

Australian Journal of Educational & Developmental Psychology



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Australian Journal of Educational & Developmental Psychology, 2016, Vol. 15, pp. 24-34

Editor for this article: Jennifer Archer, PhD
Published by the UON School of Education
ISSN 1446-5442

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Interpretation of errors made by Mandarin-speaking children on the Preschool Language Scales – 5th Edition Screening Test

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Abstract

We investigated typical errors made by Mandarin-speaking children when measured by the Preschool Language Scales - fifth edition, Screening Test (PLS-5 Screening Test). The intention was to provide preliminary data for the development of a guideline for early childhood educators and psychologists who use the test with Mandarin-speaking children. Seventy-one Mandarin-speaking children aged 36-69 months from 15 childcare centres in northwest Sydney participated in the study. The children all had typically developing Mandarin competence as screened by a standardised Mandarin test. The results were consistent with our hypotheses. That is, due to linguistic differences between Mandarin and English, and Chinese children's general low level of autonomy, the most challenging areas on the PLS-5 Screening Test were production of word final consonants which do not occur in Mandarin, the use of plurals, personal pronouns, and language items embedded with autonomy. Children's overall performance on the test improved when their time attending English speaking childcare increased. The results are discussed with reference to implications for psychologists and childcare educators working with Mandarin-speaking children.

Keywords: Mandarin-speaking children, PLS-5 Screening Test, phonemes, plurals, pronouns

The Preschool Language Scales – 5th edition Screening Test (PLS-5 Screening Test) is an efficient instrument to help clinicians and educators identify toddlers and children who are at risk for language delay and who may require referral for additional speech and language assessment (Zimmerman, Steiner, & Pond, 2012). The test items are the most discriminating items selected from the full test, the Preschool Language Scales (5th edition) (Zimmerman et al., 2012). The PLS-5 Screening Test is now in use in Australia. However, there are no guidelines for interpreting scores of children for whom English is not their first language. There are no studies reporting the performance of Mandarin-speaking children on the PLS-5 Screening Test even though Mandarin is the most common language spoken at home after English in Australia (Australian social trends, 2013; Cooke, Zhang, & Wang, 2013; Lu, Samaratunge, & Härtel, 2012). Given the current social and economic mobility between China and Australia, more Mandarin-speaking people are likely to migrate to Australia. If the PLS-5 Screening Test is to be used widely in Australia, it will be useful to have a guideline on interpreting performance of children who speak other languages as their first language, especially Mandarin.

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This is important because the learners' first language will influence the acquisition patterns of their second language (Bedore & Peña, 2008). During the early stages of acquiring English as a second language, Mandarin-speaking children are likely to experience specific challenges that are influenced by their first language Mandarin. We can expect these children to make errors on the PLS-5 Screening Test that reflect difficulties with learning English as a second language even though their Mandarin may be typically developing. To date no studies have examined the errors made on the PLS-5 Screening Test by children who are learning English as a second language and who have typically developing Mandarin. The present study attempts to fill this gap and provide preliminary data on this group of children.

The PLS-5 Screening Test provides the following: norm-based criterion scores on areas of emerging interaction, language and speech skills in infants and toddlers; norm-referenced scores for articulation and language; and descriptive information for social/interpersonal communication skills, stuttering, and voice for children aged three years to seven years and eleven months (Zimmerman et al., 2012). In our study we examined the performance of a group of Mandarin-speaking children aged from three to five years.

Some items in the PLS-5 Screening Test measure pronunciation of certain phonemes (e.g., the last sound in *dog*), use of plurals and use of personal pronouns. These tasks are likely to be demanding for Mandarin-speaking children and lead to poor performance on the test because of substantial differences between Mandarin and English in these areas. In the following sections we illustrate these differences.

The typical syllabic word structure in Mandarin is consonant plus vowel (Hua & Dood, 2000; Lin & Johnson, 2010). Most words in Mandarin are in the form of /ma/ and /pa/ with only two consonants /n/ and /ng/ allowed in word final position, like the final sounds in the English words *kin* and

king. English, on the other hand, has an abundance of word final consonants, e.g., *dog*, *cats*. Moreover, English has voiced consonants /b, d, g, z/ and interdental fricatives /θ, ð/, but these consonants are all absent in Mandarin (En, Brebner, & McCormack, 2014; Lin & Johnson, 2010). Therefore when voiced consonants or interdental fricatives appear at word final position in English, Mandarin-speaking children may display difficulties. Previous studies have shown that in the word final position, voiced consonants (e.g., /g/) and interdental fricatives (e.g., /θ/), are particularly challenging for native Mandarin-speakers (Broselow, Chen, & Wang, 1998; Broselow & Xu, 2004; En et al., 2014; Hansen, 2001; Lin & Johnson, 2010).

Mandarin and English differ greatly in the use of inflectional grammar in marking plurals. English regular plural nouns are marked by adding the morpheme -s, e.g., *dogs*. Mandarin on the other hand marks plurals by number and/or quantifier, e.g., 'two dogs' in Mandarin would be 'two quantifier dog'. Given that inflectional grammar occurs at the end of words, evidence shows Mandarin-speaking children have difficulty in acquiring plurals even after many years of English emersion (Jia, 2003).

The two languages also differ in personal pronominal systems and the marking of possessives. While English has gender (*he* vs. *she*), animacy (*he* vs. *it*) and case contrasts (*he* vs. *him*) (Qi, 2010), Mandarin only uses one spoken form of pronoun 'ta' to cover all these pronouns (e.g., *he*, *she*, *him*, *her*, and *it*). While spoken forms of possessive pronouns, e.g., *his*, *hers* and *its*, are different in English, possessives in Mandarin are marked by a single morpheme 'de' attached to the pronoun 'ta', e.g., 'ta de' which could mean *his*, *hers*, and *its*. To avoid this ambiguity, Mandarin speakers prefer to use nouns and proper names, e.g., boy/girl, the boy's/the girl's (Qi, 2010).

Apart from the cross-linguistic differences as illustrated above, some language tasks in the PLS-5 Screening Test are embedded with western cultural practices of autonomy,

such as self-care skills of knowing what to do when being sick or explaining how household appliances are used. These tasks favour western children because Chinese children generally are less likely to be encouraged by their parents to develop self-care skills and learn self-sufficiency in various activities including toileting, walking, exploring, and communicating (Keller et al., 2007; Liu et al., 2005; Luo, Tamis-LeMonda, & Song, 2013).

The linguistic and cultural differences noted above may result in Mandarin-speaking children performing poorly on the PLS-5 Screening Test, but their overall performance on the test may increase with more exposure to the English language and Australian culture. Research shows that proficiency in a language among young children is associated with length of exposure to the language (Bedore & Peña, 2008; Jia, Aaronson, & Wu, 2002). Many bilingual children growing up in English-speaking countries do not start functional learning of English until they enter childcare centres or preschools (Bedore & Peña, 2008; Verdon, McLeod, & Winsler, 2014). Thus, length of attending childcare can be taken as an index of length of exposure to English, with longer attendance predicting better performance on the PLS-5 Screening Test.

The present study

The present study was part of a larger project on social competence, emotion regulation, and language development in Mandarin-speaking preschoolers (Ren, Wyver, Xu Rattanasone, & Demuth, 2015). The primary goal of the present study was to examine typical errors made by Mandarin-speaking children as measured by the PLS-5 Screening Test. Based on the phonological, grammatical, and morphological differences between English and Mandarin and in cultural values of autonomy, we hypothesised that Mandarin-speaking children would show poor performance in articulating word final consonants, plurals, personal pronouns, and language items embedded with autonomy. We also hypothesised that length of attending

childcare would predict overall performance on the PLS-5 Screening Test.

Methods

Participants

Ninety-six children who spoke Mandarin as a first language at home were recruited from 15 English-speaking childcare centres located in northwest Sydney (Ren et al., 2015). The teachers' consent forms showed Mandarin-speaking children made up 25-40% of the overall number of children across the 15 childcare centres. From the 96 children, we selected children whose scores on a Mandarin receptive and expressive language test were no less than one standard deviation below the mean (i.e. 85 and above). This was to ensure that all participants had normal development in their first language, that is, there was no speech and language disorder or delay. Seventy-one children were included in the present study with age ranging from 36 to 69 months ($M = 51.90$, $SD = 8.61$) and length of time in childcare ranging from 2 to 57 months ($M = 20.92$, $SD = 11.13$). There were 37 boys and 34 girls. Twenty-eight were first generation (born overseas) and 43 were second generation (born in Australia with at least one parent born overseas). The parents of the 71 children all came from mainland China. Seventy-five percent of the parents had a bachelor degree or higher. Because the PLS-5 Screening Test and Mandarin proficiency test have different forms designed for different age ranges (see the section *Measures* below), the participants in the present study were given tests on three ages: 3-, 4-, and 5-year-olds. Twenty-five (35.2%) children were 3-year-olds (age range 36-47 months, $M = 42.40$, $SD = 3.08$; Mandarin score range 85-128, $M = 100.36$, $SD = 13.39$), 28 (39.4%) children were 4-year-olds (age range 48-59 months, $M = 53.21$, $SD = 3.40$; Mandarin score range 89-134, $M = 105.82$, $SD = 12.54$), and 18 (25.4%) children were 5-year-olds (age range 60-69 months, $M = 63.06$, $SD = 2.44$; Mandarin score range 87-134, $M = 109.83$, $SD = 16.70$).

Measures

PLS-5 Screening Test The PLS-5 Screening Test has different forms designed for different age ranges. We used three forms (3-, 4-, and 5-year-olds) according to the participants' ages. Cronbach's alphas of three forms in the present study were .90, .86 and .89. The PLS-5 Screening Test includes six sections: Articulation, Language, Connected Speech, Social/Interpersonal, Fluency, and Voice. Articulation measures pronunciation of certain phonemes in the initial, medial and final positions of words. Language consists of several subsections with each subsection comprising several questions and assessing specific language skills. The three age forms differ in the tasks of the Articulation and Language, as Table 1 indicates. The other four sections measure the same constructs and are identical in wording. Connected Speech measures how much the child can be understood. Social/Interpersonal measures the child's typical behaviours such as greeting or saying "bye." Fluency examines degrees of smoothness, repetitions or pause of the child's speech. Voice examines whether the child sounds like typically developing children or there are atypical sounds like sounding hoarse or screaming. At the end of a test record form, a Screening Summary is provided. A child should be referred for additional assessment if he or she cannot pass any of the six sections.

The fourth author of this paper, who is a native English speaker with a teaching degree in early childhood and teaching experience, conducted the PLS-5 Screening Test assessment. She was trained by the third author who is a native English speaker with a PhD in psychology. The assessment took place in a quiet place in the childcare centres. The assessor first established rapport with each child before administering the test. Children who were shy were often accompanied by childcare teachers during the testing session to help them feel more relaxed. Administration, recording of responses, and scoring followed the procedures outlined in the PLS-5 Screening Test

Mandarin proficiency test The Receptive and Expressive Vocabulary Test (REVT) (Huang, Jian, Zhu, & Lu, 2010) is a norm-referenced measure assessing Mandarin proficiency of children aged 3-6 years. It is administered individually and assesses expressive and receptive skills. Each age range has its own test form and the present study used three forms (three, four and five years) according to the participants' ages. Cronbach's alphas of the three forms in the present study were .95, .98 and .97. The REVT was administered in the childcare centres by the first author who is a native Mandarin speaker with extensive language testing and early childhood research experience.

Table 1

Phonemes in articulation and subsections in language across three age groups

	Phonemes (underlined and bold)	Language subsections
3-year-olds	1. <u>pan</u> 2. <u>dog</u> 3. <u>dog</u> 4. <u>monkey</u> 5. <u>monkey</u> 6. <u>teeth</u> 7. <u>horse</u> 8. <u>feather</u>	1. Recognizes action in pictures 2. Understands negatives in sentences 3. Names a variety of pictured objects 4. Uses plurals 5. Produces one four-to-five-word sentence
4-year-olds	1. <u>pan/pot</u> 2. <u>dog</u> 3. <u>monkey</u> 4. <u>monkey</u> 5. <u>teeth</u> 6. <u>feather</u> 7. <u>shoe</u> 8. <u>chicken</u> 9. <u>horse</u> 10. <u>light/lamp</u>	1. Understands sentences with post-noun elaboration 2. Understands pronouns (<i>his, her, she, they</i>) 3. Tells how an object is used 4. Uses possessives 5. Answers questions about hypothetical events
5-year-olds	1. <u>shoe</u> 2. <u>light/lamp</u> 3. <u>sun</u> 4. <u>chicken</u> 5. <u>horse</u> 6. <u>feather</u> 7. <u>feather</u> 8. <u>teeth</u> 9. <u>car</u> 10. <u>red</u>	1. Points to letters 2. Understands complex sentences 3. Uses possessive pronouns 4. Formulates meaningful, grammatically correct sentences 5. Uses modifying noun 6. Names categories

Scoring

Scoring was conducted in accordance with the instructions provided by the PLS-5 Screening Test (Zimmerman et al., 2012). The first author transferred all the scores of the participants from the record forms into Excel spreadsheets. The Articulation section was coded 1 for *pass* when a 3-year-old child correctly pronounced five or more phonemes and a 4- and 5-year-old child correctly pronounced eight or more phonemes. Otherwise, the child was coded as 0 for *fail*. The Language sections of 3- and 4-year-olds had five subsections and the language section of 5-year-olds had six subsections (see Table 1). Based on the criterion of the test, each subsection was coded as 1 for *pass* and 0 for *fail*. The overall Language section was coded as 1 for *pass* when a 3- and 4-year-old child passed four or more subsections and a 5-year-old child passed five or more subsections. Otherwise, the child was coded as 0 for *fail*. The other four sections of Connected Speech, Social/Interpersonal, Fluency and Voice were coded as 1 for *pass* and 0 for *fail* according to the criterion provided in the test. Finally, the performance (i.e., *pass* or *fail*) of each of the six sections was recorded in the Screening Summary.

Results

We use *pass rate* to report our results. Pass rate refers to the percentage of children who passed a particular task. For instance, 17 out of the 25 3-year-olds correctly produced the word *pan/pot*, so the pass rate for this task is 68%. We will focus on two sections of the PLS-5 Screening Test in the following analyses because of low pass rates. These include the phonemes of Articulation section and the subsections of Language section. The pass rates of Connected Speech, Social/Interpersonal, Fluency and Voice were relatively stable and high (68-92% for the 3-year-olds; 82-93% for the 4-year-olds; and 78-94% for the 5-year-olds). We will not report these sections in detail because they are not the interest of this paper (i.e., examining typical errors). In the following sections, we will report first on the phonemes in Articulation with pass rates less than 60% and then on subsections in Language with pass rates less than 60%. It should be noted

that the selection of the criterion of less than 60% pass rate is an arbitrary decision. The PLS-5 Screening Test does not provide percentile scores on the normative sample. In the final analysis, we examine whether children's length of time in childcare predicts overall performance of the PLS-5 Screening Test (i.e., number of passes of the six sections).

Articulation

The pass rates of Articulation were 84%, 82%, and 72% for the 3-, 4- and 5-year-olds respectively. The ranges of the pass rates of the phonemes were 60-92% for the 3-year-olds, 68-100% for the 4-year-olds, and 28-100% for the 5-year-olds (see Table 2). The 3-year-olds had one phoneme, i.e., /g/ in the final consonant in *dog*, of which the pass rate was just 60%. A typical wrong response was deletion of the final consonant, i.e., /dɔg/ produced as /dɔ/. The 4-year-olds did not have any items of which the pass rates were below 60%. The 5-year-olds had one item /θ/, the word final consonant in *teeth* of which the pass rate was only 28% (see Table 2). A typical wrong response to *teeth* was /s/ substitution, i.e., /ti:θ/ produced as /ti:s/.

Language

The pass rates for Language were 44%, 32%, and 33% for the 3-, 4- and 5-year-olds respectively. This section has a set of subsections, each made up of several questions. We only report the subsections of which the pass rates were below 60%. When a subsection had a pass rate higher than 60%, we then checked whether any individual question within the subsection had a pass rate below 60%.

3-year-olds

Figure 1 shows the pass rates of the five subsections among the 3-year-olds. Two subsections had a pass rate below 60%: *using plurals* and *producing a four-to-five word sentence*. *Using plurals* was by far the most difficult subsection because it had the lowest pass rate (8%) among the five subsections of the language measure. Though the subsection *naming a variety of pictured objects*, designed to measure expressive vocabulary, had a pass rate higher than 60%, two questions in this subsection were particularly challenging:

scissors and refrigerator/fridge with a pass rate of 40% and 19% respectively.

4-year-olds Figure 2 shows the pass rates of the five subsections among the 4-year-olds. Two subsections had a pass rate below 60%: *understanding pronouns* and *telling how an object is used* (i.e., *What do you do with a coat/towel/cup?*). Though the subsection *answering questions about hypothetical questions* had a pass rate higher than 60%, two questions in this subsection had a pass rate lower than 60%: *What would you do if you felt sick* (54%) and *What would you do if you want to play with your friend's toy* (50%).

5-year-olds Figure 3 shows the pass rates of the six subsections among the 5-year-olds. Three subsections had a pass rate below 60%: *using possessive pronouns*, *formulating meaningful sentences*, and *using modifying noun phrases*. Specifically, on *using possessive pronouns*, most children used nouns such as *boy/boy's* and *girl/girl's* instead of using pronouns of *his* or *her/hers* as the instructions prompted. The subsection

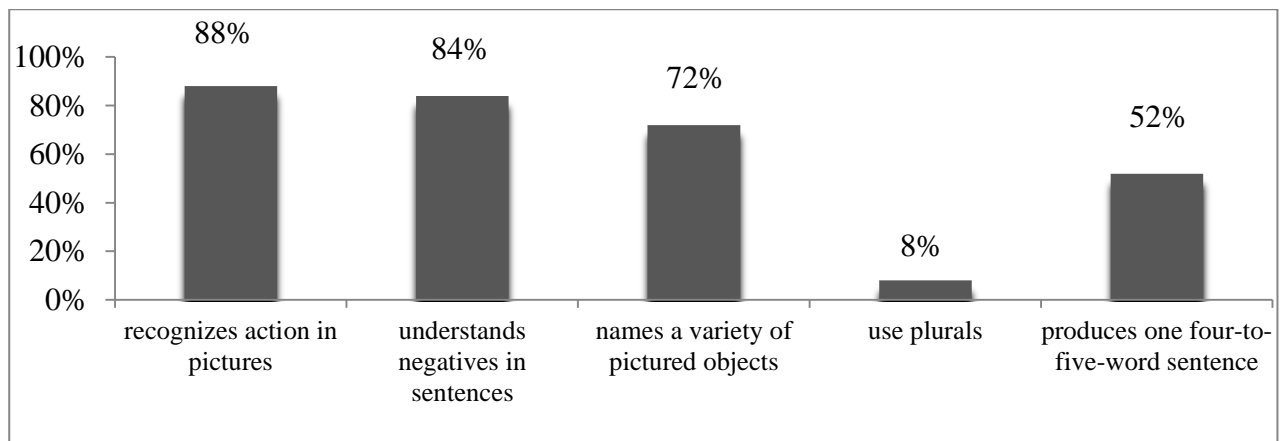
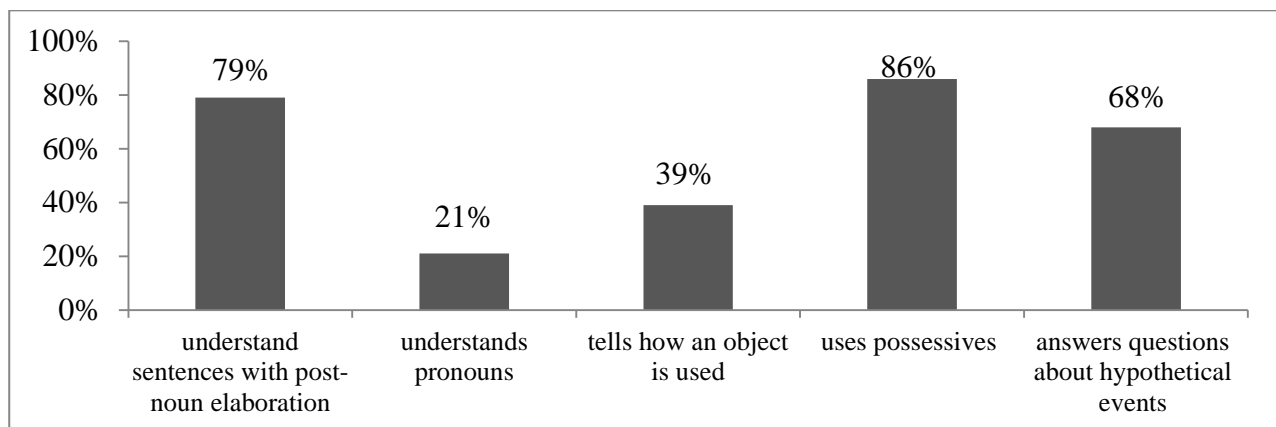
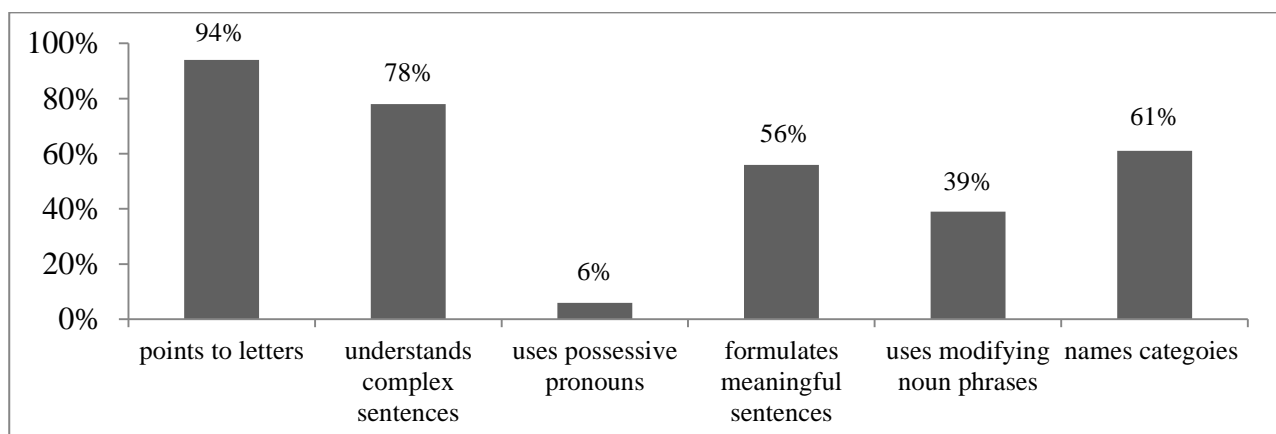
formulating meaningful sentences had four questions and all of them contained pronouns such as *she*, *her*, and *he*. For the subsection *using modifying noun phrases*, most children just pointed to the pictures instead of asking questions. For instance, the assessor instructed "Here are two cars. Tell me which car to point to. Say, point to..." The children then pointed to a particular car instead of asking the assessor to do so (e.g., *point to the dirty car*). This indicates the children had trouble not only in modifying noun phrases but also in correctly understanding the assessor's instructions.

Though the subsection of *naming categories* had a pass rate higher than 60%, two questions had a pass rate lower than 60%: *naming categories*, i.e., *Cereal, orange, mashed potatoes, pizza: these are all...* (56%) and *Water, milk, juice, cordial: these are all...* (56%). The two questions were difficult possibly because some items such as *cereal*, *mashed potatoes* and *cordial* are western food and drinks (Kim, Thompson, & Penm, 2010) and may be unfamiliar to Chinese children.

Table 2

Pass rates of the phonemes in articulation across three age groups

3-year-olds		4-year-olds		5-year-olds	
sound	%	sound	%	sound	%
<u>p</u> an/pot	68	<u>p</u> an/pot	86	<u>sh</u> oe	72
<u>d</u> og	88	<u>d</u> og	75	<u>l</u> ight/ <u>l</u> amp	83
<u>d</u> og	60	<u>m</u> onkey	100	<u>s</u> un	100
<u>m</u> onkey	88	mon <u>k</u> ey	100	<u>ch</u> icken	89
mon <u>k</u> ey	92	<u>t</u> eeth	93	hor <u>s</u> e	83
<u>t</u> eeth	80	<u>f</u> eather	82	<u>f</u> eather	100
<u>h</u> orse	84	<u>sh</u> oe	68	feath <u>e</u> r	89
<u>f</u> eather	68	<u>ch</u> icken	89	teeth <u>h</u>	28
		hor <u>s</u> e	82	<u>car</u>	94
		<u>l</u> ight/ <u>l</u> amp	86	<u>r</u> ed	94

Figure 1*Pass rates of 3-year-olds in Language (n=25)***Figure 2***Pass rates of 4-year-olds in Language (n=28)***Figure 3***Pass rates of 5-year-olds in Language (n=18)*

Screening summary

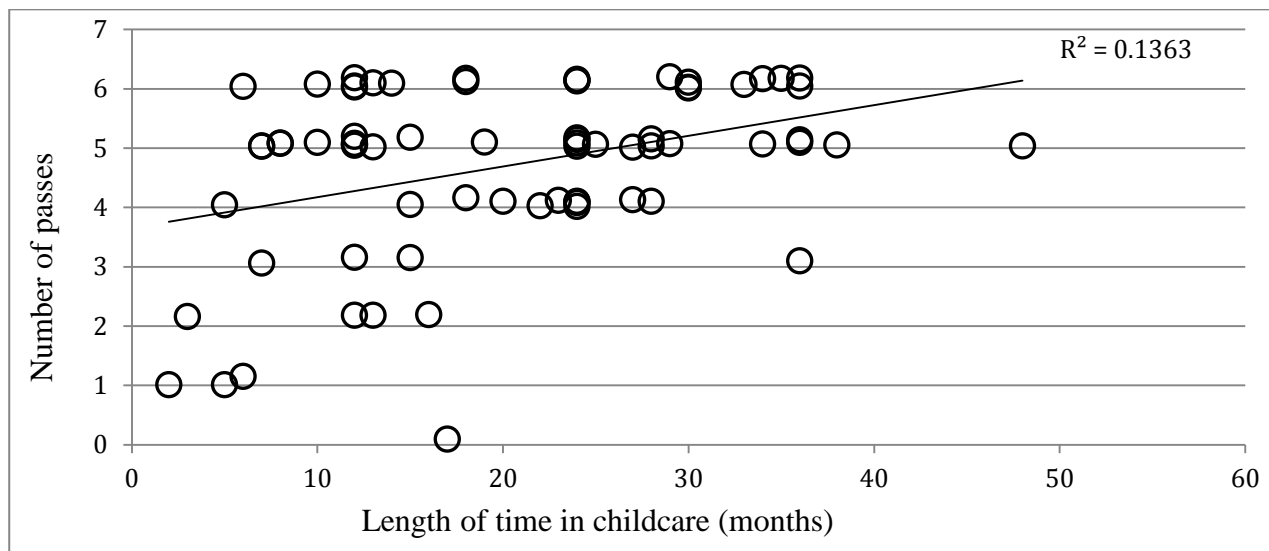
The Screening Summary records the number of passes of the six sections: Articulation, Language, Connected Speech, Social/Interpersonal, Fluency, and Voice. A child passes the PLS-5 Screening Test if he or she passes all the six sections and should be referred to additional assessment if he or she fails any of the six sections. Among the 71 children in the present study, 21 children (29.6%) passed all the sections of the PLS-5 Screening Test but the majority of the

children (70.4%) failed at least one section of the test.

To investigate whether length of time in childcare was related to performance on the PLS-5 Screening Test, we plotted *number of passes* (i.e., 0-6) of the six sections by *length of time in childcare in months* and regressed the former on the latter as shown in Figure 4. The result indicates that length of time in childcare positively predicts number of passes, $b = 0.5$, $p = .002$.

Figure 4

Relationship of length of time in childcare and number of passes of the six sections in the PLS-5 Screening Test



Discussion

The main aim of the present study was to explore typical errors made by Mandarin-speaking children as measured by the PLS-5 Screening Test. Consistent with our hypotheses, the most salient difficulties Mandarin-speaking children displayed were on word final consonants that do not occur in Mandarin, plurals, personal pronouns, and items embedded with autonomy. Their length of attending childcare positively predicts the number of passes of the six sections of the PLS-5 Screening Test.

Our result suggests that when producing a word final consonant that does not occur in Mandarin, children will typically use deletion or substitution. In the 3-year-olds, the final

consonant/g/ in *dog* is deleted. This finding is consistent with other studies that reported word final consonant deletion among Mandarin-English bilingual children and adults (Broselow & Xu, 2004; En et al., 2014; Lin & Johnson, 2010). In the 5-year-olds, the final consonant of *teeth* is substituted with /s/ (*tees*). In both cases, the Mandarin children's pattern of performance is consistent with much younger English monolinguals (Kirk, 2008; McIntosh & Dodd, 2008).

Regarding the difficulties with plurals, while it is consistent with previous studies with order Mandarin-speaking children (Jia, 2003; Lin & Johnson, 2010), the children in our study were much younger. Few studies have examined this group of preschoolers. While typically developing English monolingual

children have mastered plural morphology by three years of age (Brown, 1973; Lahey, Liebergott, Chesnick, Menyuk, & Adams, 1992), only 8% of the 3-year-olds in the present study demonstrated mastery of English plurals (see Figure 1). The poor mastery may also be due to pronunciation variations in the plurals measured. The PLS-5 Screening Test uses three allomorphs in testing plurals: /z/ (*babies*), /s/ (*cats*) and /əz/ (*horses*). Different plural allomorphs may have increased difficulties for Mandarin-speaking children, whose first language does not use inflectional grammar to mark plurals.

Comprehension and production of personal pronouns also proved to be very challenging to the Mandarin-speaking children. The difficulties were not only reflected in the language tasks that directly measured personal pronouns (e.g., *understanding pronouns* among the 4-year-olds and *using possessive pronouns* among the 5-year-olds), but also may be embedded in the other language tasks, for example, *formulating meaningful sentences* among the 4-year-olds, which had four questions all containing personal pronouns. Mandarin-speaking children's preference for nouns and proper names to personal pronouns (Qi, 2010) was also supported in the present study. Instead of using pronouns such as *his* or *her/hers*, the children used *boy/boy's* or *girl/girl's* when performing the task of *using possessive pronouns*. Third personal pronouns tend to be difficult for young children because third personal pronouns represent someone else out of the speech situations (Huxley, 1970). A study with monolingual English-speaking children aged 3-7 years has shown that stable correct comprehension of third personal pronouns appears at age five, with improvement through ages six and seven (Scholes, 1981). Therefore tasks with pronouns are especially difficult for Mandarin-speaking young children.

Difficulties with language items that refer to behaviours that encourage autonomy are demonstrated by large percentages of children who failed to answer self-care language tasks. More than 60 percent of the 4-year-olds could not answer what they could do with a *coat/towel/cup*. Nearly 50

percent of children could not correctly answer the questions about *what they would do if they felt sick*, and more than 60 percent of the 3-year-olds could not correctly name *scissors* and *a fridge*. Chinese children are rarely encouraged to do self-care or family-care tasks such as putting on a coat, opening a fridge, taking medicine or going to bed when being sick. As a result, they may not have rich or in-depth language experience in these terms and hence were unable to answer the questions. Also, many of these items and tasks that appear on the test are not items or tasks children may be exposed to in a childcare situation. For example, children may not know the English word *fridge*.

Implications and limitations

There are at least three implications of the findings of the study. First, early childhood educators and psychologists need to be mindful of the potential for over-referral of Mandarin-speaking children based on the PLS-5 Screening Test. Though the majority of the children in this study did not pass the PLS-5 Screening Test, interpretation of typical errors indicates that the problems were mainly associated with interference by their first language Mandarin. Second, it is recommended that early childhood educators and psychologists using the PLS-5 Screening Test with children from a Mandarin-speaking background need to check error patterns and consider whether they are consistent with the typical errors reported here when interpreting the test results. If referral is made for additional speech and language assessment, it is recommended that the full test results, not just the Screening Summary (which only shows a pass or a fail) be provided. The full test form makes it possible to check in detail the child's performance on individual items and look for typical errors. Ideally, information on time spent in an English speaking childcare context should also be included. Third, we observed that some children were shy and needed their educators' presence during testing. This was in contrast to many Euro-Australian children who can sit alone for a language assessment. We recommend additional time for building rapport when using the PLS-5 Screening Test with Mandarin-speaking

children.

Although the present study provides useful evidence for developing a guideline on using the PLS-5 Screening Test when assessing Mandarin-speaking children's language skills, there are at least two limitations to be noted. First, the assessment was not recorded with a digital recorder or camera. Digital recording would provide more detailed data. Nevertheless, our method of recording was consistent with standard PLS-5 Screening Test administration. Second, our sample was fairly small in size and homogeneous in socioeconomic background. Seventy-five percent of the parents had a bachelor degree or higher, which indicates that most children come from socioeconomically advantaged backgrounds. To provide more comprehensive data, future research should consider a larger participant population and recruit children from diverse socioeconomic backgrounds.

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AJEDP is published by the University of Newcastle, Australia

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ISSN:	1446-5442	
Title:	Australian Journal of Educational and Developmental Psychology	Additional Title Information
Publishing Body:	University of Newcastle, Faculty of Education	
Country:	Australia	
Status:	Active	
Start Year:	2001	
Frequency:	Annual	
Document Type:	Journal; Academic/Scholarly	
Refereed:	Yes	
Abstracted/Indexed:	Yes	
Media:	Online - full text	
Language:	Text in English	
Price:	Free (effective 2010)	
Subject:	EDUCATION PSYCHOLOGY	
Dewey #:	370.15	
LC#:	LB1051	
Editor(s):	Dr. Melissa Monfries, Dr. Robert Cantwell, Jennifer Archer	
E-Mail:	ajedp@newcastle.edu.au	
URL:	http://www.newcastle.edu.au/group/ajedp/	
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