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Standardization of Odia Stimuli for Few Phonological and Morphological Tasks

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ABSTRACT

Phonological skills development is one of the basic foundations before language mastery of a child. Similarly, morphological skills development in children is a basic link between cognitive language functions and literacy, which also makes a unique contribution to vocabulary growth and acquisition. To test phonological and morphological abilities or skills, testing tool should be available in the native language of the speaker or the participant. Translated versions of different such tests may not yield similar results for a typical developing child compared to the native speaker age matched child, tested on the original test. Therefore, such tests or tools are warranted to be constructed in the native language of the speaker. The formation of test procedures in a language is essential for testing different psycholinguistic abilities and testing hypotheses regarding normal development and patterns of development related to various disorders.

Odia is one of the alphasyllabic languages of the Indic group of the Indo-European family, with unique features of few phonemes, morphophonemic and morphosyntactic rules, dissimilar to its sister languages. Very few and limited studies exist on the development pattern of acquisition of linguistic skills (specifically phonology and morphological skills) in Odia language in general and specifically the lexical and conceptual levels in Odia language.

The present study reports on the development and standardization of stimuli as a part of PhD research, aiming at developing a screening test to assess phonological and morphological abilities in Odia speaking individuals.

The test stimuli include words, non-words, segments of words, sentences and synthetically modified words, targeted to measure fifteen different subtests in the area of phonology and morphology, like syllable segmentation, word blending, morphological closure etc. Development of the test stimuli included preparation of initial word lists for familiarity testing by 10 adults (25-35 years) and 10 children 10-12 years), preparation of test stimuli like words, non-words, sentences, word pairs, modified words and presentation to pilot subjects (12 sub-groups of typically developing children and one adult group), twice with an interval of one month. The two data obtained from the pilot sub-groups compared and scores were analysed to check test-retest reliability.

Summary: The analysis indicated a clear internal consistency and therefore the stimuli were finalized to be used for the main data collection to develop a screening test in assessing these abilities in Odia-speaking children.

Keywords: Stimuli, Familiarity, Phonological abilities, Morphological abilities, Odia language

INTRODUCTION

The study of development of various psycholinguistic abilities helps in forming a base of reference to identify abnormality in patterns of abilities with an explanation of possible underlying phenomena; which, in

turn, helps in intervention. These abilities have been explained and theorized as psychological phenomena representing the physiology of neural systems at various levels. Different models show relations between several aspects of language forms or structures.

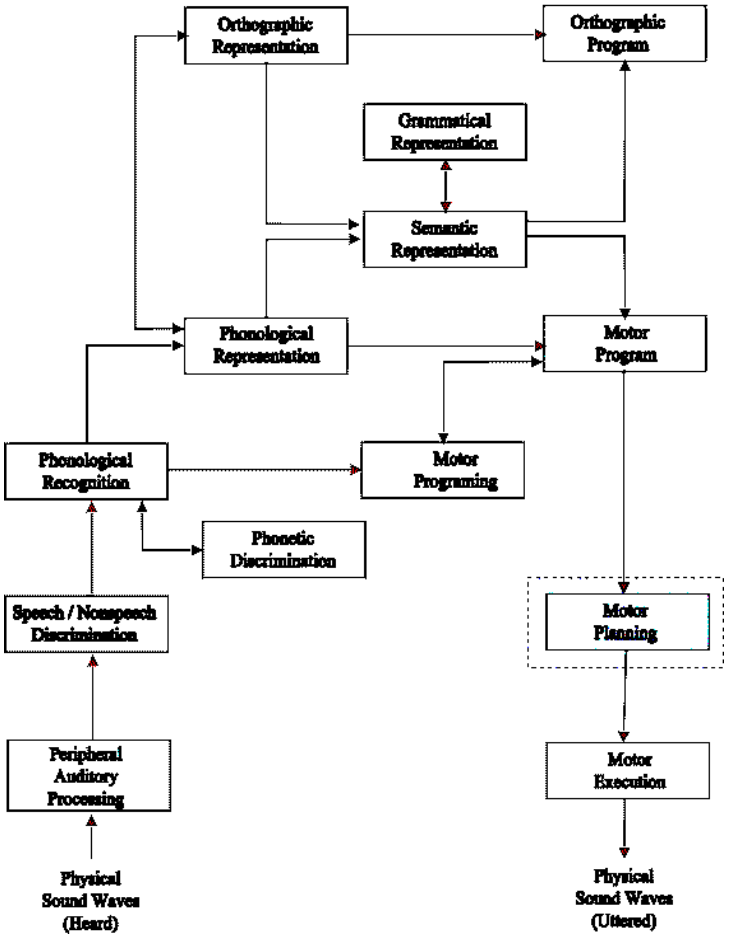

Fig. 1.a. The Stackhouse and Wells (1997) Model - Fifth Developmental Phase.

This model shows the importance of motor planning, either from lexical or non-lexical routes, besides other processes starting from peripheral auditory perception and speech/nonspeech discrimination.

Narrowing down to the smaller units, sounds of a syllabic writing system represent the syllables. Dividing speech into syllables is psychologically more complicated, and it requires a more mature analytical ability than dividing speech into words. Syllabic writing uses a smaller number of signs than the logographic system, and it reflects more precisely the phonetics of language and its grammatical forms.

From the difference in the characteristics features of the different writing system, it can be seen that the basic principle of teaching reading and writing is determined to a considerable degree by the writing system.

Similarly, the morphological processing contributes to word decoding and reading comprehension via the identification, analysis, and description of the structure of a new word, as well as its morphemes and other units of meaning, which is unique to each language.

Odia is one of the important languages in the Eastern subgroup, the Indic group of the Indo-Aryan family, closely related Bhojpuri (including Sadani), Maithilim, Maghi, Bengali and Assamese. The Odia language, in the natural process, enriched itself by incorporating the Austric and Dravidian

features by adapting the Perso-Arabic and English elements along with its co-existence with the common features of neighboring Indo-Aryan languages in the relic areas. It is widely spoken in the state of Odisha, some regions of West Bengal, Andhra Pradesh and Chhattisgarh; at the same time, it is influenced by Bengali language, Bihari languages, Chattisgarhi and Telugu.

Regardless of different regional dialects, social dialects and tribal dialects, there is an inter-group communication method- the standard Odia, which is the closest form of written Odia, using more or less derived words.

The Odia phonemes amounting to thirty-eight segmental phonemes, including six vowels and thirty-two consonants, two suprasegmental phonemes and two juncture phonemes have unique features like non-phonemic vowel length with two different orthographic symbols for two long vowels used in written form, but presence of phonetic variations of vowel length. The phonology of Odia has unique features comprises vowel ଅ /ɔ/, vowel ending words, use of semivowels ୱ /(w)/ and ୟ /(y)/ only in clusters, allophonic ଡ଼ /ɽ/ and phoneme ଷ /s/ produced for three different graphemes.

There are other unique features such as-presence of gemminations besides two, three and four consonant clusters at specific positions of the words and nasal sound occurring before the velar consonant is less than a nasal sound occurring before a dental consonant,

Morphologically, Odia is a syntactically head-final and agglutinative language. A number of morphemes carrying different grammatical functions get affixed to the nominal root to make a nominal form. Odia morphology has unique features like except declinables, all other categories of words have nominal and verbal inflections, presence of singular number markers, plural markers; all the nouns receive a case even if they do not carry case endings; gender is lexical and not grammatical; accusative case marker ଙ୍କ / ʈe/ is used specifically with ଜ୍ଞ। /mo/ and ଙ୍କୁ /ʈo/; three degrees for second-person pronouns, such as familiar, polite and honorific pronouns; both finite and non-finite verb inflections; and many others.

Therefore, it is very much essential to form or construct a test in Odia language, by preparing and standardizing stimuli, not translated or adapted from other tests of different languages.

REVIEW OF LITERATURE

Researchers agree that phonological awareness is a multilevel skill of breaking down words into smaller units (Hoien, Lundberg, Stanovich & Bjaalid, 1995; Muter, Hulme, Snowling & Taylor, 1997; Stahl & Murray, 1994). Phonological awareness reflects emergent readers' abilities to progressively detect and manipulate smaller units of sound within spoken words. The difficulty of Phonological Awareness tasks varies with linguistic level is not a new concept (Trieman & Zukowski, 1991).

Phonemic awareness is considered a subset of the broader construct of phonological awareness (Snow, Burns & Griffin, 1998). It involves conscious awareness of the smallest distinguishable auditory units (Harris & Hodges, 1995). The abilities to detect and manipulate phonological units within words (i.e., syllable, onset-rime, body-coda, and phoneme) are acquired in a progressive fashion by emergent readers. According to Cassady, Smith, and Huber (2005), the first step in gaining a phonological processing skill is to detect or isolate the component sound within a word. Once the learner achieves automaticity in these skills of isolation and detection, they eventually progress to be able to manipulate the phonological units, like the ability to blend two or more discrete sounds into a complete whole, segment apart whole words into component sounds, substitute alternate sounds for specific syllabic units, or find out remaining part of the word when one phonological unit is removed.

In general, researchers agree that phonological awareness tasks may be

divided into three main levels, including those related to syllable awareness, onset-rime awareness, and phoneme awareness (Gillon, 2007). Treiman (1993) suggested three principles of syllable division based on children's spelling development:

- Each syllable in a word contains a vowel.
- Syllable division follows the stress pattern of a word, with as many consonants as possible beginning a stressed syllable.
- A syllable is divided to ensure that consonants that cannot be clustered together in English do not begin or end a syllable.

Different tasks can help in evaluating phonological awareness, as evidenced by different studies like-

- Syllable segmentation, Syllable identity, Phoneme segmentation, Spoonerism (Dodd, Holm, Oerlemans, & McCormick, 1996; Robertson & Salter, 2007)
- Syllable completion (Muter, Hulme, & Snowling, 1997),
- Syllable deletion (Rosner, 1973; Robertson, & Salter, 2007),
- Onset-rime awareness (Goswami, & Bryant, 1990; Moats, 2000)
- Spoken rhyme recognition (Dodd, Holm, Orlemans, & McCormick, 1996; Robertson, & Salter, 2007)
- Spoken rhyme detection or rhyme oddity task (Bradley, & Bryant, 1983)
- Spoken rhyme generation (Muter, Hulme, & Snowling, 1997; Robertson, & Salter, 2007)
- Alliteration awareness/ phoneme detection or phoneme categorization/Phoneme matching (Torgeson, & Bryant, 1994; Robertson, & Salter, 2007)
- Phoneme isolation (Stahl, & Murray, 1994; Robertson, & Salter, 2007)
- Phoneme completion (Muter, Hulme, & Snowling, 1997)
- Phoneme blending (Wagner, Torgesen, & Rashoote, 1999)
- Phoneme deletion (Rosner, 1973; Robertson, & Salter, 2007)

Besides these tasks, there are several other tasks, generally included in the battery, such as- sentence segmentation, compound word segmentation and compound word deletion (Robertson & Salter, 2007), Phonemic restoration (Warren, 1970), Phoneme monitoring: (Foss, 1969), Phonological-similarity effect (Baddeley, 1966; Conrad & Hull, 1964, Fallon, Groves, & Tehan, 1999), Non-word repetition (Gathercole and Baddeley 1989, 1990b, Dollaghan and Campbell (1998), Mispronunciation detection (Cole & Jakimak, 1979), Phoneme reversal (Wagner, Torgesen, & Rashoote, 1999), Phoneme manipulation (Rosner, 1973; Robertson, & Salter, 2007), Rhyme Awareness Task (Ziegler and Goswami, 2005).

Different studies focused on developmental trends in various phonological processing, few of them relating with other areas of languages (Liberman, Shankweiler, Fischer & Carter, 1974; Goswami & Bryant, 1990; Caravalos & Bruck, 1993; Carroll, Snowling, Hulme & Stevenson, 2003). Other studies like Preston and Edwards (2010) suggested that poorer phonological skills are associated with lower receptive vocabularies and more atypical sound errors. Several studies like Anthony and Francis (2005) suggested that children's experiences with written language dramatically influence phonological awareness development, especially the Development of phoneme awareness. Also, Vogt & Shearer (2011) investigated phonemic awareness, its Development and found that children demonstrating phonemic awareness in the beginning stages of learning to read are less likely to develop later reading problems.

Similarly, Morphological abilities like Awareness is seen to be closely related to language developmental milestones as well as literacy skills. Although children's knowledge of morphology and morphemes have been studied extensively in the child language literature (Nicoladis, 2002, 2003; Pounder, 2000), and a mastery of

morphological structure has long been assumed to be important to vocabulary learning both for children and adults (Anglin, 1993; Nagy & Anderson, 1984), there has been relatively little research on whether children's ability to manipulate the morphological components of words is related to their current or subsequent vocabulary development (Lyytinen & Lyytinen, 2004).

Studies in Indian languages like Telugu (Sailaja, 1997, 2007; Vasanta, 2004, 2007), Tamil (Akila, 2000; Palani & Dhanavendan, 2016), Malayalam (Seeta & Prema 2002; Dinesh, 2002), Kannada (Prakash, Rekha, Nigam & Karanth, 1993; Nag, 2007; Selvakumar, John, Kanaka & Rajashekhar, 2015), Hindi (Kumar & Karanth, 2006; Bajre & Khan, 2018), Gujurati (Gokani, 1992), Odia (Prakash & Mohanty, 1995; Mishra & Stainthrop, 2007), Marathi (Sarasambe, 2010; Waknis & Vanaja, 2017) have established relationship between phonological abilities, morphological abilities, language development, literacy skills and abnormalities in the processes could cause other aspects. These measures are language specific and different than English and other international languages; also, different in different Indian languages based on the language features or structures.

Mahfoudi and Elbeheri (2020) conducted a similar study on development and standardization of a phonological processing test in Arabic, based on similar observation that although phonological skills are important across different languages, their specific influence may vary on a language, depending on the orthographic depth of that language (Eklund et al., 2018; Smythe et al., 2008; Ziegler, 2010).

METHODOLOGY

Participants

For both Familiarity testing and pilot study of test items, subjects included both genders in all the sub-groups.

For familiarity testing, 10 adults (25-35 years) and 10 children of (10-12 years) were included and for pilot study, Group A-Pilot comprised 12 sub-groups with 10 children in each sub-group and Group D-pilot comprised 10 adult subjects. (as shown in Table 1.1)

Table 1.1. The number of participants in the pilot study.

Pilot Groups	Number of Participants (Male/Female)	Pilot Groups	Number of Participants (Male/Female)
A-I (3;0-3;6 years)	5/5	A-VIII (7-8 years)	5/5
A-II (3;6-4;0 years)	5/5	A-IX (8-9 years)	5/5
A-III (4;0-4;6 years)	5/5	A-X (9-10 years)	5/5
A-IV (4;6-5;0 years)	5/5	A-XI (10-11 years)	5/5
A-V (5;0-5;6 years)	5/5	A-XII (11-12 years)	5/5
A-VI (5;6-6;0 years)	5/5	D (25-35 years)	5/5
A-VII (6-7 years)	5/5		

Informed Consent: All participants were given a consent form to participate in the study. For children, the parents were asked to sign after explaining the test procedure, aim of the study. Another consent form was given to the school administration for their understanding about the data collection procedure, in case the data was collected at the school.

Inclusion and Exclusion criteria: The participants were chosen as such with no problem or deficits in hearing (hearing screening, report of school staff or family members), Speech and Language problems (Oral peripheral mechanism examination, language screening) psychological, visual or neurological functioning.

- Odia as their primary language, Odia (only) used by all participants for their daily communication needs.
- Typical/ age-appropriate development of speech and language, for children.
- No prior enrolment in speech or language intervention of any sort.
- Normal hearing status and Absence of a history of neurological and/or psychological disorder.
- All children above 5 years of age, attending schools where the medium of

instruction should be Odia and exposure to English and Hindi should be very limited to learning these languages in school as part of their curriculum.

Stimuli for different target subtests

Subtests in all the three sections of tests required words, and non-words of various lengths, sentences and rhyming word pairs. Few sets of words were produced with varying lengths by the speaker. Few words were edited or synthesized, as per the requirement of the subtest.

Familiarity testing

Initial word list: The phonemes on which the test items were constructed were based on the frequency of occurrence of phonemes in Odia language from the list of Phonemic and Morpho-Phonemic frequency count in Odia. (Kelkar, 1994).

The words of various lengths, compound and complex words were selected from an initial list of frequently used words list form the corpus of Odia language words providing the frequency of usage of words (Matson, 1970), commonly and popularly used books for children in Odia language, like- Chhabila bhidhaana, published by state council of Educational Research and training (pictorial glossary book); Sarala Odia abhidhaan, Friends publisher, Cuttack, Odisha; Taruna shabda kosha, Grantha Mandir, Cuttack, Odisha; Word book (Direct approach series), published by Odisha Book Emporium; Books for children published by Sarva Sikhsya Avijana, Odisha; and also knowledge on Odia language from standard text books like-Odia Dhwanitatwa o Sabda Sambhar, Friends Publishers. 1976. (by Dhaneswar Mohapatra); Odia Sabda-byutpatti Bigyan, Cuttack, 1982 (by Sahu Basudeba); Odia Bhasha o Bhasha Bigyan, Cuttack: Grantha Mandir, 1985 (by Debi Prasanna pattanayak); Aspiration in Odia: On the basis of the observer's own pronunciation, Utkal University, 1966 (by G.B. Dhal); Historical Odia Morphology, Bharata Manisha research series: 4. Bharata Manisha, Varanasi. 1975 (by Haripriya Mishra); and A Historical Phonology of Odia, Calcutta Sanskrit College Research Series No. LXVI. Kolkata: Sanskrit College, 1970. (by Paresh Chandra Majumdar)

*Frequency of words were based on day to day spoken use, and not on written/used in scientific, poetic use.

Table. 1.2. Example of Initial word list Appendix A: Initial Word List for Familiarity

Words		Unfamiliar	Familiar	Very Familiar	Remarks
Bi-syllabic Simple (CVCV, VCV)					
ଧନୁ	/d̪ʰɔn̪u/				
ନାଲି	/n̪ali/				
ପତି	/pɔt̪i/				
Bi-syllabic Cluster – VCCV, CVCCV, CCVCV					
ଅନ୍ଧ	/ɔn̪d̪ʰɔ/				
ଅଣ୍ଟା	/ɔɳʈa/				
ଶସ୍ତା	/ʂɔs̪t̪a/				
Tri-syllabic Simple- VCVCV, CVCVCV					
ଝରକା	/d͡ʒʰɔrɔka/				
ଠେକୁଆ	/ʈʰekua/				
କଦଳୀ	/kɔd̪ɔl̪i/				
Tri-syllabic Cluster- CVCVCCV, CVCCVCV, CCVCVCV					
ଦରିଦ୍ର	/d̪ɔrid̪rɔ/				
କର୍ମଠ	/kɔrmɔʈʰɔ/				
ଗ୍ରାମୀଣ	/gɾamiɳɔ/				
4 Syllabic Simple- VCVCVCV, CVCVCVCV					
ଅରକ୍ଷୀତ	/ɔɾɔkʰit̪ɔ/				
କାରିଗର	/kaɾigɔɾɔ/				
ରସଗୋଲା	/ɾɔsgɔgolɑ/				
4 Syllable Cluster- CVCVCCVCV, VCVCCVCV, CVCVCVCCV, CVCCVCVCV					
ପରିଶ୍ରମ	/pɔɾiʂɾɔmɔ/				
ଆଶୀର୍ବାଦ	/aʂiɾbad̪ɔ/				
କାରୁକାର୍ଯ୍ୟ	/kaɾukad͡ʒjɔ/				

Table 1.3 List of Non-Words (Regular & Non-regular)

Regular Non-words		A word	May be a word	Not a word	Remarks
ଜିମା	/d͡ʒimɑ/				
ବେଗୁ	/begu/				
Non-regular Non-words					
ଜାଖେ	/d͡ʒɑːkʰe/				
ପାଢ଼ୋ	/pɑːɽʰo/				

The initial list of words was presented to 10 children in the age group of 10-to-12 years and 10 young adults of 25-35 years. The listeners were asked to rate the familiarity of words on a three-point rating scale with the levels being 'very familiar', 'familiar' and 'unfamiliar'. The word, rated as 'familiar' and 'very familiar' by at least 5 participants, each from children and adults, were taken in the list of words to be used. It was observed that two syllable and three syllable simple words were rated as very familiar by most of the participants, and as the length and complexity of the word form increased, the familiarity was rated frequently as familiar and slowly towards unfamiliar by some individual.

One list of non-words was prepared such as matching and following the phonotactic rules of Odia language (regular non-words). The list of regular non-words was presented to children and adults and were asked to rate as 'may be a word', 'a word' and 'not a word'. The words rated as 'not a word' were selected. It was seen that as the non-words were Bi-Syllabic simple form, the responses were similar for both the set of words.

From the familiarity rated word list, words and sets of words were chosen for each target sub-test, as per the requirement of the subtest. Such as-

- Syllable segmentation: Bi-Syllabic Simple words, Bi-syllabic Cluster, Tri-Syllabic Simple, Tri-Syllabic Cluster, Four Syllable Simple, Four Syllable Cluster words
- Syllable deletion- Three syllable simple words
- Addition and Substitution of Syllable- Three syllable simple words and word pairs with minimal pair form
- Rhyme identification and production- Two syllable simple words and word pairs with minimal pair form
- Repetition of words with varied vowel length- two syllable simple words with long vowel in grapheme
- Phoneme Restoration- three syllable simple words
- Phoneme Monitoring- Simple sentences more than 6 words in each
- Morphological closure- Compound word pairs having same bound morphemes
- Word Awareness- Words and Non-words
- Morpheme learning- Regular non-words of bi-syllabic simple form.
- Word Blending- Two and three-syllabic simple words
- Compound word segmentation- Compound words of various lengths

For all subtests under each section and sub tests, two sets of stimuli items were used. The first set consisting of few demonstration/ examples; and the second set consisting of test stimuli.

Example of few subtests, instructions, demonstration items and test items:

Syllable segmentation: It is the person's ability to segment the word into its constituent syllables.

Instructions: You are required to tap for each syllable, when you repeat the word after the instructor.

Demonstration items: The word ପାଡ /pɑɖɔ/ can be segmented into 2 syllables, ପା /pɑ/ and ଡ /ɖɔ/. So, participant has to tap or clap twice, once for each syllable.

Another example for three syllable words- the word ଚପଲ /t͡ʃ̪ɔpɔlɔ/ can be segmented

into 3 syllables, ଚ /t͡ʃ/, ପ /pɔ/ and ଲ /lɔ/. So, participant has to tap or clap thrice, once for each syllable.

Rhyme identification, production: This task requires identification of rhyming words. The participants were asked to hear a pair of words and pick a word out of second pair of words, that rhymes with the set of words. For example- The word pair- କଥା /kɔʈʰɑ/, ମଥା /mɔʈʰɑ/, participants had to choose a rhyming word from a set of two words like /, ଓଜତ /d͡ʒoʈɑ/, ବଥା /bɔʈʰɑ/.

Pilot 1 and Pilot 2 difference:

The first pilot study included larger numbers of items in few subtests. The outcome of the scores were analyzed to find out any too high, too low values of a specific stimuli, vagueness of stimuli or instructions, ease of understanding the instructions, any practice effect or fatiguability. If any items didn't behave as expected, they were deleted. Items which were harder were removed or moved to extra set of items. Easier word were not removed as the final list wold give full score to most young children in the simple basic tasks to encourage participation. The second pilot was then conducted at an interval of one month on the same subjects and scores obtained from same stimuli were analysed to check internal consistency.

RESULTS

As described, for the pilot data analysis, each subgroup of Group A-Pilot comprised 10 individuals (equal number from both genders). Group D- Pilot also comprised 10 adult subjects for pilot data. Participants were presented with the instructions, demonstration items and test items twice, with an interval of 1 month. The mean scores, SD and median scores, obtained from both the pilot data for the sub-test syllable segmentation of section I, is tabulated in Table 1.3. for the sub-test of syllable segmentation.

Table 1.3. Descriptive Statistics of all sub-groups of typically developing children (Group A-Pilot) and adults (Group D-Pilot), for syllable segmentation, repeated at an interval of 1 month. (P1- indicates first Pilot data, P2- indicates Pilot data after 1 month from the same sub-group or group.)

Sub-Groups serial		P1-Bi-Si	P2-Bi-Si	P1-Bi-Cl	P2-Bi-Cl	P1-Tri-Si	P2-Tri-Si	P1-Tri-Cl	P2-Tri-Cl	P1-4S-Si	P2-4S-Si	P1-4S-Cl	P2-4S-Cl
1	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	1	1	2	1	2	2	1	1	2	2	2	2
	Max	3	3	3	3	3	3	3	3	3	3	3	3
	Mean	2.3	2.3	2.6	2.5	2.7	2.7	2.3	2.3	2.7	2.7	2.3	2.4
	S.D.	0.823	0.823	0.516	0.707	0.483	0.483	0.823	0.823	0.483	0.483	0.483	0.516
	Medn	2.5	2.5	3	3	3	3	2.5	2.5	3	3	2	2
2	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	3	3	2	2	2	2	2	2	1	1	1	1
	Max	4	4	3	3	3	3	3	3	3	3	3	3
	Mean	3.4	3.4	2.8	2.8	2.8	2.8	2.3	2.3	2.7	2.7	2.5	2.5
	S.D.	0.516	0.516	0.422	0.422	0.422	0.422	0.483	0.483	0.675	0.675	0.707	0.707
	Medn	3	3	3	3	3	3	2	2	3	3	3	3
3	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	4	4	3	3	3	3	2	2	2	2	2	2
	Max	5	5	4	4	4	4	4	4	4	4	3	3
	Mean	4.1	4.1	3.2	3.2	3.2	3.2	3	3	3	3.1	2.8	2.7
	S.D.	0.316	0.316	0.422	0.422	0.422	0.422	0.471	0.471	0.471	0.568	0.422	0.483
	Medn	4	4	3	3	3	3	3	3	3	3	3	3
4	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	4	3	3	3	3	3	2	2	3	3	3	3
	Max	5	5	4	5	4	4	4	4	4	4	4	4
	Mean	4.6	4.5	3.9	4	3.9	3.9	3.2	3.2	3.8	3.8	3.5	3.5
	S.D.	0.516	0.707	0.316	0.471	0.316	0.316	0.632	0.632	0.422	0.422	0.527	0.527
	Medn	5	5	4	4	4	4	3	3	4	4	3.5	3.5
5	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	4	4	4	4	4	4	2	2	4	4	3	3
	Max	5	5	5	5	5	5	5	5	5	5	4	4
	Mean	4.8	4.9	4.4	4.4	4.4	4.4	3.5	3.4	4.2	4.2	3.8	3.8
	S.D.	0.422	0.316	0.516	0.516	0.516	0.516	0.85	0.843	0.422	0.422	0.422	0.422
	Medn	5	5	4	4	4	4	3.5	3	4	4	4	4

Table 1.3 To Be Continued…

6	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	4	4	4	4	4	4	4	4	4	4
	Max	5	5	5	5	5	5	5	5	5	5	4	4
	Mean	5	5	4.6	4.6	4.6	4.6	4.2	4.2	4.3	4.3	4	4
	S.D.	0	0	0.516	0.516	0.516	0.516	0.422	0.422	0.483	0.483	0	0
	Medn	5	5	5	5	5	5	4	4	4	4	4	4
7	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	3	3	4	4	3	3
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	4.4	4.4	4.8	4.8	4.4	4.4
	S.D.	0	0	0	0	0	0	0.699	0.699	0.422	0.422	0.699	0.699
	Medn	5	5	5	5	5	5	4.5	4.5	5	5	4.5	4.5
8	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	4	4
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	4.5	4.5
	S.D.	0	0	0	0	0	0	0	0	0	0	0.527	0.527
	Medn	5	5	5	5	5	5	5	5	5	5	4.5	4.5
9	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	4	4
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	4.8	4.8
	S.D.	0	0	0	0	0	0	0	0	0	0	0.422	0.422
	Medn	5	5	5	5	5	5	5	5	5	5	5	5
10	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	5	5
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	5	5
	S.D.	0	0	0	0	0	0	0	0	0	0	0	0
	Medn	5	5	5	5	5	5	5	5	5	5	5	5
11	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	5	5
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	5	5
	S.D.	0	0	0	0	0	0	0	0	0	0	0	0
	Medn	5	5	5	5	5	5	5	5	5	5	5	5
12	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	5	5
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	5	5
	S.D.	0	0	0	0	0	0	0	0	0	0	0	0
	Medn	5	5	5	5	5	5	5	5	5	5	5	5
D-P	N	10	10	10	10	10	10	10	10	10	10	10	10
	Min	5	5	5	5	5	5	5	5	5	5	5	5
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	5	5	5	5	5	5	5	5	5	5	5	5
	S.D.	0	0	0	0	0	0	0	0	0	0	0	0
	Medn	5	5	5	5	5	5	5	5	5	5	5	5
Total	N	130	130	130	130	130	130	130	130	130	130	130	130
	Min	1	1	2	1	2	2	1	1	1	1	1	1
	Max	5	5	5	5	5	5	5	5	5	5	5	5
	Mean	4.55	4.55	4.35	4.35	4.35	4.35	4.07	4.06	4.27	4.28	4.05	4.05
	S.D.	0.863	0.872	0.929	0.954	0.914	0.914	1.129	1.133	0.955	0.948	1.041	1.041
	Medn	5	5	5	5	5	5	5	5	5	5	4	4

***Sub Groups 1-12 stands for Group A(CWTD) Pilot-Sub-Groups A-I till A-XII, D represents Group D Pilot-Adults.**

For all the sub-tests, all scores for individuals were noted, mean, SD, median, minimum and maximum were obtained. Mean scores for each sub-test for total items in all the sub-tests and mean scores for each sub groups in Group A-Pilot, Group D-Pilot, had no changes.

To measure internal consistency, Cronbach's Alpha method was used and scale reliability of the test items was analysed and tabulated in Table 1.4.

Table. 1.4. Item-wise co-efficient of reliability for all subtests, for two scores of participants of Pilot group with an interval of 1 month.

Sub-Test or stimuli	Cronbach's Alpha	Sub-Test or stimuli	Cronbach's Alpha	Sub-Test or stimuli	Cronbach's Alpha
Syl. Segmentation (Bi-Syl Si)	0.995	Syllable Identification (oddity-2 syllable)	0.998	Morphological closure	1.000
Syllable segmentation (Bi-Syl Cl)	0.996	Syllable Identification (oddity-3 syllable)	0.998	Word Awareness (words)	1.000
Syllable segmentation (Tri-Syl Si)	1.000	Addition of syllable	0.999	Word Awareness (non-words)	0.999
Syllable segmentation (Tri-Syl Cl)	0.998	Substitution of syllable	0.999	Morpheme Learning	0.993
Syllable segmentation (Four-Syl Si)	0.998	Rhyme identification	0.999	Word Blending 2 syllables out of 3	1.000
Syllable segmentation (Four-Syl Cl)	0.996	Production of rhyme	1.000	Word Blending 3 syllables out of 4	1.000
Syllable deletion (Initial)	1.000	Repetition of words-after one word	1.000	Compound word segmentation (Both simple words)	1.000
Syllable deletion (Final)	1.000	Repetition of words-out of two	0.999	Compound word segmentation (With one marker)	0.997
Syllable Identification (Initial)	0.996	Perception of words with varied vowel lengths	0.989	Compound word segmentation (Coalescence)	0.999
Syllable Identification (Medial)	0.998	Phoneme Restoration	0.996		
Syllable Identification (Final)	0.999	Phoneme Monitoring	0.977		

From the above table, it is clearly seen that for each subtest, the Cronbach's Alpha is more than 0.9, which shows excellent internal consistency. Therefore, the items taken as stimuli for the test are seen to be reliable for main data collection.

There was no gender comparison or any other types of comparison done, as the main data would include an equal number of participants of both genders in each sub group and total number of participants in sub groups would be higher than pilot study, implying the difference in scores for age groups, between typically developing children and children with phonological errors, between typically developing children and children with learning disabilities, children groups with that of adults will be more accurately representing the population.

DISCUSSION

The first pilot investigation was meant to narrow down the stimuli to limited number and to elicit reliable and expected outcomes. The second pilot investigation was meant to check internal consistency of items. The outcome of the analysis suggests that the stimuli presented for different sub-tests had an internal consistency and can be used for main study to get age related changes.

The test item developed and the findings derived from the work performed, should provide opportunities for the modification of assessment practices to include sll other different phonological processing skills, and the basis on which to adapt measures for use in other dialects of Odia, which is a far sought due to huge differences in dialects. However, the stimuli developed seem to provide opportunities for further research on the underlying skills associated with literacy acquisition in Odia, as it doesn't use picture cards or photos or real objects to elicit a response. In this study, we also included a measure of decoding (non-word reading) along the traditional tests of phonological processing. The results suggest that this measure was associated most clearly with phonological awareness across different age levels.

The complete list of stimuli is not shared in this current study, as the stimuli is used in the original study to develop a screening test in Odia language, to be published with complete test format, administration sheets and score cards.

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