

Dyslexia and Phonological Processing

Richard Wagner, Florida State University and the Florida Center for Reading Research

Dyslexia and Phonological Processing

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**Dyslexia and Phonological Processing – Non Technical
Webinar**

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CA Education Code 56334

Dr. Richard Wagner, Ph.D. Biographic Summary

- Robert O. Lawton Distinguished Research Professor of Psychology and the W. Russell and Eugenia Morcom Chair at Florida State University.
- Co-founder and a current Associate Director of the Florida Center for Reading Research.
- Ph.D. in cognitive psychology from Yale University in 1985.
- Principal Investigator of a Multidisciplinary Learning Disability Center funded by the National Institute of Child Health and Human Development (NICHD)
- Co-author of tests that are commonly used in evaluating children for dyslexia and other learning disability including:
 - Comprehensive Test of Phonological Processing (CTOPP-2),
 - Test of Word Reading Efficiency (TOWRE-2),
 - Test of Preschool Early Literacy (TOPEL).

Overview

- Brief review of dyslexia.
- Phonological processing and its relation to dyslexia.
- How to use the CTOPP-2 to assess phonological processing.
 - Administration and scoring.
 - Interpreting results.
- Some frequently asked questions.

Brief Review of Dyslexia

What “Dyslexic” Reading Looks Like

- The hallmark characteristics of the word-level reading problem are:
 - An inability to sound out new words.
 - New words require sounding out or by analogy to other known words.
 - A small pool of words read automatically.
 - Typical readers recognize a large pool of words with little conscious effort.

Look at But Don't Read the Following
Word

Look at But Don't Read the Following
Word

•horseradish

Look at But Don't Read the Following
Word

Look at But Don't Read the Following
Word

•hovolupshim

Poor Spelling and Writing

- Spelling and writing may even be more affected than reading is.

Poor Comprehension

- Reading comprehension may be poor, but a by-product of not being able to read the words on the page.
- Over time, however, the limited information coming through the reading channel can also affect comprehension.

Dyslexia is Dimensional

- Continuum exists from having only a minor problem to a very severe problem.

Origins of Dyslexia

- Major breakthrough was the discovery that dyslexia is due to a problem in language not in vision.

Origins of Dyslexia

- Dyslexia runs in families.
 - A family history of reading problems is associated with a 4 times greater risk of dyslexia.

Origins of Dyslexia

- Dyslexia occurs in both males and females but males are about twice as likely to have a severe problem than are females.

Dyslexia Rarely Occurs Alone

- Co-occurring conditions are the rule rather than the exception.
 - Common ones included ADHD, dysgraphia, dyscalculia, poor spelling and writing, and a history of early speech or language problems.

Phonological Processing and its Relation to Dyslexia

Phonological Processing

- Phonological processing refers to using speech sounds for coding information when reading, listening, and speaking.¹
 - Phonological comes from the Greek word phone with means sound or voice.

Three Kinds of Reading-Related Phonological Processing²

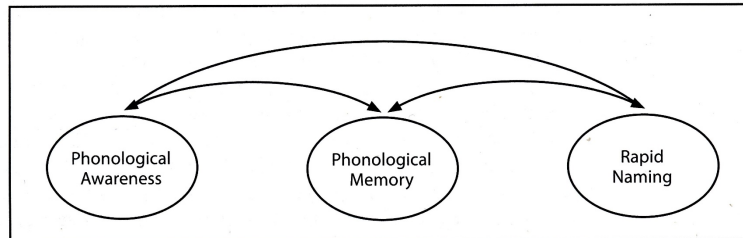


Figure 1.1. The model of phonological processing.

Phonological Awareness

- Awareness of and access to the sound structure or phonology of one's language.

Phonological Awareness

- How are the spoken words “cap,” “map,” and “tap,” the same and different in the sounds they contain?

Phonological Awareness

- How are the spoken words “cap,” “map,” and “tap,” the same and different in the sounds they contain?
 - Identical middle and ending sounds.
 - Different beginning sounds.

Phonological Awareness

- If you can hear how they are the same and different, their spellings make sense.
 - Different first letter, same middle and final letters.
 - cap
 - map
 - tap

Development of Phonological Awareness

- Proceeds from larger units to smaller:
 - 1. word-length units (e.g., cow-boy)

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 - 4. phonemes within rimes (e.g. from en to e-n)

Development of Phonological Awareness

- Proceeds from larger units to smaller:
 - 1. word-length units (e.g., cow-boy)
 - 2. syllables within words (e.g., sev-en)
 - 3. onsets (sound prior to vowel) and rimes (vowel and remaining consonants) within syllables (e.g., from pen to p-en)
 - 4. phonemes within rimes (e.g. from en to e-n)
 - 5. phonemes within consonant clusters (e.g, from str to s-t-r).

Phonological Awareness Plays Causal Role in Learning to Read

- To a child who can hear similarities and differences among “cap,” “map,” and “tap,” their spellings (cap, map, tap) are sensible.
- Impaired phonological awareness is a common characteristic of individuals with dyslexia.

Phonological Awareness can be Taught and Trained

- Training phonological awareness early can prevent or at least mitigate the severity of later word-level reading problems.
 - Early identification is critical to prevention.

Phonological Memory

- Phonological memory refers to coding information phonologically for temporary storage in short-term memory.
 - If you try to remember a number or someone's name you just heard you most likely will be using phonological memory.
 - You do the same for sounds that make up the pronunciation of the words you read.

Phonological Memory

- Most important part of phonological memory is the phonological loop, which in turn comprises two parts:
 1. phonological store—like a tape-recording loop that retains the most recent 2 seconds of auditory information that has been recorded.
 2. articulatory control process—provides input to and can refresh contents of phonological store, extending time information can be held.

Assessing Phonological Memory for Early Identification

- Preschool age children can't do phonological awareness tasks that require access to phonemes (e.g., say "bat" without /b/), but can do a version with larger units.
 - Say "starfish."
 - Now say "starfish" without "star."
 - "fish"

Cognitive Complexity Still Too Much for Some Young Children

- Examiner: "Say doorbell"

Cognitive Complexity Still Too Much for Some Young Children

- Examiner: "Say doorbell"
- Child: "doorbell"

Cognitive Complexity Still Too Much for Some Young Children

- Examiner: "Say doorbell"
- Child: "doorbell"
- Examiner: "Now say doorbell without bell"

Cognitive Complexity Still Too Much for Some Young Children

- Examiner: "Say doorbell"
- Child: "doorbell"
- Examiner: "Now say doorbell without bell"
- Child: "Doorbell without bell"

Phonological Memory Tasks are Cognitively Simple

- Just involves repeating what you hear.
- Nonword repetition, a phonological memory task, has been used in children as young as 2.

Overlap Between Phonological Awareness and Phonological Memory for Prereaders

- Before children learn to read, phonological awareness tasks and phonological memory tasks are actually tapping the identical underlying phonological ability.
 - Most likely quality of phonological representations.

Rapid Naming

- Rapid naming of digits, letters, objects, or colors requires retrieving phonological information (the pronunciations of their names) from permanent memory.
 - This retrieval process is also used when retrieving pronunciations of words or parts of words when you read them.

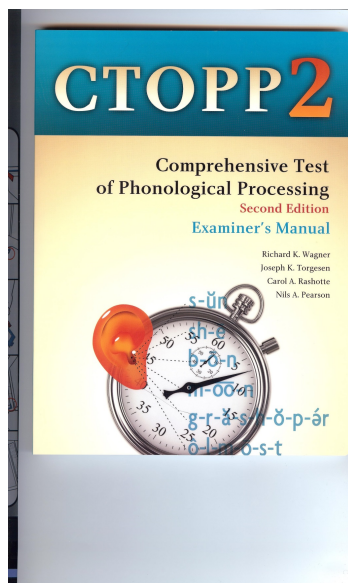
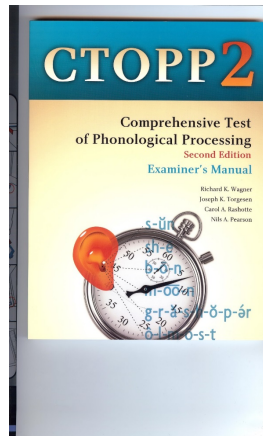
Rapid Naming

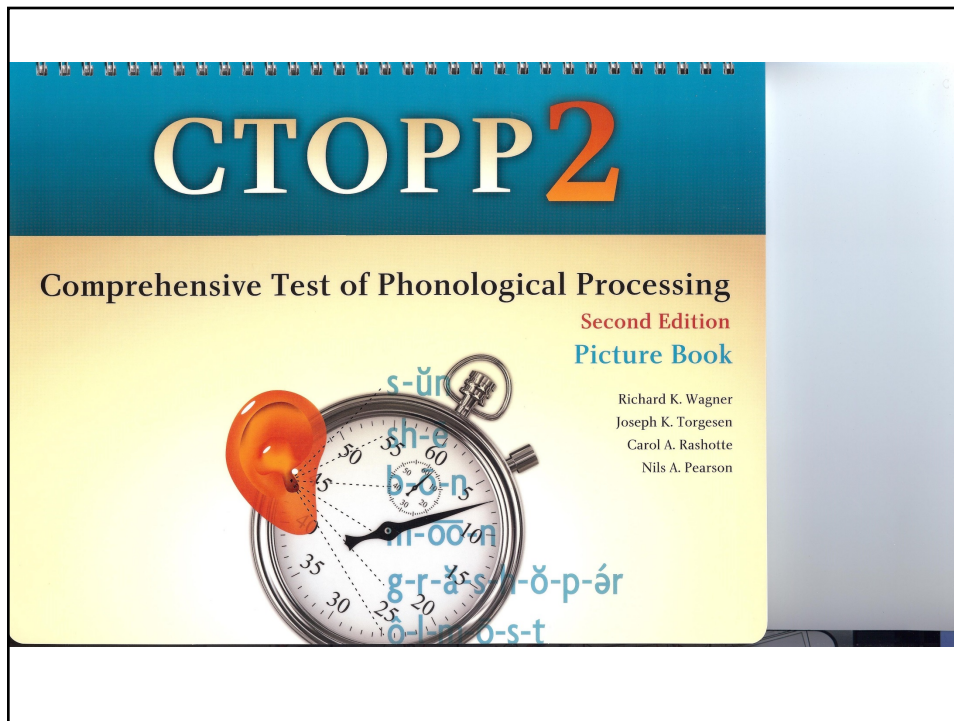
- It matters what you are asked to name rapidly. One primary distinction:
 - Symbols that are used in one's writing system such as letters and digits.
 - Non-symbolic items that are not used in one's writing system such as objects or colors.

Summary

- Dyslexia results from a subtle problem in language, not in vision.
- The language system involved in the phonological system.
- Three kinds of phonological processing important for reading: phonological awareness, phonological memory, and rapid naming.

Assessing Phonological Processing with the CTOPP-2²





Comprehensive Test of Phonological Processing—Second Edition
CTOPP-2
 Examiner Record Booklet Ages 7–24
 Richard K. Wagner Joseph K. Torgesen Carol A. Rashotte Nils A. Pearson

Section 1. Identifying Information

Name _____ Female Male Grade _____
 Parent/Guardian _____ School _____
 Date Tested _____ Year _____ Month _____ Day _____ Teacher's Name _____
 Date of Birth _____ Examiner's Name _____
 Age _____ Examiner's Title _____

*When accessing the normative tables, use years and months. Do not round up.

Section 2. Subtest Performance

Subtest	Raw Score	Age Equiv.	Grade Equiv.	Norm Rank	Scaled Score	SEM	Descriptive Term
Core							
1. Blends (BL)	_____	_____	_____	_____	_____	_____	_____
2. Blending Words (BW)	_____	_____	_____	_____	_____	_____	_____
3. Phoneme Isolation (PI)	_____	_____	_____	_____	_____	_____	_____
4. Memory for Digits (MD)	_____	_____	_____	_____	_____	_____	_____
5. Nonword Repetition (NR)	_____	_____	_____	_____	_____	_____	_____
6. Rapid Digit Naming (RD)	_____	_____	_____	_____	_____	_____	_____
7. Rapid Letter Naming (RL)	_____	_____	_____	_____	_____	_____	_____
8. Rapid Color Naming (RC)	_____	_____	_____	_____	_____	_____	_____
9. Rapid Object Naming (RO)	_____	_____	_____	_____	_____	_____	_____
Supplemental							
10. Blending Nonwords (BN)	_____	_____	_____	_____	_____	_____	_____

Section 3. Composite Performance

Composite	Subtest Scaled Score							Sum of Scaled Scores	Norm Rank	SEM	Composite Score	Descriptive Term
	EL	BW	SM	MD	NR	RD	RL					
Phonological Awareness	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Phonological Memory	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Rapid Symbolic Naming	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Rapid Non-Symbolic Naming	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Section 4. Descriptive Terms

Scaled Score	1–2	4–5	6–7	8–12	13–14	15–16	17–20
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior
Composite Score	<70	70–79	80–89	90–110	111–120	121–130	>130

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Comprehensive Test of Phonological Processing—Second Edition
CTOPP-2
 Examiner Record Booklet Ages 4–6
 Richard K. Wagner Joseph K. Torgesen Carol A. Rashotte Nils A. Pearson

Section 1. Identifying Information

Name _____ Female Male Grade _____
 Parent/Guardian _____ School _____
 Date Tested _____ Year _____ Month _____ Day _____ Teacher's Name _____
 Date of Birth _____ Examiner's Name _____
 Age _____ Examiner's Title _____

*When accessing the normative tables, use years and months. Do not round up.

Section 2. Subtest Performance

Subtest	Raw Score	Age Equiv.	Grade Equiv.	Norm Rank	Scaled Score	SEM	Descriptive Term
Core							
1. Elision (EL)	_____	_____	_____	_____	_____	_____	_____
2. Blending Words (BW)	_____	_____	_____	_____	_____	_____	_____
3. Sound Matching (SM)	_____	_____	_____	_____	_____	_____	_____
4. Memory for Digits (MD)	_____	_____	_____	_____	_____	_____	_____
5. Nonword Repetition (NR)	_____	_____	_____	_____	_____	_____	_____
6. Rapid Digit Naming (RD)	_____	_____	_____	_____	_____	_____	_____
7. Rapid Letter Naming (RL)	_____	_____	_____	_____	_____	_____	_____
8. Rapid Color Naming (RC)	_____	_____	_____	_____	_____	_____	_____
9. Rapid Object Naming (RO)	_____	_____	_____	_____	_____	_____	_____
Supplemental							
10. Blending Nonwords (BN)	_____	_____	_____	_____	_____	_____	_____

Section 3. Composite Performance

Composite	Subtest Scaled Score							Sum of Scaled Scores	Norm Rank	SEM	Composite Score	Descriptive Term
	EL	BW	SM	MD	NR	RD	RL					
Phonological Awareness	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Phonological Memory	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Rapid Symbolic Naming	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
Rapid Non-Symbolic Naming	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

Section 4. Descriptive Terms

Scaled Score	1–2	4–5	6–7	8–12	13–14	15–16	17–20
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Differences between the CTOPP and CTOPP-2

- 1. New norms.
- 2. Floor lowered with addition of more basic items. Now goes down to age 4.
- 3. Phoneme isolation added as new phonological awareness subtest.
- 4. Added rapid naming of digits and objects to 4-6 year-old version, giving measures of symbolic and non-symbolic naming.

The Three Kinds of Reading-Related Phonological Processing are Assessed by the CTOPP-2

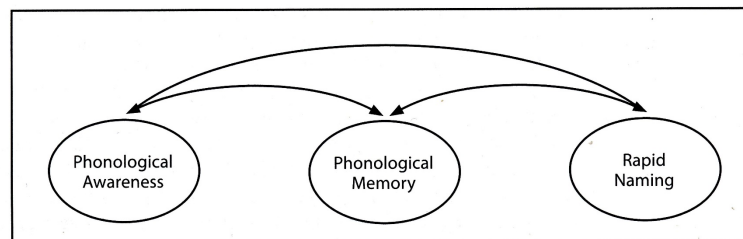


Figure 1.1. The model of phonological processing.

Four Primary Uses of CTOPP-2

- 1. Identify individuals who are deficient in phonological processing.
- 2. Identify individual strengths and weaknesses.
- 3. Evaluate progress in response to remediation of phonological awareness deficits
- 4. As a measure for use in research.

Who Can Administer the CTOPP-2?

- Requires formal training in assessment.
- Supervised practice in test administration is highly desirable.
 - College courses and workshops are ways to acquire these skills.
- Most examiners have backgrounds in school psychology, speech pathology, special education, or are reading specialists.

Administration Guidelines

- Appropriate for individuals 4-0 to 24-11 in age who can understand directions.
- The entire core battery takes about 30 minutes to administer.

Administration Guidelines

- Subtests should be administered in the order they appear in the record form.
 - If you administer selected subtests, do them in the order they appear.
- Two versions are provided, one for 4 – 6 year-olds and one for 7–24.

Administration Guidelines

- Ceilings are provided.
- If items are accidentally administered beyond the ceiling, no credit is given for the above ceiling items even if one or more is answered correctly.
- Follow good testing practices. See manual for suggestions specific to the CTOPP-2.

Materials Needed

- Examiner Record Booklet, Picture Book, CD, device for playing CD, stopwatch, sharpened pencil with eraser.

CTOPP-2 Subtests and Composites: 4- to 6-Year-Old

Table 2.1
CTOPP-2 Subtests and Composites for 4–6-Year-Olds

Subtest	Composite			
	Phonological Awareness	Phonological Memory	Rapid Symbolic Naming	Rapid Non-Symbolic Naming
Core				
Elision	X			
Blending Words	X			
Sound Matching	X			
Memory for Digits		X		
Nonword Repetition		X		
Rapid Digit Naming			X	
Rapid Letter Naming			X	
Rapid Color Naming				X
Rapid Object Naming				X
Supplemental				
Blending Nonwords ^a				

^aSubtest is not used in any composite.

Phonological Awareness Composite Subtests (4 to 6-year-old version)

Elision

- You are asked to say a word after dropping out part of it. For example:
 - Say “cowboy” without saying “cow” (Correct answer is “boy.”)
 - Say “grain” without saying “n.” (Correct answer is “gray.”)

Elision

- Nothing needed beyond record form.
- Pay attention to when directions and feedback are given.
- Note that the progression of items types follows the developmental progression noted earlier.

Blending Words

- Spoken words are presented in parts that must be blended together to form a word. For example:
 - You will hear a word one part at a time. Listen carefully and put the sounds together to make a whole word: /m/ /oo/ /s/ (“moose”).

Blending Words

- Need Core CD, and device to play tracks 1-33.
- If child asks for item to be repeated, one repetition is permitted per item.
- For items 1-12, if child says sounds separately (e.g., “m-e” rather than “me,” say “Try to say the sounds all together as a real word.”

Sound Matching

- The task is to identify a word that begins with the same sound as a target word. Later it changes to identify the word that ends with the same sound as the target word. For example:
 - Which word starts with the same sound as “soap?” “ripe” “toast” or “sand.” (“sand”)

Sound Matching

- Need picture book.
- Two parts: first sound and last sound.
- For all items, pause 1 second after saying the target before saying the 3 alternatives.
- Point to pictures as names are pronounced.
- Child may point to or say answer.
- Items can be repeated once if child appears to forget names given to pictures.

CTOPP-2 Subtests and Composites: 7- to 24-Year-Old

Table 2.2
CTOPP-2 Subtests and Composites for 7–24-Year-Olds

Subtest	Composite			
	Phonological Awareness	Phonological Memory	Rapid Symbolic Naming	Alternate Phonological Awareness
Core				
Elision	X			
Blending Words	X			
Phoneme Isolation	X			
Memory for Digits		X		
Nonword Repetition		X		
Rapid Digit Naming			X	
Rapid Letter Naming			X	
Supplemental				
Blending Nonwords				X
Segmenting Nonwords				X

Phoneme Isolation

- The task is to say a part of a word that represents the 1st, 2nd, 3rd, or 4th sound in a word. For example:
 - What is the second sound in the word “witch?” (correct answer is /i/).

Phoneme Isolation

- Nothing needed beyond record form.
- Pay attention to when directions and feedback are given.

Alternate Phonological Awareness Composite Score

- For children and adults age 7 through 24 only.
- It consists of Blending Nonwords and Segmenting Nonwords and can be used to verify a problem in phonological awareness.

Blending Nonwords

- Need Supplemental Subtest CD tracks 1-31.
- You may replay an item one time if examinee asks you to or gives no response.
- For items 1-12, give prompt “Try to say the sounds all together” if examinee repeats sounds separately.

Segmenting Nonwords

- Need Supplemental Subtest CD tracks 32-64.
- Repeat an item if the examinee mispronounces a word or asks to hear it again.
- Prompt with “Now say ____ one sound at a time” if the examinee forgets to.

Phonological Memory Composite Score

- For all children and adults, the phonological memory composite score consists of Memory for Digits and Nonword Repetition.

Memory for Digits

- The task is to listen to a string of digits then repeat them back in the correct order. For example:
 - "3 8 5 9 4 7 2"

Memory for Digits

- Need Core CD, and device to play tracks 34-63.
- If child asks for item to be repeated, no repetition is permitted.
- For items 1-4, if child makes an error, count item as incorrect but give correct answer.

Nonword Repetition

- The task is to listen to nonwords and say them exactly as they are heard. For example:
 - Listen to this made-up word then say it exactly as you hear it: "vootusoaf."

Nonword Repetition

- Need Core CD, and device to play tracks 64-96.
- If child asks for item to be repeated, no repetition is permitted.
- Pay attention to feedback given on items 1 – 9.

Rapid Naming Composite Scores

- For children age 4 to 6, there are two rapid naming composite scores:
 - Rapid Symbolic Naming
 - Rapid Non-Symbolic Naming
- For children and adults age 7 to 24, the only rapid naming composite score is Rapid Symbolic Naming.

Rapid Symbolic Naming

- Rapid Letter Naming requires letters presented in rows as quickly and accurately as one can. Rapid Digit Naming is similar except that digits rather than letters are named.

Rapid Digit and Rapid Letter Naming

- Need stopwatch and Picture Booklet.
- Record number of seconds to name all numbers on form.
- If examinee hesitates for 2 seconds, mark it as incorrect and point to next item and say go on.
- If line is skipped, redirect examinee to skipped line.

Rapid Non-Symbolic Naming

- Rapid Color Naming requires naming colors as quickly and accurately as one can. Rapid Object Naming is the same but common objects are named instead of colors.

Rapid Color Naming and Rapid Object Naming

- Need stopwatch and Picture Book
- Prompt examinee with the next item if he or she hesitates for more than 2 seconds.
- If line is skipped, redirect to skipped line.

Comprehensive Test of Phonological Processing-2

Scoring and Interpretation

Types of Scores

- Raw scores—scores earned on the subtests.
- Age equivalents—identifies age at which performance would be average.
- Grade equivalents—identifies grade at which performance would be average.
 - Age and grade equivalents are not recommended for use because of common misinterpretations.

Types of Scores

- Percentile ranks—indicates the percentage of the normative distribution that scored at or below the examinee's score.
- Subtest scaled scores—standard score with a mean of 10 and a standard deviation of 3.
- Composite scores—standard scores with a mean of 100 and a standard deviation of 15.

Types of Scores

- Developmental score—an equal interval developmental scale useful for examining absolute changes in performance over time.
 - What this means is that the difference between 50 and 100 is exactly the same as the difference between 100 and 150.
 - This makes the developmental score useful for monitoring progress in response to intervention (RTI).

Some General Recommendations

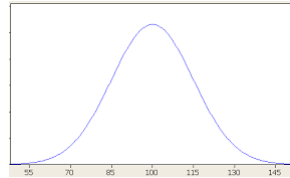
- Composite scores are preferred over subtest scores because they are more reliable. They are the most useful scores on the CTOPP-2.
- For subtests, standard scores are used to compare a score to the normative sample; developmental scores are used to measure change in absolute performance.

Composites Scores

- Composite scores are available for each of the three kinds of reading-related phonological processes.
 - Phonological Awareness (and Alternate Phonological Awareness for the 7-to-24 age form), Phonological Memory & Rapid Naming
 - They are combinations of individual subtests.

Interpreting Composites Scores

- 130+ Very Superior
- 121-130 Superior
- 111-120 Above Average
- 90-110 Average
- 80-89 Below Average
- 70-79 Poor
- 70- Very Poor




Subtest Scaled Scores

- A standard score that is identical for each subtest making it possible to compare performance across different subtests.
 - The average subtest scaled score is 10.

Interpreting Subtest Scaled Scores

- 17-20 Very Superior
- 15-16 Superior
- 13-14 Above Average
- 8-12 Average
- 6-7 Below Average
- 4-5 Poor
- 1-3 Very Poor

Comprehensive Test of Phonological Processing—Second Edition
CTOPP-2
 Examiner Record Booklet Ages 7–24
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Section 1. Identifying Information

Name Joshua Jones Female Male Grade 2
 Parent/Guardian _____ School Covert Avenue School
 Date Tested Year 2011 Month 2 Day 21 Teacher's Name Mr. Pounser
 Date of Birth 2004 6 4 Examiner's Name Dr. Joseph Crafter
 Age 7 8 27 Examiner's Title Psychologist

*When accessing the normative tables, use years and months. Do not round up.

Section 2. Subtest Performance

Subtest	Raw Score	Age Equiv.	Grade Equiv.	%ile Rank	Scaled Score	SEM	Descriptive Term
Core							
1. Elision (EL)	17	6-9	1.7	25	8	1	Avg.
2. Blending Words (BW)	15	5-9	1.7	9	6	1	Below Avg.
3. Phoneme Isolation (PI)	16	6-9	1.2	16	7	1	Below Avg.
4. Memory for Digits (MD)	12	4-6	1.2	9	6	1	Below Avg.
5. Nonword Repetition (NR)	14	6-9	1.0	25	8	1	Avg.
6. Rapid Digit Naming (RD)	38	5-9	1.7	9	6	1	Below Avg.
7. Rapid Letter Naming (RL)	40	6-9	1.0	16	7	1	Below Avg.
Supplemental							
8. Blending Nonwords (BN)	15	6-9	1.7	25	8	1	Avg.
9. Segmenting Nonwords (SN)	14	6-9	1.2	25	8	1	Avg.

Section 3. Composite Performance

Composite	Subtest Scaled Score								Sum of Scaled Scores	%ile Rank	SEM	Composite Score	Descriptive Term
	EL	BW	PI	MD	NR	RD	RL	BN					
Phonological Awareness	8	6	7						21	12	4	82	Below Avg.
Phonological Memory				6	8				14	12	6	82	Below Avg.
Rapid Symbolic Naming						6	7		13	8	4	79	Poor
Alt. Phonological Awareness								8	8	21	4	88	Below Avg.

Section 4. Descriptive Terms

Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior
Composite Score	<70	70-79	80-89	90-110	111-120	121-130	>130

Identifying Information Section

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Section 1. Identifying Information

Name Joshua Jones Female Male Grade 2
Parent/Guardian _____ School Lovert Avenue School
Date Tested 2011 06 31 Teacher's Name Mr. Rouner
Date of Birth 2004 06 27 Examiner's Name Dr. Joseph Crafter
Age* 7 8 27 Examiner's Title Psychologist

*When accessing the normative tables, use years and months. Do not round up.

Score Reporting Section

Section 2. Composite Performance

Composite	Raw Score	Age	Grade	SSM
Phonological Awareness	17	7.8	2	82
Phonological Memory	12	7.5	2	78
Rapid Syllable Naming	12	7.5	2	78
Composite Avg.				82

Section 3. Supplemental

Subtest	Raw Score	Age	Grade	SSM	Below/Above Avg
1. Phoneme Deletion (Phon)	17	7.8	2	82	Avg
2. Phoneme Blending (Phon)	15	7.5	2	78	Avg
3. Phoneme Deletion (Ph)	14	7.3	2	76	Avg
4. Phoneme Blending (Ph)	12	7.0	2	75	Avg
5. Nonword Repetition (Nw)	10	6.5	2	72	Avg
6. Rapid Digit Naming (Rd)	35	5.1	1	91	Below Avg
7. Rapid Letter Naming (Rl)	40	6.0	1	94	Below Avg
8. Rapid Digit Naming (Rd)	15	4.8	1	81	Avg
9. Supplemental (Nw)	12	4.3	1	76	Avg
Supplemental Avg.				83	

Section 4. Care

Name	Age	Grade	SSM
_____	_____	_____	_____

Score Interpretation: Raw Scores

Subtest	Raw Score	Age Equiv.	Grade Equiv.	Scale Rank	Scaled Score	SEM	Descriptive Term							
Section 2. Subtest Performance														
Core														
1. Elision (E1)	17	4-1	1.7	25	8	1	Avg							
2. Blending Words (BW)	15	5-1	1.7	4	1	1	Below Avg							
3. Phoneme Isolation (PI)	16	4-3	1.2	10	7	1	Below Avg							
4. Memory for Digits (MD)	12	4-4	1.4	4	1	1	Below Avg							
5. Nonword Repetition (NR)	14	4-0	1.0	25	8	1	Avg							
6. Rapid Digit Naming (RD)	38	5-1	1.7	4	1	1	Below Avg							
7. Rapid Letter Naming (RL)	40	4-0	1.0	10	7	1	Below Avg							
Supplemental														
8. Blending Nonwords (BN)	15	4-1	1.7	25	8	1	Avg							
9. Segmenting Nonwords (SN)	14	4-3	1.2	25	8	1	Avg							
Section 3. Composite Performance														
Composite														
	EL	BW	PI	MD	NR	RD	RL	BN	SN	Sum of Scaled Scores	Scale Rank	Composite Score	Descriptive Term	
Phonological Awareness	8	1	7							21	12	4	82	Below Avg
Phonological Memory		1	8							14	15	4	82	Below Avg
Rapid Symbolic Naming				1	7					19	8	4	74	Poor
All Phonological Awareness					8	8				16	21	4	88	Below Avg
Section 4. Descriptive Terms														
Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20							
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior							
Composite Score	<70	70-79	80-89	90-110	111-120	121-130	>130							

- How many items were correct for each subtest.
- Not very meaningful for comparing subtests because they have different numbers of items.

Figure 3.1. Sample page 1 of Examiner Record Booklet filled out for Joshua.

Age and Grade Equivalents

Subtest	Raw Score	Age Equiv.	Grade Equiv.	Scale Rank	Scaled Score	SEM	Descriptive Term							
Section 2. Subtest Performance														
Core														
1. Elision (E1)	17	4-1	1.7	25	8	1	Avg							
2. Blending Words (BW)	15	5-1	1.7	4	1	1	Below Avg							
3. Phoneme Isolation (PI)	16	4-3	1.2	10	7	1	Below Avg							
4. Memory for Digits (MD)	12	4-4	1.4	4	1	1	Below Avg							
5. Nonword Repetition (NR)	14	4-0	1.0	25	8	1	Avg							
6. Rapid Digit Naming (RD)	38	5-1	1.7	4	1	1	Below Avg							
7. Rapid Letter Naming (RL)	40	4-0	1.0	10	7	1	Below Avg							
Supplemental														
8. Blending Nonwords (BN)	15	4-1	1.7	25	8	1	Avg							
9. Segmenting Nonwords (SN)	14	4-3	1.2	25	8	1	Avg							
Section 3. Composite Performance														
Composite														
	EL	BW	PI	MD	NR	RD	RL	BN	SN	Sum of Scaled Scores	Scale Rank	Composite Score	Descriptive Term	
Phonological Awareness	8	1	7							21	12	4	82	Below Avg
Phonological Memory		1	8							14	15	4	82	Below Avg
Rapid Symbolic Naming				1	7					19	8	4	74	Poor
All Phonological Awareness					8	8				16	21	4	88	Below Avg
Section 4. Descriptive Terms														
Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20							
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior							
Composite Score	<70	70-79	80-89	90-110	111-120	121-130	>130							

Figure 3.1. Sample page 1 of Examiner Record Booklet filled out for Joshua.

- These are the age and grade that the score would be average for.
- As mentioned previously, they are easily misinterpreted. Best not to use them.

Scaled Scores

SECTION 2. SUBTEST PERFORMANCE												
Subtest	Raw Score	Age Equiv.	Grade Equiv.	Scale Rank	Scaled Score	SEM	Descriptive Term					
Core												
1. Elision (E1)	17	4-1	1.7	25	8	1	Avg					
2. Blending Words (BW)	15	5-1	1.7	4	12	1	Below Avg					
3. Phoneme Isolation (PI)	16	4-3	1.2	10	7	1	Below Avg					
4. Memory for Digits (MD)	12	4-4	1.4	4	12	1	Below Avg					
5. Nonword Repetition (NR)	14	4-0	1.0	25	8	1	Avg					
6. Rapid Digit Naming (RD)	38	5-1	1.7	4	12	1	Below Avg					
7. Rapid Letter Naming (RL)	40	5-0	1.0	10	7	1	Below Avg					
Supplemental												
8. Blending Nonwords (BN)	15	4-1	1.7	25	8	1	Avg					
9. Segmenting Nonwords (SN)	14	4-3	1.2	25	8	1	Avg					
Section 3. Composite Performance												
Composite	EL	BW	PI	MD	NR	RL	BN	SN	Sum of Scaled Scores	Scale Rank	Composite Score	Descriptive Term
Phonological Awareness	8	12	7						27	12	4	82 Below Avg
Phonological Memory		12	8						19	12	4	82 Below Avg
Rapid Symbolic Naming				12	7				19	8	4	74 Poor
RI: Phonological Awareness						8	8		16	21	4	88 Below Avg
Section 4. Descriptive Terms												
Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20					
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior					
Composite Score	<70	70-79	80-89	90-110	111-120	121-130	>130					

- These are the best scores to compare performance on different subtests.

Figure 3.1. Sample page 1 of Examiner Record Booklet filled out for Joshua.

Percentile Ranks

SECTION 2. SUBTEST PERFORMANCE												
Subtest	Raw Score	Age Equiv.	Grade Equiv.	Scale Rank	Scaled Score	SEM	Descriptive Term					
Core												
1. Elision (E1)	17	4-1	1.7	25	8	1	Avg					
2. Blending Words (BW)	15	5-1	1.7	4	12	1	Below Avg					
3. Phoneme Isolation (PI)	16	4-3	1.2	10	7	1	Below Avg					
4. Memory for Digits (MD)	12	4-4	1.4	4	12	1	Below Avg					
5. Nonword Repetition (NR)	14	4-0	1.0	25	8	1	Avg					
6. Rapid Digit Naming (RD)	38	5-1	1.7	4	12	1	Below Avg					
7. Rapid Letter Naming (RL)	40	5-0	1.0	10	7	1	Below Avg					
Supplemental												
8. Blending Nonwords (BN)	15	4-1	1.7	25	8	1	Avg					
9. Segmenting Nonwords (SN)	14	4-3	1.2	25	8	1	Avg					
Section 3. Composite Performance												
Composite	EL	BW	PI	MD	NR	RL	BN	SN	Sum of Scaled Scores	Scale Rank	Composite Score	Descriptive Term
Phonological Awareness	8	12	7						27	12	4	82 Below Avg
Phonological Memory		12	8						19	12	4	82 Below Avg
Rapid Symbolic Naming				12	7				19	8	4	74 Poor
RI: Phonological Awareness						8	8		16	21	4	88 Below Avg
Section 4. Descriptive Terms												
Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20					
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior					
Composite Score	<70	70-79	80-89	90-110	111-120	121-130	>130					

- %ile Ranks show that Joshua's scores are only better than or equal to the bottom 8 to 21 percent of his peers.

Figure 3.1. Sample page 1 of Examiner Record Booklet filled out for Joshua.

Composite Scores

Subtest	Raw Score	Age Equiv.	Grade Equiv.	Scale Rank	Scaled Score	SEM	Descriptive Term							
Section 2. Subtest Performance														
Care														
1. Elision (E)	17	4-1	1.7	25	8	1	Avg							
2. Blending Words (BW)	15	5-1	1.7	4	4	1	Below Avg							
3. Phoneme Isolation (PI)	16	4-3	1.2	10	7	1	Below Avg							
4. Memory for Digits (MD)	12	4-4	1.6	9	6	1	Below Avg							
5. Nonword Repetition (NR)	14	4-0	1.0	25	8	1	Avg							
6. Rapid Digit Naming (RD)	38	5-1	1.7	4	4	1	Below Avg							
7. Rapid Letter Naming (RL)	40	4-0	1.0	10	7	1	Below Avg							
Supplemental														
8. Blending Nonwords (BN)	15	4-1	1.7	25	8	1	Avg							
9. Separating Nonwords (SN)	14	4-3	1.2	25	8	1	Avg							
Section 3. Composite Performance														
Composite	EL	BW	PI	MD	NR	RD	RL	BN	SN	Sum of Scaled Scores	Scale Rank	SEM	Composite Score	Descriptive Term
Phonological Awareness	8	4	7							21	12	4	82	Below Avg
Phonological Memory				6	8					14	15	4	85	Below Avg
Rapid Symbolic Naming						4	7			19	8	4	78	Poor
RI: Phonological Awareness						8	8			16	21	4	88	Below Avg
Section 4. Descriptive Terms														
Scaled Score	1-3	4-5	6-7	8-12	13-14	15-16	17-20							
Descriptive Term	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior							
Composite Score	<75	75-79	80-89	90-110	111-120	121-130	>130							

- The composite scores and their descriptive terms follow.
- Joshua is below average or poor in every area of phonological processing.

Composite Score Discrepancy Analyses

- Are two composite scores different statistically?
- Are two composite scores different clinically?

Statistically Significant Discrepancies²

Table 3.2
Level of Confidence That Differences Between Composite Scores Are Statistically Significant

Level of confidence	Composite score difference	
	PMCS to RSNCS	PACS to RNNCS
	PMCS to RNNCS	RSNCS to RNNCS
	PACS to PMCS	PACS to RSNCS
95%	>13	>11
90%	12–13	10–11
85%	10–11	8–9
80%	9	7
70%	7–8	6
60%	6	5
Not confident	<6	<5

Note: PMCS = Phonological Memory Composite Score; RSNCS = Rapid Symbolic Naming Composite Score; RNNCS = Rapid Non-Symbolic Naming Composite Score; PACS = Phonological Awareness Composite Score.

Clinically Significant Discrepancies (4-6-year-old)²

Table 3.3
Level of Confidence That Differences Between Composite Scores Are Clinically Significant for 4–6-Year-Olds

Level of confidence	Composite score difference				
	PACS to PMCS	PACS to RSNCS	PACS to RNNCS		
			PMCS to RNNCS	PMCS to RSNCS	RSNCS to RNNCS
95%	>31	>28	>32	>34	>24
90%	27–31	25–28	28–32	29–34	21–24
85%	22–26	21–24	23–27	25–28	18–20
80%	19–21	19–20	21–22	23–24	16–17
70%	17–18	15–18	17–20	19–22	13–15
60%	14–16	12–14	14–16	15–18	11–12
Not confident	<14	<12	<14	<15	<11

Note: PACS = Phonological Awareness Composite Score; PMCS = Phonological Memory Composite Score; RSNCS = Rapid Symbolic Naming Composite Score; RNNCS = Rapid Non-Symbolic Naming Composite Score.

Clinically Significant Discrepancies (7-24-year-old)²

Table 3.4
Level of Confidence That Differences Between Composite Scores
Are Clinically Significant for 7–24-Year-Olds

Level of confidence	Composite score difference		
	PACS to PMCS	PACS to RSNCs	PMCS to RSNCs
95%	>32	>36	>37
90%	27–32	31–36	32–37
85%	23–26	26–30	27–31
80%	21–22	24–25	25–26
70%	17–20	20–23	20–24
60%	14–16	16–19	16–19
Not confident	<14	<16	<16

Note. PACS = Phonological Awareness Composite Score; PMCS = Phonological Memory Composite Score; RSNCs = Rapid Symbolic Naming Composite Score.

Frequently Asked Questions

Frequently Asked Questions

- When should I give the supplemental subtests?
 - To confirm the presence of a phonological processing deficit.
 - Especially useful for examinees with well-developed vocabularies whose performance on word-based phonological awareness tasks may be inflated by their vocabulary.

Frequently Asked Questions

- Can I diagnose dyslexia from the CTOPP-2 alone?
 - No single assessment can do this.
 - The CTOPP-2 is used to assess phonological processing.
 - A deficit in phonological processing is a hallmark of dyslexia, but is not sufficient by itself.

Frequently Asked Questions

- Can I diagnose dyslexia from the CTOPP-2 alone? (cont.)
 - Other things are important to assess:
 - Unexpectedly poor reading, family history, poor response to effective intervention, and exclusionary criteria (e.g., missed visual acuity problem, limited opportunity to learn because of extensive absences).

Frequently Asked Questions

- Is a deficit in any of the 3 composites (Phonological Awareness, Phonological Memory, and Rapid Naming) a potential cause of dyslexia?
 - Yes. Each of the three kinds of phonological processing is related to and important for reading.

Frequently Asked Questions

- Can an individual have dyslexia and not score poorly on the CTOPP-2?
 - Yes, especially if a lot of intervention on phonological processing has been given.
 - This is more common for phonological awareness than for phonological memory or rapid naming, and more common for individual subtests than for composite scores.

Frequently Asked Questions

- What is “double-deficit” dyslexia?
 - It refers to being below average in both the phonological awareness and rapid naming composite scores. (Whether it is a separate condition or just an indication of very low phonological processing is a matter of controversy.)

Frequently Asked Questions

- If an individual scores in the average range on the CTOPP-2 but well above average in IQ or language measures, would this be an indication of a phonological processing problem.
 - Yes because phonological processing is impaired relative to performance in other areas.

Frequently Asked Questions

- Can poor performance on the CTOPP-2 be due to inattention and not poor phonological processing?
 - Probably not. Problems in attention and in phonological processing commonly co-occur, and both are predictors of dyslexia. Inattention does not explain poor performance on the CTOPP-2 for most individuals.

Frequently Asked Questions

- What if there is large range between the subtest scores within a given composite score? Would that indicate the need for further assessment?
 - It would suggest the need for further assessment. Perhaps the student did not understand one of the tasks.

Frequently Asked Questions

- Can a child have a language disorder such as specific language impairment and dyslexia? If so, what would that look like?
 - Yes. What you would expect to see is an impairment in phonological processing and in reading that is greater than the magnitude of the specific language impairment.

Frequently Asked Questions

- Can the CTOPP-2 be used to measure response to intervention?
 - The developmental scores provide an equal interval scale that is useful for measuring longer-term response to intervention.
 - Longer-term because the CTOPP-2 should not be given more frequently than annually to avoid practice effects.

Frequently Asked Questions

- Does not using the audio CD validate the administration of the CTOPP-2?
 - The audio CD should be used for several reasons.
 - It provides a standardized assessment.
 - It was used for the normative sample.
 - Verbally presenting the items gives examinees who watch an examiner's mouth clues that were not available to the normative sample.

Frequently Asked Questions

- Which composites should improve with intervention?
 - Intervention is more successful for deficits in phonological awareness than for phonological memory or rapid naming.

Have a Question you Need Answered?

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References

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- ²Wagner, R. K., Torgesen, J. K., Rashotte, C. A., & Pearson, N. A. (2013). *Comprehensive Test of Phonological Processing* (2nd ed.). Austin, TX: Pro-Ed.

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