions that are more precise, include conventional social information (Benelli et al, 1988), and increasingly refer to superordinates (Curtis, 1987; Snow, 1990; Watson, 1995). Taken together, this research points to an increase in semantic content and syntactic form across word classes. Interestingly, children generally provide higher-quality definitions for nouns than for verbs and adjectives, and for roots and compounds than for morphologically inflected or derived words (Anglin, 1993; Johnson and Anglin, 1995). Definitions thus provide a potentially powerful investigative tool, since they assess semantic representations, demonstrate developmental progress, and show word-class effects. Yet definitions place a high cognitive load on the respondent. Initial understanding of a lexical entry is implicit and there are significant difficulties in expressing this knowledge. Thus, definitions require meta-linguistic awareness and are dependent on other linguistic skills beyond knowledge of the lexicon. With age, children make greater use of morphological analysis in processing unfamiliar vocabulary, a process described as *morphological problem-solving* (Anglin, 1993). Some words may appear to have been learnt but in effect the child may construct a meaning from morphological information alone (Ravid, this volume). Similar more general processes can be seen in children’s developing ability to use words explicitly to express their ideas about other domains such as science (Karmiloff-Smith, 1992; Pine and Messer, 1998; 2003).

Other attempts to apply techniques that tap various aspects of vocabulary knowledge have generally been limited to small-scale tests of their effectiveness in experimental studies (e.g., Jenkins, Stein, and Wysocki, 1984; McKeown, Beck, Omanson, and Pople, 1985; Nagy, Herman, and Anderson, 1985). Such approaches have often involved investigations of the breadth of children’s semantic

representations including knowledge of relevant antonyms, synonyms, hyponyms (Heibeck and Markman, 1987); the semantic attributes of words (Funnell, Hughes, and Woodstock submitted); and children's inferences about categorical dimensions of new lexical items (Keil, 1983). Taken together, different methods of measuring vocabulary indicate that word knowledge needs to be defined along a continuum that involves several dimensions (Section 3.1), and evaluating a child's vocabulary means specifying where along the continuum a particular lexical item lies in relation to each dimension.

*Context* also provides children with potential cues for inferring word meaning. For example, Rudel, Denckla, Broman, and Hirsch (1980) asked children aged between 5 and 11 years to generate names in four different conditions: picture naming, naming to definition, sentence completion, and naming to touch. The oldest children's performance did not differ across the contexts, but for younger children sentence-completion and tactile naming were the most supportive while naming to definition the hardest. These data add further evidence to view that once knowledge is fully established, children's responses are less task-dependent and less vulnerable to context (Section 4.2).

*Online tasks* offer new ways to assess lexical representations, particularly the organization and links that are present between items in the lexicon. Online tasks involve largely automatic, non-conscious processes and so may be less vulnerable to metalinguistic knowledge. Simple picture-naming tasks demonstrate that lexical access become quicker with increasing age and is related to word frequency and age of acquisition. The presence of a semantically related spoken word also increases naming latency, while the presence of a phonologically-related word shortly before production will decrease naming latency (Jerger, Martin, and Damian, 2002). Thus, words that are similar in meaning interfere with search while words similar in phonological form facilitate naming. Such findings could provide information about the way in which items are linked together in the lexicon.

In sum, the nature of the assessment protocol is central to the conclusions we draw about children's skills and the representations that they develop. As children develop, a range of techniques are available to study vocabulary acquisition. We will argue that when different dimensions of lexical knowledge are considered, a multifaceted picture of vocabulary development emerges. Such lexical profiles can

also provide important insight into how context and cognition support ensuing representations.

### **3. School-based Lexical Development**

By the end of the preschool period, children have a range of cognitive, linguistic, and social processes to support vocabulary learning. In addition, an average 6-year-old knows about 10,000 words (Anglin, 1993) which will provide a basis from which to extend their vocabulary and to “capitalize effectively on the information-rich social context within which word learning occurs” (Baldwin and Moses 2001: 318). Yet there is considerable lexical learning to be done; the six year old possess 1/6<sup>th</sup> of the words that will be known by the end of formal schooling (Bloom 2000: 12); and not all children are equally well equipped for the task (Section 5). The rate of vocabulary growth differs significantly between children with larger vocabularies supporting the faster acquisition of new words than smaller vocabularies (Elley, 1989; Leung and Pikulski, 1990).

#### *3.1 Oral language input*

Both the amount and the nature of the language input children receive impacts on the subsequent development of their lexicon (Hart and Risley, 1992; 1995; Hoff and Naigles, 2002). The relationship between input and acquisition holds across a range of situations including bilingual acquisition (Pearson, Fernandez, Lewedeg, and Oller, 1997). The type of lexical items that parents use plays an important role and for some children the environmental opportunity to develop vocabulary is less rich than for others (Weizman and Snow, 2001). This is an important factor in school achievement: vocabulary assessed in first grade predicts over 30% of the reading comprehension variance in 11<sup>th</sup> grade (Cunningham and Stanovich, 1997). Thus, for children from less educated or less advantaged backgrounds, the exposure to language received in educational contexts is of critical importance.

As children develop through the school years, they increasingly encounter new words in educational and leisure contexts. Support for lexical acquisition can be provided explicitly, in the form of direct instruction or dictionary use, or incidentally, in varied types of exposures and contexts. Little time appears to be devoted to vocabulary instruction in schools (Graves, 1986; 1987; Nagy and Herman, 1987). Moreover, dictionaries are inappropriate for younger children and the definitions

provided are not always easily understood even by older children (Scott and Nagy, 1997); much of schoolchildren's vocabulary exposure tends to occur incidentally. Children are not necessarily given enough opportunities to build a rich vocabulary in the early school years. Findings from longitudinal studies indicate that gains in receptive and expressive language skills occur as a result of participation in quality nursery provision (McCartney, Scarr, Phillips, and Grajek, 1985). Yet on the whole, preschool settings are not sensitive vocabulary learning environments (McCathren, Yoder, and Warren, 1995).

As with younger children (Section 1), the linguistic context where children encounter new words influences the resultant semantic representations. In a study of 130 five and six-year-olds children over a period of six weeks, Ralli (1999) collected baseline data about vocabulary knowledge and then had children exposed to new vocabulary items in one of five conditions: (i) repetition of the unfamiliar word, (ii) an ostensive definition, (iii) an introduction of a word as a lexical contrast, (iv) a definition which included a description of the item, and (v) a no-exposure condition. The following week the children heard a story that included the 'new word', and their knowledge of the item was assessed on a variety of tasks. Both the lexical contrast group and the definition group developed detailed semantic representations of the new terms. The definition group had the most detailed knowledge and this knowledge was maintained overtime. Ralli also found that children's performance varied with the measure used to assess word knowledge: all groups performed well on the comprehension measure, but only those in the lexical contrast and definition groups provided categorical information about the new term and used the term productively in a story telling task. The repetition and control group could not be differentiated, and both performed poorly on the semantically more demanding tasks. This highlights the importance of the types of exposures children typically receive in schools and indicates that informal oral definitions can provide children with enduring knowledge about a new lexical item.

Word learning has been examined in other contexts, such as when teachers are reading to children (Elley, 1989; Penno, Wilkinson, and Moore 2002). As was shown by Ralli's (1999) study, explicit highlighting of word meanings (Penno, Wilkinson, and Moore, 2002) and direct instruction (Stahl and Fairbanks, 1986) facilitate vocabulary acquisition. Vocabulary acquisition is also facilitated if children are actively engaged in a story rather than simply hearing a 'good' reading of it (Elley,

1989). Interactional reading facilitates vocabulary acquisition of both six- and eight-year-olds (Brabham and Lynch-Brown, 2002).

Explicit vocabulary instruction is not always provided. Carlisle, Flemming, and Gudbrandsen's (2000) observations of 4<sup>th</sup> and 8<sup>th</sup> grade science lessons indicate that teachers seldom offer formal vocabulary instruction about unfamiliar words. These results are corroborated by studies with younger children. Best (2003) recorded science lessons for five- and six-year-olds. Teachers also rated the vocabulary used in these lessons along a scale, from definitely known to unknown for both comprehension and production. There was no explicit vocabulary teaching, but Best found subtle differences in how teachers introduced new terms. It was the combination of linguistic and non-verbal cues provided by the teachers that discriminated between items believed to be new and those believed to be familiar. Explicit teaching of word meanings can therefore only explain a limited amount of classroom-based word learning.

### *3.2 Written language input*

Once children start formal schooling, written language becomes increasingly important for learning about language generally and vocabulary specifically (Nagy, Herman, and Anderson 1985; Ravid, this volume; Sternberg and Powell, 1983; Tolchinsky, this volume). There is evidence that words are learned in roughly the same order in school, although the rate of development is determined by a child's initial root word vocabulary (Biemiller and Slonim, 2001). Some estimates indicate that ten-year-olds may be exposed to as many as a million words of text in a year, between 15% to 55% of which may be unfamiliar.

The ability to learn words incidentally from written texts increases with age. Children who know more words are better at reading comprehension than children with poorer vocabularies (Nagy and Herman, 1987; Nagy et al, 1985; Sternberg, 1987) and good readers develop larger vocabularies than poorer readers (Carnine, Kameenui, and Coyle, 1984; Nagy et al, 1985). Studies that have investigated word learning from written texts have manipulated the types of exposure, the rationale provided to the participants, how word learning is evaluated, and the characteristics of the participants. Swanborn and de Glopper (1999) carried out a meta-analysis of 20 experiments of incidental word learning during normal reading, students' attention was not drawn to the lexical item and there was a single exposure of the target item

They found substantial variation in the results; assessment methods sensitive to partial word learning showed higher word learning gains and students learnt more words when the ratio of text to target words was higher (Swanborn and de Glopper 1999: 277) yet the mean rate of incidental word learning was low. However, can children and young people be sensitized to key unknown terms and trained how to use context effectively? Probably yes (Fukkink and de Glopper, 1998). Exposure to new words, oral and written, in school offers an important source of later vocabulary acquisition.

#### **4. The Challenges of Later Vocabulary Learning**

Initial word exposures provide the basis for developing a semantic representation of a term but input is often insufficient to establish meaning and learning is not inevitable. In this section we consider how phonological form and semantic and morphological complexity impact on later word learning.

##### *4.1 Phonological processes in lexical Acquisition*

As noted earlier, children's ability to establish an initial phonological representation is central to the development of subsequent semantic representations. During early and middle childhood there is a close link between children's ability to retain new phonological information for short periods of time and their vocabulary knowledge (Gathercole and Baddeley, 1989; Gathercole and Adams, 1994). The nature of the relationship between vocabulary and phonological memory tasks is a matter of debate. Phonological sensitivity can enhance the acquisition of phonologically unfamiliar words (Bowey, 1996, 2001; de Jong, Seveke, and van Veen, 2000), yet phonological awareness as such may not be independent of oral language skill (Cooper, Roth, Speece, and Schatschneider, 2002); that is, children with larger vocabularies construct more detailed phonological representations and may therefore be more successful on phonological tasks. The role of phonological regularities in lexical acquisition indicates that common sound sequences are learnt more rapidly than rare sound sequences, and that the word learning of older children (10- and 11-year-olds) continues to be influenced by phonotactic features (Storkel, 2001; Storkel and Rogers, 2000).

Older children may use their receptive vocabularies as a scaffold to assist in the encoding and retrieval of non-words with word-like characteristics. When four-year-olds are exposed to similar-sounding words after they had heard a novel word

their production of the item is enhanced (Demke, Graham, and Siakaluk, 2002). Exposure after learning helped maintain the phonological traces of the new word in working memory, thereby leading to more durable long-term representations (Section 3.1). New words with many phonological neighbours (phonologically similar competitor words), then, should be learnt more quickly than those with fewer phonological neighbours (Metsala, 1999).

Phonological information alone is not sufficient to establish a lexical mapping. For example, phonological memory predicts the acquisition of explicitly taught lexical items but not of items introduced in an incidental fashion (Michas and Henry, 1994). This is consistent with studies showing that schoolchildren's ability to acquire the meaning of complex scientific terms was limited by difficulties in establishing the semantic representations of the new terms. No relationship was found between phonological memory and patterns of acquisition for either comprehension, production, or assessments of wider domain knowledge (Braisby, Dockrell, and Best, 1999).

#### *4.2 Semantic Factors in Lexical Acquisition*

Some of the issues concerning the acquisition and assessment of semantic representations are noted earlier (Section 3). In this section we consider the way that acquisition of the semantic representations continues to present challenges beyond the early preschool years. A number of studies have pointed to the difficulties that children experience in developing the meanings of relational terms and mental state terms (Nelson, 1996). In cases where there is a non-obvious relationship between a term and its possible meanings, the development of semantic representations is difficult and extended. The semantic representations of objects also change with development.

The complexity of these processes is illustrated by a study of object naming and object knowledge in 288 children between the ages of 3;7 and 11;6 in relation to four different categories of object (implements, fruits, vegetables and vehicles) (Funnell et al, submitted). Different patterns of performance were evident for the children above 6;6 from those who were younger. For younger children, their ability to name exceeded their object knowledge, while for older children the reverse pattern was true, suggesting that the older children's knowledge was more conceptually based. This shift in performance varied across category. Funnell et al. argue that older

children develop their knowledge of objects in contexts where the object is not present. Thus, an older child may have a rich semantic representation for the word 'yacht' but be unable to accurately name a picture of a yacht.

A change in representational status of lexical items is also supported by a study conducted by Keil and Batterman (1984). They presented children with verbal descriptions and then asked them to judge whether a particular term, such as 'robber' or 'island', could be applied to the description. One description contained characteristic information and the other description contained defining features. There was a focus on characteristic features during the preschool period moving towards an emphasis on defining features by the age of 9. This shift from individual exemplars to defining features occurs at different ages for different words; suggesting that experience and familiarity play a central role in the evolution of children's understanding of terms. The nature of these changes depends on the semantic domains concerned.

Words that stand for many meanings also pose challenges. Preschool children understand the primary meaning of polysemous words, but acquire secondary meanings gradually over subsequent years (Durkin, Crowther, Shire, Riem, and Nash, 1985). This is consistent with more recent work where low-level meanings are mastered rapidly while higher-level meanings show a more protracted profile of development (Booth and Hall, 1995). Similarly, the overlap between psychological and physical properties (such as *sweet*, *hard*) is a particularly late attainment with mastery being achieved only in the mid-teens (Schechter and Broughton, 1991). These studies demonstrate that when the cognitive system is taxed by the complexity of the semantic representations, lexical acquisition is a more protracted affair.

#### *4.3 Morphological Factors in Lexical Acquisition*

The structural complexity of word forms also influences children's vocabulary acquisition. Compounding occurs when two or more root words are combined to create a new word. Relatively young children know a lot about the rules of compounding, yet this knowledge appears to be restricted to morphologically simpler combinations (Clark and Berman, 1987). Morphologically more complex terms also take longer to acquire. Anglin (1993) studied children's definitions for four different morphological relations – inflected words, derived words, literal compounds, and idioms. Skilled word learners appeared to be particularly good with literal compounds



and could use derivational knowledge to infer the meanings of new words (Freyd and Baron, 1982). The ability to use derivational morphology appears to be “a quite gradual development extending throughout the school years” (Anglin 1993: 33). This ‘morphological problem solving’ ability is influenced by two factors, the knowledge of root words and the productivity of the suffix (Bertram, Laine, and Virkkala, 2000).

## **5. Difficulties in Vocabulary Learning**

We have seen that phonological and semantic factors impact on later vocabulary learning. Studies of children with difficulties in vocabulary acquisition (Dollaghan, 1987; Rice, Buhr, and Nemeth, 1990; Rice and Woodsmall, 1988) offer further evidence of how these factors can impact on lexical development. The problems identified can be attributable to difficulties with either the process of acquisition itself or to a failure in consolidating and retaining information in the lexicon. In the following three sections we consider the evidence supporting these different views.

### *5.1 Children with Language Difficulties*

Children with Specific Language Impairment (SLI) have language skills below the level that would be expected on the basis of their non-verbal abilities, and their level of language is not attributable to hearing or neurological disabilities (Bishop, 1997). The problems that these children face in comprehending and using language are varied, and as yet there is no generally agreed typology of the condition. Given the varied nature of these children’s language problems it is significant that many appear to have difficulties in acquiring new words (Dollaghan, 1987).

A good example of the problems with lexical acquisition faced by children who have SLI has been reported by Rice (1990). She and her colleagues used a story presented via television that included novel words and assessed lexical acquisition by means of a comprehension test. The performance of children with SLI was compared with peers matched for chronological age (CA) and mean length of utterance (MLU). The 5-year-old children with SLI performed less well than both CA and MLU matched controls on comprehension tasks. Rice, Oetting, Marquis, Bode, and Pae (1994) report that children with SLI, unlike their CA and MLU peers, failed to acquire words after 3 exposures, but like peers were successful after 10 such exposures.

Thus, children with SLI have a greater difficulty than their peers in acquiring new words and verbs pose particular problems (Kelly, 1997; Windfuhr, Faragher, and

Conti-Ramsden, 2002). It would appear that some children with SLI are less able to make use of word-world mappings. This is likely to make the further development of the language system during the pre-school and school years more difficult and protracted. As yet the reasons why these children have difficulties with lexical acquisition are not yet understood. In the next two sections we consider findings that suggest problems with lexical entries may occur as a result of inadequate phonological or semantic representations.

### *5.2 Lexical Acquisition and Phonological Representations*

The ability to name pictures can be used as a basic assessment of whether a lexical item has been acquired (Section 2). Children with literacy difficulties make more errors on discrete picture naming tasks than skilled readers (Snowling, van Wagtenonk, and Stafford, 1988; Scarborough, 1989). Why should there be this link between lexical acquisition and literacy abilities? It has been argued that imprecise or inadequate phonological representations make it more difficult to learn the mapping between graphemes and phonemes (Snowling et al, 1988; Swan and Goswami, 1997). Evidence of imprecise or ‘fuzzy’ phonological representations is provided in these studies by a high rate of phonological errors when naming, more naming errors with longer than shorter words, and there being more naming errors in comparison to children with similar semantic abilities.

Thus, failure to acquire the full phonological specifications of words in the lexicon appears to have consequences that go beyond difficulties in oral communication. Low scores on phonological awareness tasks and on assessments of phonological short-term memory implicate the perception and storage of phonological information as the cause of the children’s difficulties. In other words, information-processing limitations interact with exposure to external information to influence lexical acquisition, and this has significant consequences for development

### *5.3 Lexical Acquisition and Semantic Representations*

Children with word-finding difficulties (WFDs) (German, 1984) are able, on hearing a word, to identify the appropriate picture on a comprehension test, but are sometimes unable to produce the same word spontaneously during discourse or when presented with a picture of the item. Even when they do produce the appropriate word, it often has longer latency than in children of the same chronological or language age

(Dockrell, Messer, and George, 2001). A range of findings supports the view that WFDs are a consequence of inadequate or incomplete semantic representations (Kail and Leonard, 1986). Seven-year-olds with WFDs have been found to give less accurate definitions of object names than control groups and provide fewer semantic features in their definitions (Dockrell, Messer, George, and Ralli, 2003). When producing verbs they make greater use of general all-purpose verbs and inappropriate choices from other semantic domains (Dockrell et al, 2001). Children with WFDs also perform poorly on tasks where they asked to name as many items as possible that correspond to an identified target (Messer, Dockrell, and Murphy, in press).

The problems of these children in accessing a name of an item can be attributed to a failure in to fully acquire semantic representations. Research on a related group of children reinforces this interpretation. Studies by Nation, Snowling, and their colleagues have identified a group of children that they term 'poor comprehenders'. Children with these characteristics who are aged 10 years have difficulties making use of semantic information when reading (Nation and Snowling, 1998). They also tend to be slower and less accurate at picture naming than their peers (Nation, Marshall, and Snowling, 2001). The children perform relatively well on phonological tasks and at decoding when reading. This suggests that inadequate phonological representations of words is not the cause of their difficulties. Instead, their problems are attributed by Nation and Snowling (1999) to an inadequate semantic content in the children's lexicon. Thus, in this group of children, as in children with WFDs, it appears that impaired lexical acquisition results in difficulties when dealing with information where knowledge of semantic relations could help the children be more efficient and more accurate.

These studies, suggest that children's development is put at risk by impairments involving lexical acquisition. The studies also suggest that these effects can occur in sub-components of the lexical acquisition process, those involving phonological information and those involving semantic information.

#### *5.4 Summary*

This section has concerned challenges to lexical acquisition, and it contains a number of messages about the development of children with disabilities, about typical children, and about models of lexical acquisition. Children with SLI are less likely than language-age matched peers to be able to pick out the referent of words that they

previously have heard in an appropriate context. Not only are such problems likely to directly delay vocabulary development, but the presence of an impoverished lexicon may effect further lexical acquisition (Section 3). New words may be more difficult to integrate into a less sophisticated lexical network. Other studies of the naming process indicate that there are children who have impoverished phonological or semantic information in their lexicon. The findings draw attention to the general consequences of a failure to acquire stable representations of a word, and raise questions about the mechanisms responsible for these difficulties. The findings also point to the vulnerability of specific components of lexical acquisition.

## **6. Conclusions**

This chapter has considered the ways in which context and cognitive factors support later lexical learning. Word learning has sometimes been viewed as a simple word-to-world pairing that is established predominantly through access to the extralinguistic context. But such a view fails to consider the range of factors that have an effect on, and play a part in acquisition. These include the more general social context of the situation, the linguistic information supplied with the new word, the sophistication of the child's existing lexicon, and the child's ability to detect and retain relevant information from the exposure to the new word. A simple view about acquisition also fails to consider the nature and types of lexical information that children acquire and by corollary the need for a range of assessments to fully understand the nature of the acquisition process.

As children progress through the school years it is clear that the increasing sophistication of the lexicon enables children to acquire new words more easily and with less need for contextual support. As a result, those children who have more developed lexical structures, are better able to add to these already developed structures and make further gains. Another feature of development is that even though acquisition results in more information and increasingly complex information being stored in the lexicon, this is associated with easier access to the information. For example, children become quicker at naming, and better at providing more complex definitions. It also appears that the experience of schooling can facilitate these processes, though teachers do not always provide optimal circumstances for the learning of new words.

Anglin stated, “Vocabulary acquisition is a remarkable process and one we that we need to understand better” (1993: 185). To achieve this objective we need to collect information about the influences on lexical acquisition and to develop more comprehensive models of the process (Gentner, 2003). Considerable advances have been made in understanding the acquisition of phonological information about words and developing models about this process (Section 4.1). In contrast, there are still many uncertainties about the nature of semantic and of morphosyntactic representations in the lexicon. Lexical acquisition is a complex process, and the lexicon increases in complexity as children become older. Further research is needed to produce a model of lexical acquisition that addresses the complexity of the process.

## REFERENCES

- Anglin, J.M. 1993. "Vocabulary development: A morphological analysis". *Monographs for the Society for Research in Child Development* 58 (10 Serial No. 238), 1-165.
- Baldwin, D.A. 1991. "Infants contribution to the achievement of joint reference". *Child Development* 62 (5): 875-890.
- Baldwin, D.A. and Moses, L.J. 2001. "Links between social understanding and early word learning: Challenges to current accounts". *Social Development* 10 (3): 309-329.
- Beck, I.L. and McKeown, M.G. 1991. "Conditions of vocabulary acquisition". In *The Handbook of Reading Research*, P.D. Pearson (ed.), 2: 789-814. New York: Longman.
- Benelli, B., Arcuri, L. and Marchesini, G. 1988. "Cognitive and linguistic factors in the development of word definitions". *Journal of Child Language* 15: 619-635.
- Bertram, R., Laine, M. and Virkkala, M. 2000. "The role of derivational morphology in vocabulary acquisition: Get by with a little help from my morpheme friends". *Scandinavian Journal of Psychology* 41: 287-296.
- Best, R. 2003. *Young children's acquisition of novel science terms*. Unpublished Doctoral Dissertation. South Bank University, London.
- Biemiller, A. and Slonim, N. 2001. "Estimating root word vocabulary growth in normative and advantaged populations: Evidence for a common sequence of vocabulary acquisition". *Journal of Educational Psychology* 93: 498-520.
- Bishop, D.V.M. 1997. *Uncommon Understanding: Development and Disorders of Language Comprehension in Children*. Hove, East Sussex: Psychology Press.
- Bloom, P. 2000. *How children learn the meanings of words*. Cambridge, MA: MIT Press.
- Booth, A.E. and Waxman, S.R. 2002. "Word learning is 'smart': evidence that conceptual information affects preschoolers' extension of novel words". *Cognition* 84: B11-B22.
- Booth, J.R. and Hall, W.S. 1995. "Development of the understanding of the polysemous meanings of the mental-state verb know". *Cognitive Development* 10 (4): 529-549.
- Bowerman, M. and Choi, S. 2003. "Space under Construction: Language-Specific special categorization in first language acquisition". In *Language in mind: Advanced in the study of language and thought*, D. Gentner and S. Goldin-Meadow (eds), 195-235. Cambridge, MA: MIT Press.
- Bowey, J.A. 1996. "On the association between phonological memory and receptive vocabulary in five-year olds". *Journal of Experimental Child Psychology* 63: 44-78.
- Bowey, J.A. 2001. "Nonword repetition and young children's receptive vocabulary: A

- longitudinal study". *Applied Psycholinguistics* 22 (3): 441-469.
- Brabham, E.G. and Lynch-Brown, C. 2002. "Effects of teachers' reading aloud styles on vocabulary acquisition and comprehension of students in the early elementary grades". *Journal of Educational Psychology* 94: 465-473.
- Braisby, N. and Dockrell, J.E. 1999. "Why is colour naming difficult?" *Journal of Child Language* 26: 23-47.
- Braisby, N., Dockrell, J. and Best, R. 2001. "Children's acquisition of science terms: Does fast mapping work?" In *Research on Child Language Acquisition: Proceedings of the 8<sup>th</sup> Conference of the International Association for the Study of Child Language*, M. Almgren, A. Barreña, M.J. Ezeizabarrena, I. Idiazabal and B. MacWhinney (eds), 1066-1087. Somerville, MA: Cascadilla Press.
- Carey, S. 1978. "The child as word learner". In *Linguistic Theory and Psychological Reality*, M. Halle, G. Miller and J. Bresnan (eds), 264-293. Cambridge, MA: MIT Press.
- Carlisle, J.F., Fleming, J.E. and Gudbrandsen, B. 2000. "Incidental word learning in science classes". *Contemporary Educational Psychology* 25 (2): 184-211.
- Carnine, D., Kameenui, E.J. and Coyle, G. 1984. "Utilization of contextual information in determining the meaning of unfamiliar words". *Reading Research Quarterly* 19: 188-204.
- Choi, S. and Bowerman, M. 1991. "Learning to Express Motion Events in English and Korean: The Influence of Language Specific Lexicalization Patterns". *Cognition* 41: 82-121.
- Choi, S., McDonough, L., Bowerman, M. and Mandler, J.M. 1999. "Early sensitivity to language-specific spatial categories in English and Korean". *Cognitive Development* 14, 241-268.
- Clark, E.V. 1993. *The Lexicon in Acquisition*. Cambridge: Cambridge University Press.
- Clark, E.V. 2003. *First Language Acquisition*. Cambridge: Cambridge University Press.
- Clark, E.V. and Berman, R.A. 1987. "Types of Linguistic Knowledge - Interpreting and Producing Compound Nouns". *Journal of Child Language* 14 (3): 547-567.
- Clark, E.V. and Wong, A. 2002. "Pragmatic directions about language use: Words and word meanings". *Language in Society* 31: 181-212.
- Cooper, D., Roth, F., Speece, D. and Schatschneider, C. 2002. "The contribution of oral language skills to the development of phonological awareness". *Applied Psycholinguistics* 23: 399-416.

- Cronbach, L.J. 1942. "An analysis of techniques for systematic vocabulary testing". *Journal of Educational Research* 36: 206-217.
- Cunningham, A.E. and Stanovich, K.E. 1997. "Early reading acquisition and its relation to reading experience and ability ten years later". *Developmental Psychology* 33 (6): 934-945.
- Curtis, M.E. 1987. "Vocabulary testing and vocabulary instruction". In *The nature of vocabulary acquisition*, M.G. McKeown and M.E. Curtis (eds), 37-51. Hillsdale, NJ. Erlbaum.
- Dapretto, M. and Bjork, E.L. 2000. "The Development of Word Retrieval Abilities in the Second Year and its Relation to Early Vocabulary Growth". *Child Development* 71: 633-646.
- De Jong, P.F., Seveke, M.J. and van Veen, M. 2000. "Phonological sensitivity and the acquisition of new words in children". *Journal of Experimental Child Psychology* 76: 275-301.
- Demke, T., Graham, S. and Siakaluk, P. 2002. "The influence of exposure to phonological neighbours on preschoolers' novel word production". *Journal of Child Language* 29 (2): 379-392.
- Dockrell, J.E. and Campbell, R.N. 1986. "Lexical acquisition strategies". In *The Development of Word Meaning*, S. Kuczaj and M. Barrett (eds), 121-154. New York: Springer Verlag.
- Dockrell, J.E., Messer, D. and George, R. 2001. "Patterns of Naming Objects and Actions in Children With Word Finding Difficulties". *Language and Cognitive Processes* 16: 261-286.
- Dockrell, J.E., Messer, D., George, R. and Ralli, A. 2003. "Beyond naming patterns in children with WFDs – definitions for nouns and verbs". *Journal of Neurolinguistics* 16 (2-3): 191-211.
- Dollaghan, C. 1987. "Fast mapping of normal and language impaired children". *Journal of Speech and Hearing Disorders* 52 (3): 218-222.
- Durkin, K., Crowther R., Shire, B., Riem, R. and Nash, P. 1985. "Polysemy in mathematical and musical education". *Applied Linguistics* 6: 147-161.
- Elley, W. 1989. "Vocabulary acquisition from listening to stories". *Reading Research Quarterly* 24 (2): 174-187.
- Freyd, P. and Baron, J. 1982. "Individual differences in acquisition of derivational morphology". *Journal of Verbal Learning and Verbal Behaviour* 21: 282-295.



- Fukking, R.G. and de Glopper K. 1998. "Effects of instruction in deriving word meaning from context: a meta-analysis". *Review of Educational Research* 68 (4): 450-468.
- Funnell, E., Hughes, D. and Woodcock, J. (submitted). "Age of acquisition for naming and knowing: A new hypothesis". *Quarterly Journal of Experimental Psychology*.
- Gathercole, S.E. and Adams, A. 1994. "Children's phonological working memory: Contributions of long-term knowledge and rehearsal". *Journal of Memory and Language* 33: 672-688.
- Gathercole, S.E. and Baddeley, A.D. 1989. "Evaluation of the role of phonological STM in the development of vocabulary in children: a longitudinal study". *Journal of Memory and Language* 28: 200-213.
- Gentner, D. 2003. "Why we're so smart". In *Language in mind: Advances in the study of language and thought*, D. Gentner and S. Goldin-Meadow (eds). Cambridge, MA: MIT Press.
- German, D.J. 1984. "Diagnosis of word finding disorders in children with learning disabilities". *Journal of Learning Disabilities* 17 (6): 353-359
- Gillette, J., Gleitman, H., Gleitman, L. and Lederer, A. 1999. "Human simulations of vocabulary learning". *Cognition* 73: 135-176.
- Golinkoff, R.M., Mervis, C.V. and Hirsh-Pasek, K. 1994. "Early object labels: The case for a developmental lexical principles framework". *Journal of Child Language* 21: 125-155.
- Graves, M. 1986. "Vocabulary learning and instruction". In *Review of research in education*, E.Z. Rothkopf (ed.), 13: 49-90. Washington, D.C.: American Educational Research Association.
- Graves, M. 1987. "The roles of instruction in fostering vocabulary development". In *The nature of vocabulary acquisition*, M.G. McKeown and M.E. Curtis (eds), 165-184. Hillsdale, NJ: Erlbaum.
- Hart, B. and Risley, T. 1992. "American parenting of language-learning children: Persisting differences in family-child interactions observed in natural home environments". *Developmental Psychology* 28: 1096-1105.
- Hart, B. and Risley, T. 1995. *Meaningful differences in everyday experience of young American children*. Baltimore: Brookes Publishers.
- Heibeck, T.H. and Markman, E.M. 1987. "Word learning in children: an examination of fast mapping". *Child Development* 58: 1021-1034.

- Hoff, E. and Naigles, L. 2002. "How children use input to acquire a lexicon". *Child Development* 73 (2): 418-433.
- Jenkins, J.R., Stein, M.L. and Wysocki, K. 1984. "Learning Vocabulary Through Reading". *American Educational Research Journal* 21 (4): 767-787.
- Jerger, S., Martin, R.C. and Damian, M.F. 2002. "Semantic and phonological influences on picture naming by children and teenagers". *Journal of Memory and Language* 47 (2): 229-249.
- Johnson, C.J. and Anglin, J.M. 1995. "Qualitative developments in the content and form of children's definitions". *Journal of Speech and Hearing Research* 38: 612-629.
- Kail, R. and Leonard, L.B. 1986. "Word-finding abilities in language-impaired children". *ASHA Monographs* 25.
- Kameenui, E.J., Dixon, D.W. and Carnine, D. 1987. "Issues in the design of vocabulary instruction". In *The nature of vocabulary acquisition*, M.G. McKeown and M.E. Curtis (eds), 129-145. Hillsdale, NJ: Erlbaum.
- Karmiloff-Smith, A. 1992. *Beyond Modularity*. Cambridge MA: MIT Press
- Keil, F. 1983. "Semantic inferences and the acquisition of word meaning". In *Concept development and the development of word meaning*, T.B. Seiler and W. Wannemacher (eds). New York: Springer.
- Keil, F.C. and Batterman, N. 1984. A characteristic-to-defining shift in the development of word meaning. *Journal of Verbal Learning and Verbal Behaviour* 23, 221-236.
- Kelly, D.J. 1997. "Patterns of verb use by pre-schoolers with normal language and specific language impairment". *Applied Psycholinguistics* 18 (2): 199-218.
- Leung, C. and Pikulski, J.J. 1990. "Incidental word learning of kindergarten and first grade children through repeated read aloud events". In *Literacy, theory and research: Analyses from multiple paradigms*, J. Zutell and S. McCormick (eds). Chicago: National Reading Conference.
- Levy, E. and Nelson, K. 1994. Words in discourse; a dialectical approach to the acquisition of meaning and use. *Journal of Child Language* 21: 367-390.
- Markman, E. 1989. *Categorisation and naming in children: Problems of induction*. Cambridge, MA: MIT Press.
- Markman, E.M. and Hutchinson, J.E. 1984. "Children's sensitivity to constraints on word meaning: Taxonomic versus thematic relations". *Cognitive Psychology* 16: 1-27.

- McCartney, K., Scarr, S., Phillips, D. and Grajek, S. 1985. "Day care as intervention: comparisons of varying quality programs". *Journal of Applied Developmental Psychology* 6 (2-3): 247-260.
- McCathren, R.B., Yoder, P.J. and Warren, S.F. 1995. "The role of directives in early language intervention". *Journal of Early Intervention* 19: 91-101.
- McGregor, K.K. and Waxman, S.R. 1998. "Object Naming at Multiple Hierarchical Levels: A Comparison of preschoolers with and without word-finding deficits". *Journal of Child Language* 25: 419-430.
- McKeown, M.G., Beck, I.I., Omanson, R.C. and Pople, M.T. 1985. "Some Effects of the Nature and Frequency of Vocabulary Instruction on the Knowledge and Use of Words". *Reading Research Quarterly* 20 (5): 522-535.
- Messer, D., Dockrell, J.E. and Murphy, N. (in press) "The relationship between naming and literacy in children with word-finding difficulties". *Journal of Educational Psychology*.
- Metsala, J.L. 1999. "Young children's phonological awareness and nonword repetition as a function of vocabulary development". *Journal of Educational Psychology* 91: 3-19.
- Michas, I. and Henry, L.A. 1994. "The link between phonological memory and vocabulary acquisition". *British Journal of Developmental Psychology* 12: 147-163.
- Miller, G.A. and Fellbaum, C. 1991. "Semantic Networks of English". *Cognition* 41 (1-3): 197-229.
- Nagy, W. and Herman, P. 1987. "Depth and breadth of vocabulary knowledge: Implications for acquisition and instruction". In *The nature of vocabulary acquisition*, M.G. McKeown and Curtis M.E. (eds), 19-35. Hillsdale, NJ. Erlbaum.
- Nagy, W.E., Diakidoy, I.-A. and Anderson, R.C. 1993. "The acquisition of morphology: learning the contribution of suffixes to the meanings of derivatives". *Journal of Reading Behaviour* 25: 155-170.
- Nagy, W.E., Herman, P.A. and Anderson, P.A. 1985. "Learning words from context". *Reading Research Quarterly* 20: 233-253.
- Nation, K. and Snowling, M.J. 1998. "Individual differences in contextual facilitation: Evidence from dyslexia and poor reading comprehension". *Child Development* 69: 996-1009.
- Nation, K. and Snowling, M.J. 1999. "Developmental differences in sensitivity to semantic relations among good and poor comprehenders: evidence from semantic priming". *Cognition* 70: B1-13.

- Nation, K., Marshall, C.M. and Snowling, M.J. 2001. "Phonological and semantic contributions to children's picture naming skill: Evidence from children with developmental disorders". *Language and Cognitive Processes* 16: 241-259.
- Nelson, K. 1996. *Language in Cognitive Development: The emergence of the mediated mind*. Cambridge: Cambridge University Press.
- Nelson, K. 1988. "Constraints on word learning?" *Cognitive Development* 3: 221-246.
- Nippold, M.A., Cuyler, J.S. and Braunbeck-Price, R. 1988. "Explanation of ambiguous advertisements: a developmental study with children and adolescents." *Journal of Speech and Hearing Research* 31 (3): 466-474.
- Pearson, B.Z., Fernandez, S.C., Lewedeg, V. and Oller, D.K. 1997. "The relation of input factors to lexical learning by bilingual infants". *Applied Psycholinguistics* 18 (1): 41-58.
- Penno, J.F., Wilkinson, I.A.G. and Moore, D.W. 2002. "Vocabulary acquisition from teacher explanation and repeated listening to stories: Do they overcome the Matthew effect". *Journal of Educational Psychology* 94 (1): 23-33.
- Pine, K. and Messer, D. 1998. "The influence of social processes on children's implicit and explicit representations". *Cognitive Development* 13: 109-126.
- Pine, K. and Messer, D. 2003. "The development of representations as children learn about balancing". *British Journal of Developmental Psychology* 21 (2): 285-301.
- Plunkett, K. and Wood, C. (in press) "The Development of Children's Understanding of grammar". In *Cognitive and language development in children*, J. Oates (ed.). Oxford: Blackwell.
- Ralli, A. 1999. *Investigating lexical acquisition patterns: context and cognition*. Doctoral Dissertation. University of London.
- Rice, M. 1990. "Preschoolers' QUIL: Quick incidental learning of words". In *Children's language*, G. Conti-Ramsden and C. Snow (eds), 7: 171-194. Hillsdale, NJ: Erlbaum.
- Rice, M. and Woodsmall, L. 1988. Lessons from television: Children's word learning when viewing. *Child Development* 59, 420-429.
- Rice, M. Oetting, J., Marquis, J., Bode, J. and Pae, S.Y. 1994. "Frequency of input effects on word comprehension of children with specific language impairment". *Journal of Speech and Hearing Research* 37 (1): 106-122.
- Rice, M., Buhr, J. and Nemeth, M. 1990. "Fast mapping word-learning abilities of language-delayed pre-schoolers". *Journal of Speech and Hearing Disorders* 55 (1): 33-42.

- Rudel, R.G., Denckla, M.B., Broman, M. and Hirsch, S. 1980. "Word finding as a function of stimulus context: Children compared with aphasic adults". *Brain and Language* 10: 111-119.
- Sabbagh, M.A. and Baldwin, D.A. 2001. "Learning words from knowledgeable versus ignorant speakers: Links between preschoolers' theory of mind and semantic development". *Child Development* 72 (4): 1054-1070.
- Scarborough, H.S. 1989. "Prediction of reading disability from familial and individual differences". *Journal of Educational Psychology* 81: 101-108.
- Schechter, B. and Broughton, J. 1991. "Developmental relationships between psychological metaphors and concepts of life and consciousness". *Metaphor and Symbolic Activity* 6 (2): 119-143.
- Scott, J.A. and Nagy, W.E. 1997. "Understanding the definitions of unfamiliar verbs". *Reading Research Quarterly* 32: 184-200.
- Snow, C. 1990. "The development of definitional skill". *Journal of Child Language* 17 (3): 697-710.
- Snowling, M., van Wagendonk, B. and Stafford, C. 1988. "Object naming deficits in developmental dyslexia". *Journal of Research in Reading* 11 (2): 67-85.
- Soja, N.N., Carey, S. and Spelke, E. 1991. "Ontological categories guide young children's inductions of word meaning: Object terms and substance terms". *Cognition* 38: 179-211.
- Stahl, S.A. and Fairbanks, M.M. 1986. "The effects of vocabulary instruction: A model based meta-analysis". *Review of Educational Research* 56 (1): 72-110.
- Stanovich, K.E. and Cunningham, A.E. 1993. "Where does knowledge come from? Specific associations between print exposure and information acquisition". *Journal of Educational Psychology* 85 (2): 211-229.
- Sternberg, R.J. 1987. "Most vocabulary is learned from context". In *The nature of vocabulary acquisition*, M.G. McKeown and M.E. Curtis (eds), 89-106. Hillsdale, NJ: Erlbaum.
- Sternberg, R.J. and Powell, J.S. 1983. "Comprehending verbal comprehension". *American Psychologist* 38: 878-893.
- Storck, P.A. and Looft, W.R. 1973. "Qualitative analysis of vocabulary responses from persons aged six-to sixty-six plus". *Journal of Educational Psychology* 65: 192-197.

- Storkel, H.L. 2001. "Learning new words: Phonotactic probability in language development". *Journal of Speech Language and Hearing Research* 44 (6): 1321-1337.
- Storkel, H.L. and Rogers, M.A. 2000. "The effect of probabilistic phonotactics on lexical acquisition". *Clinical Linguistics and Phonetics* 14: 407-425.
- Swan, D. and Goswami, U. 1997. "Picture naming deficits in developmental dyslexia. The phonological representations hypothesis". *Brain and Language* 56 (3): 334-353.
- Swanborn, M. and de Glopper, K. 1999. "Incidental word learning while reading: A meta-analysis". *Review of Educational Research* 69 (3): 261-285.
- Tomasello, M. and Kruger, A.C. 1992. "Joint Attention on Actions - Acquiring Verbs in Ostensive and Non-Ostensive Contexts". *Journal of Child Language* 19 (2): 311-333.
- Watson, R. 1995. "Relevance and definition". *Journal of Child Language* 22 (1): 211-222.
- Weizman, Z.O. and Snow, C.E. 2001. "Lexical input as related to children's vocabulary acquisition: Effects of sophisticated exposure and support for meaning". *Developmental Psychology* 37 (2): 265-279.
- Windfuhr, K.L., Faragher, B. and Conti-Ramsden, G. 2002. "Lexical learning skills in young children with specific language impairment (SLI)". *International Journal of Communication Disorders* 37: 415-432.

---

<sup>i</sup> We would like to thank Eve Clark and Ruth Berman for constructive criticisms of an early draft of this chapter. The discussions with Dr. Assimina Ralli and Dr. Rachel Best during the completion of their doctorates has contributed to our understanding of the issues raised here.