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# **Dynamic Assessment of bilingual children's language at the point of referral**

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## **Abstract**

The DAPPLE (Dynamic Assessment of Preschoolers' Proficiency in Learning English) was developed in response to a clinical need to obtain information about bilingual children's English language learning ability, particularly in the absence of detailed information regarding their proficiency in their other language/s. The assessment looked at children's responses to opportunities to learn in the areas of vocabulary, sentence structure and phonology (speech sounds). Twelve bilingual children aged between three and five years who had been referred to speech and language therapy were assessed. Their responses across the three areas were explored to derive profiles of strength and weakness across language areas. One of the twelve children was found to possess good language learning abilities across all areas, which may reflect an inappropriate referral. All of the remaining children demonstrated difficulties with learning within one or more areas of the DAPPLE, with one child having difficulties across all areas. The findings indicate that the DAPPLE could be used productively as a pre-diagnostic tool. Future directions for the development of the test are considered.

**Keywords:** *Dynamic assessment, language, bilingual, children, pre-diagnostic.*

## **Introduction**

With their origin in psychological and intelligence testing, models of Dynamic Assessment (DA) are concerned with the assessment of domain general versus domain specific skills. Feuerstein and his colleagues, for example, in their emphasis

on accessing the true learning potential of children from a variety of social and cultural backgrounds, stressed the importance of testing *domain general* learning skills, free from the bias of the structured learning experience of Western schooling (Feuerstein, Rand & Hoffman, 1979; Feuerstein, Rand & Hoffman, 1980; Feuerstein, Rand & Hoffman, 1981). A focus on *domain specific* and *curriculum based assessments* has been maintained by other researchers, in order to draw conclusions about how teachers might support students' specific difficulties, and in order to evaluate validity by comparison with school based assessments. Kaniel (2009) commented that adopting domain general assessments as a rule, leads to assessors tending to overgeneralize the findings of DA, and recommended that potential for learning should be assessed in each domain to improve predictive validity. Vye, Burns, Delclos and Bransford (1987) identified many of the issues involved in choosing domain specific over domain general tasks. In the context of school programmes of teaching and assessment, they recommended using tasks closely related to specific content areas. They further explained that DA of specific areas enabled them to explore, for example, the reasons for students' problems, and strategies that could help them to learn a specific subject. While information about thinking and cognitive skills is vital, understanding the relationship between thinking skills and domain specific competencies is not simply additive. Rather '*competencies in a domain, and the ability to think about that domain seem to develop hand in hand*' (Bransford, et al, 1987, p.492).

With regard to language, the specific domain is clearly delineated, and published normative static tests measure *language ability* (the product) in contrast to Dynamic Assessments which measure the *ability to learn language*. Expressive language as a

product is more easily defined than 'intelligence' and domain specific tasks have been devised to assess the extent to which knowledge and skills in language have been mastered. However, multiple skills and processes are involved in the processing, understanding, retention and production of phonology, vocabulary, semantics, grammar and pragmatic areas of language, or combinations of these. In order to gain a comprehensive profile of an individual's language, numerous subtests have to be used. In this domain, therefore, an assessment that sheds light on fundamental learning skills, or cognitive processes that may contribute to the learning of a range of linguistic structures, would be a valuable addendum to an assessment battery. Further, the links between competence in language and the acquisition of literacy are well established, and language ability is viewed as an important component of access to the educational curriculum (Stackhouse, 2000).

### **DA of Language**

DA methods have added to the body of knowledge about language development and performance in typically developing children. In addition, according to Pena (2000), DA has provided a more valid approach to assessment of children who are: bilingual, from different cultural backgrounds, disadvantaged or have educational or clinical needs. Standardised tests are not applicable for many of these children (Hasson and Joffe 2007). With regard to typically developing (TD) children, studies have addressed children of different ages developing skills in morphology (e.g. Larsen and Nippold, 2007; Ram, Marinellie, Benigno & McCarthy, 2012), phonological awareness and reading, (e.g. Bridges and Catts, 2011; Elleman, Compton, Fuchs,

Fuchs & Bouton, 2011) and sentence combination from the two-word level (Olswang Bain & Johnson 1992) to complex sentences (Gummersall & Strong 1999).

Originating some 20 years ago, Spector (1992) devised a DA of phonemic awareness, specifically looking at segmentation skills, that was found through positive correlation with subsequent tests, to predict progress in reading. It appeared that children who showed the most improvement in word recognition across the study period were also those who benefited most from the prompts and cues supplied during the DA. The problem subsequently posed by Swanson and Howard (2005) was the distinction between those with reading disabilities (RD) who have genuine information processing difficulties, and those who are poor readers for reasons of poor experience and instruction. Dynamic assessments of working memory were used to determine whether the procedure could increase differentiation of RD from poor readers and whether the responsiveness to mediation of children with RD was poorer than that of poor readers. The tasks used were of phonological working memory, i.e. rhyming, and of semantic memory i.e. digit and sentence recall, and prompting sequences to facilitate performance were constructed for each. Results of the study were complex and inconclusive due to the small sample sizes. Nevertheless, there were indications that although the children with RD were not clearly differentiated from the poor readers, strategy learning was maintained in poor as well as skilled readers, but not in children with reading or reading + maths disorders.

Elleman et al. (2011) similarly employed a DA to help identify children at risk for developing reading disabilities because of comprehension difficulties, and found that DA explained 4% unique variance above and beyond vocabulary and word

identification on the Passage Comprehension (PC) task. The unique variance explained by the DA indicates that the DA is picking up skills that word identification and vocabulary are not addressing in the PC assessment. Further research by Bridges and Catts (2011) showed that the dynamic screening measure of phonological awareness uniquely predicted end-of-year reading achievement and outcomes. These studies suggest that educators may be able to more accurately determine the sources of difficulty in children performing poorly on assessments, and the prognosis for their achievements, and as a consequence, devise appropriate interventions to improve those outcomes.

A parallel exists as Speech and Language Therapists (SLTs) from many countries are confronted with needing to differentiate children with Language Impairments (LI) from those who perform poorly on language tests for reasons of cultural diversity, or the disadvantage of assessment in a language other than their own first language. Key studies into the use of DA to assess culturally and linguistically different children (hereafter CLD), and differentiate typically developing children from those with LI have been published by Elizabeth Peña and colleagues. Gutierrez-Clellan and Peña (2001) described the tendency of children from diverse cultural and linguistic backgrounds to under-perform on standardized tests, resulting in over-diagnosis of language impairment. DA was found to be a more culturally fair means of assessing the responses of such children to learning experiences, providing opportunities to familiarize them with test expectations and probe their responses.

Peña, Iglesias and Lidz (2001) examined the performance of preschool CLD children, using a word learning task, with a pretest-teach-posttest method. The teach phase

consisted of mediated strategies for naming, and the children's performance during these sessions was also rated for modifiability (i.e. their amenability to learn). Posttest scores and ratings differentiated the typically developing children from those with low language ability, who were less able to benefit from the short-term intervention. Similarly, Camilleri and Law (2007) and Kapantzoglou, Restrepo and Thompson (2011) demonstrated that children with typically developing language made associations between the phonological and semantic representations of new words faster than children with Primary Language Impairments, showing greater modifiability. Camilleri and Law (in press) showed that one of the measures derived from their dynamic assessment of vocabulary skills predicted children's vocabulary growth over a six month follow-up period.

Moving away from vocabulary studies, Peña et al. (2006) examined the classification ability of a DA of narrative ability in first and second grade school children. In general, all children performed better on the post-test after the two sessions of MLE, but as expected, the TD children showed greater gains than those with LI. Pre-test measures of narrative did not accurately classify TD and LI children but the LI children could be identified on the basis of their limited pre to post-test gains.

More recently, Hasson et al. (2013) developed a dynamic test battery called the 'Dynamic Assessment of Preschoolers' Proficiency in Learning English' (DAPPLE) which assessed children's ability to learn phonology, vocabulary and sentence structure within an interactive assessment incorporating both graduated prompting and test-teach-retest elements. Hasson et al. (2013) found that children's responses

within the DAPPLE were able to differentiate TD pre-school bilingual children from those bilingual children referred for SLT.

It is regarded as best practice to assess multilingual children in all the languages they are exposed to (RCSLT, 2006). However, the reality within schools in London is that a wide variety of home languages exist (as many as 300 different languages spoken in London) and there is limited access to interpreters. This means that timely assessment in different languages can be difficult to achieve (Hasson et al., 2013). This was the case with the children in Hasson et al.'s (2013) study. The DAPPLE was developed partly to address this difficulty – not as a replacement of multilingual assessment, but as a means of obtaining information about a child's language-learning ability in the absence of reliable and valid information on the child's language abilities in language/s other than English. As a group, the referred bilingual children in Hasson et al.'s (2013) research were found to respond differently on each of the three components (vocabulary, sentence structure, phonology) of the DAPPLE when compared to non-referred (TD) bilingual children. Referred children needed a greater number of cues to learn in both the vocabulary and the sentence structure components of the assessment. Referred (bilingual) children were also less able to retain targeted words in the vocabulary component. The types of errors produced by the referred children on the sentence structure and phonology components were also qualitatively different from those of the control group (non-referred children). Across groups, Hasson et al. (2013) also found that there were moderate correlations between children's performance on the different components of the DAPPLE. This finding is compatible with the clinical presentation of children who may have areas of relative strength and weakness across different areas of language. An exploration of these areas of strength and weakness in dynamic assessment performance for individual

children allows for the development of a clearer profile and a better judgement as to whether a child's language skills are developing appropriately across language areas.

The current paper revisits the findings from Hasson et al's (2013) study, looking specifically at the group of bilingual referred children. Rather than comparing this group to a control group of typically developing, or considering group quantitative data, the current paper will explore individual children's pattern of responses to the separate components of the DAPPLE and to the DAPPLE as a whole.

## **Methodology**

### *Aims of the study*

To explore individual referred bilingual children's pattern of responses within individual components/ domains (vocabulary, sentence structure, phonology) of the DAPPLE.

To explore individual referred bilingual children's pattern of responses across the components of the DAPPLE and identify key areas of need (or lack of, across the domains).

## **1. Participants**

Ethical approval for the study was obtained from South West London Research Ethics Committee. Once ethical approval was obtained, the researchers identified twelve suitable participants to take part in the study.

Participants were bilingual children aged 3-5 years who had been recently referred to speech and language therapy and had started receiving intervention within their

preschool or school setting. Regrettably (as mentioned above), little information had been obtained by the schools about the participants' level of exposure to other languages or proficiency in the languages they were exposed to outside of the school. Participants' parents/carers were contacted for consent for their child to be assessed using the DAPPLE. Bilingual children from a range of linguistic and cultural backgrounds were included. Home languages included Bengali, Gujarati, Lingala, Polish, Turkish, Twi, Yoruba, Shqip, French and Spanish. The only pre-requisite for inclusion in the study was that the children had some exposure to English, given that the assessment would be carried out in English. This exposure was assumed if the participant had attended their educational setting for several months, which was the case for all identified children. Children were only excluded from the study if they had significant difficulties in addition to, or other than language, including autistic spectrum disorders and hearing loss. Children's non-verbal cognitive ability was not assessed prior to the study, or used as a criterion for inclusion or exclusion.

## **2 The Assessment Tasks**

The DAPPLE battery was devised with test–train–retest components (Peña et al., 2001, 2006, 2007) and some graduated prompting elements (Bain & Olswang, 1995), to elicit information about the participants' proficiency in learning English. The language tasks within the battery were presented in this order:

Task 1: Dynamic assessment of vocabulary consisting of a static pre-test receptive vocabulary picture selection task followed by a vocabulary teaching phase and a post-test of targeted vocabulary

Task 2: Dynamic assessment of expressive language including static pre-test followed by an expressive language teaching phase,

Task 3: Dynamic phonological assessment (Diagnostic Screen taken from the Diagnostic Evaluation of Articulation and Phonology (DEAP, Dodd et al, 2002)

Task 4: The assessment of expressive language post-test was carried out to assess the child's ability to carry over learning from the teaching phase .

Task 1: Dynamic assessment of vocabulary learning.

The procedure was based on that described by Camilleri and Law (2007). The first part of the DAPPLE's vocabulary assessment consisted of a static assessment of vocabulary knowledge. The starting point for the intervention phase occurred once up to six words (out of 30) had been identified as being unknown to a child. The intervention phase of the dynamic assessment was carried out in the form of a posting game where the child posted picture cards into a post box. The child was presented with three cards, one of which was a targeted previously unknown item, and the other two were previously known items, used as distractors. Children were then encouraged to use elimination strategies to accurately create a new word-referent match. Prompting to achieve picture recognition was according to a standardised hierarchy of cues (from least to most assistive).

If the child was able to select the picture (independent identification) using only contextual mediation, i.e. using elimination of known items as a strategy, they scored three points. At this point, if the child was unable to identify the correct picture the researcher provided feedback to the child by saying *“No, that's not the ‘judge’; that was a hard word; let's try and find the easier ones first”* (context/language

mediation). The researcher proceeded to get the child to find the easier items first which they had already identified correctly in the pre-test. Once the child had identified both distractors correctly, they were again asked to find the difficult target word, and scored two points if they were successful.

If the child was still struggling to identify the correct target item a final level of mediation which made an explicit link between the referent and the word (context/language/context mediation) was used by turning the distracter pictures face down after correct identification. This meant that there was only one possible option left to point at for the target word (explicit identification) scoring one point. The process was repeated for all of the chosen vocabulary items (up to six). Children were assigned an overall score for mediation (1 to 3) based on the mean score across items. For example, if children consistently adopted independent identification they achieved a mean score of three. Mean scores were adopted, rather than total scores, to allow for the possibility of targeting a different number of vocabulary items (e.g. five instead of six) and still deriving a comparable score.

Expressive task. Once the child had identified all three of the vocabulary items (one targeted item and two distractors) during the mediation phase of the vocabulary picture selection task, irrespective of the level of mediation, the first expressive task was presented. This first expressive task, unlike the post-test (see below) was therefore embedded within the mediation phase, and carried out each time a word was targeted alongside two distractors. The child was asked which picture they would like to post in the post box first. This demonstrated whether the child was able to show immediate recall for the target word and use it expressively. All three items named

would be posted away, including the two distracters. This continued for each set of three words (up to six target words) with the child naming the distractor items and target items before posting them in the post box.

Post-test. After the child named all of the vocabulary items and posted them away, the target pictures were selected from the post box (maximum of six) and presented to the child all at once; without the distractor items. The child was asked to name the items for a second time and post them away. This represented a measure of each child's retention of items on an expressive level. If the child was unable to name some of the items, the child was asked to point to each remaining picture in turn when spoken by the researcher. This procedure served to check whether the child retained those remaining vocabulary items receptively.

## Task 2: Dynamic assessment of expressive language

In the expressive language assessment, the child was told that '*We are going to look at some pictures and tell some little stories about them*'. The child was initially given a model of a sentence next to a given picture e.g. '*Look, the fireman is squirting water on the fire*'. The static pre-test then required the child to comment on what was happening in two consecutive different pictures. The child's response was recorded verbatim and no prompting was given. Children were scored on the number of clause elements present in the sentences produced to describe the two pictures.

During the intervention phase the child was presented with four different composite pictures. Each picture was intended to elicit a three or four element sentence from the child e.g. '*the boy is eating the banana*' or '*the grandma is sitting on her chair in the garden*'. The child was shown one picture at a time and asked '*What is happening?*' If

the child responded spontaneously with a correct sentence containing three or four elements they were scored three. If the responses were not achieved and the child did not produce the sentence, the sentence did not contain the correct number of elements or the sentence was not sequenced appropriately, the researcher prompted as necessary e.g. '*what is he eating?*' or '*where is she sleeping?*' If these prompts elicited the required response the child scored two. If the child was still unable to produce the target sentence, the sentence was modelled by the researcher for the child to imitate, and if this level of prompting was required, the child scored one. This procedure of successive prompts is a simplified version of that used by Bain and Olswang (1995) to assess potential for children to learn 2-word combinations.

Task 3. The phonological assessment was adapted from the Diagnostic Screen of the Diagnostic Evaluation of Articulation and Phonology (DEAP), Dodd et al., 2002) The phonological screening consisted of ten colourful pictures that the child was required to name twice. The procedure assessed single word production, consistency of sound production in single words and stimulability of phones involving repeated attempts to elicit accurate production. The child was asked to name all ten pictures. Any speech sounds that were not produced accurately by the child were modelled by the researcher and the child was encouraged to copy the sound to check stimulability. The child was then asked to name the 10 pictures again. The child's two productions were compared for consistency. The inconsistency calculation divided the number of words produced differently by the number of words produced twice. If teaching the articulation of individual sounds enhanced children's pronunciation of words, their inconsistency score would be higher than if the teaching did not affect pronunciation.

Task 4: Dynamic assessment of expressive language post-test:

The child was presented with two more composite pictures and again asked ‘*What is happening?*’ No prompting was given, and the child’s spoken responses were recorded verbatim as with the static pre-test. Children were again scored on the number of clause elements present in the sentences produced to describe the two pictures.

### **3 Procedure**

The assessment was carried out by one of two speech and language therapist researchers in a single session lasting a maximum of 40 minutes. Responses were transcribed during the procedure and scoring carried out immediately after completion of the test. The mediational score for the vocabulary component was re-scored for this paper by the first author for consistency across assessors, using the transcribed (verbatim) answers.

## **Results**

The following sections present a qualitative analysis of children’s performance on the individual sections of the DAPPLE. This will be followed by a discussion of the ways in which the DAPPLE might inform clinical practice, with particular reference to the work of educational psychologists.

### **1 Vocabulary**

Table 1 shows the scores obtained by children during the dynamic assessment of vocabulary learning. They obtained a mediational score based on the amount of assistance they required to establish an initial link between the spoken word and the referent (picture). They were then given a percentage score based on the number of words they were able to name during the interaction (Expressive 1) and at post-test (Expressive post-test). Their receptive post-test takes into account the number of words the children could identify over and above the ones that they could name so, for example child #8 could only name one word, but could identify one additional word, leading to a receptive score of 2 (33%).

All of the children were exposed to six target words (different ones for each child), except for child #7 who was exposed to five words (because he could identify the other 25 words correctly at pre-test).

**Table 1 Vocabulary learning scores for each of the 12 children**

Child	Age: months	Mediation Score	Expressive 1: Percentage (number)	Expressive post-test: Percentage (number)	Receptive post-test: Percentage (number)
1	58	3.00	67 (4)	50 (3)	100 (6)
2	57	3.00	67 (4)	50 (3)	100 (6)
3	45	2.83	67 (4)	17 (1)	50 (3)
4	44	2.50	67 (4)	50 (3)	100 (6)
5	49	2.33	50 (3)	17 (1)	83 (5)
6	54	2.67	0 (0)	0 (0)	83 (5)
7	50	3.00	20 (1)	100 (5)	100 (5)
8	52	2.67	83 (5)	17 (1)	33 (2)

9	45	3.00	0 (0)	17 (1)	100 (6)
10	48	3.00	50 (3)	33 (2)	100 (6)
11	59	2.83	50 (3)	33 (2)	100 (6)
12	42	2.83	33 (2)	17 (1)	83 (5)

### *Amount of assistance needed*

Across items (words) children varied in the amount of assistance needed to identify the targeted words. Child #5, for example, required the third (highest) level of mediation on two occasions, but then required minimal assistance for the remaining items. In most instances children managed to establish an initial link between the word and picture with minimal assistance, with five children (1, 2, 7, 9, 10) achieving this with all of the words that were targeted.

### *Expression and Understanding of newly learned words*

Having been exposed to the new words and established the initial match, most children were able to name some of these words in order to post them away in the posting game. However, two children (#6 and #9) were unable to name any of the targeted words during this first expressive naming trial. Even though these children were again given an opportunity to hear the words, one of these children (#6) was still unable to express any of the words at the post-test (second expressive naming trial). The other child (#9) named only one item correctly at post-test. On the positive side, these children were able to identify most/all of the targeted words when assessed for their comprehension of these words.

Three children (#1, #2 and #4) presented with an identical pattern of responses. They were able to name four of the six targeted items at the first expressive naming trial

and retain three of them at post-test. They were also able to identify (receptively) all the remaining targeted items. Children #5, #8, #10, #11 and #12 show a similar pattern of naming some words at the first trial and then fewer at the post test. The most dramatic reduction in words named from the first trial to the second (at post-test) was demonstrated by child #8, who also performed poorly on the receptive task, identifying only one additional word (on top of the one named correctly).

Child #7 was the only child to improve their expressive score from the first trial to the second one, achieving a remarkable 100% at post test (i.e. correctly naming all of the words that had been targeted).

## 2. Sentence structure

Table 2 displays a summary of the caseload participants' performance on the dynamic sentence structure task.

**Table 2 Sentence structure scores for each of the 12 children**

Child	Age: months	Pretest Score	Prompt Score	Post-test Score	Gain
1	58	3	7	5	2
2	57	4	5	3	-1
3	45	3	4	5	2
4	44	5	7	11	6
5	49	4	1	3	-1
6	54	5	4	2	-3
7	50	4	8	7	3

8	52	5	4	4	-1
9	45	3	1	3	0
10	48	3	3	2	-1
11	59	4	5	5	1
12	42	4	5	5	1

Table 2 shows the scores obtained by the children on the different sections of the ‘sentence structure’ component of the DAPPLE. Five of the children (2, 5, 8, 9, 10) exhibited very low levels of expressive language (scores of 3 to 4 on pretest) and no gain from pre-post test in spite of the prompts provided. All produced sentence fragments, with at least one of the pre- or post test responses consisting of a single word. Participants #5, #8 and #9 all used gestures in place of words, and participant #10 used the term ‘goodnight’ instead of describing the picture of the child going to sleep.

A small number of 3 element sentences were used, no more than one by any one participant, and all of which were simplified in structure, omitting or substituting articles, third person singular morphemes, and on occasion substituting semantically inappropriate words. e.g.

#5 *I got cat*

#9 *A mum sleep in bed*

#2 *He make the teeth* (brushing his teeth)

And #8 *He bleeding in the nose* (brushing his teeth).

In addition, participant #6 performed less well on the post-test, having produced a 3 element sentence on pre-test, (*He's getting his cat*). He was unable to produce 3 and 4 elements sentences during the training items, responding to prompts with incomplete sentences, but managing to imitate the full structures. Thereafter he responded to post-test items with single elements (eg. '*sleeping*').

It would appear that all of these six children demonstrated severe difficulties in their spontaneous expressive language in comparison to expectations for their chronological age.

Furthermore, four participants were seen to make minimal gains from pre to post test, but again none produced more than one 3 element sentence, and those that were produced were again grammatically incomplete e.g.

#1 *the mummy drop boy*

#3 *mummy doing good boy*

#11 *it's a sleeping and a story*

#12 *mummy sleep in bed.*

All of these children were scored higher in their responses to the prompting phase. This means that they were able to express a 3 element sentence either spontaneously, or in response to a prompt question, such as 'who was doing the action?' or 'what was X doing? Only one of the children in the previous group achieved this, the remainder were dependant on imitation only. However, learning from the prompts in the training phase was not consistently transferred to the post –test, and although they performed

better in the post than the pre-test, the inconsistent use of simple 3 element sentences, use of atypical errors and difficulty learning from models provided for imitation, characterises these children as having difficulty learning language. These features are also assumed to be independent of the language being learnt.

Participants #4 and #7, however, both demonstrated responsiveness to the prompts, and produced considerably longer, age appropriate utterances at the post test than in the pre-test phase. Both had been previously referred to speech and language therapy, and indeed their spontaneous language showed evidence of grammatical errors e.g.

#4 'He climbing up the trees'

#7 'Him up the tree'.

However, their subsequent production showed a grasp of syntactic formulation and an ability to sequence multiple elements appropriately :

#4 'Her mummy said to him he can't go outside'

#7 'The dad says Shh because the baby's gone to sleep'

It would appear that these two children may have been referred to SLT on the basis of morphological inaccuracies. Furthermore, their spontaneous language in response to picture cues was limited to simple 2 and 3 element clauses. However, after models of full sentence descriptions of pictures, their performance improved substantially.

### **3. Phonology**

Table 3 displays a summary of the caseload participants' performance on the dynamic phonological task. The children named ten pictures from the *Diagnostic Evaluation of Articulation and Phonology's* screening subtest, twice. In the teaching phase that occurred between the two trials, the assessors attempted to elicit any speech sounds not produced correctly in the first trial.

Table 3. Summary of participants' performance in the phonology tasks.

ID	Age: months	Words Correct		Phones Not Elicited	Percent Inconsistency	Atypical Errors	Errors	
		Trial 1 (out of 10)	Trial 2 (out of 10)				Trial 1 (out of 54)	Trial2 (out of 54)
1	58	4	4	0	40	12	13	12
2	57	6	6	0	20	2	8	5
3	45	5	5	2*	20	6	7	6
4	44	4	4	3	0	2	10	10
5	49	3	3	5	20	10	15	15
6	59	4	5	2	10	3	11	10
7	50	3	4	0	30	11	17	14
8	52	3	5	0	40	4	13	7
9	45	3	4	1	20	0	9	7
10	48	3	6	2*	20	2	12	4
11	59	3	5	0	30	1	8	6
12	42	0	2	2	40	14	22	15
		3.4	4.4	1.4	24.2	5.6	12.1	9.3
		(1.4)	(1.2)	(1.7)	(14.2)	(4.9)	(4.3)	(4.0)

\*Distortion of fricatives: /s,z,f,v,ʃ/ (shy) ʒ (measure)/ or affricates /tʃ/ (chip), dʒ (joy)/

### *Word Production*

Five of the children produced the same number of words correctly in both trials. There were only four children who each said one word correctly in trial 1 but in error in trial two. There were only four children who each said one word correctly in the first trial but in error in trial two. Four children added one correct word after the sound elicitation activity (e.g., wats -> watch), one added two, and participants #10 and #12 added three correct words in trial two.

Mean inconsistency of word production of the same lexical items was over 20%, which is high. Some of this inconsistency can be explained by improved accuracy of production in the second trial. There was a trend, however, for high inconsistency scores and high number of total errors to go together (see table 3).

### *Speech Sound Production*

Five children could articulate all phones in isolation that were in error in single word production. Two children demonstrated distorted production of sounds. Participant #3 had lateral production of affricates /tʃ/ (chip) and /dʒ/ (joy); and participant # 10 had dental productions of /s, z/. The remaining five children could not articulate the following sounds in isolation. Those marked with an asterisk are sounds where non-articulation is age appropriate:

#4	/ʃ*, tʃ, dʒ/	#5	/tʃ, v, s, θ*, r*/	# 6	/θ*, r*/
#9	/v/	#12	/ŋ, j/		

Where: /ʃ/ (shy), /tʃ/ (chip), /dʒ/ (joy), /θ/ thing, /ŋ/ ring /j/ you..

### *Error Patterns*

All children demonstrated the use of some error patterns typical of monolingual development of English-speaking younger children. As examples, they simplified clusters (\_pider/spider), stopped fricatives (tided/scissors), glided (bwidge/bridge), fronted velars (doves/gloves) and deleted unstressed syllables (\_bela/umbrella).

Eleven of the children also made errors that are atypical of monolingual children's development, including vowel errors. Examples of atypical error patterns included use of a glottal stop to mark affricates (waʔ/watch), addition of [ə] before words (əgla] for gloves), deletion of final clusters ta/thank, backing (piger/spider), word initial consonant deletion (atch/watch). Table 4 displays the number of developmental and atypical errors made, including the number of vowel errors. Two children (#8, #10) eliminated their atypical errors in Trial 2.

Table 4. Phonological performance by participant

ID	Number of Developmental Error Patterns	Atypical Error Patterns	Vowel Errors
1	3	3	2
2	3	0	2
3	3	2	2
4	4	1	0
5	4	3	4
6	3	1	2
7	4	2	2
8	5	2	1

9	3	0	0
10	3	1	1
11	3	1	0
12	2	5	8

The data presented capture a transient stage of bilingual children's phonological development. They are learning how speech sounds can be combined to make English words. Examination of the quantitative and qualitative data suggest that participants #1, #5, #7, #12, have high numbers of errors overall, high inconsistency and a high number of atypical errors reflecting the number of atypical error patterns. These four children might be considered more at risk than children making fewer atypical errors. Participants #2, #4, #6, #8, #9, #11 seem to be acquiring the constraints of English phonology. Two children (#3 and #10) with suspected articulation difficulties may need further assessment. The type of errors, rather than the total number of errors seems to provide a better guide for the identification of bilingual children who have articulation and phonological difficulties.

## **Discussion**

The findings from the three component tests within the DAPPLE provide useful indicators of children's areas of strength and need, within the individual components themselves and across language areas. The vocabulary section provided information about children's ability to learn new words and retain them beyond immediate exposure. Camilleri & Law (2007, 2013) identified the second expressive task within

their dynamic vocabulary assessment procedure as being the most informative, because this task reflected both the ability to construct a phonological representation for words on the basis of increased exposure, and the ability to retain that representation with sufficient accuracy to be able to use the word expressively. If this is applied to the Vocabulary assessment in the DAPPLE (which was based on Camilleri and Law's procedure), one of the participants (#7) demonstrated excellent abilities to learn new words within the context of the DAPPLE. When this is combined with the findings from the Sentence Structure component of the DAPPLE, we are presented with a child who responded well to learning opportunities, both in the areas of vocabulary and sentence structure.

Participants #1 and #4 also responded well within both language components of the DAPPLE. On the 'Sentence Structure' component they both responded well to prompting, achieving a prompt score of 7, and they both made gains from pre-to post test, although participant #1 was less consistent (hence the smaller gain). On the vocabulary learning component both children managed to retain words receptively, and (perhaps more importantly) expressively – managing to name half of the targeted items at post-test.

It would appear that these three children (#1, 4 and 7) may have been referred to SLT on the basis of their limited vocabularies and morphological/syntactic inaccuracies, possibly arising from their learning of English as a second or additional language. Their vocabularies were below expectations for their ages and the use of spontaneous sentences in response to picture cues was limited to simple 2 and 3 element clauses. However, they performed well on both language components of the DAPPLE. Their ability to learn new words (particularly participant #7) approximated what might be

expected from a typically developing child of that age. Additionally, their fundamental grasp of the syntactic rules of sentence formulation in English was shown to be intact, and after models of full sentence descriptions of pictures, their own performance improved substantially. It is unlikely that children with language learning impairments would have been able to readily learn new words and produce sentences such as the ones produced at post-test by these children, without a longer period of more intensive intervention.

At this stage it is important to consider the findings from the Phonology component of the DAPPLE, particularly with regards to these three children. Children #1 and #7 were among the four children who were found to have high numbers of speech sound errors overall, high inconsistency and a high number of atypical errors and error patterns. These two children may well be at some risk for longer term phonological difficulties within their speech, in spite of their strengths in the areas of vocabulary and sentence structure learning. The information provided from the DAPPLE therefore can be seen to justify the referral of these children to speech and language therapy, while focussing attention towards the area that is more likely to be problematic. In the case of child #1 and child #7, phonology seems to be the key area of concern.

The child whose DAPPLE profile uncovered strengths across all three areas of speech and language covered by the assessment battery was participant #4. This child learnt a number of new words in the vocabulary component, demonstrated a great improvement of sentence structures between pretest and post-test and presented with a profile of speech sounds and errors of a typically developing child learning English, albeit at a younger age level.

All of the remaining participants can be seen as presenting with a profile of strengths and weakness across the areas of language assessed by the DAPPLE. Most children presented as having problems with more than one area of language and some children can be seen as being of greater cause for concern than others. For example child #6 demonstrated a very poor response to learning opportunities in the Vocabulary and Sentence Structure components, while emerging as less of a cause for concern from a phonological perspective. Child #12 appeared to have difficulties across all areas of the DAPPLE, demonstrating limited word learning potential, limited gains in sentence structure and several atypical sound errors and patterns.

### *Conclusions and Future Research Directions*

The extent to which norm-referenced assessments can be used to classify children accurately and the utility of classification itself have been questioned in the field of educational psychology (Elliott, 2003; Haywood & Lidz, 2007) as in the field of speech and language therapy (Camilleri & Law, 2007). The possibility of developing procedures which incorporate learning opportunities as an alternative or complementary tool when assessing both children's cognitive and language abilities has been considered in different contexts (Bain & Olswang, 1995; Peña et al., 2001, 2006, 2007). This is particularly relevant for children from diverse cultural and linguistic backgrounds, for whom standardised, norm-referenced assessments are particularly problematic (Hasson and Joffe, 2007; Hasson et al., 2013; Peña, 2000). As Hasson et al (2013) have pointed out, The Dynamic Assessment of Preschoolers' Proficiency in Learning English (DAPPLE) is unlikely to lead to straightforward pass/fail classification although it might inform the process of discriminating children with different language learning abilities. As can be seen from the findings of this

study, the DAPPLE leads to a profile of responses which educational psychologists and speech and language therapists can interpret in terms of the child's learning abilities. Hasson et al (2013) found that referred bilingual children performed differently to a control group of non-referred bilingual children. The current study has shown that there are considerable differences across children and across the different components of the DAPPLE. One child demonstrated excellent language learning potential across all areas and may well have been a case that was inappropriately referred. Interestingly, the DAPPLE findings corroborate the remaining eleven referrals - on one or more components of the DAPPLE, all of the remaining children appeared to be at risk of longer term speech and/or language impairments, which required ongoing monitoring at the very least.

These findings also reinforce the importance of domain specific assessment of different areas of cognition and specifically the importance of assessing children across different areas of language. Child #7 for example appeared to have excellent learning potential in the key areas of vocabulary and sentence structure, and may well have continued to develop in these areas. The phonology component of the assessment however indicated that his speech errors, in themselves, warranted attention.

Going forward, there is a need for further detailed and longitudinal case studies, which follow up children beyond the point of assessment. This was not carried out with the twelve participants in this study, but would add a lot of value in establishing the validity of the DAPPLE as a tool which can differentiate between children with a transient delay in speech/language development from ones who will continue to experience ongoing difficulties. In the current study we have focussed specifically on

the referred bilingual children. However, given the inherent difficulties in comparing the DAPPLE's findings with any form of "gold standard" (Hasson et al, 2013), there is a clear need for following up an entire cohort of bilingual children (i.e. not just referred children) in establishing the predictive validity of the DAPPLE. Research is needed to establish whether the profile of results for individual children, based on the small numbers of test items in the DAPPLE, is a valid and reliable indicator of a lasting profile of language abilities. A key point made by Hasson et al (2013) was their recommendation that the DAPPLE should be considered a pre-diagnostic tool, which alerts professionals to the need for further assessment once children have been identified as "at risk". Such further assessments would need to include both a broad evaluation of the child's learning abilities across different areas, and a thorough evaluation of the child's competence in their other language/s. This would require teachers, educational psychologists, speech and language therapists and parents to work together to establish a clear profile of the individual child's learning strengths and needs across cognitive and linguistic domains.



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