



# What will improve the reading of children with both ADHD and reading disabilities?

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# Attention-Deficit/Hyperactivity Disorder (ADHD)

- ADHD is a **behavioral syndrome** defined by the presence (or absence) of particular symptoms and developmental signs that tend to cluster together
  - Inattention
  - Hyperactivity/Impulsivity
- 4-10% of population diagnosed with ADHD
  - In a classroom of 24 to 30 children, it is likely that at least one will have ADHD.



## Inattention examples

- Often becoming easily distracted by irrelevant sights and sounds
- Often failing to pay attention to details and making careless mistakes
- Rarely following instructions carefully and completely losing or forgetting things like toys, or pencils, books, and tools needed for a task
- Often skipping from one uncompleted activity to another.



## Hyperactivity/Impulsivity examples

- Feeling restless, often fidgeting with hands or feet, or squirming while seated
- Running, climbing, or leaving a seat in situations where sitting or quiet behavior is expected
- Blurting out answers before hearing the whole question
- Having difficulty waiting in line or taking turns.

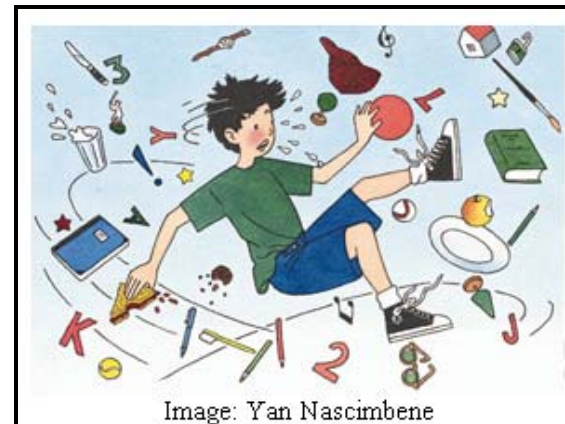


Image: Yan Nascimbene

# Reading Difficulties and Disabilities

- Dyslexia = Word-reading disability
- Difficulty perceiving and manipulating the sounds in language
- Identification is not an “exact science”
- RD affects the processing mechanics of reading
- 4-9% of population diagnosed with RD

NOTE: In non-English languages that have more regular and consistent letter-sound correspondences, dyslexia is characterized mainly by poor fluency.



## Comorbid ADHD/RD

- Although ADHD and RD are distinct disorders, they co-occur in about 25%-40% of children with either disorder
- Comorbidity associated with :
  - More severe reading difficulties than RD alone
  - More severe attention difficulties than ADHD alone
  - More severe academic failure and lower grades
  - More severe social impairment
  - Weaker response to interventions
  - Poorer long-term social and occupational outcomes
  - More severe pervasive neurocognitive impairment

## Treatment for ADHD & RD

Well-validated interventions exist for each disorder.

- ADHD: medication + behavior therapy
- RD: intensive reading instruction

**Much less is known about optimal treatment approaches for the comorbid ADHD/RD group. Findings have been mixed.**



# **The I-CARD Study: Interventions for Children with Attention and Reading Disorders**

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## **Thanks To**

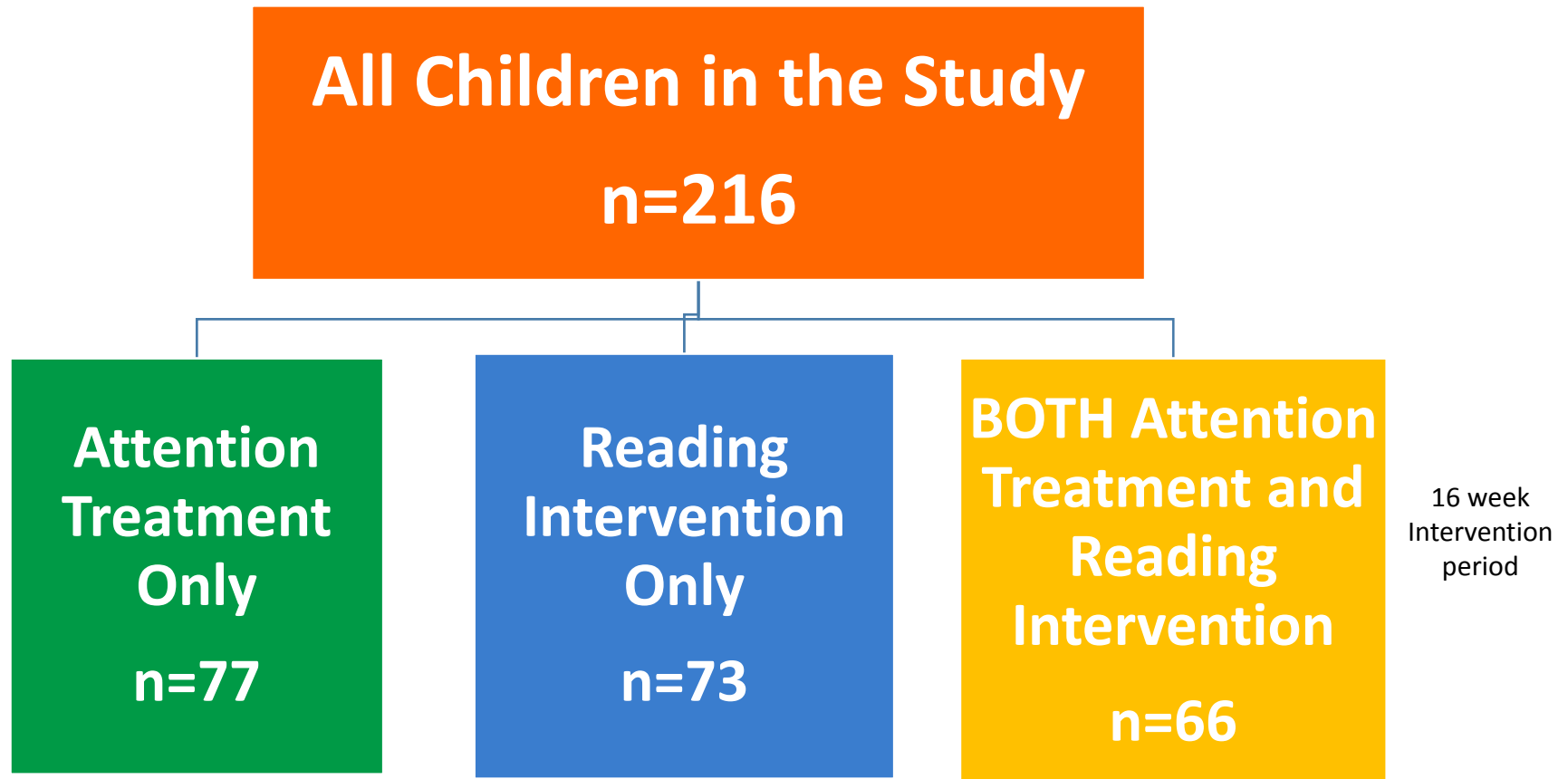
Peter Jensen, M.D., Erik Willcutt, Ph.D.,  
& the I-CARD Scientific Steering Group (2007-2008)

# ICARD Research Questions

- Do ADHD treatments impact RD?
- Do RD treatments impact ADHD?
- Do combined ADHD and RD treatments result in better outcomes for children with ADHD & RD?
  - Primary study outcomes: Word reading, phonemic decoding, ADHD symptoms
  - Secondary outcomes: Fluency, Comprehension



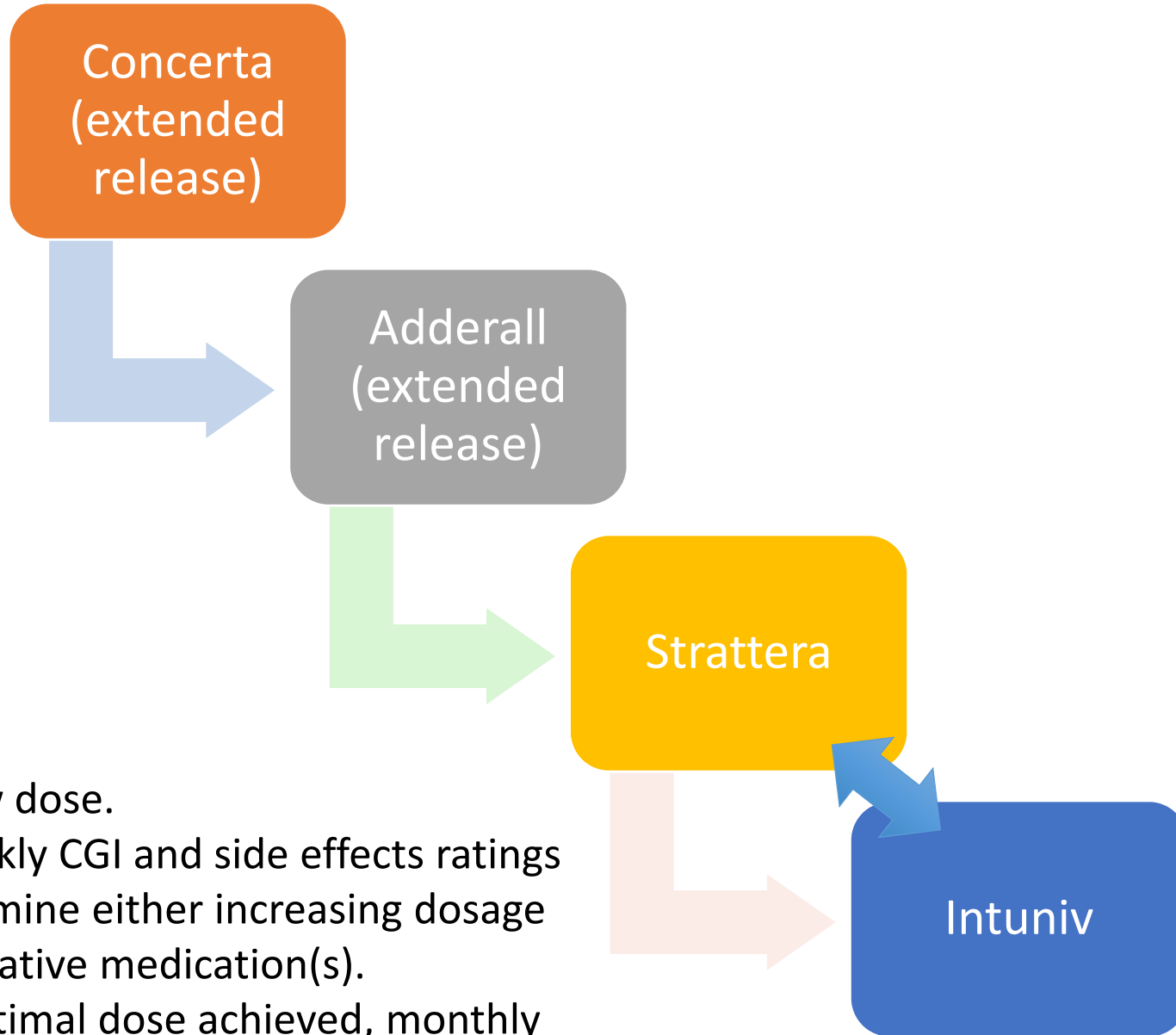
# ICARD Study Design



# Participants

- n = 216 in grades 2-5 in the United States (M age = 8.8 years)
- Study was conducted in English
- Met DSM-IV criteria for ADHD (combined or inattentive type) on Diagnostic Interview Schedule for Children administered to parent
- Selected for word reading/decoding impairments (WJ-III letter-word identification or word attack < 90)
- KBIT-2 full-scale or nonverbal IQ > 70
- Mostly male (60.6%), African American (72.1%), and economically disadvantaged (76.1%)
- Most recruited through schools (22 districts; 73 schools), some from clinics and community; in Houston, TX, and Cincinnati, OH, areas

# Carefully Managed Medication



- Start low dose.
- Use weekly CGI and side effects ratings to determine either increasing dosage or alternative medication(s).
- Once optimal dose achieved, monthly maintenance visits

# Parent Training Sessions

Session	Content
1	Overview of ADHD, introduction to treatment
2	Behavior modification principles
3	Compliance training
4	Token/point systems
5	Daily report cards (DRC)
5a	Optional consultation with teacher re DRCs
6	Response cost
7	Time out
8	Managing homework
9	General review and generalization

## Intensive Reading Intervention

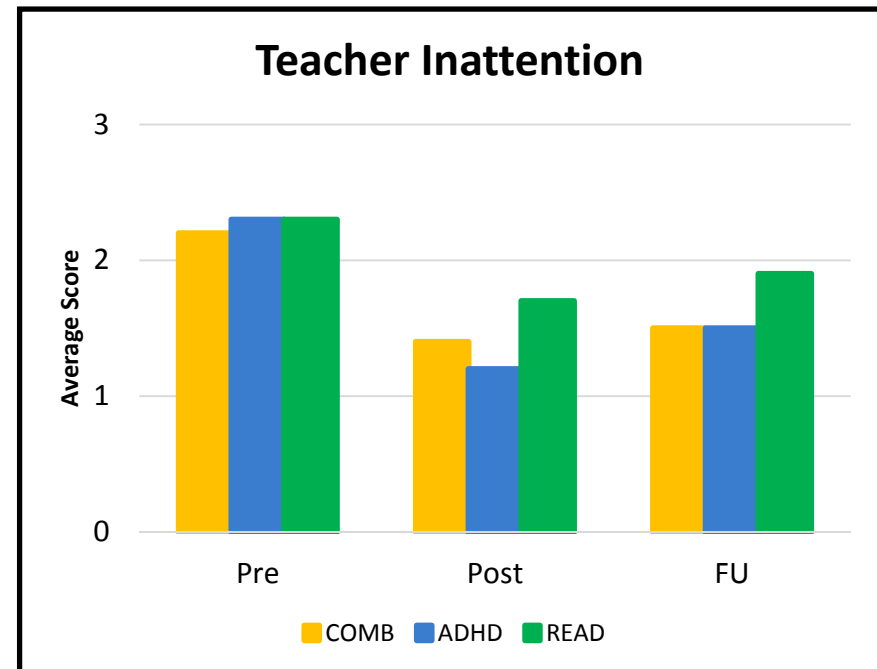
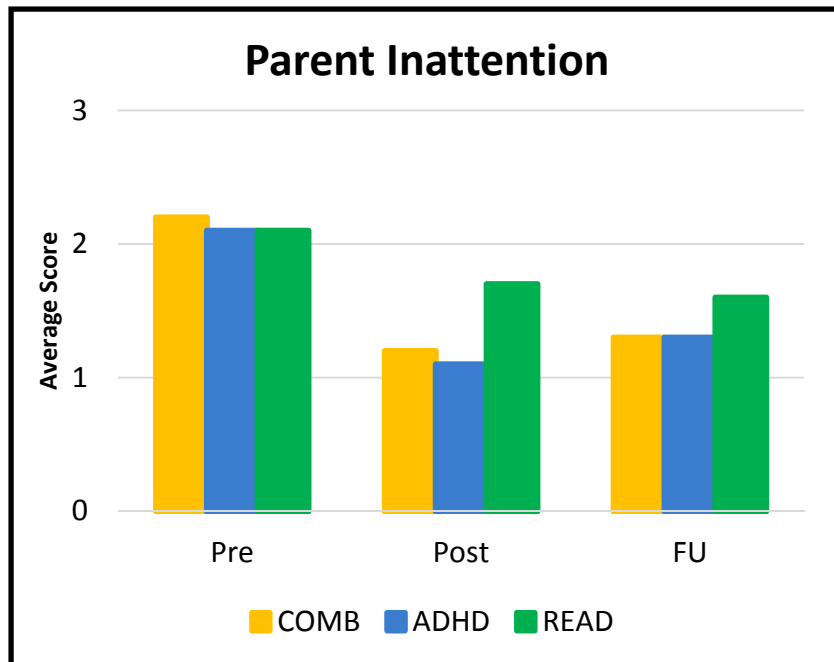
- Explicit, systematic instruction in phonemic awareness, phonics, word reading, fluency, & comprehension
- Extended opportunities to practice; many hands-on practice activities
- Time reading connected text with teacher support
- Four days per week for 45 minutes, for 16 weeks.
- Individual or in groups of two students with one teacher

# Data Analysis

- Intent-to-treat analysis\*
- Covariate-adjusted gain score approach
  - Post-test score regressed onto pretest score and other predictors in the model (baseline score)
  - Follow-up score regressed onto pretest score and other predictors in the model (baseline score)
- Effect sizes computed – Hedges  $g$
- Adherence analyses
  - Correlations between change scores and 1) reading intervention attendance, 2) parent training attendance, and 3) proportion of days on medication

# Primary Outcomes (presented INS 2016)

## Swanson, Nolan & Pelham (SNAP)-ADHD Rating Scale

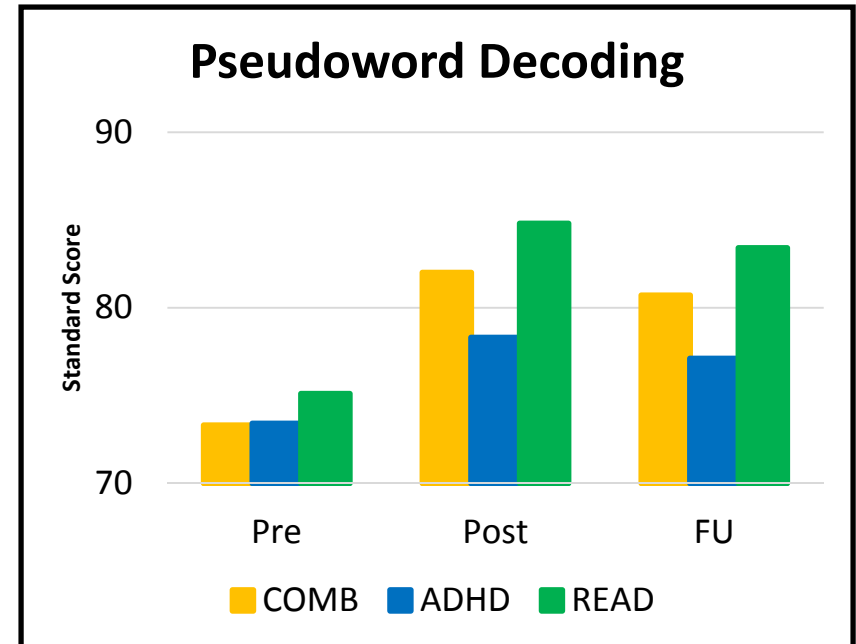
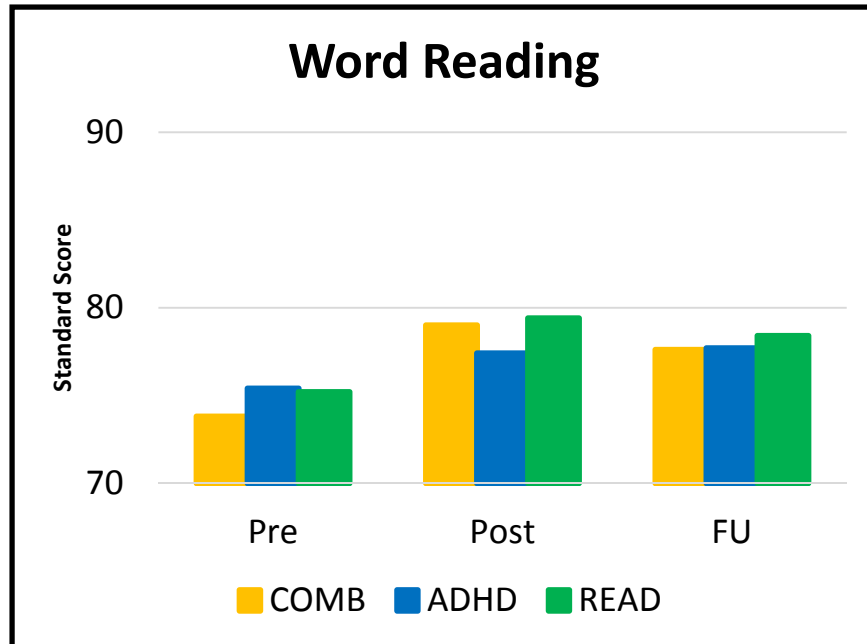


ADHD = Combined < Reading

Same pattern of results for hyperactivity/impulsivity ratings

# Primary Outcomes (presented INS 2016)

## Wechsler Individual Achievement Test (WIAT-3)



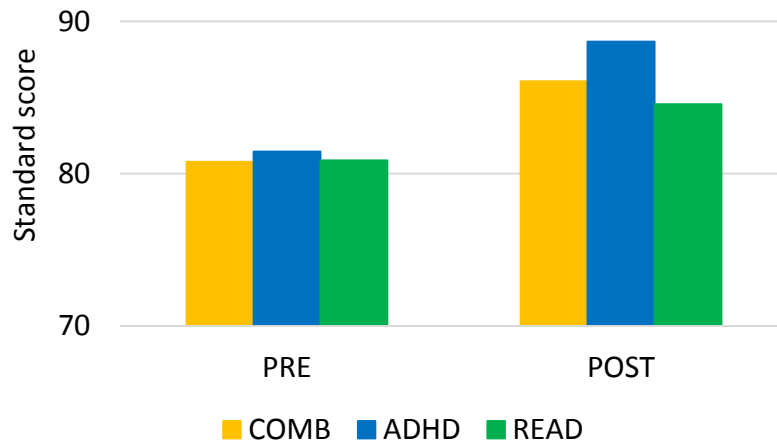
Read = Comb > ADHD  
No main effect of treatment at  
follow-up

Read = Comb > ADHD



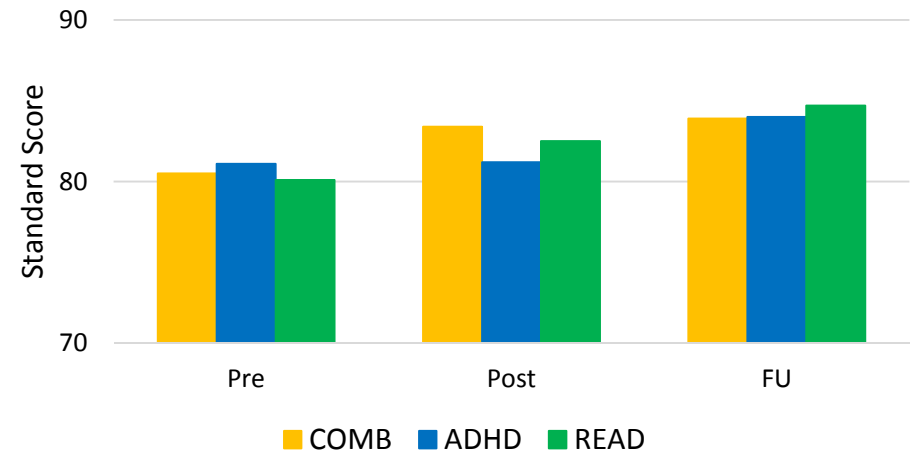
# Secondary Outcomes (presented SSSR 2016)

## WIAT Reading Comprehension



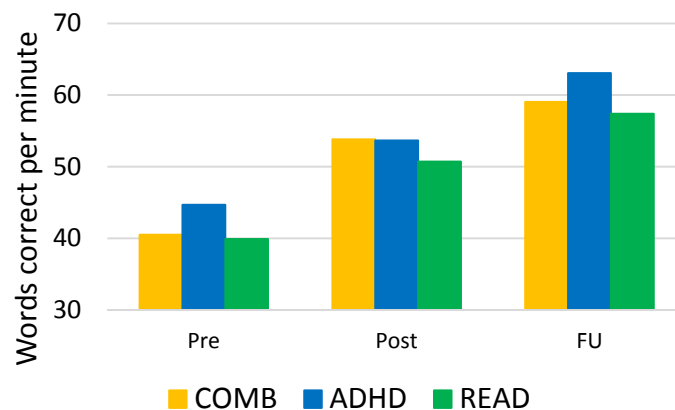
ADHD = Comb > Reading

## Sight Word Efficiency



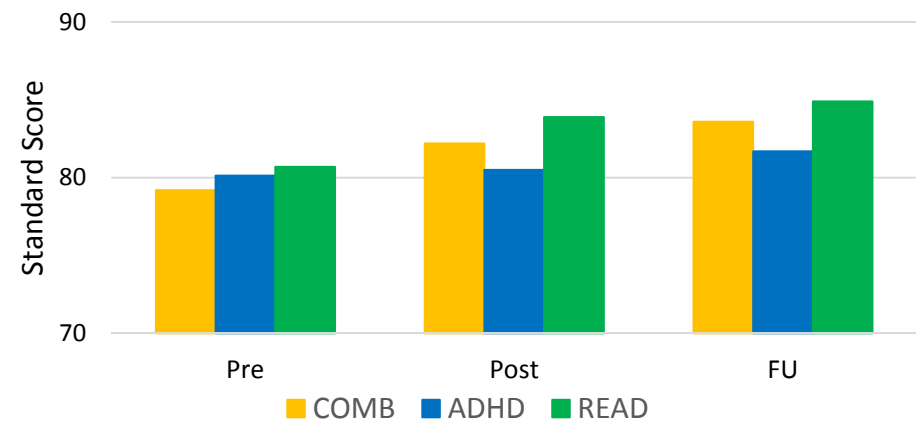
No main effect of treatment

## DIBELS Oral Reading Fluency



No main effect of treatment

## Phonemic Decoding Efficiency



Read = Comb > ADHD

# ICARD Research Questions

- Do ADHD treatments impact RD?
  - Not significantly except possibly comprehension of extended text
- Do RD treatments impact ADHD?
  - Not significantly
- Do combined ADHD and RD treatments result in better outcomes for children with ADHD & RD?
  - Not particularly

Conclusion: Each disorder must be treated

# For Children with Comorbid ADHD/RD...

## **ADHD Medication and Parent Training can support**

- Reduced ADHD symptoms
- Improved reading comprehension

## **Intensive reading intervention can support**

- Improved accurate and fluent phonemic decoding
- Improved accurate word Identification

...but children remained impaired on all reading measures

- Extended reading intervention is required to build fluency and comprehension

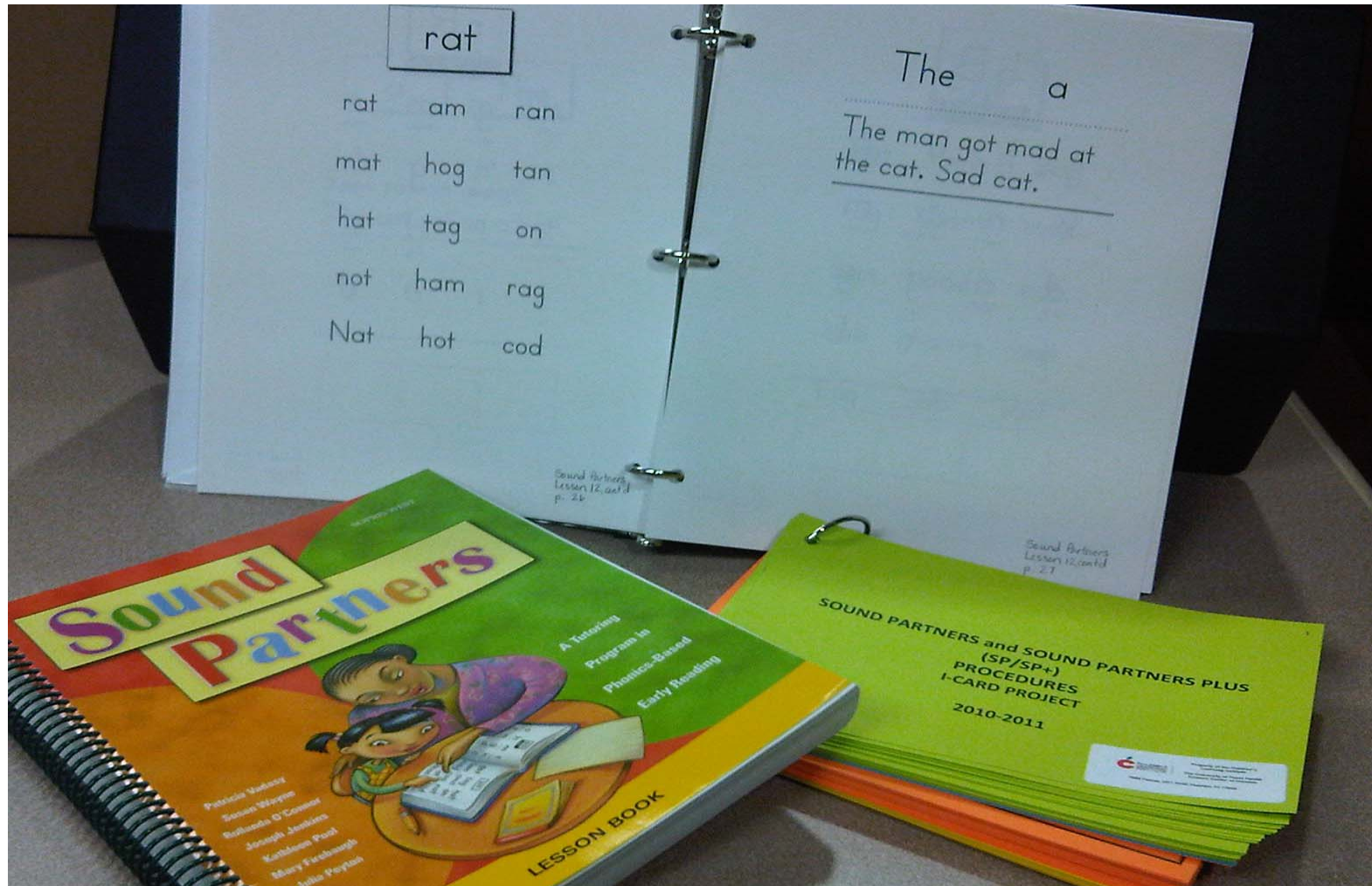
# The ICARD Reading Intervention



# Reading Intervention

Component	Program
PA, word reading, decoding, spelling	Sound Partners (Vadasy et al., 2005)
Multi-syllable word reading	Sound Partners Plus (Vadasy & Sanders, 2007)
PA, word reading, decoding, spelling,	Practice routines from Responsive Reading Instruction (Denton & Hocker, 2006)
Reading Fluency	Quick Reads (Hiebert, 2003).
Comprehension	Researcher-developed, using text from Quick Reads
Text Reading	Decodable and Non-Decodable Text

# Word Study

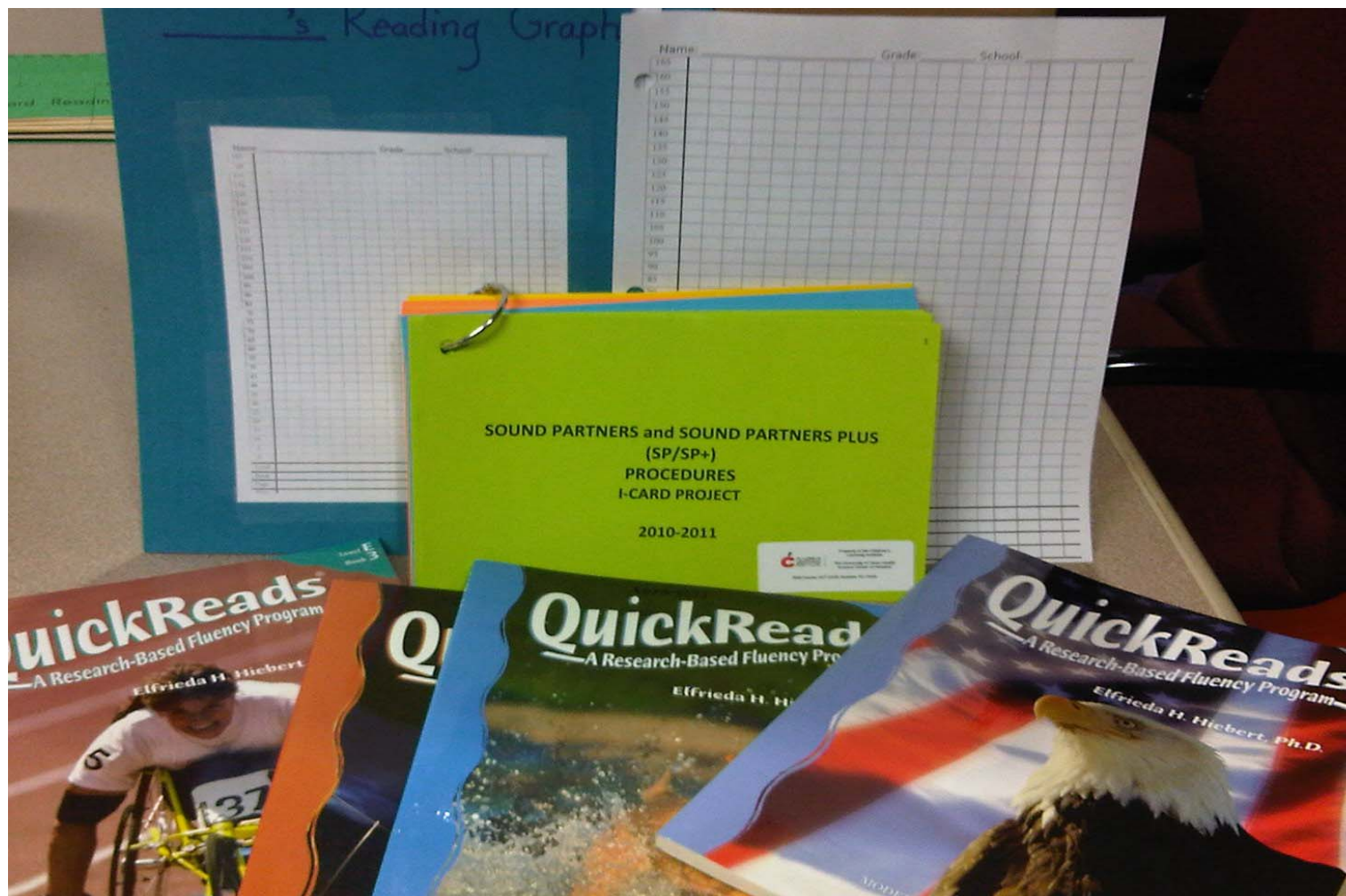




# Text Reading

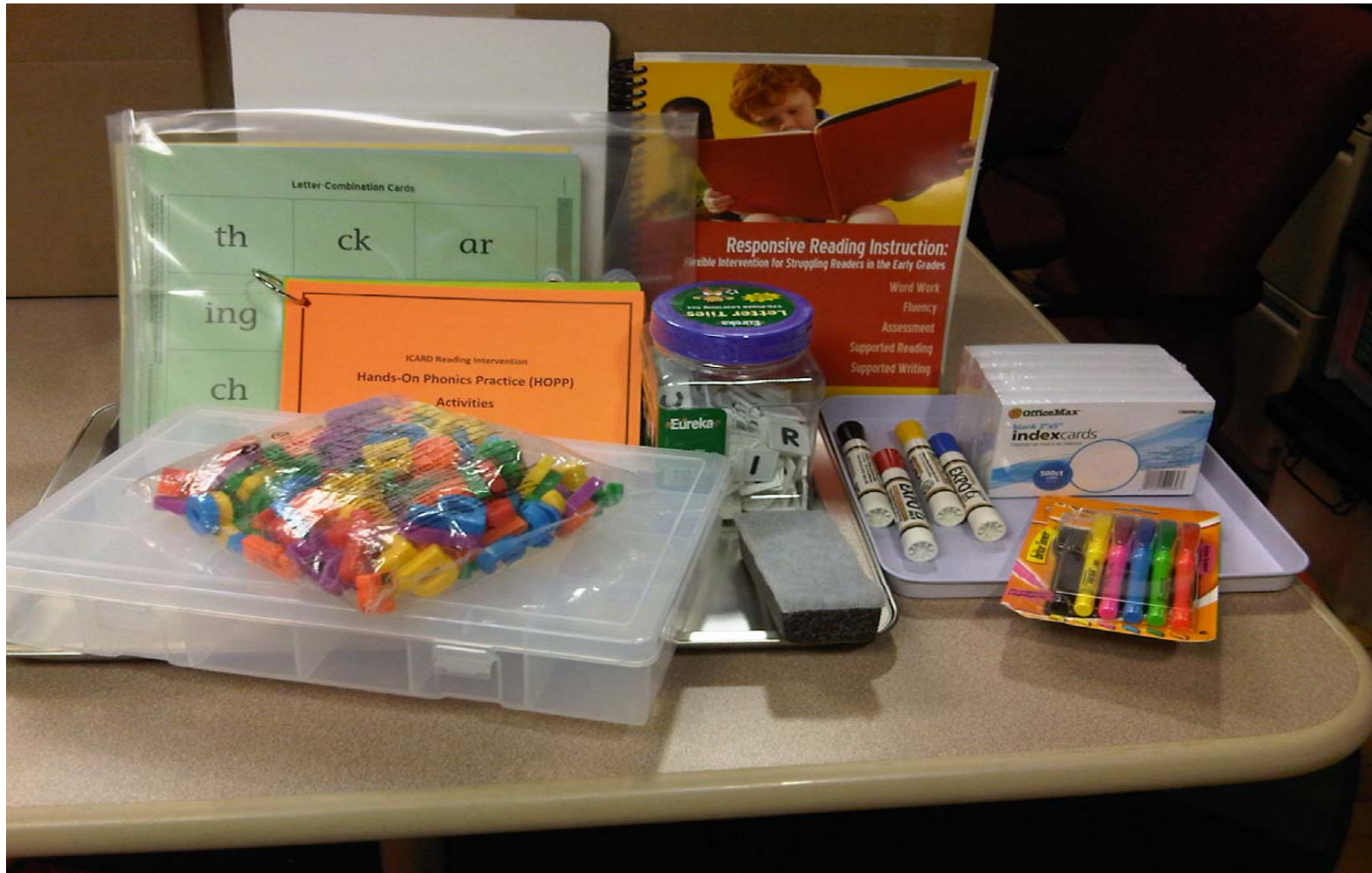


# Fluency and Comprehension





# Hands-On Phonics Practice (HOPP)



## Hands-On Phonics Practice

- Active involvement with manipulatives and games **encourages cognitive involvement.**
- Students with learning difficulties need **extended opportunities for practice.**
- Activities from *Responsive Reading Instruction* (Denton & Hocker, 2006)

# Characteristics of Effective Reading Instruction for Students with Attention and Reading Disorders



# Explicit Instruction Routine

## **Model and teach (“I do it”)**

Show students the correct way.

## **Guided practice (“We do it”)**

Students do it with teacher support.

## **Independent practice (“You do it”)**

Students practice alone.

## **Cumulative practice**

Students practice new items along with items already learned.



# Letter-Sound Instruction

- MODEL

***“I do it”*** The sound of this letter is \_\_\_\_.

- *GUIDED PRACTICE*

***“We do it”*** Do it with me. What’s the sound of this letter?

- *INDEPENDENT PRACTICE*

***“You do it”*** Your turn. What’s the sound of this letter?  
(individual turns)

- *CUMMULATIVE PRACTICE*

***Let’s practice this letter along with the other  
ones we have learned.***

# Well-Organized, Structured Instruction

- Daily lessons follow consistent routines
- Follow a carefully planned scope and sequence (Easy to hard; teach required pre-skills)
- Build in frequent reviews

# Individualized Instruction

OPTIONS	Word Study	HOPP	Fluency	Comprehension
Decoding/Spelling + Comprehension	20-25 min	5-10 min		15-20 min
Decoding/Spelling + Fluency + Comprehension	20-25 min	5-10 min	10-15 min	
Decoding/Spelling + Fluency + Comprehension	10-15 min		15-20 min	15-20 min



## Quick Pacing and Active Student Involvement

- **Several brief instructional and practice activities**
- Well-organized with little “down time”
- Little “Teacher Talk”
- “Hands-on” Manipulatives
- **Perky pacing**





# Extended Opportunities for Practice with Feedback and Scaffolding

- Students need extended practice over time.
- Feedback is essential.
- What is practiced becomes a habit: **Don't let students practice their mistakes!**



# Impaired Planning and Flexibility in Children with ADHD

- Taught **one** 3-step strategy for identifying unknown words
- Also taught a simple strategy for reading multi-syllable words

## Reading Challenging Words: What Do *You* Do?

"Our previous work demonstrated that regulation of **apoptotic** cell death is a critical factor in controlling **lymphomagenesis**."

*Unpublished manuscript,  
Used with Permission*

# Three-Step Strategy for Reading Words



1. Look for parts you know.
2. Sound it out.
3. Check it! Make sure the word you read makes sense.

# Discourage reliance on a guessing strategy.

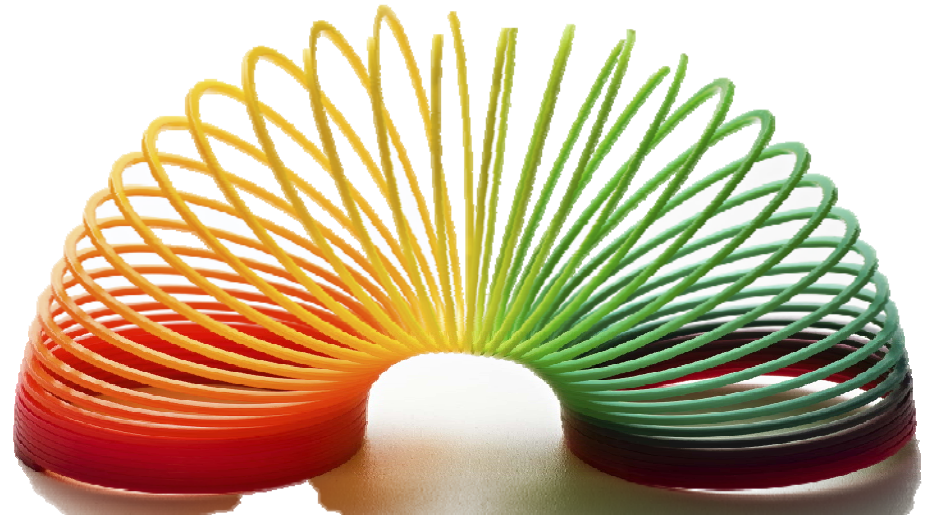
When reading non-decodable text: If the student doesn't have the knowledge or skills to decode a word, the teacher ***models the 3-part strategy or supplies the word.***

## Poor Working Memory in Students with RD and ADHD

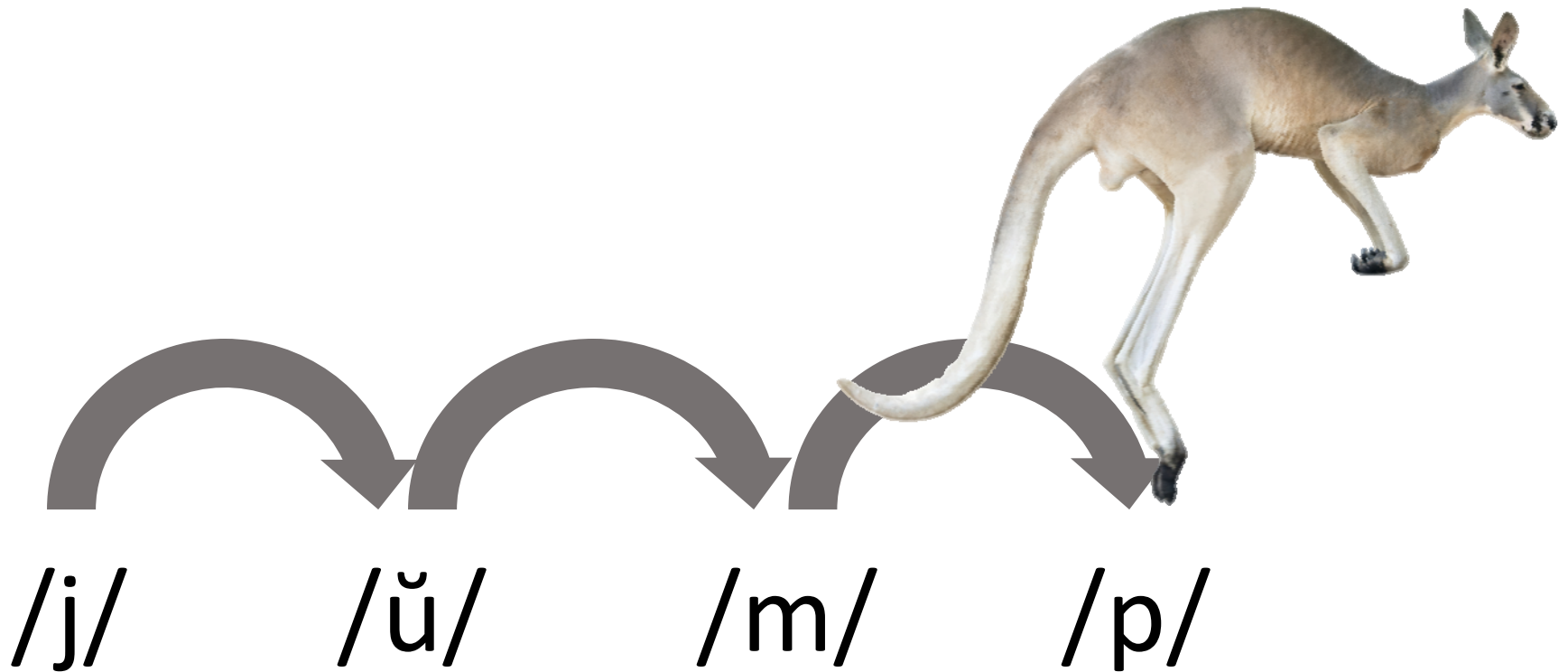
- Break down multi-step directions
- Teach students to sound out words smoothly, without breaking between the sounds

## Say It Slowly

- Say the sounds in a word in a smooth, stretched-out way while pulling a Slinky apart.
- Say the whole word while putting the Slinky back together.



Don't break between the sounds when  
saying a word slowly....





DO sound out words in a smooth,  
connected way!



## Stretching Words Format

- MODEL

- ✓ **“I do it” “My turn.”**

Listen. I’m going to say the sounds in *man*. *Mmmmaaaaannnnn*.

- GUIDED PRACTICE

- ✓ **“We do it” “Do it with me.”** Say the sounds in *man*.

- INDEPENDENT PRACTICE

- ✓ **“You do it” “Your turn.”** Say the sounds in *man*. Joey, say the sounds in *man*. Martina, say the sounds in *man*.

# Sound Out Smoothly

man



tan



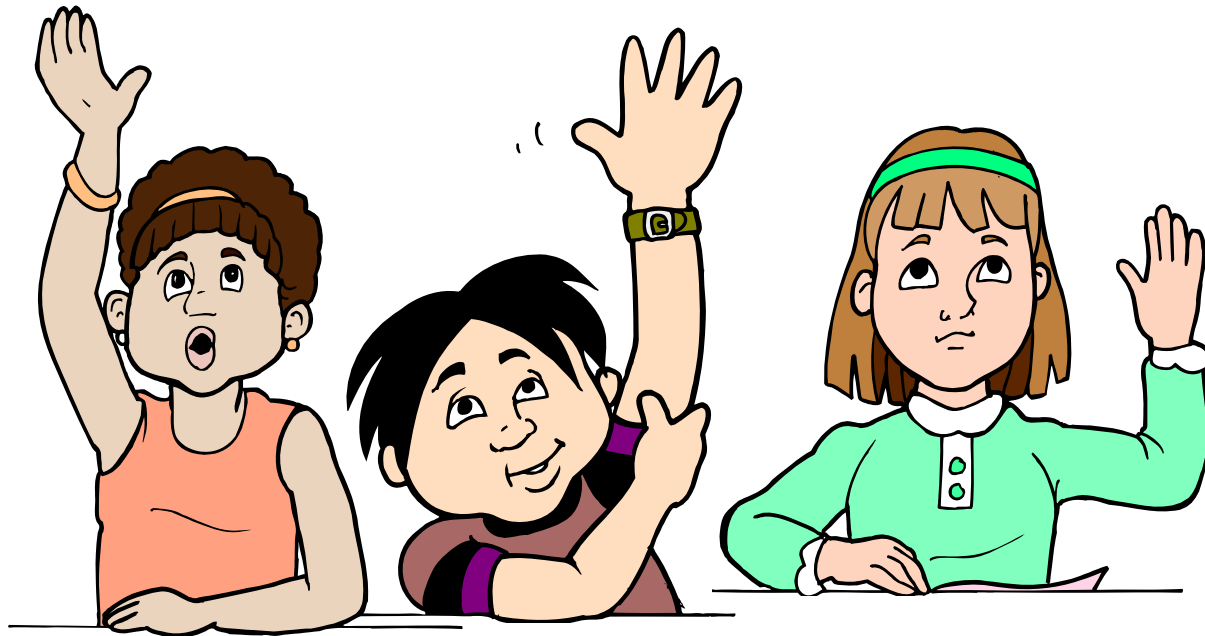


## Some Take-Aways

- Word-reading difficulties and ADHD are different brain-based conditions with underlying genetic causes.
- Children with both disorders have more serious impairment and worse outcomes than those with one of them.
- Effective reading instruction for these children is explicit, systematic, provides many opportunities for practice with feedback, and is quick-paced and “hands-on.”
- Use evidence-based programs with these characteristics.
- Some children need intensive intervention for extended periods of time

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# QUESTIONS?



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