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Real world word learning: Exploring the development of children's lexical representations

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ABSTRACT

The ability to acquire new words draws on cognitive, linguistic and social competencies. Assessments of lexical acquisition are often limited to studies using multiple choice comprehension measures in contrived experimental contexts. To address these limitations the current study assessed the ways in which children developed their semantic representations of animal and artefact terms. Children differed in their knowledge of the target terms and experienced different linguistic exposures over a four week period. One hundred and thirty preschool children (mean age = 5;6) were randomly assigned to five conditions (one control and four experimental conditions). For the control and the phonological group, the knowledge children acquired about the target words was assessed at two points, baseline and at a three week follow up. For the remaining experimental groups their understanding of the terms was assessed at five points in time (baseline, 1st week, 2nd week and 3rd week post test). A range of assessment tasks were used to assess lexical knowledge: confrontational naming, multiple choice comprehension measures, sorting, short questions, identification of relations, (association task) definitions and a story generation task. Children's word knowledge from the different conditions/groups was compared across tasks and time. The analysis focused on the depth and breadth of knowledge that the children acquired for the target words. Independent variables included previous knowledge of the target words, lexical knowledge of other words from the same semantic domain, semantic domain of the target words and type of lexical exposure. There were subtle and complex effects of the different exposure contexts for word learning. Children's performance was significantly better for items that were partially represented than for the unknown words. Children's existing vocabulary knowledge for animals was positively correlated with the acquisition of the target words describing animals. However, this was not the case for artefacts. The assessments of word knowledge revealed different aspects of depth in lexical knowledge.

Key words: Lexical representation, Prior lexical knowledge, Linguistic context, Word learning.

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1. Introduction

Children's ability to acquire new words challenges our understanding of teaching and learning. Children appear to rapidly acquire many new words during the preschool period, but later acquisition can be slower. It is estimated that between 10.000-16.000 words are acquired before the age of six, and this equates to a rate of approximately eight to nine words per day, or one word every waking hour (Markman, 1990). Many new words are acquired incidentally from verbal or written contexts rather than through explicit vocabulary instruction (Penno, Wilkinson & Moore, 2002).Young children can grasp aspects of the meaning of a new word on the basis of a few incidental exposures, without any explicit training or feedback. This skill has been described as "fast mapping" (Carey 1978. Carey & Bartlett, 1978. Dockrell & Campbell, 1986. Heibeck & Markman, 1987. Rice and Woodsmall, 1988). The extent to which "fast mapping" generalizes beyond highly controlled or simplified situations or for a certain type of words is a matter of debate (Deak & Wagner, 2003. Dockrell, Braisby & Best, 2007).

Lexical acquisition is a complex phenomenon that extends beyond the simple mapping of meanings to word referents (Deak, 2000. Deak & Wagner, 2003). Learning the full conventional meaning of a word may take months or even years and is characterized by reorganization of lexical categories that continues well after the entry of new words into the vocabulary (Ameel, Malt & Storms, 2008). In order for the child to complete the acquisition process, knowledge of the relevant information about words (pronunciation, syntax, meaning, communication of the message) must be represented in the mind. An interesting attempt to determine the nature of these representations (mental lexicon) was offered by Lyons (1977) who proposed a distinction between reference, denotation and sense. Reference of a word is the thing or the things picked out by the word on a particular occasion of use. Denotation indicates the entire class of entities associated with a word. Sense describes the ways in which words are related to one another in the lexicon.

However, in order for the child to complete the acquisition process a variety of other factors, (the linguistic input, the partial knowledge and the semantic domain of the target words), play also a significant role. The recent findings about those parameters are discussed in the following sections.

The role of input for word learning

Hoff and Naigles (2002) suggested that lexical acquisition is a data-crunching process and conversation is a delivery mechanism whose value lies, to a substantial degree, in the nature of the data that it delivers. More, specifically, this data-providing-view of input proposes that three different data-providing properties of input are related to children's vocabulary development: frequency of presentation, number of different words, and richness and variety of linguistic environments in which the words are placed.

Children can use their (sometimes partial) understanding of the words and the structure of the utterance in which an unknown word is placed, to make inferences about the referent of that novel word (Hoff & Naigles, 2002). The amount of variation in the lexical richness and syntactic complexity of the utterances that children are exposed to, accounts for a significant proportion of variation in productive vocabularies (Akhtar & Tomasello, 2000. Bloom, 2000. Hirsh-Pasek, & Golinkoff, 2000. Hoff & Naigles, 2002). Experimental studies have also demonstrated that 2- and 3- year old children can use the surrounding sentence as a source of information about word reference and meaning (Dockrell & McShane, 1990. Gillette et al., 1999. Prasada & Choy, 1998). Experimental data from children aged 4-6 has shown that young children can attend the syntax of a word and the linguistic context when determining what the word means (Best, Dockrell & Braisby, 2006. Ralli & Dockrell, 2005).

Multiple exposures to lexical items may support learning by providing the children with a range of linguistic contexts. It is well documented that children require cross-situational information to develop lexical representations as this can reveal more aspects of a given's word's meaning (Fisher et al., 1994. Pinker, 1989). Thus, each presentation provides new information about word meaning (Akhtar & Montague, 1999.

Gleitman, 1990. Hoff & Naigles, 2002. Naigles, 1996. Waxman & Markow, 1998).

The role of partial knowledge for word leaning

In order for children to complete the acquisition process they must learn at least four things: (1) phonological output representation, (b) the syntactic properties of the word, (3) the sense of the word and (4) how the word is used to communicate one's intended message (Carey, 1978). Ultimately each representation will be subject to continual revision as the children encounter different examples of the intended referent. Given a hypothesis space and one or more examples of a novel's word referents, the learner evaluates all hypotheses for candidate word meanings by computing their posterior probabilities, proportional to the product of prior probabilities and likelihoods (Tenenbaum & Xu, 2000).

Few studies have attempted to operationalise this process by considering the role of children's prior knowledge of the target words for the development of their semantic representations. Ameel, Malt and Storms (2008) found substantial evolution in the use of common nouns (partially known names for objects) well past the early years of language acquisition. Gradual convergence to adult meaning was achieved through addition of new words to the vocabulary as well as through extended reorganizations of existing categories. Computer simulations have similarly demonstrated that the use of partial linguistic knowledge to constrain hypotheses, combined with the ability to extract commonalities across different situations of use can result in enhanced lexical acquisition (Siskind, 1996). Thus, the child's previous understanding of a lexical item is likely to play a key role in the subsequent development of the terms' meaning.

The role of semantic domain of the words

Another important parameter in word learning is the semantic complexity of the words that children encounter. Animals and artefacts are two ontological categories which have been used by many studies (e.g. Keil, 1989) to explore this issues. There is now a substantial literature, indicating that by 3 or 4 years of age, children conceptualize animate entities and artefacts in very different ways. In match-to-sample tasks animate entities are more likely than artefacts to prompt young children to go beyond observable similarity judgments and to make inferences about the "non-observable" characteristics of animate entities (Blanchet, Dunham & Dunham, 2001. Gelman, Croff & Panfanq, 1998). Such that, the ontological domain of a labeled object influences preschoolers' extension of the novel word (Braisby, Dockrell & Best, 1999. Keil, 1994). It has also been documented in the literature that children as young as three extend novel words differently depending on the ontological kind of the object being labeled (Booth & Waxman, 2002). In the artifact conditions words were extended on shape alone, while those in the animate conditions were extended both on shape and texture. Thus, another important consideration in understanding the development of children's semantic representations is the extent to which different lexical domains produce different acquisition patterns from different inputs.

Assessments of lexical knowledge

Researchers typically distinguish between two aspects of an individual's vocabulary knowledge: breadth and depth. Breadth of vocabulary refers to the size of the mental lexicon and reflects the number of words that the child has some knowledge of. However, breadth does not address how well each of these words is known (Anderson & Freebody, 1981). Depth refers to the richness of knowledge that the individual possesses about the words. Depth of lexical knowledge can vary. At the most basic level, a word can be recognized but not well understood (Funnell, Hughes & Woodcock, 2006). As a richer representation is developed, words can be defined in detail, relations can be made between the word and other words, multiple meanings of a word can be learned, and the word can be used in different contexts (Beck, Mckeown, & Kucan, 2002. Stahl, 1998).

To evaluate depth of lexical knowledge multiple approaches to assessment are required. One persistent difficulty is that there are no formal criteria to judge when a word is known (Beck &

McKeown, 1991. Dockrell & Messer, 2004). The most widely used measure of word knowledge in experimental studies is the multiple-choice format immediately after the exposure (Elley, 1989. Robbins & Ehri, 1994). However, word knowledge assessed from a multiple-choice test only is limited since children can succeed on such tasks with only partial knowledge of the items tested. However, such measures can provide and indication of the breadth of children's vocabulary knowledge. Furthermore, the immediate assessment of comprehension in this format, which is typically used in "fast mapping" tasks, provides an indication of the retention over time of new lexical items. The nature of lexical knowledge acquired through a multiple choice comprehension or production measures provides us with an important insight into how well a word is known "at a first level" (Best, 2003. Ralli, 1999). On the other hand, depth of lexical knowledge needs to be investigated through different assessments to ascertain what has been acquired (Beck & McKeown, 1991. Ralli & Dockrell, 2005). Recent studies have shown the importance of measuring word learning using multiple tasks in order to tap both the breadth and the depth of word knowledge (Best, Dockrell & Braisby, 2006. Ralli & Dockrell, 2005). Ralli and Dockrell (2005) have proposed that the synthesis of various approaches provides the most comprehensive indicator of a child's lexical knowledge. The current study extends this approach to examining lexical acquisition by evaluating children's performance for new lexical items on tasks which assess both depth and breadth of vocabulary knowledge over time.

The current study develops Hoff's & Naigles's (2002) hypothesis by examining two of the three data-providing properties. Frequency of presentation is investigated by including four experimental conditions and one control where the frequency of presentation of the target words varies by condition. The importance of the linguistic input was examined by exposing children to different linguistic contexts in which novel words were introduced. The choice of the different linguistic contexts is informed by findings about the ways in which sentence frames and context support lexical learning. Three different exposures formats were considered: Ostensive definition, Lexical contrast and Definition. Ostensive definition support children's lexical learning and have been particularly successful in acquisition of complex terms (Gottfried & Tonks, 1996). Also, preschool children can successfully use lexical contrast to establish the meanings of new terms of contrast to infer the meanings of novel words (Carey, 1978. Dockrell & Campbell, 1986) while older school age children can learn words from a single definition (Dickinson, 1984. Weizman & Snow, 2001). To ensure that children's learning was not simply explained by repeated exposure to a novel phonological form, a phonological comparison condition was included.

The extent, to which children's word learning process is moderated also by within child and lexical factors, was investigated by examining children's previous lexical knowledge and controlled the semantic domains of the target terms. Taking into account findings from other studies that were previously mentioned (Braisby & Dockrell, 1999. Keil, 1994. Siskind, 1996) the present study explores the role of children's prior knowledge as well as the semantic domain of the target words. Last, in order to investigate the incremental development of lexical representations, target items were identified on the basis of the children's current level of knowledge - half the items were unknown to the children and for the remaining half the children were deemed to have partial representations of the new terms-. Multiple methods of assessing word knowledge were used to tap the depth and breadth of the children's developing lexical representations.

2. Purpose of the present study

The current study aimed to extend our understanding of lexical acquisition in pre-school children by using naturalistic exposures to novel words to tap children's developing representations of animal and artefact terms. Terms were introduced in different linguistic contexts, phonological, ostensive definition, lexical contrast,

Table 1
Characteristics of the sample

Groups	Age		Boys	Girls	Total
	Range	Mean	13	13	26
Control	4.10-6.00	5 yrs 5 months	13	13	26
Phonological	4.10-5.11	5 yrs 3 months	13	13	26
Ostensive Definition	4.10-5.08	5 yrs 3 months	13	13	26
Lexical contrast	4.11-6.00	5 yrs 6 months	13	13	26
Definition	4.11-5.09	5 yrs 3 months	13	13	26
TOTAL					130

definition. The choice of the certain linguistic contexts is based on certain findings demonstrating the supportive role they have on word learning and were discussed in the previous section It was also hypothesized that naturalistic exposure to cross-situational information (experimental groups) as opposed to single exposures (control group) would reveal more aspects of a given's word's meaning (Fisher et al., 1994. Pinker, 1989). Based on the literature, indicating that the ontological domain of a labeled object influences preschoolers' extension of the novel word (Braisby, Dockrell & Best, 1999. Keil, 1994. Siskind, 1996. Ameel, Malt & Storms, 2008) it was also predicted that the impact of lexical input would vary between animal and artefact terms, and that children would acquire animal terms more readily. To examine the effect of children's previous knowledge of the lexical items children were presented with unknown and partially represented items.

Acquisition was monitored over a four week period. Performance was evaluated across a range of tasks (naming, multiple choice, association, short questions (world knowledge and categorization), lexical contrast, definition and story generation) over time in order to tap the breath and depth of word knowledge. It was hypothesized that children's performance would differ by the type of task.

3. Method

Participants

Two hundred and fifty children between 5 and 6 years old from five primary schools in London, drawing from a mixed socio economic background, were screened to assess their knowledge of the target items. All the children had English as their first language. Children's knowledge of the four target words (2 were of high frequency and 2 were of low frequency) was assessed on two different pretest measurements: (a) naming and (b) multiple choice tasks. To be included in the study, children needed: (a) to fail in the naming and multiple choice task for both the low frequency words and (b) to succeed in the multiple choice and fail the naming task for both the high frequency words. One hundred and thirty children met the entry criteria to the study. All the children who participated in the study had a mean age: 5; 6, (range 4;10- 6; 0), 65 were boys and 65 were girls (Table 1).

4. Materials and Measurements

The target lexical items

Four target items were identified; two were animal terms (ostrich and mole) and two were artefact terms (ladle and stool). For each domain one item was a high frequency word (mole for

Table 2
Tasks assessing lexical knowledge for the four target words

Measurement	What does it measure	Description of the measurements
1. Naming task	Phonological knowledge	*"What is this?"*
2. Multiple choice task	Non-verbal knowledge	*"Can you show me the x?"*
3. Association task	Semantic knowledge	*"What goes best with the x?"*
4. Short questions task		
a. World knowledge quest.	Semantic knowledge	*"Can we find the x in the y place?"*
b. Categorisation quest.	Semantic knowledge	*"Is the x a kind of y?"*
5. Lexical contrast task	Semantic knowledge	*Can you tell me something else which is different from the y?"*
6. Definition task	Metalinguistic knowledge	*"What do you think an x is?"*
7. Story generation task	Spontaneous production and understanding	*"Can you make up a story about the x?"*

animals and stool for artefacts) and the other one was a low frequency word (ostrich for animals and ladle for artefacts). The items' word frequency was based on Thorndike's and Lorge's index (1944).

Screening measures

In order to explore the effects of existing vocabulary knowledge, a vocabulary test particularly designed for the present study, (based on Dockrell, Messer & George, 2001) was employed. The new vocabulary test measured children's expressive and receptive vocabulary for the four target items and a further 18 items, 9 animal terms and 9 artefact terms (Appendix 1). Thus, the maximum score a child could get for comprehension and production vocabulary tests was 18 for each one. Items were presented on a laptop computer. The order of presentation was randomized. Expressive vocabulary was examined using a picture naming test, while receptive vocabulary was examined using a multiple choice test. The naming vocabulary test included the same items as the comprehension vocabulary test.

Post test measurements

Multiple tasks were developed to tap children's word knowledge. The order of the post-test assessment tasks was preset in the order that follows in Table 2.

Design

The children were randomly assigned to one of five experimental conditions. Control and four experimental conditions (Phonological, Ostensive definition, Lexical contrast and the Definition). The number of children in the different conditions was balanced for age and gender. The children from the Control condition did not take part in any intervention.

The experimental assessments took place after each intervention and children's word knowledge was evaluated at four point times (Screening, 1st week post test, 2nd week post test, 3rd week post test). The children from the Control and the Phonological condition were only assessed at the pre-test and post test 3, while the

Table 3
Design of the Study

	Sc	Session 1	M	Session 2	M	Session 3	M
Control Group	✓	No intervention	–	No intervention	–	Story reading	✓
Phonological group	✓	**Phonological repetition** *«Can you repeat after the puppet?»*	–	**Phonological repetition** *«Can you repeat after the puppet?»*	–	**Story reading** *«Listen to the story that the puppet will tell you».*	✓ ✓
Ostensive definition group	✓	**Ostensive definition** *«This is an x».*	✓	***Ostensive definition***	✓	**Story reading**	✓
Lexical contrast group	✓	**Ostensive definition** *«This is an x».*	✓	**Lexical contrast** *«The x is different from the y and z because it.....*	✓	**Story reading**	✓
Definition group	✓	**Ostensive definition** *«This is an x...»*	✓	**Definition** *«The x is a...»*	✓	**Story reading**	✓

Sc.=screening, M = measurement (–) = no measurement ✓ = measurement

children from the other three experimental conditions (Ostensive definition, Lexical contrast, Definition) were assessed on two additional occasions (post test 1 and 2).

5. Procedure

All the tasks were introduced to the children as "games" where there were no right or wrong answers. Each session lasted around 20 minutes. Children were tested in four separate sessions, one week apart.

The first session included two pre-test measurements: (a) Prior lexical knowledge which measured children's receptive and expressive vocabulary knowledge of lexical items from the same semantic domains as the target words; (b) the target vocabulary pre-test which was described in the participants' section.

The children in the Control condition received no further assessments until the final session. The children in the Phonological condition during the first two sessions (screening and post test 1) repeated the new terms in the context of a copying game.

The remaining three experimental groups were exposed to different linguistic contexts

Table 4
Children's performance (means, sds and statistical comparisons) on the screening test

	Comprehension		Naming		T	Sig.
	Mean	Sd	Mean	Sd		
Control	16	1.11	12	1.83	12.2	0.000
Phon. Control	16.19	1.76	12.30	2.86	11.4	0.000
Ostens. Definition	16.50	1.24	11.88	1.92	11.5	0.000
Lex. Contrast	15.54	1.55	13	2.43	5.3	0.000
Definition	16.81	1.57	13.92	1.78	7.6	0.000

throughout three consecutive sessions. As shown in Table 3, the order of exposure to the different linguistic contexts was structured in such a way that children were given additional information about the meaning of the word in each subsequent session.

Apart from the control condition, the children in the phonological condition received mainly phonological information about the target words, and the children in the ostensive definition condition received only a name for the target words. On the other hand, the children in the lexical contrast condition received additional information about the semantic category of the target words while the Definition condition was the one that provided the children with the most information about the target words.

For all the children, the last session consisted of a story reading session where the four stories that were read to them, included the following information for the target words: (a) Description/ what it can do; (b) where it can be found; (c) be kind of a superordinate category. Also, each of the target words appeared an equal number of times (three) in each story and was also presented in relation to other items for the same semantic category. After each exposure to story readings, children's word knowledge was assessed in seven post test tasks which were presented before in Table 2.

6. Results

The present study had mixed within-subjects (time of testing, 1st , 2nd, and 3rd) and between-subjects design (exposure group, the prior lexical knowledge the semantic domain and prior knowledge of the target lexical items). All children were exposed to four terms.

The results are reported in five sections. The first section describes children's existing vocabulary knowledge and word learning, the second section examines the role of input on children's word learning, the third section examines the impact of prior lexical knowledge on word learning, the fourth section examines the differential impact of semantic domains and the final section considers the depth of the children's vocabulary acquisition.

Baseline measures established that all the children who took part in the study met the entry criteria, that is they failed both on the multiple choice comprehension and production measures for the low frequency items and passed the comprehension task but failed the production test for the high frequency items. In general, non-parametric statistics were applied, since the conditions for using parametric tests were not satisfied. Only in a few cases where the variances among groups were equal (according to Levene test) parametric statistics were used.

Table 5
Children's performance (means and sds) on the screening tests (existing naming and comprehension vocabulary knowledge) for each subgroup

Groups	Naming		Comprehension	
	Mean	SD	Mean	SD
Control				
High level	14.14	(0.377)	17.22	(0.44)
Low level	11.21	(1.47)	15.4	(0.795)
Phonological				
High level	14.4	(0.726)	17.35	(0.497)
Low level	11.17	(2.94)	14.83	(1.74)
Ostensive definition				
High level	14.75	(9.57)	17.40	(0.507)
Low level	11.36	(1.55)	15.27	(0.786)
Lexical contrast				
High level	15.44	(1.33)	17.50	(0.547)
Low level	11.70	(1.79)	14.95	(1.23)
Definition				
High level	15.00	(0.866)	17.52	(0.51)
Low level	11.88	(1.16)	14.85	(1.86)

7. Existing vocabulary knowledge and word learning

Children's performance on the baseline vocabulary assessments is presented in Table 4. The maximum score achievable for the naming and the comprehension test was 18. As shown in Table 4 for each of the five conditions children's baseline vocabulary for comprehension was significantly higher than their baseline vocabulary for naming. Furthermore, no significant differences were found in success rates among the conditions for either naming or comprehension.

To identify groups of good and poor namers and comprehenders children were classified using their results on the screening measures. Stem and leaf charts were used to classify children's performance on the screening tests into high or low. Children were placed in the low naming vocabulary category if they scored between 1-13 and the high naming vocabulary category was given if they scored between 14-18. Children were placed in the low comprehension vocabulary if they scored between 1-16 and in the high level comprehension if they scored between 17-18 correct responses. Table 5 presents children's subgroups' performance on the screening tests

Overall, children with high existing receptive and expressive vocabulary knowledge performed better than the children with low expressive and receptive

vocabulary knowledge across all the post tests (only the significant differences will be presented). Specifically, in the 1st post test children with high existing expressive vocabulary knowledge performed significantly better on the naming ($Z=2.1$, $p<0.05$) and the multiple choice tasks ($Z=2.4$, $p<0.05$). Children with high existing receptive vocabulary knowledge also performed better on the naming task ($Z=2.1$, $p<0.05$). During the 2nd post test, for those children with high existing receptive vocabulary knowledge, performance was significantly better on the short questions (categorisation) task ($Z=2.89$, $p<0.005$). Also, for those children with high existing expressive vocabulary knowledge performance was significantly better on the naming ($Z=4.64$, $p<0.005$) and the definition ($Z=3.89$, $p<0.005$) tasks. During the final post test children with high existing receptive vocabulary performed significantly better on the short questions (categorisation task) ($Z=3.38$, $p<0.005$) and the story generation task ($Z=3.08$, $p<0.005$). For those children with high existing expressive vocabulary knowledge, performance was significantly better on the naming ($Z=4.01$, $p<0.005$), short questions (world knowledge) ($Z=2.85$, $p<0.005$) short questions (categorisation) ($Z=3.16$, $p<0.005$) lexical contrast ($Z=2.95$, $p<0.005$) and definition ($Z=3.05$, $p<0.005$) tasks.

A series of bivariate correlations were carried out between children's existing vocabulary for animals and artefacts (excluding target items) and their overall performance on the acquisition of the new target items. Across the three sessions there were 24 measures of knowledge of the new animal terms and 24 measures of knowledge of the new artefact terms. Children's existing vocabulary knowledge for animals (expressive and receptive vocabulary) was positively correlated with virtually all measures tapping the acquisition of the target words describing animals (31 of the correlations were significant for animals (see Table 6). In contrast, children's existing vocabulary knowledge for artefacts was not strongly related to the acquisition of the target words describing artefacts (11 of the correlations were significant for artefacts) (see Table 7 for stats).

Overall, children with high existing receptive and expressive vocabulary knowledge performed better across tasks and post tests. Furthermore, children's existing vocabulary knowledge for animals (receptive and expressive) was positively correlated with the acquisition of the target words describing animals. In contrast, children's existing vocabulary knowledge for artefacts (receptive and expressive) was not strongly associated with the acquisition of the target words describing artefacts.

8. The role of input on children's novel word learning

To examine children's word learning performance by the type of exposure across post tests, a composite score was constructed; each child could score a maximum of 32 (8 tasks * 4 items). Three Kruskall-Wallis one-way analyses of variance were carried out, with group of exposure as the independent variable and the composite score for word learning as the dependent variable. Children's word learning varied significantly by the type of exposure across testing (P1:$x^2=17.07$, $df=2$, $p<0.005$]; (P2: $x^2=42.04$, $df=2$, $p<0.005$]; (P3: $x^2=75.39$, $df=4$, $p<0.005$]. Table 8 presents descriptive statistics for each condition across testing.

Further analyses for the 1st post test, revealed that children in the Ostensive definition condition performed significantly worse than children in the Definition (Wilcoxon: $Z=2.01$, $p<0.05$) and the Lexical contrast conditions (Wilcoxon: $Z=3.03$, $p<0.005$) for overall word learning. Post-hoc analysis for the 2nd post test revealed the same pattern as in the 1st post test. Again, children in the Ostensive definition condition performed significantly worse than children in the Lexical contrast (OD<LC: Wilcoxon: $Z=2.04$, $p<0.05$), and the Definition conditions [OD<DE group (Wilcoxon: $Z=4.01$, $p<0.005$). Children in the Definition condition performed significantly better than those children in the Lexical Contrast condition (Wilcoxon: $Z=3.06$, $p<0.005$). During the 3rd post test, no significant differences were found between children in the Control and the Phonological condition or children in the Phonological and the Ostensive

Table 6
Correlations between children's expressive and receptive vocabulary for animals and performance to the target words describing animals across testing

MEASUREMENTS	ExiNaVoAni	ExiCoVoAni
Naming (1)	0.3318 (78) p=**	0.3611 (78) p=**
Naming (2)	0.5218 (78) p=***	0.4181 (78) p=***
Naming (3)	0.4798 (130) p=***	0.3276 (130) p=***
Multiple choice (1)	0.4389 (78) p=***	0.4709 (78) p=**
Multiple choice (2)	0.4938 (78) p=***	0.5179 (78) p=***
Multiple choice (3)	0.2710 (130) p=**	0.2545 (130) p=**
Definition (1)	0.3496 (78) p=**	0.3002 (78) p=**
Definition (2)	0.4533 (78) p=***	0.3022 (78) p= **
Definition (3)	0.3743 (130) p=***	0.3093 (130) p=***
Association (1)	0.1871 (78) p=0.101	0.2501 (78) p=*
Association (2)	0.0791 (78) p=0.491	0.1572 (78) p=0.169
Association (3)	0.3150 (130) p=***	0.1630 (130) p=0.064
Lexical contrast (1)	0.0319 (78) p=0.782	0.0319 (78) p=0.782
Lexical contrast (2)	0.3417 (78) p=**	0.2002 (78) p=0.079
Lexical contrast (3)	0.3129 (130) p=***	0.1616 (130) p=0.066
Story generation (1)	0.1040 (78) p=0.365	0.0716 (78) p=0.534
Story generation (2)	0.2214 (78) p= *	0.2771 (78) p=*
Story generation (3)	0.2883 (130) p=**	0.2843 (130) p=**
Categorisation question (1)	0.0293(78) p=0.799	0.0947 (78) p=0.410
Categorisation question(2)	0.3078 (78) p= **	0.2727 (78) p=*
Categorisation question (3)	0.3343 (130) p=***	0.2542 (130) p=**
World knowledge question (1)	0.3315 (78) p=**	0.1214 (78) p=0.290
World knowledge question (2)	0.1500 (78) p=0.190	0.1170 (78) p=0.308
World knowledge question (3)	0.3652 (130) p=***	0.2055 (130) p=*

Abbreviations: ExiNaVoAni=Existing Naming Vocabulary for animals; ExiCoVoAni=Existing Comprehension Vocabulary knowledge for animals; (1) =Post test 1; (2) Post test 2; (3) =Post test 3.
*=p<0.05, **=p<0.01, ***=p<0.001

Table 7
Correlations between children's expressive and receptive vocabulary for artifacts and performance to the target words describing artefacts across testing

MEASUREMENTS	ExiNaVoAni	ExiCoVoAni
Naming (1)	0.1863 (78) p=0.102	0.2061 (78) p=0.070
Naming (2)	0.2716 (78) p=*	0.1985 (78) p=0.081
Naming (3)	0.2255 (130) p=*	0.1057 (130) p=0.232
Multiple choice (1)	0.1491 (78) p=0.193	0.1346 (78) p=0.240
Multiple choice (2)	0.1727 (78) p=0.131	0.1310 (78) p=0.253
Multiple choice (3)	–0.1522 (130) p=0.084	0.0698 (130) p=0.430
Definition (1)	0.0767 (78) p=0.504	–0.0517 (78) p=0.653
Definition (2)	0.1920 (78) p=0.092	0.2713 (78) p=*
Definition (3)	0.2227 (130) p=*	0.117 (130) p=0.182
Association (1)	0.0717 (78) p=0.533	0.1166 (78) p=0.309
Association (2)	0.1976 (78) p=0.083	0.858 (78) p=0.455
Association (3)	0.1722 (130) p=*	0.0168 (130) p=0.849
Lexical contrast (1)	0.1421 (78) p=0.215	0.1278 (78) p=0.265
Lexical contrast (2)	0.1427 (78) p=0.213	0.0160 (78) p=0.889
Lexical contrast (3)	0.0729 (130) p=0.410	0.1871 (130) p<*
Story generation (1)	0.2408 (78) p=*	0.0071 (78) p=0.950
Story generation (2)	0.0998 (78) p=0.385	0.0765 (78) p=0.506
Story generation (3)	0.1551 (130) p=0.078	0.1031 (130) p=0.243
Categorization question (1)	0.0015 (78) p=0.990	0.1672 (78) p=0.143
Categorization question (2)	0.1201 (78) p=0.295	0.1929 (78) p=0.091
Categorization question (3)	0.1525 (130) p=0.083	0.1912 (130) p=*
World knowledge question (1)	0.0839 (78) p=0.465	0.0015 (78) p=0.989
World knowledge question (2)	0.1965 (78) p=*	0.0774 (78) p=0.501
World knowledge question (3)	0.3944 (130) p=***	0.1974 (130) p=*

Abbreviations: ExiNaVoArti=Existing Naming Vocabulary for artifacts; ExiCoVoArti=Existing Comprehension Vocabulary for artifacts; (1) =Post test 1; (2) Post test 2; (3) =Post test 3.
*=p<0.05, **=p<0.01, ***=p<0.001

Table 8
Children's overall word learning by group of exposure across testing

Groups	Post test 1 Mean (sd)	Median	Mode	Post test 2 Mean (sd)	Median	Mode	Post test 3 Mean (sd)	Median	Mode
Control							12.4 (5.3)	13	13
Phonological							14.3 (5.6)	15	15
Ostensive definition	13.04 (4.7)	13.50	14	13.50 (4.6)	13	11	16.04 (5.9)	17	11
Lexical contrast	16.1 (4.6)	16	13	18.5 (4.9)	18.50	17	21.6 (4.2)	21	21
Definition	18.6 (3.8)	18.50	15	24.2 (3.1)	24.50	25	26.7 (2.1)	27.50	28

definition conditions on overall word learning. In contrast, children in the Control condition performed significantly worse than the children in the Ostensive definition (Wilcoxon: $Z=2.03$, $p<0.05$), the Lexical contrast (Wilcoxon: $Z=5.1$, $p<0.005$) and the Definition conditions (Wilcoxon: $Z=6.1$, $p<0.005$). The children from the Phonological condition performed significantly worse than the children in the Lexical contrast (Wilcoxon: $Z=4.4$, $p<0.005$) and the Definition conditions (Wilcoxon: $Z=6.1$, $p<0.005$). The children from the Ostensive definition condition performed significantly worse than those from the Lexical contrast (Wilcoxon: $Z=3.4$, $p<0.005$) and the Definition conditions (Wilcoxon: $Z=5.7$, $p<0.005$). Last, the children from the Definition condition performed significantly better than those from the Lexical contrast condition (Wilcoxon: $Z=4.2$, $p<0.005$). Three analyses of covariance were carried out to explore whether existing vocabulary knowledge was a significant factor in post test performance. The covariates were the existing receptive and expressive vocabulary raw scores, with exposure condition (Control, Phonological, Ostensive definition, Lexical contrast, Definition)[3] as the independent variable and the composite score on word learning as the dependent variable.

A significant effect of condition was found $F(1,73)=5.1$, $p<0.05$) for the 1st post test, demonstrating that the children from the Definition condition still performed better than the children from the other conditions when controlling existing receptive and expressive vocabulary. A similar pattern was found for the 2nd and 3rd post tests, with group of exposure still having a significant effect (P2: $F(1,73)=28.6$, $p<0.005$); P3: $F(1,123)=32.2$, $p<0.005$)

Input had a significant role in the children's overall word learning across post tests. This was particularly evident for children in the Lexical contrast and Definition conditions. Both these conditions resulted in significantly enhanced performance than the Ostensive definition, Phonological and Control conditions. The best performance was observed by the children in the Definition condition.

9. The impact of prior lexical knowledge on word learning

The impact of the children's prior knowledge for the lexical items was examined across the testing sessions. During post test 1, children's performance

3. For the 1st and the 2nd post test only the last three groups were included in the group variable.

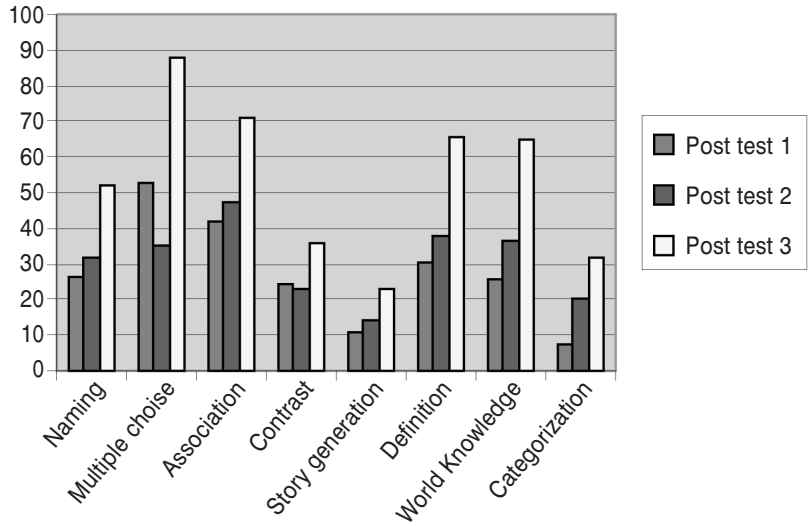

Figure 1
Correct responses (%) across tasks over time

was significantly better for the partially represented items than for the unknown words for naming ($Z=3.98$, $p<0.005$), short questions (world knowledge) ($Z=4.31$, $p<0.005$), short questions (categorisation) ($Z=2.88$, $p<0.005$), and story generation ($Z=2.23$, $p<0.05$) tasks. The same pattern was evident for naming ($Z=2.29$, $p<0.005$), short questions (world knowledge) ($Z=2.27$, $p<0.05$), and categorisation ($Z=2.09$, $p<0.05$), tasks during post test 2. During the 3rd post test, the pattern of differential performance was retained for naming ($Z=5.24$, $p<0.000$), short questions (categorisation) ($Z=3.03$, $p<0.005$), short questions (world knowledge) ($Z=3.05$, $p<0.005$) and definition ($Z=2.11$, $p<0.05$) tasks.

In general, partially represented lexical items provided a benefit for the more complex tasks such as naming, definition and both the short questions tasks, whereas no benefit of partial representations was evident for the multiple choice comprehension measure, association and lexical contrast tasks.

10. The differential impact of semantic domains

Analysis of children's performance across tasks by semantic domain indicated that performance for animal terms was significantly better than for artefacts on the naming task (P1: $Z=3.5$, $p<0.005$; P2: $Z=3.2$, $p<0.005$; P3: $Z=3.8$, $p<0.005$), on the lexical contrast task (P1: $Z=2.2$, $p<0.05$; P3: $Z=4.6$, $p<0.005$) and on the story generation task on the 3rd post test ($Z=2.80$, $p<0.005$). Artefact terms resulted in significantly better performance, compared to animal terms, in the short questions (world knowledge) across post tests (P1: $Z=0.51$, $p<0.005$; P2: $Z=.52$, $p<0.005$; P3: $Z=0.75$, $p<0.005$), and on the definition task during the 1st post test ($Z=3.00$, $p<0.005$). No significant differences were found for children's performance on the multiple choice, short questions (categorisation questions) and association tasks.

11. Depth of vocabulary acquisition

Comparison of children's performance across the different assessments provided a metric of depth of vocabulary knowledge. Figure 1 presents children's performance across measurements over time.

As Figure 1 shows children's performance varied by the type of measurement across testing. Children's performance on the multiple choice comprehension measures (short questions - world knowledge-association and definition tasks) was the most accurate and this relative advantage for these measures held across time with the best performance in the last measurement. In contrast, the naming, lexical contrast, story generation and short questions (categorization) tasks produced lower levels of accuracy in all three sessions.

A series of Friedman Two Way ANOVAs were conducted across the measures to further examine these patterns of performance. Children's performance differed statistically significantly across the measures (P1: $x^2 = 190.4$, df=7, $p < 0.005$; P2: $x^2 = 158.2$, $df = 7$, $p < 0.005$; P3: $x^2 = 276.5$, $df = 7$, $p < 0.005$).

In addition, separate Wilcoxon tests were carried out to examine the differences among tasks. The patterns of significant differences between tasks are presented in three different diagrams. In each diagram the length of the panel indicates the relative performance for the groups on a particular task, the longer the base the more children were successful, and thus tasks towards the base of the triangle indicate greater levels of success. Where tasks are aligned this indicates there were no significant differences in performance. The pattern of significant differences between tasks for post test 1 is presented in Diagram 1.

As Diagram 1 shows, at the 1st post test children's performance on the multiple choice and comprehension measures was significantly better than all the other tasks. The association task also resulted in increased levels of success. The definition task resulted in more successful performance than the lexical contrast, story generation and short questions (categorization) tasks. Children's performance was also significantly better on short questions (world knowledge), naming, lexical contrast and story generation tasks than the short questions (categorization) task (see Table 9 for stats).

As Diagram 2 shows there were similar patterns during the 2nd post test, with performance on the multiple choice comprehension measures and the association task resulting in high levels of performance. However, greater differentiation is now evidenced on the tasks demanding more depth of knowledge of the lexical item and flexible use of the terms. Thus, performance on the story generation task and the categorization task was particularly poor (see Table 10 for stats).

Diagram 3 presents the significant differences between the tasks during post test 3.

The pattern of responses for post test 3 is similar to that of post test 2. However, at this point the relative advantage of the association task above other measures has been lost. Further differentiation is evident for the tasks demanding more depth of knowledge of the lexical item and flexible use of the terms. At this point performance on the naming and the lexical contrast tasks is poorer than definitions, short questions (world knowledge) and association tasks (see Table 11 for stats).

In sum, over time the breadth of children's word knowledge as measured by the forced choice multiple choice comprehension measure is maintained, but greater differentiation is evident in the children's ability to respond to the more complex measures.

12. Discussion

The purpose of the present study was to extend our understanding of lexical acquisition in pre-school children by using natural situational exposures to tap into children's developing representations of animal and artefact terms over a period of four weeks. The ways in which their existing vocabulary knowledge, their prior knowledge of the target words, as well as the type of exposure impacted on performance, was also addressed to provide an overall picture of the young children as word learners. In order to

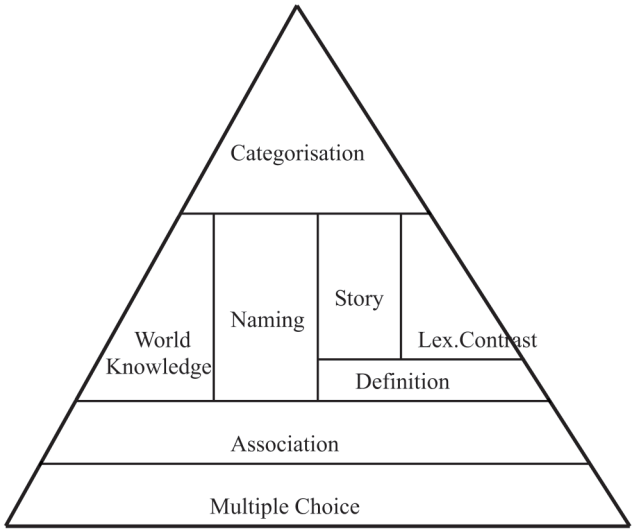

Diagram 1
Pattern of success across tasks during post test 1

Table 9
Statistical comparison of children's performance between tasks during post test 1

	Naming	M.choice	Association	Contrast	Story generation	Definition	Sh. Qu. (wk)	Sh. Qu. (ca)
Naming M.choice	Z=6.7 $p<0.000$							
Association	Z=4.6 $p<0.000$	Z=3.9 $p<0.005$						
Contrast	ns	Z=6.4 $p<0.000$	Z=5.03 $p<0.000$					
Story generation	ns	Z=6.5 $p<0.000$	Z=5.04 $p<0.000$	Z=2.2 $p<0.05$				
Definition	ns	Z=6.1 $p<0.000$	Z=3.8 $p<0.005$		Z=3.1 $p<0.005$			
Sh. Qu. (wk)	ns	Z=6.9 $p<0.000$	Z=4.9 $p<0.000$					
Sh. Qu. (ca)	Z=5.7 $p<0.000$	Z=7.6 $p<0.000$	Z=7.2 $p<0.000$	Z=5.2 $p<0.000$	Z=3.8 $p<0.005$	Z=6.2 $p<0.000$	Z=5.8 $p<0.000$	

Abbreviations: M.choice=Multiple choice; Sh.qu. (wk)=Short question world knowledge; .Sh. qu. (ca) =Short question categorisation; ns = not significant

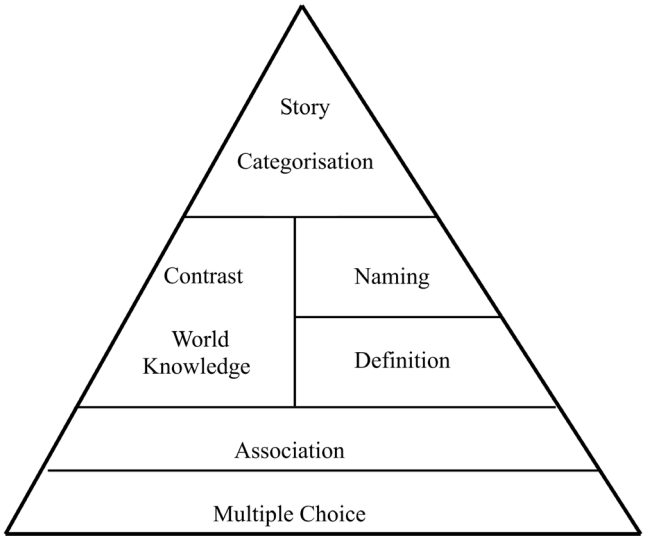

Diagram 2
Pattern of success across tasks during post test 2

Table 10
Statistical comparison of children's performance between tasks during post test 2

	Naming	M.choice	Association	Contrast	Story generation	Definition	Sh. Qu. (wk)	Sh. Qu. (ca)
Naming M.choice	Z=6.6 $p<0.000$							
Association	Z=5.2 $p<0.000$	Z=3.3 $p<0.005$						
Contrast	Z=2.8 $p<0.005$	Z=6.6 $p<0.000$	Z=5.8 p<0.000					
Story generation	Z=3.4 $p<0.005$	Z=6.6 $p<0.000$	Z=6.1 $p<0.000$					
Definition	Z=1.9 $p<0.05$	Z=5.4 $p<0.005$	Z=3.4 $p<0.005$	Z=4.2 $p<0.000$	Z=4.5 $p<0.000$			Z=5.08 $p<0.000$
Sh. Qu. (wk)	Z=1.9 $p<0.05$	Z=6.4 $p<0.000$	Z=4.3 $p<0.000$	Z=4.2 $p<0.000$	Z=4.1 $p<0.000$			Z=4.7 $p<0.000$
Sh. Qu. (ca)	Z=3.7 $p<0.005$	Z=7.1 $p<0.000$	Z= 6.7 $p<0.000$					

Abbreviations: M.choice=Multiple choice; Sh.qu. (wk)=Short question world knowledge; .Sh. qu. (ca) =Short question categorisation; ns = not significant

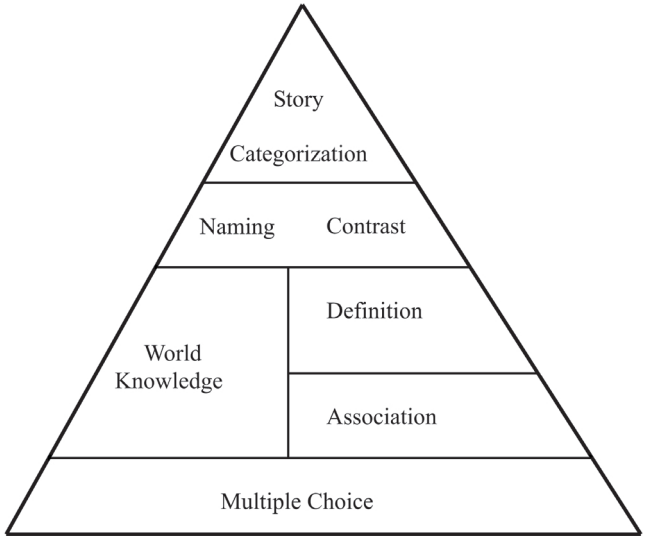

Diagram 3
Pattern of success across tasks during post test 3

Table 11
Statistical comparison of children's performance between tasks during post test 3

	Naming	M.choice	Association	Contrast	Story generation	Definition	Sh. Qu. (wk)	Sh. Qu. (ca)
Naming M.choice	Z=8.3 $p<0.000$							
Association	Z=5.2 $p<0.000$	Z=5.1 $p<0.000$						
Contrast	Z=4.03 $p<0.005$	Z=8.2 $p<0.000$	Z=6.9 $p<0.000$					
Story generation	Z=5.2 $p<0.000$	Z=8.6 $p<0.000$	Z=7.5 $p<0.000$					
Definition	Z=3.7 $p<0.005$	Z=6.6 $p<0.000$	Z=1.9 $p<0.000$	Z=5.8 $p<0.000$	Z=7.2 $p<0.000$			Z=7.3 $p<0.000$
Sh. Qu. (wk)	Z=3.9 $p<0.005$	Z=7.2 $p<0.000$		Z=6.3 $p<0.000$	Z=7.6 $p<0.000$			Z=8.1 $p<0.000$
Sh. Qu. (ca)	Z= 5.5 $p<0.000$	Z=9.1 $p<0.000$	Z=7.9 $p<0.000$					

Abbreviations: M.choice=Multiple choice; Sh.qu. (wk)=Short question world knowledge; Sh. qu. (ca) =Short question categorisation; ns = not significant

detect the multifaceted nature of children's word learning patterns, performance was considered across a range of tasks over time that tap different levels of representations of the target words.

13. Existing vocabulary knowledge and word learning

Existing vocabulary knowledge was found to be related to the children's performance across measurements during post tests. Children with high receptive and expressive vocabulary knowledge performed better than children with low receptive and expressive vocabulary knowledge across tasks. The important role of existing vocabulary knowledge on word learning has also been emphasized by other studies (Dromi, 1996. Mervis & Bertrand, 1994). The effect of vocabulary size on word learning is what Stanovich (1986) has called a "Mathew effect", where the rich get richer, while the poor get poorer. He explained it as a reciprocal relationship; development of vocabulary facilitates comprehension and comprehension feeds into vocabulary growth. A rich elaborated knowledge of words will assist the child's ability to make inferences about the meanings of unfamiliar words, allowing effective use of context cues. These cues boost incidental learning, thus expanding the child's knowledge base.

The semantic domain of the lexical items was also important in this process. The results revealed that children's existing vocabulary knowledge for animals (expressive and receptive vocabulary) was positively correlated with the acquisition of the target words describing animals. In contrast, children's existing vocabulary knowledge for artefacts was not related to the acquisition of the target artefact words. The above finding could be seen as reflecting that the animal domain, (a natural kind), provides clearly delineated boundaries which link to animacy. This knowledge of animal kinds which is established earlier provides the children with a basis for making hypothesis and drawing inferences about animal terms. The above interpretation is supported by other findings demonstrating that animate entities were more likely than artefacts to prompt young children to go beyond observable similarity judgments and to make inferences about the "non-observable" characteristics of animate entities (Blanchet, Dunham & Dunham, 2001. Gelman, Croff & Panfanq 1998). In contrast, artefacts do not limit hypothesis in the same manner as they may depict a wide range of referents with no clear conceptual delineations.

14. The role of linguistic context on word learning

Another important finding of the present study was the crucial role of the linguistic context in which the children encountered the terms. The lexical richness and the syntactic complexity of the utterances the children were exposed to, contributed to word learning as this was measured over time using multiple assessments. The previous finding supports previous studies (Best, Dockrell & Braisby, 2006. Carey & Bartlett, 1978. Dockrell & Campbell, 1986. Gottfried & Tonks, 1996) although in these studies the mappings between input and use had not been evaluated. A study that started with evaluating this mapping between input and use is the study carried out by Ralli & Dockrell, (2005) where they found that children's success on particular tasks reflected the input received from particular linguistic contexts. However, the previous study assessed children's word knowledge only immediately after exposure and one week later. The results from the present study extends Ralli's & Dockrell's (2005) study by demonstrating that the children performed better in those tasks were input and assessment matched as well as that the new word knowledge was retained and was reorganised over time.

15. The role of prior lexical knowledge on word learning

In the current study children performed significantly better on the partially represented than the unknown words. The children that had

a partial knowledge of the target words were better able to learn their name (post test naming task), to define them (post test definition task) and to classify them in a category (post test categorisation questions) than the children that had no prior knowledge. The findings suggest that when children have already acquired the denotation or part of the denotation of a word's meaning (success in the multiple choice task for the partially represented words) they can extend the acquisition of the denotation of the word (success on the naming task) and also acquire the sense of the word's meaning (success on the definition and short questions task). This was not found to be true when the words were totally unknown for the children. The above results support the findings of Siskind (1996) and Ameel, Malt and Storms (2008), who demonstrated that the use of partial linguistic knowledge to constrain hypotheses can result in lexical acquisition.

16. Depth of vocabulary acquisition

The current study extends previous work by examining the ways in which children comprehend, produce and use a new term across a variety of tasks, providing some light into the depth of vocabulary acquisition. The synthesis of various approaches to measuring lexical knowledge demonstrated that word knowledge and the child's ability to utilise this new knowledge falls along a continuum (see also Ralli & Dockrell, 2005). The children's performance on the multiple choice comprehension measures, association and short questions (world knowledge) tasks, was the most accurate and this relative advantage for these measures held across times of measurement with the best performance in the last measurement (see Diagrams 1,2,3). In contrast, the naming, definition, lexical contrast, story generation and short questions (categorization) tasks produced lower levels of accuracy in all three sessions. Importantly, the relative difficulty of these measures changed over time, supporting the view that there was a reorganization in the children's representations of these terms – a reorganization that was influenced by the number of exposures they received (see Diagrams 1, 2, 3).

Recently, many studies have acknowledged that multiple sources of information must contribute to word learning and have built an integrative account of how word learning occurs (Akhtar & Tomasello, 2000. Bloom, 1993, 2000. Hirsh-Pasek & Golinkoff, 2000). The present study demonstrated that word learning is a multifaceted and extended process. The nature of the linguistic input where the novel word is presented, children's existing vocabulary knowledge, as well as their prior knowledge and the semantic domain of the target words were found to be very critical parameters for word learning from context between five and six years of age.

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Appendix 1

Name: School:

Group: Date of test D.O.B.

Practice items: ball, door, rabbit, house, tree, arm

TARGET WORDS	SCORE	RESPONSE
1. bear		
2. bowl		
3. cow		
4. cup		
5. deer		
6. elephant		
7. horse		
8. mole		
9. stool		
10. television		
11. vase		
12. bed		
13. camel		
14. cushion		
15. dog		
16. knife		
17. table		
18. tiger		
19. wardrobe		
20. zebra		
21. ostrich		
22. ladle		
TOTAL		

The same target words were used for the picture naming and the multiple choice tasks.

Η μάθηση λέξεων του πραγματικού κόσμου: Διερευνώντας την ανάπτυξη των λεξιλογικών αναπαραστάσεων στα παιδιά

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ΠΕΡΙΛΗΨΗ

Η ικανότητα της κατάκτησης νέων λέξεων επηρεάζεται από γνωστικές, γλωσσικές και κοινωνικές παραμέτρους. Οι μέθοδοι αξιολόγησης της κατάκτησης νέων λέξεων που συνήθως χρησιμοποιούνται στις έρευνες περιορίζονται σε μετρήσεις της κατανόησης των λέξεων μέσα σε αυστηρά πειραματικά πλαίσια. Λαμβάνοντας υπόψη τους παραπάνω περιορισμούς, η παρούσα έρευνα αξιολόγησε τους τρόπους με τους οποίους αναπτύσσονται στα παιδιά, οι σημασιολογικές αναπαραστάσεις λέξεων που αφορούν ζώα και αντικείμενα. Στην έρευνα έλαβαν μέρος παιδιά που είχαν διαφορετικό επίπεδο γνώσης των υπό εξέταση λέξεων και τα οποία συμμετείχαν σε διαφορετικές παρεμβάσεις γλωσσικού πλαισίου για μια περίοδο 4 εβδομάδων. Εκατόν τριάντα παιδιά προσχολικής ηλικίας (Μ.Ο.=5,6 έτη) έλαβαν μέρος σε 5 συνθήκες (μια συνθήκη ελέγχου και 4 πειραματικές συνθήκες). Για τα παιδιά που ανήκαν στην ομάδα ελέγχου και στη φωνολογική ομάδα, η γνώση των υπό εξέταση λέξεων αξιολογήθηκε σε δύο φορές, στην αρχή και 3 εβδομάδες αργότερα. Για τις υπόλοιπες πειραματικές ομάδες η κατάκτηση των υπό εξέταση λέξεων αξιολογήθηκε διαχρονικά σε 5 χρονικές στιγμές (αρχικά 1η, 2η, 3η, 4η εβδομάδα επανεξέτασης). Μια σειρά έργων χρησιμοποιήθηκε για να αξιολογηθεί η κατάκτηση των συγκεκριμένων λέξεων: ονοματοθεσία, κατανόηση, ταξινόμηση, σύντομες ερωτήσεις, εντοπισμός σχέσεων, ορισμός και παραγωγή ιστορίας. Κατά την ανάλυση των δεδομένων έγινε σύγκριση των επιδόσεων των παιδιών στα λεξιλογικά έργα, καθώς και σύγκριση των επιδόσεών τους στις διαφορετικές χρονικές μετρήσεις. Η ανάλυση εστιάστηκε στο εύρος της λεξιλογικής γνώσης που κατέκτησαν τα παιδιά για τις υπό εξέταση λέξεις. Οι ανεξάρτητες μεταβλητές περιλάμβαναν την προηγούμενη γνώση των παιδιών για τις υπό εξέταση λέξεις, τη λεξιλογική γνώση των παιδιών ανά σημασιολογικό τομέα, το σημασιολογικό πεδίο που ανήκαν οι λέξεις και το είδος της παρέμβασης. Βρέθηκαν σύνθετα αποτελέσματα σχετικά με το είδος της παρέμβασης (διαφορετικό γλωσσολογικό πλαίσιο) που ακολουθήθηκε, για την κατάκτηση των υπό εξέταση λέξεων. Επίσης οι επιδόσεις των παιδιών ήταν στατιστικά σημαντικά καλύτερες για τις λέξεις που ήταν εν μέρει γνωστές στα παιδιά παρά για τις άγνωστες λέξεις. Η υπάρχουσα λεξιλογική γνώση των παιδιών για τα ζώα βρέθηκε να συσχετίζεται θετικά με την κατάκτηση νέων λέξεων που περιέγραφαν ζώα. Ωστόσο, το παραπάνω δεν βρέθηκε να ισχύει για τα αντικείμενα. Τέλος τα διαφορετικά λεξιλογικά έργα που χρησιμοποιήθηκαν για την αξιολόγηση των υπό εξέταση λέξεων ανέδειξαν τις διαφορετικές πλευρές του εύρους της λεξιλογικής γνώσης.

Λέξεις-κλειδιά: Λεξιλογική αναπαράσταση, Προηγούμενη λεξιλογική γνώση, Γλωσσολογικό πλαίσιο, Μάθηση λέξεων.

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