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# Indonesian Language Normative Test: Preschool Semantic Comprehension Test

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**ABSTRACT**

**Background:** The needs and limitations of norm-referenced language tests are still a challenge for speech therapists in Indonesia. This study aims to provide an overview of the psychometric property profile of the Tes Pemahaman Semantik Prasekolah (TPSP).

**Method:** The psychometric property test in this study consisted of several stages; tryout (pilot testing), validity test and reliability test. The total sample in this study was 306 typical children, with an age range of four to six years. This study was conducted from 2022 to 2023.

**Result:** Based on statistical analysis, it is known that all test items on the TPSP have a good discrimination index (DI = .45 to DI = .70.). Then, in terms of construct, TPSP has a positive relationship with verbal intelligence, verbal short-term memory, and verbal working memory. Furthermore, the reliability coefficient of TPSP is in the very high category (r = .90 – r = .95).

**Conclusion**: Referring to the existing findings, it can be concluded that TPSP is an Indonesian language test instrument with a good psychometric property profile.



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## INTRODUCTION

Aphasia is one of problems with high prevalence. Twelve percent (12%) – 33% post-stroke patients Developmental language disorders are persistent difficulties in understanding and/or using language skills (oral and/or written language) that occur during development (APA, 2013; Bishop, 2006; Kaderavek, 2014). This disorder occurs primarily, it is not a secondary or acquired disorder (Nelson, 2010; Norbury et al., 2008; Owens, 2022). Children with developmental language disorders have significant problems in the semantic area, in the form of receptive language and/or expressive language modalities (Paul et al., 2018). In the psycholinguistic approach, semantic ability is a very crucial component, because this ability is the final terminal in receptive language processing, and the initial terminal in expressive language processing (Whitworth et al., 2014).

In clinical practice, examining semantic abilities is one of the most crucial things in oral language assessment (Norbury et al., 2008). Based on the results of the survey conducted, it is known that 100% (N = 37) of speech therapists strongly agree that the semantic area is a very important area in evaluating language abilities in children with language disorders. Although Indonesian speech therapists believe that it is important to conduct assessments in the semantic area, in Indonesia there is no norm-referenced test instrument that can be used to assess semantic abilities in accordance with Indonesian culture and language.

Considering the urgency and limitations of existing instruments, this study attempts to explain the results of research on the psychometric properties of the *Tes Pemahaman Semantik Prasekolah* (TPSP) or in English called the Preschool Semantic Comprehension Test (PSCT). TPSP is a test developed by Rexsy

Taruna, starting in 2022. TPSP is constructed with reference to The SLP's IEP Companion by Wilson et al. (2005). According to Wilson et al. (2005), semantic ability consists of several sub-skills or indicators, some of which are the concept of quality, the concept of position, the concept of comparative, temporal, verbal analogy, and the concept of negative.

TPSP in clinical practice of speech therapists is used to determine the level of semantic understanding in children aged 4 years 0 months to 6 years 11 months. Then, TPSP is also used to map weaknesses and strengths in certain semantic indicators, such as the concept of quality, the concept of position, comparative, temporal, verbal analogy, and negative as a reference for making speech therapy treatment plans for semantic understanding abilities (Taruna, 2023).

**Table 1.** Preschool Semantic Comprehension Test Blueprint

| Indicator | Definition | Item | Distribution | Task (example) |
|---|---|---|---|---|
| Quality concept | The concept of quality is one of the semantic abilities related to the knowledge and understanding of adjectives. | 1, 2, 3, 11, 12, 13 | 27% | *Tunjuk mobil kecil* (point to the small car); *tunjuk hewan yang paling lambat* (point to the slowest animal) |
| Position concept | The concept of position is a semantic ability related to the knowledge and understanding of the position of an object/thing, image or item. | 4, 5, 6, 8 | 18% | *Tunjuk kucing di dekat tas* (Point to the cat near the bag) |
| Comparative | The comparative concept is a semantic ability related to knowledge, understanding, and differences between two or more objects, images, or items. | 7 | 5% | *Tunjuk mobil-mobilan yang lebih kecil daripada kucing* (Point to cars that are smaller than cats) |
| Temporal | Temporal concept is one of the semantic abilities related to knowledge and understanding of the concept of time; before (*sebelum*), after (*setelah*), first (*pertama*), next (*kemudian*), last (*terakhir*), etc. | 9, 10 | 9% | *Ini gambar mobil* (tester menunjuk mobil). *Tunjuk gambar sebelum gambar mobil* (This is a picture of a car (tester points to the car). Point to the picture before the picture of the car) |
| Verbal analogy | Verbal analogy is a semantic ability related to comparisons made between two events, situations, or conditions that are different but in some ways comparable. | 14, 15, 16, 17, 18 | 23% | *Minum menggunakan gelas, memotong menggunakan piring. Benar atau salah?* (Drinking using a glass, cutting using a plate. True or false?) |
| Negative | Negative concept is one of the semantic abilities related to knowledge and understanding of language concepts such as; except (*kecuali*), which is not (*yang bukan*), which is not (*yang tidak*), not (*tidak*), etc. | 19, 20, 21, 22 | 18% | *Tunjuk semua mobil yang tidak berwarna merah* (Point to all the cars that are not red.) |

## METHOD

The psychometric property test in this study consisted of several stages; tryout (pilot testing), validity test and reliability test. The total sample in this study was 306 typical children, with an age range of four to six years. This study was conducted from 2022 to 2023.

### *Pilot Testing*

The pilot test was conducted to determine the quality of the items that had been constructed through item discrimination analysis. Items that had a discrimination index (DI) of less than .30 were considered unsatisfactory or needed to be revised, while items with an index of .30 or more were considered items with a

good index. The item trial was conducted on 245 typical children, aged four to six years. Each child was assessed individually. Item discrimination analysis in this study used Microsoft Excel with the formula DI = (U - L) / N (Kaplan & Saccuzzo, 2009).

***Construct Validity Test***

Validity testing was conducted on items that had a good discrimination index (.30 or more). The validity test used in this study was construct validity using convergent validity. Convergent validity is a construct validity test technique that is conducted by correlating the test instrument to be tested with other instruments that measure similar abilities or related abilities (Domino & Domino, 2006). In this study, the TPSP results will be correlated with verbal intelligence, verbal short-term memory and verbal working memory (listening recall task) on 41 typical children aged four to six years. Each child was assessed individually. Data analysis in the validity test using the SPSS application. The total score (raw score) on each variable is correlated.

***Test-retest Reliability***

Reliability testing on TPSP was conducted using test-retest reliability, by calculating the reliability coefficient on the results of the first test and the results of the second test. Twenty samples were used in test-retest reliability to represent each age group. The first and second tests were one month apart. Data analysis in the validity test using the SPSS application. The total score (raw score) on each variable is correlated.

## RESULTS

***Descriptive Statistics of TPSP***

TPSP has been tested on 245 Indonesian-speaking preschool children, ranging in age from 4 years 0 months to 6 years 11 months. The difference in the proportion of male and female in each age group was not significantly different.

Table 2. Descriptive Statistics of TPSP by Age

| Age | N | Mean (SD) |
|---|---|---|
| 4 years | 54 | 14.83 (2.77) |
| 5 years | 156 | 18.77 (1.21) |
| 6 years | 35 | 20.23 (1.41) |
| Total | 245 | 18.11 (2.48) |

Tabel 3. Descriptive Statistics of TPSP by Gender

| Age | Female | Male | Total |
|---|---|---|---|
| 4 years | 59% | 41% | 100% |
| 5 years | 40% | 60% | 100% |
| 6 years | 51% | 49% | 100% |

Based on descriptive analysis, it is known that the average score at the age of six years ($M$ = 20.23; $SD$ = 1.41) is generally higher than the age of five years ($M$ = 18.77; $SD$ = 1.21) and the average score at the age of five years is generally higher than the age of four years ($M$ = 14.83; $SD$ = 2.77). The results of the one-way ANOVA analysis have confirmed that there are significant differences in ability among the three age groups ($F$ = 138.426; $p < 0.05$). Furthermore, based on the correlation analysis, it is known that there is a significant relationship between the age group of four years and five years ($r$ = .837; $p < 0.05$), and the age group of five years and the age group of six years ($r$ = .802; $p < 0.05$).

***Pilot Test Results***

TPSP has been tested on 245 Indonesian-speaking preschool children, ranging in age from 4 years 0 months to 6 years 11 months. Based on the results of item analysis using the discrimination index, it is known that DI ranges from .45 to .70. Based on this, it can be concluded that all items in the TPSP have good discrimination ability.

***Construct Validity Test Results***

TPSP has been tested on 41 Indonesian-speaking preschool children, ranging in age from 4 years 0 months to 6 years 11 months. Based on the correlation analysis, it is known that TPSP has a positive correlation with verbal intelligence (information, vocabulary, similarities, comprehension), verbal short-term memory (V-STM), and verbal working memory (listening recall task/LRT). This is empirical evidence that TPSP has construct validity by considering the relationship with other abilities that are theoretically related.

Table 4. Correlation TPSP and Other Variable

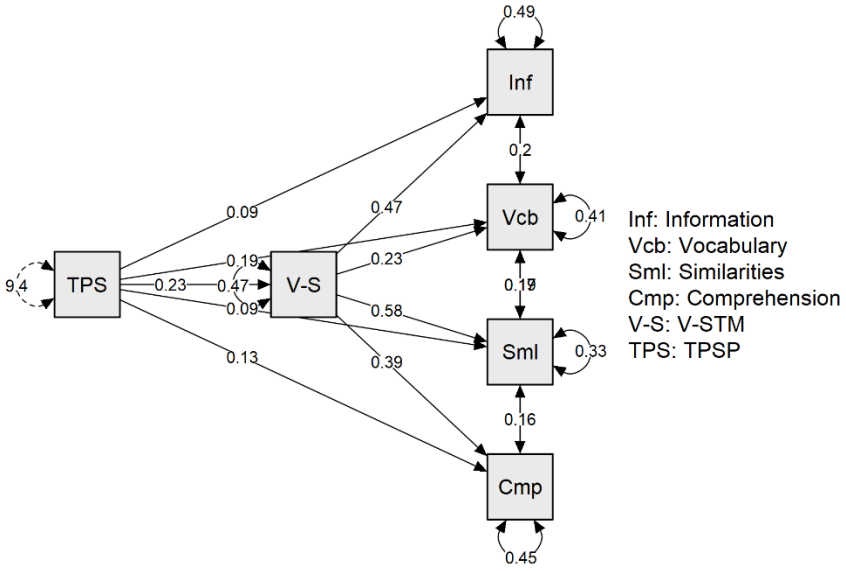
| Variable | | Info | Vocab | Similarities | Compre | TPSP | V-STM | LRT |
|---|---|---|---|---|---|---|---|---|
| 1. Information (Info) | Pearson's r | — | | | | | | |
| | p-value | — | | | | | | |
| 2. Vocabulary (Vocab) | Pearson's r | 0.723 | — | | | | | |
| | p-value | < .001 | — | | | | | |
| 3. Similarities | Pearson's r | 0.789 | 0.790 | — | | | | |
| | p-value | < .001 | < .001 | — | | | | |
| 4. Comprehension (Compre) | Pearson's r | 0.698 | 0.708 | 0.760 | — | | | |
| | p-value | < .001 | < .001 | < .001 | — | | | |
| 5. TPSP | Pearson's r | 0.628 | 0.746 | 0.708 | 0.686 | — | | |
| | p-value | < .001 | < .001 | < .001 | < .001 | — | | |
| 6. V-STM | Pearson's r | 0.680 | 0.649 | 0.789 | 0.679 | 0.721 | — | |
| | p-value | < .001 | < .001 | < .001 | < .001 | < .001 | — | |
| 7. LRT | Pearson's r | 0.680 | 0.649 | 0.789 | 0.679 | 0.721 | 1.000 | — |
| | p-value | < .001 | < .001 | < .001 | < .001 | < .001 | < .001 | — |

Considering the positive relationship between TPSP and other variables, this study conducted a mediation analysis to assess in more detail whether verbal short-term memory (V-STM) and verbal working memory (LRT) mediate the relationship between TPSP and verbal intelligence. Based on the indirect effect, it is known that V-STM and LRT mediate the relationship between TPSP and information, similarities, and comprehension, except vocabulary.

Table 5. Indirect effects TPSP, V-STM, and Verbal Intelligence

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | **Estimate** | **Std. Error** | **z-value** | **p** | **Lower** | **Upper** |
| TPSP → V-STM → Information | 0.109 | 0.040 | 2.710 | 0.007 | 0.030 | 0.189 |
| TPSP → V-STM → Vocabulary | 0.054 | 0.035 | 1.548 | 0.122 | -0.014 | 0.122 |
| TPSP → V-STM → Similarities | 0.134 | 0.036 | 3.690 | < .001 | 0.063 | 0.206 |
| TPSP → V-STM → Comprehension | 0.089 | 0.038 | 2.362 | 0.018 | 0.015 | 0.164 |

*Note.* Delta method standard errors, normal theory confidence intervals, ML estimator.



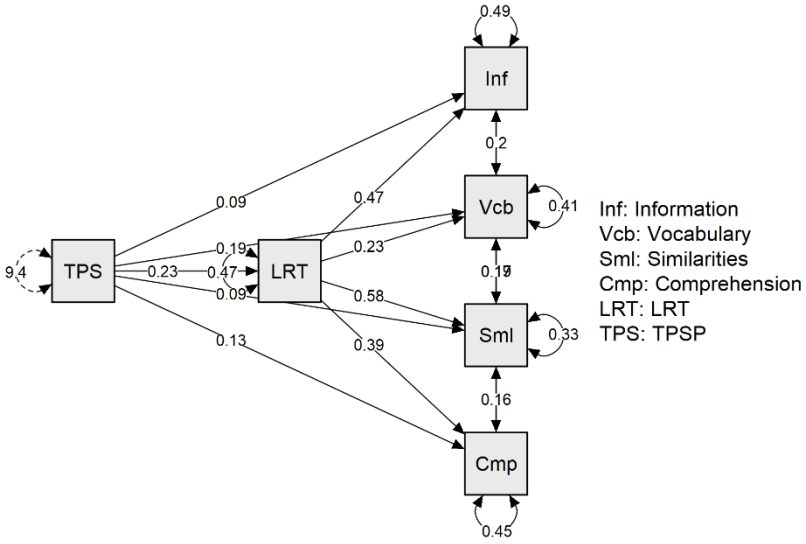



Figure 2. Path Plot TPSP, LRT, Verbal Intelligence

***Test-retest Reliability Results***

TPSP has been tested on 20 samples to test the reliability of the scores on TPSP. The first test and the second test were one month apart. The results of the reliability coefficient on TPSP for each age group ranged from r = .90 to r = .95.

Table 6. Test-retest reliability

| Age | Coefficient Correlation | p Value |
|---|---|---|
| 4 years | .95 | < 0.05 |
| 5 years | .94 | < 0.05 |
| 6 years | .90 | < 0.05 |

**DISCUSSION**

This study shows some very useful findings to assess the quality of psychometric properties of TPSP. The results of the analysis show that all TPSP items have a good discrimination index, so this is one of the reasons the reliability coefficient on TPSP is included in the very high category (*r* = .90 - .95). According to Urbina (2004), it is explained that the higher the item discrimination index on a test instrument, the more it will impact the reliability of the instrument.

The results of the statistical analysis also show that TPSP has construct validity because there is a positive relationship between TPSP and verbal intelligence and verbal memory (verbal short term memory and verbal working memory). This finding is in line with other findings that explain that there is a relationship between semantic ability and verbal intelligence and verbal memory. For example, Smith et al. (2005) in their study examined 243 children and found that there was a relationship between semantic comprehension ability and verbal intelligence (*r* = .83). This phenomenon can be explained because language (eg, semantics) is one of the important variables in the development of verbal intelligence (Rexsy Taruna, 2021). Likewise with verbal memory.

Verbal memory has been empirically proven to be important in language processing and ultimately affects verbal intelligence (Baddeley, 2003). This has been shown by many studies that have found that verbal memory deficits affect language abilities, which can be seen in children with developmental language disorders (McGregor et al., 2020). However, the view of the relationship between verbal memory and language is no longer unidirectional, but bidirectional, because specific language processing ultimately also affects the type and function of verbal memory (Archibald, 2018).

For example, verbal short-term memory may influence language tasks such as understanding quality concepts (e.g., point to the small car) and position concepts (e.g., point to the cat near the bag). However, language tasks such as verbal analogies will require verbal working memory rather than verbal short-term memory, such as drinking using a glass, cutting using a plate, true or false?.

On that basis, this study found in the mediation analysis that the relationship between language and verbal intelligence is mediated by verbal memory. Thus, it is necessary to consider that verbal memory is not a single factor in influencing language and having an effect on verbal intelligence. However, verbal memory is an ability that bridges the relationship between language and verbal intelligence (Taruna, 2021).

## CONCLUSION

This study provides information that TPSP has good quality items, is construct valid, and has very high score consistency. TPSP can be used by Indonesian speech therapists to identify semantic understanding of children aged four to six years in Indonesian-speaking children. Speech therapists are advised to assess verbal short-term memory and verbal working memory in explaining the phenomenon of children's semantic understanding.

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