BEYOND NAMING PATTERNS IN CHILDREN WITH WFDs – Definitions for nouns and verbs

Julie E. Dockrell,[1]
Psychology and Special Needs
Institute of Education
20 Bedford Way
London WC1H 0AL

David Messer,
Psychology Division
103 Borough Road
South Bank University
London SE1 0AA

Rachel George
Psychology Department
University of East London
Romford Road
London E 4LZ

Assimina Ralli
The Ziridis School
Child Development Center
45 Kifissia Avenue
15123 Maroussi
Athens, Greece

[1] Address for correspondence.

ABSTRACT

Children who experience difficulties in naming are described as having word finding difficulties (WFDs). In the present study 31 children with WFDs were identified through a wider survey of educational provision for those with language and communication difficulties. The children were included if they were between 6;4-7;10 years, had normal non-verbal intelligence, no major articulation difficulties and had WFDs as diagnosed by standard scores below 75 on Test of Word Finding Difficulties (TWF, German, 1989). Three control groups were identified who were matched on: chronological age (N = 31), naming age (N = 31) and level of receptive grammar (N = 31). Children's accuracy of naming and latency to name were assessed for pictures of objects and actions. Children were asked to define the object and action terms at a later point. Children with WFDs were significantly less accurate in naming than their age matched peers but equivalent to that of the language matched peers. The group of children with WFDs were the slowest to accurately name all sets of items. All groups of children were less accurate in the provision of definitions for action terms than object terms. Overall the children with WFDs provided fewer accurate definitions than their chronological age matched peers. The nature of the children's definitions indicated that they also differed from their language-matched peers. Particular difficulties were noted in the provision of semantic categorisation information. A range of standardised language assessments did not account for these difficulties. The findings are discussed in relation to the idea that WFDs are caused by impoverished semantic representations.

KEYWORDS

1. INTRODUCTION

A number of recent studies have supported the view that there is a specific group of children who have difficulties in both accuracy and speed of naming relative to their chronological age peers. These children are often described as having Word Finding Difficulties (WFDs) (Lahey & Edwards, 1996, 1999; Wiig, Semel & Nystrom, 1982). Difficulties include increased errors in naming, longer response times to low frequency words (German, 1979; 1984), differences in types of errors and substitutions (German, 1982) and more difficulties in word finding during spontaneous speech. These difficulties span both different word frequencies (Denckla & Rudel, 1976; German, 1979, 1984; Wiig et al., 1982) and different word classes (Dockrell, Messer & George, 2001; McGregor, 1997). Teachers and therapists report that approximately a quarter of children who are receiving help for language difficulties exhibit WFDs (Dockrell, et al. 1998). Although these and other studies have clarified the nature of the children's difficulties there is still uncertainty about the source of the problem and whether the difficulties are best explained as general lexical delays or atypical patterns of lexical performance.

Failure to quickly and accurately retrieve a lexical item could, in theory, occur for a variety of reasons. As McGregor argues "true word finding errors occur because of breakdowns at the level of the lexical entry" (McGregor, 1997). Such breakdowns could occur either at the level of the lexeme, where phonological and morphological features are specified or at the level of the lemma where meaning and syntax are specified (See Levelt, 1991). Both Constable et al. (Constable, Stackhouse & Wells, 1997) and Chiat and Hunt (1993) argue that the semantic store is accessed with little or no difficulty and problems occur in accessing the phonological specification. In contrast, others have posited a weakness in lexical storage or semantic representations (McGregor & Leonard, 1989; McGregor & Windsor, 1996). It is often suggested that children with word-finding difficulties have less elaborate representations of words in their mental lexicon than non-delayed children (Kail & Leonard 1986; Lahey & Edwards, 1999) The semantic store hypotheses is usually seen to be supported by findings about naming behaviour. For example, semantic substitution errors (German, 1982; McGregor, 1997) or a higher number of 'don't know' responses than chronological age matched peers (Fried-Oken, 1984; German, 1982; McGregor & Waxman, 1998). Direct examinations of the children's semantic representations are relatively rare (but see McGregor, 1999 for an example). One way of investigating these different explanations is to directly tap the children's semantic representations by presenting children with a task that does not have time demands, collects information about the nature of semantic representations, but does not require the child to produce the appropriate name. Such an investigation would contribute to understanding whether semantic representations are involved

in the children's naming difficulties. Requiring a child to provide a definition for a lexical item meets these experimental requirements.

Definition tasks have been used both to assess vocabulary knowledge (Anglin, 1993; Ralli, 1999) and to understand the organisation of concepts in semantic memory (Anglin, 1977). There are both quantitative and qualitative changes in children's word definitions as they get older (Nippold, 1995). As children get older there is a tendency to include more than one characteristic in their definitions. Moreover, prior to 7 years of age children's definitions are simple, often focussing on perceptual or functional information (Benelli, Arcuri, & Marchesini, 1988; Storck & Looft, 1973) and lacking in superordinate terms (Watson, 1995). In contrast children over the age of 7 produce definitions that are more precise, include conventional social information (Benilli et al., 1988; Litowitz, 1977) and gradually include superordinates (Snow, 1990; Watson, 1995). The inclusion of the relationship between words e.g. superordinates, subordinates or inclusion relationships captures relationships between word meanings and are germane to hypotheses about WFDs. They provide the possibility of gaining insight into the organisation of the children's semantic categories. Furthermore, there is evidence to indicate that word class is a critical factor. Formal definitions of verbs are organised differently to those of objects (Gentner, 1978, 1982; Miller, 1991). There are fewer superordinates available for verbs and fewer verb superordinates produced by children with there being little or no developmental changes in production of verb superordinates (Skwarchuk & Anglin, 1997). The few studies that have compared children's skills at defining verbs and nouns have highlighted the significant differences between the word classes (Anglin, 1985; Nelson, 1978). Thus, definitions meet the requirement to assess semantic representations, demonstrate developmental progress and provide word class effects.

The impact of word-class on the naming behaviours of children with WFDs is relatively unexplored (but see Dockrell, Messer & George, 2001, McGregor, 1997). Studies have predominantly focused on children's naming of objects. This is unfortunate because it would appear that there are general differences between word classes in terms of their semantic content and these may influence word finding behaviours. In the case of the two most common word classes, nouns and verbs, there are reasons to suggest that naming of actions might be delayed relative to the naming of objects. The semantic representations for verbs are arguably inherently more complex than that of nouns (Gentner, 1981) and Davidoff and Masterson, (1996) found that error patterns were different for nouns and verbs. Given that there is some evidence that the semantics of verbs differs to that of nouns these items may pose greater problems for children with WFDs. Moreover, there is increasing evidence that verbs appear to be a particular problem area for children with Specific Language Impairments. These children tend to use fewer inflected

verbs (Fletcher and Peters, 1984) and tend to have fewer different verbs than their age and language matched peers (Watkins, Rice and Moltz, 1993). This has led to the suggestion that the children rely on general all purpose verbs (Conti-Ramsden & Jones, 1997). These problems with verbs are thought to persist into the school years even when other problems have ameliorated. Moreover, Marchman and Bates (1994) have demonstrated that verb vocabulary size is the strongest and most consistent predictor of morphological development. Thus children with WFDs may experience particular problems with verbs either because of the nature of the representations or as a result of the general vulnerability of the verb system for children with language difficulties.

Both the data on the development of children's definitional skills and the delayed development of the verb lexicon for children with SLI highlight the importance of identifying appropriate control groups so as to draw conclusions about the bases of the children's problems. All children engage in behaviours indicative of WFDs to a greater or lesser extent during the course of vocabulary acquisition thus the identification of appropriate controls provides a basis for identifying key differences across the relevant experimental variables. Moreover, since children with language difficulties will often have a smaller vocabulary than their peers (Leonard, 1988; Rescorla & Schwartz, 1990), it is important to consider their word-finding skills in relation to this and other indicators of language capacity. On the whole studies of WFDs fail to use language matched comparisons (but see Dockrell, Messer, & George, 2001). Such comparisons would, for example, allow the differentiation between 'developmental immaturities' in word-finding and alternative explanations in terms of phonological or semantic factors (McGregor, 1997).

Thus the present study seeks to explore the semantic representations of children with WFDs in relation to language matched and chronological matched peers for both object names and action words. Semantic representations are tapped through the children's definitions of selected items and related to their naming accuracy and latency. For the children with WFDs more detailed comparisons are made with a range of language variables to identify significant factors in their performance on the definitions task.

2. METHODS

2.1 Participants

The total sample consisted of 124 children attending schools, language support services and nurseries in the South East of England. Thirty-one children who experienced word-finding difficulties participated in the study, mean age 7;1 [range 6;4-7;10]. The lower age-band was determined by the standardisation of the Test of Word Finding Difficulties (TWF, German, 1989) and the upper age band was used to minimise the variability in the sample in terms of

educational opportunities (such as access to the English National Curriculum) and other developmental experiences. The children were identified following a wider survey of educational provision for children with word finding difficulties (Dockrell, Messer, George & Wilson, 1998). Schools were sampled where professionals had reported that they had children with primary word-finding difficulties. Children were drawn from 11 different language support services, nine of these were attached to mainstream schools. Once identified by the professional (teacher or speech and language therapist), children were required to meet the following criteria for inclusion in the WFDs sample: (1) to fall within an eighteen-month age band (6;4.-7;10); (2) demonstrate word-finding difficulties (standard scores less than 75) relative to their comprehension skills as identified by the Test of Word Finding Difficulties (TWF, German, 1989); (3) have age appropriate (at or above the 25th centile) non-verbal abilities as measured by Raven's matrices (1983) and, (4) have no marked difficulties in articulation as measured by the Edinburgh Articulation Test (EAT, Anthony, Bogle, Ingram & McIsaac, 1971). The articulation criterion was operationalised as not scoring below - 1SD for the age group 5;5 –6;0 (the test ceiling). The minimum EAT raw score was 49, the mode and median for the sample was 60. A raw score of 60 is equivalent to a standard score of 106 for the age range 5;9-6;0.

The children in the control groups were drawn from similar geographical areas to the children with WFDs and where possible were attending the same school. All the control children attended state mainstream educational provision. None of the children had identified special educational needs or used English as an additional language. Children in the language age control groups were required to achieve a typical score on the matched language measure (see below) that is within a three month band of their chronological age.

The 31 children in each of the three control groups were individually matched to the children in the WFDs group. Each child in the chronological age (CA) control group had a birthday within 3 months of a matched child in the target sample and their score on Raven's matrices was in the same centile band. A naming age matched group (NA) was identified using the British Abilities naming scale which provides a simple assessment of children's ability to name object pictures, but unlike the TWF does not consider actions, descriptive naming or naming in relation to the comprehension of the same words (BAS, Elliot, Smith, & McCulloch, 1997). Each child in this control group had an ability score that was (1) age appropriate and (2) exactly matched to a child in the WFDs group. The children's mean naming age was 4;10. A Reception of Grammar matched group (RG) was identified using scores from Test of Reception of Grammar scores (TROG, Bishop, 1989). Each child in this control group had a TROG score that was (1) age appropriate and (2) the raw score was matched exactly to a child in the WFDs group. The age equivalent score of each child in this control group was exactly matched to those of the children

with WFDs. The children's mean reception of grammar age was 5;9. Table 1 presents the group scores on the relevant matched measures.

INSERT TABLE 1 ABOUT HERE

2.2 Description of Language skills of the children with WFDs

The children with WFDs were not a homogeneous group with respect to language measures. Although all had word-finding problems as defined by clinicians and the Test of Word Finding Difficulties (TWF, German, 1989), other language skills showed a marked variation. Assessment using the Phonological Assessment Battery (PhAB: Fredrickson, Frith & Reason, 1997) revealed that the majority of the children had low scores on the Fluency measures on the PhAB (for these tasks children are required to generate as many words as possible according to phonological or semantic criteria) and notably low scores for semantic fluency (for this measure all children had scores at least 1 SD below the mean with 77 per cent of the children scoring 2 SD below the mean). These fluency results corroborate clinical descriptions of this population. In contrast mean scores on the other phonological measures (rhyme and alliteration) did not fall below one standard deviation of the mean, with an average standardised score of 85 for both (range 69-101 for alliteration and 69-112 for rhyme). Statistical analyses were conducted to investigate whether sub-groups could be identified based on the other language scores, such as the TROG. No homogeneous subgroups were identified. This failure to identify prominent sub-groups, together with the careful matching of the control groups on key language measures, helps to justify the decision to carry out analyses on the whole of the sample of children with WFDs.

2.3 Materials

The total naming set consisted of 40 object pictures and 20 action pictures balanced for frequency (see Dockrell, Messer, & George, 2001). Twelve of these items were selected for the children to define with the sample containing both high and low frequency items consisting of object names and action names. The items selected are presented in Appendix 1 and are referred to as the target items.

2.4 Procedure

Each child was tested individually. Children's naming (lexical production) and comprehension of the test stimuli were assessed in a single session. All children completed the naming task before the comprehension task. Items were randomly presented to each child for lexical production and there were five preset random orders for the comprehension items. Object naming occurred before action naming. The stimuli for both naming and comprehension were presented on a portable computer that recorded accuracy and latency. In parallel, a tape recorder was used to capture oral responses.

Definitions were collected approximately two weeks later. Again children were tested individually. For objects children were asked "Can you tell me what a/an X is?" and for actions children were asked "Can you tell me what xing is ?". All children were provided with the prompt "Is there anything else you can tell me about x / xing?". The children's responses were recorded on a tape recorder and written notes were taken to supplement data from the tapes. Definitions were later transcribed and analysed.

2.5 Coding of definitions:

Children's responses were coded at three levels: provision of definition, correct definition and nature of the definition. The child was classed as providing a definition if they provided verbal information in response to the definition question. A correct response was recorded if the child provided at least one correct defining feature of the object or action words that was either an attribute/ property or a class inclusion relationship. Children's oral responses were further subdivided into 6 categories that were not mutually exclusive:

1. **Perceptual** – properties that describe the referent's perceptual appearance, e.g. zebra "its got black and white stripes", dance "you move around a lot". Children could provide more than one perceptual feature.

2. **Functional** – properties that describe what the item does or is used for e.g. vest –" you wear it on you to keep warm in the winter". Children could provide more than one functional attribute.

3. Properties describing what the referent is **made of**, Shoes " made of leather or plastic". Children could provide more than one feature. This category was not relevant for verbs.

4. **Semantic** indicating the semantic category of the object as evidenced by superordinate, inclusion relationship such as kind of, part of; e.g. Cow "is an animal", vest " is clothes…". Children could provide more than one semantic relationship.

5. **Thematic associations** – items that were linked together as a result of contextual association in the world e.g. dance – " you dance when the radio is on because it make you feel happy". Vest " you buy it from shops" Children could provide more than one thematic association.

6. **Narrative** – where the child constructed a story around the item e.g. knife "Once my friends food fell out of their mouth at when they were eating and …."

Categories 1-4 on their own could provide sufficient information to be credited with a correct definition however neither thematic associations nor narrative were deemed, on their own, to meet the criterion for a definition. All definitions were coded by an experienced graduate

psychologist who was familiar with coding children's definitions but blind to the children's group and the aims of the study.

3. RESULTS

3. 1 Naming accuracy and latency

Data for the total data set is reported elsewhere (Dockrell, Messer & George, 2001). To confirm that the same patterns were evident for the subset of items selected for the definitions task analyses were carried out on the children's accuracy of naming and latency to respond to these items. Table 2 provides details of proportion correct by task and group. As in the complete data set there was a significant effect of group for both objects ($F(3,120) = 16.860$, p.<.001) and actions ($F(3,120) = 5.043$, p.<.01). Post hoc tests revealed that the children with WFDs were significantly less accurate than their CA peers for object naming (p.<.05) but they did not differ from the RG and NA language age matches. The same pattern of significance was evident for actions with the WFDs group being significantly worse that their CA peers (p.<.05). Both language matches were significantly less accurate in their naming of objects in comparison to the CA matches (p.<.05) however only the NA matches were less accurate in their naming of actions to their CA matches (p.<.05).

INSERT TABLE 2 ABOUT HERE

As shown in Table 2 the mean latency to respond for the group of children with WFDs was, as for the main data set, always the slowest. All groups of children were significantly slower to name actions than objects ($F(1,117) = 22.096$, p.<.001) but there was no overall significant effect of group ($F(3,117) = .578$, ns). Overall the children with WFDs were significantly slower than their CA matches (p.=.026), no other group differences were significant.

3.2 Definitions

3.2.1 Provision of definitions

Table 3 provides details about the children's attempts at definitions; their provision of responses and the accuracy of definitions for the object and action words by experimental group. Appendix 2a and 2b provide details about responses to each item. Most children attempted to give a definition, although there was variation in the percentage of correct responses (38.7% to 96.8%). Figure 1 presents the 95% confidence intervals for these variables across groups. As Figure 1 shows there are differences both within groups and across groups in their response rates.

INSERT FIGURE 1 ABOUT HERE

Since the data from the children's responses did not meet the requirements of parametric tests the data were analysed with non-parametric tests. There were no significant differences in the proportion of definitions provided for object and action words (Z= -1.847, ns). Comparisons between the groups using a Kruskal Wallis test revealed significant differences in the provision of definitions for object words (X^2 = 11.779, df = 3, p.<.01) but not for action words (X^2 = 7.545, df = 3, ns). Subgroups were compared using the Mann-Whitney U test for between group comparisons. For object terms there were no differences between the WFDs sample and their NA matches (U=929, ns) or their RG matches (U=451, ns) but the children with WFDs provided significantly fewer definitions than their CA matches (U=351, p.<.01). Both the NA matches (U=317.5, p.<.01) and the RG matches (U=307, p.<.01) also provided significantly fewer definitions for objects words than the CA matches. Children provided significantly more responses than they provided correct responses for both object (Z= -6.922, p.<.001) and action words (Z= -6.325, p.<.001).

INSERT TABLES 2 AND 3 ABOUT HERE

3.2.2 Accuracy of definitions

The profile of results for the accuracy of responses differed to the provision of responses. There were significant differences in the proportion of correct definitions provided for object and action words (Z= -2.632, p.<.01) with children being less accurate in the definitions they provided for the actions. Comparisons between the groups using a Kruskal Wallis test revealed significant differences in the provision of correct definitions for object (X^2 = 30.999, df = 3, p.<.001) and action words (X^2 = 15.339, df = 3, p.<.01). When subgroups were compared for object words there were no differences between the WFDS sample and their NA matches (U=404.5, ns) however the WFDs sample were significantly less accurate than their RG matches (U=344.5, p.<.05) and their CA matches (U=122.5, p.<.001). For object words both the NA matches (U=227.5, p.<.001) and the RG matches (U=221.5, p.<.001) were significantly less accurate than the CA matches.

When subgroups were compared for action words there were no differences between the WFDS sample and their NA matches (U= 478.5, ns) or their RG matches (U=390.5, ns) but the children with WFDs provided significantly fewer correct definitions for action words than their CA matches (U=247, p.<.001). The NA matches were significantly less accurate for action words than the CA matches (U=254, p.<.001) but the RG matches were (U=363.5, ns) were not. Thus

the performance of the children with WFDs was delayed relative to their CA matches and similar to that of their NA matches.

3.2.3 The relationships between accurate comprehension naming and definitions.

The relationship between the children's correct comprehension responses (i.e. choosing the correct item from a choice of four stimuli including semantic and phonological foils) and definitions was investigated using a Spearmans rank correlation. There was a significant small correlation between accurate comprehension of the target objects and accurate definitions of object words (r=.284, p.<.001) but not accurate definitions for action words (r=.012, ns). There was a further small significant relationship between comprehension of target actions and accurate definitions of action words (r=.205, p.<.01) but not accurate definitions for object words (r=.126, ns). Thus there was a positive relationship for comprehension of the defined items and accurate definitions of these items.

When the relationship between accurate naming and definitions was assessed there were significant relationships between accurate object naming and definitions of object words (r=.380 p.<.001) and definition for action words (r=.291, p.<.001). In contrast accurate naming for actions correlated with accurate definitions for object (r=.282, p.<.001) but not definitions of action words (r=.081, ns). Thus, children's definitions of object words were related to their accurate naming of these items.

3.2.4. Nature of definitions

This analysis considers both the extent and nature of the children's definitions. It was possible that the older children not only provided more correct responses but also more information in their definitions or definitions of a different kind. By corollary the children with WFDs might be providing less information or a different kind of information. The different patterns identified for objects and actions above indicated that any subsequent analysis needed to take word class into consideration.

The total number of all <u>elements</u> (separate characteristics as classified by all the coding categories) was calculated for each group and word class. Children never provided more than one narrative per item. The total number of defining <u>features</u> (that is number of instances of perceptual, semantic, functional and made of elements) was also calculated. This combination of responses satisfied the conditions for parametric analyses. Children's raw scores were converted into proportion scores so that comparisons could be made between object words and action words. For both object (t = 13.3, df = 123, p. <.001) and action words (t = 18.57, df = 123, p. <.001)

the proportion of <u>defining features</u> was always less than the proportion of number of <u>elements</u>. These data a presented in table 4. This shows that, when asked to define an item, on average children provided between 1.1 and 2.3 <u>elements</u>, and between 0.3 and 1.8 <u>defining features</u>.

There was a significant effect of word class for both proportion of total elements and defining features (<u>elements</u> $(F(1,120) = 23.06 \ \underline{p.}<.001$, accounting for 43% of the variance; <u>defining features</u> $(F(1,120) = 364.4, \ \underline{p.}<.001$, accounting for 75% of the variance). There was also a significant group effect (<u>elements</u> $F(3,120) = 4.05, \ \underline{p.}<.01$; <u>defining features</u> $F(3,120) = 3.668$, $\underline{p.}<.01$) but in these analyses less than 10% of the variance was accounted for. In both cases Bonferroni post hoc tests revealed that the CA matches were performing significantly better than the NA matches (<u>elements</u> $\underline{p.}<.05$, <u>defining features</u> $\underline{p.}<.05$). The children with WFDs were also providing significantly more <u>elements</u> than the NA matches $\underline{p.}<.05$ but there were no differences when defining features were considered. No other group differences were significant. Thus the additional information provided by the children with WFDs would have been in the form of narrative and thematic associations, elements that were less germane to the words' definition.

INSERT TABLE 4 ABOUT HERE

3.2.5 Defining features, accuracy of definitions and group differences

The mean number of defining features for objects and actions by group is presented in Table 5. As the table shows there were differences both in the relative provision of defining features and in the groups' performance. For object terms all groups of children provided more functional than perceptual information and more perceptual than semantic information. For actions the pattern was different with children, in general, providing more perceptual information than functional information and very little semantic information. However, there were no significant differences across the groups in their provision of defining features for actions. The groups differed significantly on their production of semantic category definitions for object words ($X^2 = 19.008$, df = 3, $\underline{p.}<.001$) and perceptual features for object words ($X^2 = 15.523$, df = 3, $\underline{p.}<.001$) but not functional features ($X^2 = 5.2$, df = 3, ns). The NA match provided significantly fewer perceptual features than the children with WFDs did (U=249.5, $\underline{p.}<.001$) and CA matches (U=219, $\underline{p.}<.001$) but not RG matches (U=356, ns). For semantic categorisations the performance of both the WFDs group and the NA group was lower than the other groups. Thus the WFDs group provided significantly less semantic categorisations that their CA matches (U=219.5, $\underline{p.}<.001$) and RG matches (U=334., $\underline{p.}<.05$). They did not differ from the NA matches

(U=463.5, ns). The NA matches did not differ from the RG matches (U=353, ns) but did differ significantly from the CA matches (U=229, p.<.001).

In terms of correlations, for objects correct definitions were significantly correlated with all the defining features (semantic categorisations r=.501, p.<.001, perceptual features r=.241, p.<.01); functional features r=.417, p.<.001; made of r=.198, p.<.05). In contrast for actions, correct definitions were only significantly correlated with one defining feature, the provision of perceptual features (r=.313, p.<.001).

The relationships between children's accurate naming and defining features as well as their latency to name accurately and defining features were also considered. Both object naming variables were associated with particular defining features. Accurate naming of objects was significantly associated with both the provision of functional features (r=.219, p <.01) and semantic categorisation features (r=.318, p<.001). Both of these relationships remain significant when age is controlled for (functional, r=.21, p <.05; semantic, r=.288, p <.001). Thus, independent of age both functional and semantic categorisation features are related to accurate object naming. A similar pattern is evident for speed of accurate object naming. Latency was negatively correlates with functional features (r=-.236, p <.01), perceptual features (-.205, p<.05) and semantic categorisation features (r=-.31, p<.001). However, in this case when age was controlled the only significant relationship was between latency and semantic categorisation information (-.303, p<.001). Thus speed of naming is significantly related to the provision of semantic categorisation information independent of age. No significant relationships were found between accurate naming of actions and either (1) latency to name actions or (2) the defining features that the children provided in their definitions.

INSERT TABLE 5 ABOUT HERE

3.3 Language skills of the children with WFDS and their accurate definitions

The relationship between the language measures and the number/percentage of definitions in the WFDs group was assessed through a series of correlations. Where standard scores existed these were used otherwise percentages scores were employed. We found no significant relationship for age, non-verbal ability, TROG, non-word-repetition, the semantic fluency subtest of the PhAB or the picture naming, descriptive naming or sentence completion subtests of the TWF. For action words the picture naming for verbs subtest on the TWF (r=.496, p.<.01) and alliteration (r=.365, p.<.05) and rhyme fluency (r=.374, p.<.05) from the PhAB were associated with the provision of correct definitions. For objects words the picture naming for verbs subtest on the TWF (r=.485, p.<.01), picture naming of categories (r=.415, p.<.05) alliteration (r=.471, p.<.01)

rhyme(r=.388, p.<.05) and rhyme fluency (r=.389, p.<.05) were associated with the provision of correct definitions. Two separate multiple regressions were carried out, one for actions and the other for objects using the enter model with the variables identified above. A significant model emerged for the action definitions ($F_{3,30}$=3.969, p.<.01, Adjusted R square .229). The only significant variable was picture naming for verbs (Beta .458, p.<.05). No significant model emerged for object definitions.

4. DISCUSSION

The data presented here provides further support to the view that the children with WFDs are experiencing a lexical difficulty. In relation to their CA peers they are both less accurate in naming and slower to name accurately. Moreover, they provide fewer definitions and are less accurate than both CA peers and RG peers in the definitions that they do provide. When they do provide definitions they contain more redundant information. In contrast their performance does not differ significantly to that of their NA age matches, despite a two-year age gap. This is particular surprising given the additional opportunities the children had to develop the skills involved in providing definitions (Markowitz & Franz, 1988). Thus, the data supports a general delay in the children's skills in using or accessing semantic information. However, the nature of the children's definitions prevents a conclusion that they are 'simply' delayed, this is because their pattern of performance does not exactly match any of the control groups.

Children with WFDs provided more information about the items than their NA matches. In addition, the children with WFDs produced the highest number of perceptual features in their definitions (significantly higher than the NA matches) and our impression is that this type of definitions often concerned visual features. They also produced a comparable number of functional features in relation to the other comparison groups. However, the children with WFDs produced the lowest rate of semantic categorisation features in their definitions and a low rate of 'made of' definitions (these figures were significantly lower that CA matches and equivalent to NA matches). Thus, the performance of the children with WFDs was not directly comparable with any of the control groups. They showed an over reliance on perceptual definitions, instead of the more age appropriate performance which would involve semantic and 'made of' definitions. Thus, the responses they presented could be considered less relevant and less sophisticated than that of the other groups, particularly the CA matches.

These findings complement McGregor and Waxman's (1998) conclusion that children with WFDs did not have sufficient stored information to discriminate between similar semantic

neighbours. However, in contrast to McGregor and Waxman's (1998) view that the children's hierarchical organisation of the semantic system was intact, in our study the children's difficulties were evident with the provision (or lack) of semantic categorisation information for object terms. Perhaps, unsurprisingly accounting for these difficulties within the current data set is not straightforward. When we considered the children's phonological skills, non-word repetition, reception of grammar and standardised naming scores their difficulties, these measures failed to predict object naming.

For the action terms, the children with WFDs attempted a similar number of definitions and were as successful at their definitions as the language matched control groups. In addition, they produced a similar number of elements and defining features as the chronological age matches. Indicating a delay in providing accurate definitions for actions. An explanation for the children's difficulties with action terms is more problematic. Analysis of the defining features provided no clues as to why these difficulties might exist. At first glance this might suggest that semantic factors are not relevant for the action terms. This conclusion would be premature. The overall reduced rate of definitions for the action terms makes comparisons between groups problematic and may fail to identify between group differences. Further the differential pattern of information provided between the object and action terms indicates that semantic factors are indeed relevant for all the children but they differ between word classes. Moreover, the naming errors produced for verbs in previous work (Dockrell et al. 2001) suggested that the children's semantic boundaries for verbs were less differentiated than age and language matched peers. There is need to further explore the children's performance with verbs.

For all the children the difference between the definitions provided for action words and those provided for object words is striking. Although there were fewer action words a calculation of the proportion successes allowed for comparisons between the two sets of terms. All children provided less information about action words and the information that was provided was of a different kind. Object words afforded the opportunity of more diverse and complex definitions and supported the use of functional features and semantic category information in the children's definitions while action words produced less detailed definitions and those that were produced focussed on perceptual features. Moreover when the relationships between accuracy to name, latency to respond and defining features were considered the provision of these defining features were associated with the accurate naming of objects but not of actions. Independent of age provision of both functional and categorisation features were related to the accurate naming of objects and speed of accurate naming was associated with categorisation features. These data concur with the findings of others (Anglin, 1985) that suggest that young children have a better appreciation of the meaning of simple concrete nouns than simple verbs and highlight the

15

potentially important differences in the conceptual structure of nouns and verbs (Gentner, 1978, 1982). Moreover since there were no relationships between the provision of accurate definitions for actions and accurate naming this would appear to suggest that action naming is affected by other factors than object naming.

The present data set contributes to our understanding of the development of semantic representations in two ways. Firstly, it confirms the differences between action and object terms (nouns and verbs) reported elsewhere in the literature. Indicating a more protracted acquisition of verb meanings and different critical features in the representations. Secondly, the data indicate that children with WFDs do indeed have difficulties with semantic representations but they cannot be accounted for by the standardised language measures used in this study. Thus, the problems these children experience extend beyond those of 'phonological representations'.

Definitions are metalinguistic in nature and involve making explicit the meanings that are implicit in language use (Anglin, 1977). The difficulties the children experience may involve a number of different levels. The cognitive demands of the tasks, that is the ability to organise definitions and specifically to provide semantic category information may cause problems for the children with WFDs. The slowness of the children's processing, as evidenced by their naming latencies, may impact on their ability to access more complex material. Alternatively the metalinguistic skills, per se, such as analysis of knowledge and self-monitoring, that have been implicated in success in giving definitions (Snow 1990; Snow et al., 1990), may affect the children's performance. However, the fact that the difficulty is only evident for the semantic category material suggests that the children's semantic representations themselves may be involved. Ill-defined semantic representations would lead both to less accurate and more diffuse definitions, the pattern evident for the children with WFDs in this study. Future studies will need to consider ways of differentiating between these different hypotheses to explain the children's lexical problems.

REFERENCES

Anglin, J. M. (1977) *Word, object and conceptual development*. New York: Norton.

Anglin, J. M. (1985) The child's expressible knowledge of word concepts: What preschoolers can say about the meanings of some nouns and verbs. In K. E. Nelson (Ed.). *Children's language (Vol 5)*. Hillsdale NJ: Erlbaum.

Anglin, J. M. (1993) Vocabulary development: A morphological analysis. *Monographs for the Society for Research in Child Development, 58* (10 Serial No. 238).

Anthony, A., Bogle, D., Ingram, T. T. S., & McIsaac, M. W. (1971*) The Edinburgh Articulation Test*. Edinburgh: Churchill Livingston.

Benelli, B., Arcuri, L., & Marchesini, G. (1988) Cognitive and linguistic factors in the development of word definitions. *Journal of Child Language, 15,* 619-635.

Bishop, D. V. M. (1983) *Test of Reception of Grammar*. Published by the author and available from Age and Cognitive Performance Research Centre, University of Manchester.

Conti-Ramsden, G., & Jones, M. (1997) Verb use in specific language impairment. *Journal of Speech Language and Hearing Research, 40,* 1298-1313.

Chiat, S., & Hunt, J. (1993) Connections between phonology and semantics: an exploration of lexical processing in a language impaired child. *Child Language Teaching and Therapy, 9,* 201-213.

Constable, A., Stackhouse, J., & Wells, B. (1997) Developmental word-finding difficulties and phonological processing: The case of the missing handcuffs. *Applied Psycholinguistics, 18,* 507-536.

Davidoff, J., & Masterson, J. (1996) The development of picture naming: Differences between nouns and verbs. *Journal of Neurolinguistics, 9,* 69-83.

Denckla, M. B., & Rudel, R. G. (1976) Naming of object drawing by dyslexic and other learning disabled children. *Brain and Language, 3,* 1-15.

Dockrell, J. E., Messer, D., & 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., & Wilson, G. (1998) Children with word-finding difficulties – prevalence, presentation and naming problems. *International Journal of Language and Communication Disorders, 33,* 445-454.

Elliot, C. D., Smith, P., & McCulloch, K. (1997) *British Ability Scales Second Edition (BAS II) Administration and Scoring Manual* (pp. 503-522). Windsor: NFER-Nelson.

Fletcher, P., & Peters, J. (1984) Characterizing language impairment in children: an exploratory study. *Language Testing, 1,* 33-49.

Fredrickson, N., Frith, U., & Reason, R. (1997) *Good source of lists of regular words for use in assessments. Phonological Awareness Battery*. NFER-Nelson.

Fried-Oken, M. (1984) *The development of naming skills in normal and language deficient children.* Unpublished doctoral dissertation, Boston University, Boston.

Gentner, D. (1978) On relational meaning: The acquisition of verb meaning. *Child Development, 49,* 988-989.

Gentner, D. (1981) Some interesting differences between verbs and nouns. *Cognition and Brain Theory, 4,* 161-178.

Gentner, D. (1982) Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In S. Kuczaj (Ed*.). Language Development: Vol 2, Language thought and culture.* Hillsdale, NJ: Erlbaum.

German, D. J. (1979) Word-finding skills in children with learning disabilities. *Journal of Learning Disabilities, 12(3),* 43-48.

German, D. J. (1982) Word-finding substitutions in children with learning disabilities. *Journal of Language, Speech, and Hearing Services in Schools, 13,* 223-230.

German, D. J. (1984) Diagnosis of word-finding disorders in children with learning disabilities. *Journal of Learning Disabilities, 17,* 353-359.

German, D. J. (1989) *Test of Word Finding TWF.* Chicago Ill., Riverside Publishing Company.

Kail, R., & Leonard, L. B. (1986*) Word findings in language impaired children (ASHA Monograph 25).* Rockville, MD: American Speech Language Hearing Association.

Lahey, M., & Edwards, J. (1996) Why do children with specific language impairment name pictures more slowly than their peers? *Journal of Speech and Hearing Research, 39(5),* 1081-1097.

Lahey, M., & Edwards, J. (1999) Naming errors of children with specific language impairment. *Journal of Speech and Hearing Research, 42(1),* 195-205.

Leonard, L. B. (1988) *Children with SLI.* Cambridge, MA: MIT press.

Levelt, W. (1991) Speaking. From Intention to Articulation. Cambridge, MA: MIT Press.

Litowitz, B. (1977) Learning to make definitions. *Journal of Child Language, 4,* 289-304.

Marchman, V., & Bates, E. (1994) Continuity in lexical and morphological development: a test of the critical mass hypothesis. *Journal of Child Language, 21,* 339-366.

Markowitz, J., & Franz, S. (1988) The development of defining style. *International Journal of Lexicography, 1,* 253-267.

McGregor, K. K. (1997) The nature of word-finding errors in preschoolers with and without word-finding deficits. *Journal of Speech, Language and Hearing Research, 40,* 1232-1244.

McGregor, K. K. (1999) *Semantic representation and developmental word finding deficits. Paper presented at the VIII International Congress for the study of Child Language.* San Sebastian, The Basque Country, Spain.

McGregor, K. K., & Leonard, L. B. (1989) Facilitating word-finding skills of language-impaired children. *Journal of Speech and Hearing Disorders, 54,* 141-147.

McGregor, K. K. & Windsor, J. (1996) Effects of priming on the naming accuracy of preschoolers with word-finding deficits. *Journal of Speech and Hearing Research, 39,* 1048-1058.

McGregor, K. K., & 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.

Miller, G. A. (1991) *The Science of Words.* New York: Freeman.

Nelson, K. (1978) Semantic development and the development of semantic memory. In K. E. Nelson (Ed.) *Child Language (Vol 1).* New York: Gardner Press.

Nippold, M. (1995) School-Age children and adolescents: norms for word definitions. *Language, Speech and Hearing Services in Schools, 26,* 320-325.

Raven, J. C., Court, J. H., & Raven, J. (1983) Manual for Raven's progressive matrices and vocabulary scales, Section 3: Standard Progressive Matrices. London: Lowis.

Rescorla, L., & Schwartz, E. (1990) Outcome of toddlers with specific expressive language delay. *Applied Psycholinguistics, 11,* 393-408.

Ralli, A. (1999) *Investigating lexical acquisition patterns: context and cognition.* Doctoral dissertation. University of London.

Skwarchuk, S. & Anglin, J. (1997) Expression of superordinates in Children's Word Definitions. *Journal of Educational Psychology, 89,* 298-308.

Snow, C. (1990) The development of definitional skill. *Journal of Child Language, 17,* 697-710.

Snow, C., Cancino, H., De Temple, & Schley, S. (1990) Giving definitions: a linguistic or metalinguistic skill? In E. Bialystock (Ed.). *Language processing and language awareness by bilingual children.* New York: CUP.

Storck, P. A., & Looft, W. R. (1973) Qualitative analysis of vocabulary responses from persons aged six-to sixty-six plus. *Journal of Educational Psychology, 65,* 192-197.

Watkins, R. V., Rice, M. L. & Moltz, C. C. (1993) Verb use by language-impaired and normally developing children. *First Language, 13,* 133-43.

Wiig, E., Semel, E., & Nystrom, L. (1982) Comparison of rapid naming abilities in language-learning disabled and academically achieving eight-year-olds. *Language, Speech, and Hearing Services in Schools, 13,* 11-23.

Watson, R. (1995) Relevance and definition. *Journal of Child Language, 22,* 211-222.

Table 1 Results of Standardised tests used for matching

	N	Mean Age	Mean Ravens centile	British Abilities Naming Scale		Test of Reception of Grammar	
				Mean Ability Score	Mean Age Equivalent	Mean Raw Score	Mean Age Equivalent
WFDs	31	7;1 (range,6;4-7;10)	61 (range,25- 95)	77.6 (range, 53-98)	4;10	11.3 (range, 7-17)	5;9
NA matches	31	5;8 (range, 3;4-7;3)		77.6 (range, 53-98)	4;10		
RG matches	31	7;2 (range, 4;3–10)				11.3 (range, 7- 17)	5;9
CA matches	31	7;2 (range, 6;5-7;9)	58 (range, 25- 90)				

Table 2 Proportion Accuracy for comprehension and naming and latency to name by group,

Proportion scores	Target Objects– comprehension correct	Target Objects– naming correct	Target Actions Comprehension correct	Target Actions– naming correct	Mean Latency for objects correct	Mean Latency for actions correct	Response provided objects	Response provided actions
WFDs	0.96	0.77	0.98	0.62	1.94	2.28	0.93	0.9
	(0.75-1.0)	(0.5-1.0)	(0.75-1.0)	(0.25-1.0)	(1.2-3.32)	(1.3-3.9)	(0.38-1.0)	(0-1.0)
NA match	0.96	0.77	0.93	0.47	1.81	2.18	0.89	0.84
	(0.88-1.0)	0.5-0.88	(0.75-1.0)	(0-1.0)	1.16-2.83	1.4-4.0	(0.38-1.0)	(0-1.0)
RG match	0.96	0.78	0.94	0.68	1.82	2.1	0.93	0.9
	(0.75-1.0)	0.5-1.0	(0.75-1.0)	(0-1.0)	1.17-3.74	1.47-3.67	(0.63-1.0)	(0.25-1.0)
CA match	0.99	0.88	0.99	0.65	1.72	2.03	0.99	0.97
	(0.88-1.0)	0.63-1.0	0.75-1.0	(0.25-1.0)	1.14-4.03	1.33-3.93	0.88-1.0	0.5-1.0

Table 3 Proportion provision of definition and correct definition by group

Proportion scores	WFDs	NA matches	RG matches	CA matches
Correct definition objects	0.76	0.79	0.84	0.97
	(0.38-1.0)	0.38-1	(0.25-1.0)	0.75-1.0
Correct definition actions	0.70	0.71	0.78	0.92
	(0-1.0)	(0-1.0)	(.25-1.0)	(0.5-1.0)

Table 4 Mean elements per item for object words and action words by group

	OBJECTS		ACTIONS	
	Total elements	Defining features	Total elements	Defining features
WFDs	2.1	1.8	1.6	.40
NA match	1.5	1.3	1.1	.35
RG match	2.0	1.7	1.4	.32
CA match	2.3	1.8	1.4	.39

Beyond Naming Patterns final submission Journal of Neurolinguistics

Table 5 Mean number of defining features for total object words and action words by group

	OBJECTS (n=8)				ACTIONS (n=4)		
	Semantic categorisation	Perceptual features	Functional Features	Made of	Semantic categorisation	Perceptual features	Functional features
WFDs	.87	4.55	8.23	.13	.23	.94	.45
NA match	.9	1.6	7.48	.09	.09	.62	.7
RG match	1.7	3.5	8.13	.29	.16	.77	.32
CA match	2.16	3.77	9.6	.29	.06	1.03	.45

Figure 1

Proportion of responses by group

subject group

Legend:
- provided objects
- provided actions
- correct objects
- correct actions
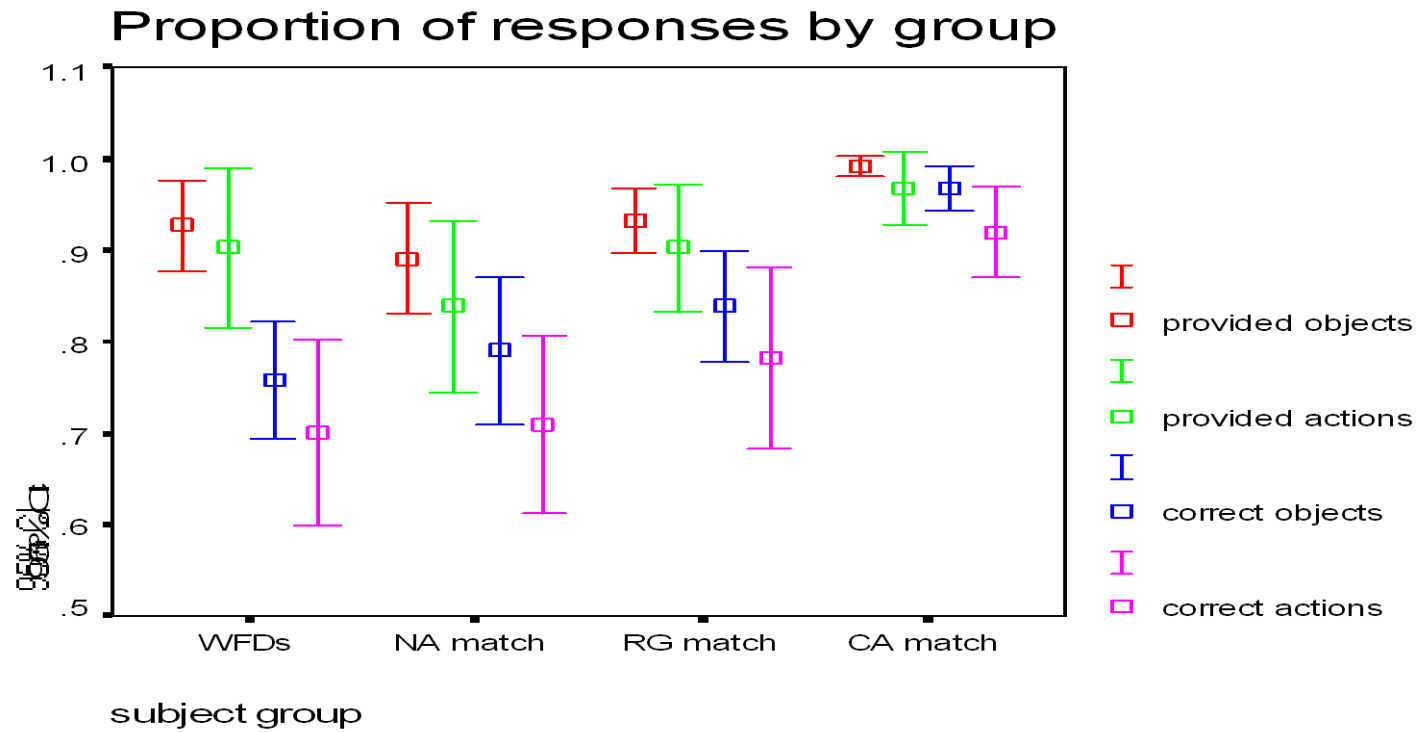
Appendix 1 Items presented in the definition task

	High Frequency	Low Frequency
OBJECTS	Cow	Zebra
	Shoe	Vest
	Hand	Ankle
	Knife	Bowl
ACTIONS	Dance	Wobble
	Cut	Stir

Appendix 2a Percentage and total of provision of definitions and accuracy of responses for objects by group

	COW		SHOES		HAND		KNIFE		ZEBRA		BOWL		VEST		ANKLE	
	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct
WFDs	96.8	87.1	96.8	80.6	96.8	83.9	100	93.5	90.3	83.9	96.8	61.3	90.3	61.3	74.2	54.8
	(30)	(27)	(30)	(25)	(30)	(26)	(31)	(29)	(28)	(26)	(30)	(19)	(28)	(19)	(23)	(17)
NA	80.6	71	96.8	90.3	93.5	87.1	96.8	90.3	90.3	90.3	96.8	80.6	90.3	83.9	67.7	38.7
Match	(25)	(22)	(30)	(28)	(29)	(27)	(30)	(28)	(28)	(28)	(30)	(25)	(28)	(26)	(21)	(12)
RG	93.5	83.9	93.5	87.1	93.5	87.1	100	100	90.3	80.6	96.8	74.2	96.8	90.3	80.6	67.7
match	(29)	(26)	(29)	(27)	(29)	(27)	(31)	(31)	(28)	(25)	(30)	(23)	(30)	(28)	(25)	(21)
CA	100	93.5	100	96.8	100	100	100	100	100	100	96.8	87.1	100	100	96.8	96.8
match	(31)	(29)	(31)	(30)	(31)	(31)	(31)	(31)	(31)	(31)	(30)	(27)	(31)	(31)	(30)	(30)

Appendix 2b Percentage and total of provision of definitions and accuracy of responses for actions by group

	DANCE		CUT		WOBBLE		STIR	
	Provision	Correct	Provision	Correct	Provision	Correct	Provision	Correct
WFDs	87.1	61.3	96.8	80.7	93.5	80.7	83.9	58.1
	(27)	(19)	(30)	(25)	(29)	(25)	(26)	(18)
NA	80.7	58.1	80.7	74.2	80.7	71	93.5	80.7
Match	(25)	(18)	(25)	(23)	(25)	(22)	(29)	(25)
RG	90.3	77.4	90.3	74.2	87.1	80.7	93.5	80.7
match	(28)	(24)	(28)	(23)	(27)	(25)	(29)	(25)
CA	93.5	83.9	93.5	93.5	100	100	96.8	90.3
match	(29)	(26)	(29)	(29)	(31)	(31)	(30)	(28)