

# DYSLEXIA 101

WHAT SLP'S NEED TO KNOW



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## DISCLOSURES

### Non-financial disclosure

Executive board member of Arizona Branch of the International Dyslexia Association

Board Member and Chair of the Professional Development committee for ArSHA

I am employed by Way To Grow Pediatric Therapy and Dyslexia Center.

## TELL ME WHAT YOU KNOW!

What do you know about dyslexia?

What do you WANT to know?

What is your experience with dyslexia? Personal or Professional

## LEARNING OBJECTIVES

- ❖ describe the core features of dyslexia
- ❖ understand the roles of the speech language pathologists in identification and intervention
- ❖ describe assessment techniques and tools to identify individuals with dyslexia
- ❖ describe evidence-based intervention techniques and approaches to manage dyslexia
- ❖ discuss the principles and key elements of structured literacy intervention

DYSLEXIA 101

## MYTHS

- ❖ Individuals with dyslexia see things backwards
- ❖ "They just need to practice more"
- ❖ They will catch up: "Let's wait and see what happens"
- ❖ Dyslexia can be cured
- ❖ Individuals with dyslexia have a low IQ
- ❖ Schools cannot recognize or use the term "dyslexia"
- ❖ SLP's cannot diagnose or treat dyslexia

## WHAT IS IT?

According to the International Dyslexia Association:

*"Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge."*

## YEAH, YEAH, YEAH.....

- ❖ Brain processes language for learning how to read and spell differently
- ❖ Difficulty in the phonological aspect of language
- ❖ 15-20% of the population are affected
- ❖ NOT always just deficits in decoding; reading comprehension, spelling and writing can also be affected
- ❖ Not related to low IQ

## RISK FACTORS/WARNING SIGNS

### • Family history of learning difficulties and/or speech and language delays

- Delayed speech and language skills
- Difficulty learning colors, shapes, or letters, days of the week
- Difficulty pronouncing words and acquiring vocabulary
- Rhyming and identifying sounds in words is difficult

### Difficulty knowing right from left

- Struggling with sight word recognition
- Poor spelling
- Difficulty memorizing number facts
- Frustration with school and homework
- Difficulty understanding what is read
- Putting ideas in writing is difficult

## CORE DEFICITS

### Phonological Core Deficit

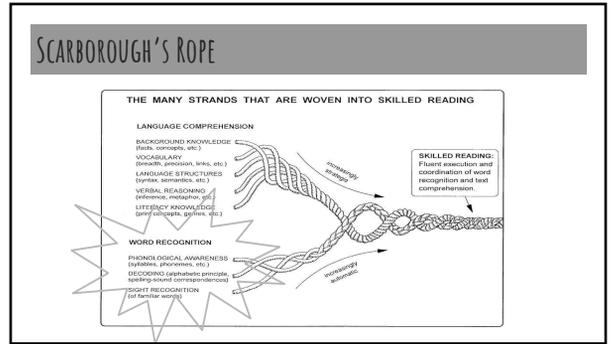
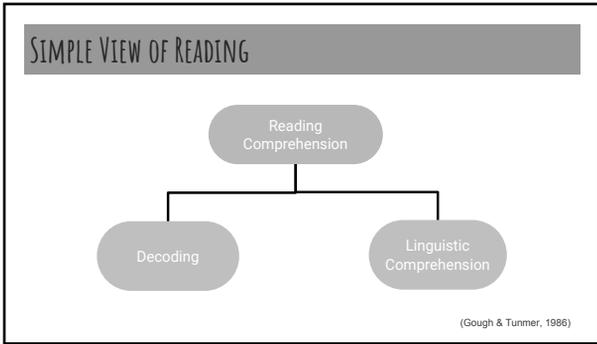
- ❖ Letter-Sound Knowledge
- ❖ Phonological/phonemic awareness
- ❖ Phonic Decoding

### Other areas of deficit

- ❖ Rapid Automatic Naming
- ❖ Working Memory

READING  
COMPREHENSION  
SIMULATION

SIMPLE VIEW OF  
READING &  
SCARBOROUGH'S ROPE



## UNDERSTANDING WORD RECOGNITION DIFFICULTIES

## ORTHOGRAPHIC MAPPING

According to Kilpatrick (2015):

*"Orthographic mapping is the process that readers use to store written words for instant and effortless retrieval."*

- Turn unfamiliar words into sight words
- Establishes a stable memory of spelling patterns
- Skilled readers develop orthographic mapping naturally

## ORTHOGRAPHY IN READING AND SPELLING

**Orthographic Recognition**

- nature of word recognition
- Orthographic sequence is instantly recognized as a familiar word

**Orthographic Recall**

- Requires more detailed and well-encoded memory of orthographic sequences

## SKILLS REQUIRED FOR ADEQUATE WORD RECOGNITION

1. Letter-Sound Knowledge

2. Phonological Awareness (analysis)

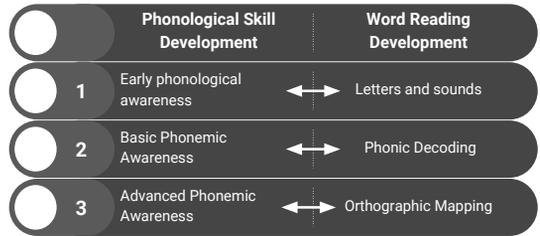
3. Phonological Blending (synthesis)

4. Vocab/Phonological Long-term Memory

**Phonic Decoding and Orthographic Mapping**

## READING DEVELOPMENT

### DEVELOPMENTAL LEVELS



## THE BRAIN & GENETICS

### NEURAL READING SYSTEMS

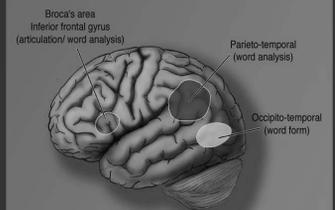
2 Posterior systems:

- Parietotemporal: - Wernicke's and Primary auditory cortex
- Occipitotemporal

1 anterior system:

- Inferior frontal gyrus: Broca's

### Reading Systems in Brain



© Sally Shaywitz, *Overcoming Dyslexia*, 2003

### GENETICS

- Dyslexia is genetic
- No specific gene has been identified
- Roles of specific genes are not yet understood
- Chromosomes
  - Chromosome 6 - phonemic awareness
  - Chromosome 15 - rapid naming
  - Chromosome 2 - visual memory for words
  - Chromosome 3
  - Chromosome 11
  - Chromosome 1
- No single locus has been identified across all studies

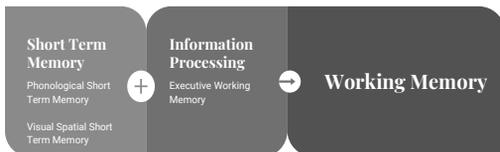
## DYSLEXIA AND ADHD

## ADHD AND DYSLLEXIA - NEUROCOGNITIVE DEFICITS

Dyslexia	ADHD	Shared Deficits
<p><i>Phonological Processing</i></p> <ul style="list-style-type: none"> <li>Phonological Awareness</li> <li>Verbal Reasoning</li> <li>Verbal Working Memory</li> </ul>	<p><i>Executive Functions</i></p> <ul style="list-style-type: none"> <li>Self Regulation/Response Control</li> <li>Executive Functions: Planning, problem solving, flexibility</li> <li>Visual Working Memory</li> </ul>	<ul style="list-style-type: none"> <li>Rapid Automatic Naming</li> <li>General Information - Processing Speed</li> <li>Strongly Heritable</li> </ul>

WORKING MEMORY

## WHAT IS WORKING MEMORY?



"Limited cognitive capacity to retain information while simultaneously processing the same or other information." *Dehn, 2016*

- Predictor of academic achievement
- Children who scored in the 10th percentile or lower had an 80% chance of having a significant learning disability

## WORKING MEMORY

### Phonological/Auditory

- Phonological Loop
- Immediate sequential recall of letters, sounds, numbers, words, non word recall
- Speech based storage of auditory/verbal information
- Phonological Awareness and Phonological STM are highly correlated

### Visual/Spatial

- Visual Sketch Pad
- Stores information for objects and locations
- Static: recall of color or shape
- Dynamic: Stimuli in motion or needs manipulation (i.e. how puzzles will fit together)

## EXECUTIVE WORKING MEMORY - PROCESSING

Processes all auditory/verbal/phonological and visual information

- Influenced by
  - Attention
  - Cognitive load of the task
  - Use of other executive function skills for remembering (i.e. inhibition, switching)

## AREAS OF IMPACT ACADEMICALLY

- |   |  |
|---|--|
| Following multiple step directions      | Poor reading comprehension and reading fluency |
| Paraphrasing and summarizing            | Difficulty tracking what you are writing       |
| Vocabulary Development                  | Organizing thoughts in writing                 |
| Keeping track of steps in math problems | Integrating organization and grammar           |
| Remembering sounds/words when decoding  | Sequencing ideas                               |

## DYSLEXIA AND WORKING MEMORY

### Phonological Deficits

- Can't retain sequential verbal information
  - Can't hold phonemes long enough to blend
  - Forgets sequence of phonemes or earlier phonemes
  - Can't store words for comprehension
  - Forgets words and phonemes before encoded into LTM
  - Failure to update (i.e. recall and follow phonics rules)

### Visual Spatial Deficits

- Conflicting evidence
- Thought to be normal
- Recent research has found a significant weakness in storage and processing of dynamic visual-spatial STM

## DYSLEXIA AND WORKING MEMORY

### Executive WM Deficits

- Many researchers think this is the core deficit
- Explains implications of deficits in both areas of STM
- If processing is overloaded = decrease in the amount of information maintain in storage
- Cognitive Load Theory

## RAPID AUTOMATIC NAMING

## RAN & DYSLEXIA

- ❖ Poor RAN is associated with reading problems
  - Exact correlation is unknown
  - More closely related to reading speech not accuracy
  - Related to the ability to identify visual forms and pair the symbol with it's auditory counterpart
- ❖ RAN for letters and numbers has a stronger correlation than colors or objects
- ❖ Training RAN will not improve reading
  - Improved RAN following PA training and improved reading

## ROLE OF THE SPEECH LANGUAGE PATHOLOGIST

## DOMAINS OF PROFESSIONAL PRACTICE AND SERVICE DELIVERY

### Professional practice domains:

- advocacy and outreach
- supervision
- education
- prevention
- screening
- assessment
- treatment

## DISORDER OF WRITTEN LANGUAGE

- Reading
  - Word Recognition (dyslexia)
    - Decoding and Sight Word Recognition
  - Reading Comprehension
- Writing
  - Word Level
    - Word choice and spelling
  - Written Expression
  - Sentence/text level
  - Conventions
  - Functions
  - Organizational structure

Can involve 5 language domains:

- Phonology
- Morphology
- Semantics
- Syntax
- Pragmatics

Can occur at various levels:

- Sound Syllable Word Level
- Discourse Level

## HOW CAN WE HELP?

- ❑ Be confident in your expertise
- ❑ Share facts with others
- ❑ Understand the relationship between other communication disorders
- ❑ Encourage appropriate use of the dyslexia label
- ❑ Promote effective reading instruction

## ROLE OF THE SCHOOL AND EDUCATORS

## WHAT SHOULD WE DO?

- Identify risk factors and warning signs
- Educate others
- Provide appropriate instruction/intervention
- Complete ongoing assessments
- Schools cannot diagnose, but can identify students with dyslexia

## LEGISLATION AND ADE

- HB2202 - 2017
  - Develop and maintain a dyslexia handbook and redefined dyslexia
- SB1318
  - ADE to designate a dyslexia specialist
  - ADE will develop a list of training opportunities for dyslexia
  - Training opportunities must meet certain requirements
  - Develop a dyslexia plan

Arizona Dyslexia Handbook

<https://cms.azed.gov/home/GetDocumentFile?id=5ada56093217e11d10341d52>

## ACCOMMODATIONS/MODIFICATIONS

### Accommodations

- Clarify and simplify directions
- Provide oral or visual instructions
- Assistive technology (audiobooks, speech to text)
- Provide outlines or notes ahead of time
- Tests read aloud
- Allow extra time on tests
- Small group testing

### Modifications

- Spelling lists/tests
- Writing rubrics
- Reading comprehension tasks

## ASSESSMENT AND DIAGNOSIS

## ASSESSMENT AND DIAGNOSIS

- Assessment should be a team approach
- Academic and language testing
- Full and comprehensive case history (including family history)
- Review of all records (school or clinic evaluations, IEPs, etc)
- Cognitive or intelligence testing is NOT required
  - Per IDEA - use of severe discrepancy must NOT be required for identification of SLD/dyslexia
  - Will aide in a more complete learning profile of the child

## ASSESSMENT AND DIAGNOSIS

Who can evaluate?

- Professionals with Master's and Doctorate degrees in the following:
  - Education
  - Reading
  - Speech Language Pathology
  - School Psychology
  - Psychology
  - Neuropsychology
  - \*\*Occupational therapy
- Many tutors offer screening assessments

Who can Diagnose?????

## AREAS TO EVALUATE

Phonological Awareness

Phonemic manipulation is greatest indicator of

Working Memory

Rapid Automatic Naming

Receptive Vocabulary

Expressive Language

Reading Comprehension

Phonics

Decoding - real and nonsense words

Oral reading fluency - single words, sentences, and paragraphs

Spelling

Written expression - sentence and paragraph level

## ASSESSMENTS TO CONSIDER

Phonological Processing

- ❖ Comprehensive Test of Phonological Processing, Second Edition (CTOPP-2)
- ❖ Phonological Awareness Screening Test (PAST)

Spoken Language

- ❖ Clinical Evaluation of Language Fundamentals, Fifth Edition (CELF-5)\*\*
- ❖ Comprehensive Assessment of Spoken Language, Second Edition (CASL-2)
- ◆ **Test of Integrated Language and Literacy Skills (TILLS)\*\***

Academic/Educational Testing

- ❖ Wechsler Individual Achievement Test, Third Edition (WIAT-3)
- ❖ Kaufman Test of Educational Achievement, Third Edition (KTEA-3)

## ASSESSMENTS TO CONSIDER

Written Language

- ❖ Test of Word Reading Efficiency, Second Edition (TOWRE-2)
- ❖ Gray Oral Reading Tests, Fifth Edition (GORT-5)
- ❖ Qualitative Reading Inventory, Sixth Edition (QRI-6)
- ❖ Test of Written Language, Fourth Edition (TOWL-4)
- ❖ Test of Early Written Language, Third Edition (TEWL-3)
- ❖ Test of Written Spelling, Fifth Edition (TWS-5)
- ❖ Word Identification and Spelling Test (WIST)
- ❖ **Test of Integrated Language and Literacy Skills (TILLS)\*\***

## IMPORTANT THINGS TO CONSIDER...

- ❖ Be cautious of composite scores
  - Can mask weaknesses
- ❖ Scores in the bottom third of distribution should be given more attention
  - Scaled score of 8 (SS 90 25th percentile)
  - 25-35% of students struggle with reading to some degree
- ❖ Phoneme manipulation tasks are more sensitive to reading skills
  - Weighs heavily on working memory and requires other PA skills
- ❖ Having a solid knowledge base in the area of reading acquisition and reading difficulties is essential

## INTERVENTION

## WHAT IS STRUCTURED LITERACY??

## STRUCTURED LITERACY PRINCIPLES

- ❖ Systematic and Cumulative
  - Follows a logical order of language
  - Starts with easiest tasks and progresses
  - Each step is based on concepts previously learned
- ❖ Explicit
  - Direct teaching
  - Multi-sensory (visual, kinesthetic, auditory)
- ❖ Diagnostic
  - Individualized instruction
  - Continuous assessment
  - Mastered to automaticity

Intensive - 2 hour minimum

## STRUCTURED LITERACY ELEMENTS

- |  |  |
|--|--|
| <ul style="list-style-type: none"><li>❖ Phonology<ul style="list-style-type: none"><li>➢ Study of the sound structure</li><li>➢ phonological / phonemic awareness</li></ul></li><li>❖ Sound Symbol Associations<ul style="list-style-type: none"><li>➢ Understanding alphabet principle and applying it</li><li>➢ Phonemes → to graphemes</li><li>➢ Graphemes → phonemes</li></ul></li><li>❖ Syllables<ul style="list-style-type: none"><li>➢ 6 syllable types</li><li>➢ Syllable division rules</li></ul></li></ul> | <ul style="list-style-type: none"><li>❖ Morphology<ul style="list-style-type: none"><li>➢ Morpheme is the smallest unit of meaning</li><li>➢ Base words and affixes help decode and understand meanings</li></ul></li><li>❖ Syntax<ul style="list-style-type: none"><li>➢ Sequence and function of words</li></ul></li><li>❖ Semantics<ul style="list-style-type: none"><li>➢ Meanings</li><li>➢ Structured literacy will include semantics throughout lessons</li></ul></li></ul> |
|--|--|

## THE ALPHABET

*A.... B.... C...*

- Predictor of later reading success, including how quickly a child will learn the letter sounds;
- letter names facilitate the learning of the letter names;
- knowing the sequence of letters increases knowledge of letter names;
- difficulty in learning letter names indicate a language or learning difference;
- highly correlated with name writing

## THE ALPHABET

### Letter naming

- ❖ Identify letters in name
- ❖ Name writing
- ❖ Letters whose names begin with their sounds (i.e. B, T, D, P)
- ❖ Multi-sensory
- ❖ Letter matching
- ❖ Letter Identification/naming

### Letter-Sound Correspondence

- ❖ Letters vs. graphemes vs. phonemes
- ❖ Key words
- ❖ Voiced versus voiceless

## GRAPHEMES/PHONEMES

### Digraphs/Trigraphs

sh -tch  
 ch -dge  
 th \*qu  
 wh  
 ph  
 -ck

### Vowel Teams

a-e ai/ay au/aw  
 \*oo  
 e-e ee/\*ea \*ie ou  
 i-e igh \*ei ow  
 o-e oa/\*ow oe ui  
 u-e ue/ew oi/oy  
 v ev

## GRAPHEMES/PHONEMES

### Vowel -r Patterns

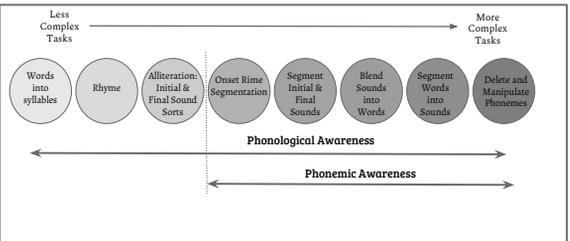
ar or er ir ur

- er ir ur - always pronounced /er/
- ar/or pronounced /er/ in unaccented syllable
- or is pronounced /er/ after a /w/ (i.e. word)
- ar is pronounced /or/ after /w/ (i.e. ward)

### Consonant graphemes with more than 1 sound

c → /k/ (s) → before e i y  
 g → /g/ (dʒ)  
 s → /s/ /z/  
 x → /ks/ /z/

## PHONOLOGICAL AWARENESS



## PHONOLOGICAL AWARENESS

### Syllable Segmentation

- o Sentence Segmentation → I like pizza
- o Compound words → cupcake, football
- o 2 syllable words → pillow, blanket
- o Multisyllabic words → unicorn, alligator

### Rhyme

- o Judge Rhymes → do cat and dog rhyme?
- o Odd one out → Which word does not rhyme? hot, fire, spot
- o Matching → Find the word that rhymes with bell: smell, hop, smile
- o Generation → Tell me a word that rhymes with cop.

## PHONOLOGICAL AWARENESS

### Initial and Final Sound Alliteration:

Initial continuants then stops- same for final

- o Judge → Do shoe and sun start with the same sound?
- o Odd one out → Which word does not have the same sound at the end: dish, wash, bath?
- o Matching → Which word ends with the same sound as bus?
- o Initial and Final Sound Sorts → Which one starts like fish and which one starts like sun? Mom, fair, laugh

## PHONOLOGICAL AWARENESS

### Onset Rime Segmentation

- Initial continuants → *What's the first sound in fun?*
- Initial stops → *What's the first sound in toy?*
- Final continuants → *What's the last sound in bus?*
- Final Stops → *What's the last sound in back?*

### Blending and Segmenting – target as reciprocal tasks

- CV and VC – *continuants then stops (i.e. so, is, up, go)*
- CVC continuants then include stops (*i.e. fish, moon, bat*)
- CCVC and CVCC (*i.e. jump, stop*)
- Varying Shapes (*i.e. chomp, street*)

## ADVANCED PHONEMIC AWARENESS

### Syllable Level

- ❖ (sun)set → set
- ❖ la(dy) → lay
- ❖ bumble(bee) → humble
- ❖ (re)member → member
- ❖ (hurri)can → icane
- ❖ coco(nut) → coco

### Onset Rime Level

- ❖ (sh)ake → ake
- ❖ s(t) → /s/
- ❖ Rain → change /r/ to /ch/ → chain
- ❖ Lit → change /l/ to /b/ → bit

### Phoneme Level

- ❖ Map → change /a/ to /o/ → mop
- ❖ s(w)eat → seat
- ❖ Glow → change /l/ to /r/ → grow
- ❖ Sheep → change /p/ to /t/ → sheet
- ❖ Ant → change /l/ to /d/ → and
- ❖ sa(n)d → sad
- ❖ Lift → change /l/ to /s/ → list

## 6 SYLLABLE TYPES - CLOVER

**C** Closed – *ends in a consonant; vowel is short (i.e. not, jump)*

**L** Consonant 'le' (*i.e. turtle, little*)

**O** Open – *ends in a vowel; vowel is long (i.e. no, he)*

**V** Vowel team (*i.e. play, grow*)

**E** Silent 'e' (*i.e. time, cute*)

**R** Bossy 'r' (*i.e. star, bird*)



## SYLLABLE DIVISION

### Compound Words

- ❖ "Catfish rule"
- ❖ *rainbow, makeup*

### VC.CV and VC.CCV

- ❖ "Rabbit rule" and "monster rabbit rule"
- ❖ *plenty magnet, dandruff*

### Cle – count back 3

- ❖ "Turtle rule"
- ❖ *little, jumble*

### V.CV

- ❖ "Tiger rule"
- ❖ First syllable is open
- ❖ *frozen, polo*

### VC.V

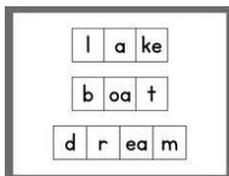
- ❖ "Camel rule"
- ❖ First syllable is closed
- ❖ *clever, limit*

### V.V

- ❖ "Lion rule"
- ❖ *boa, diet*

## SPELLING

- Simultaneous Oral Spelling
- elkonin boxes/visual supports
- teach common spelling patterns



## COMMON SPELLING PATTERNS

### FLOSS rule

- f, l, s, z

### Long spelling right after short vowel

- -ck, -tch, dge

### 2 sounds of y

- all/alk

### Closed syllable rule breakers

- Ost, old, oll, olt, ind, ild

### Doubling Rule

#### Silent 'e' rule

#### Final 'y'

- Vowel+y = keep y

- Consonant+y = change y to i

(except for suffixes that begin with i)

#### 3 sounds of -ed

## MORPHOLOGY

- ❖ Improves decoding, spelling, and vocabulary development
- ❖ Inflectional morphemes
  - > Does not change meaning; grammatical marker
  - > -s, -es, -ed, -ing, -er, -est
- ❖ Derivational morphemes
  - > Changes part of speech/meaning
  - > -er, -ly, -ness, -less, -ment, -able
- ❖ Words sorts and word building

## SIGHT WORDS

- ❖ Multisensory instruction
- ❖ Mnemonics
  - > "Oh you lucky duck"
- ❖ Incorporate into reading and spelling words
- ❖ Use lists or curriculum

## SYNTAX AND SEMANTICS

- Written expression
- Sentence structure
- Parts of speech
- COPS
  - capitalization
  - organization/order
  - punctuation
  - spelling

## LESSONS

- Phonological/Phonemic Awareness
- Visual Drill
- Auditory Drill
- Morphemes
- Review for Reading
  - Words
  - Sentences
- Review for spelling
  - Words
  - Sentences
- Syllable Division
- New Concept
  - Phonogram
  - Reading
  - Spelling
- Sight Words
- Oral reading
- Written Expression

## ACTIVITIES

- Blocks/manipulatives
- Bingo
- Bang
- War
- Go Fish
- Matching
- Uno
- Shaving cream
- Rice
- play-doh
- Treasure hunts
- Board games
- Fortune Tellers

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