The Power and Possibility of Predicting Reading Outcomes with RAN

Dr. Kelly A. Powell-Smith
Dr. Jacob S. Gray
Dr. Roland H. Good, III
Amy N. Warnock

NASP 2021

Disclosure

Dr. Kelly A. Powell-Smith, Dr. Jacob S. Gray, and Amy N. Warnock are employees, and Dr. Roland Good is co-owner, of Acadience Learning Inc. (ALI).

ALI is an educational company that is dedicated to supporting success for children and schools. ALI was founded by Roland H. Good III and Ruth Kaminski, the original authors of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS®)*. ALI receives revenue from the publication of the assessments in our family of assessments, training and professional development, and the operation of Acadience Learning Online and Acadience Data Management, our data reporting services.

Acadience Reading K-6 is available for free download and photocopying for educational purposes at acadiencelearning.org

*“Acadience® Reading K-6 is the new name for the DIBELS® Next assessment. Acadience is a registered trademark of Acadience Learning Inc. The DIBELS Next copyrighted content is owned by Acadience Learning Inc. The DIBELS® and DIBELS Next registered trademarks were sold by Acadience Learning Inc. to the University of Oregon (UO) and are now owned by the UO.

Session Objectives

- This session will help participants:
  1. become familiar with new RAN measures
  2. understand the association between various RAN measures and other commonly used reading measures
  3. understand the differences between RAN and extant reading measures, including Letter Naming Fluency

Rapid Automatized Naming (RAN)

Rapid Automatized Naming (RAN) is “the ability to name, as quickly as possible, visually presented familiar symbols such as digits, letters, colors, and objects” (Georgiou et al., 2013)
Introduction and Overview

Acadience RAN
Rapid Automatized Naming = quickly and accurately naming repeated sets of highly familiar items
- functions as a predictor of reading skills
- difficulties with RAN don’t impact reading as much as difficulties with phonological awareness
- no known way to directly improve RAN

Research Base for RAN

Research suggests RAN is
- a reliable measure of automatic naming
- predictive of a variety of reading and reading-related skills

Research on the technical adequacy of the Acadience RAN measures is forthcoming.

Acadience RAN

RAN Objects
RAN Letters
- RAN Numbers
  (alternate to RAN Letters)
Spanish Version

The Predictive Power of RAN

- Correlation with Oral Reading Fluency in second grade: -.56 (Georgiou & Parrila, 2020)
- Correlation with Silent Reading Fluency in second grade: -.40 (Georgiou & Parrila, 2020)
- RAN predicts Word Reading Initial Status and Word Reading Growth (Clayton et al., 2019)
- RAN predicts Word Identification Fluency intercept (-.40 and -.47) (Fuchs et al., 2012)
- RAN at Time 1 correlates with reading outcomes at Time 2 (Cho et al., 2017):
  - .45 for Test of Word Reading Efficiency: Phonemic Decoding Efficiency;
  - .50 for Test of Word Reading Efficiency: Sight Word Efficiency;
The Mystery of RAN

Theories about why RAN works to predict:

- “RAN taps into a language-universal cognitive mechanism that is involved in reading alphabetic orthographies” (Landerl et al., 2019)
- “RAN is sometimes interpreted as also reflecting phonological processing” (Savage, Pillay, & Melidona, 2007)
- “sequential naming mimics the timely integration of visual and verbal skills required during efficient word recognition” (Landerl et al., 2019)
- Alphabet knowledge may completely explain the relation between RAN and later reading outcomes.

Three Research Questions

1. Does Acadience RAN significantly predict later reading outcomes controlling for RCS? i.e. Does RAN add any information not already captured by RCS?
2. Does Acadience RAN significantly predict later reading outcomes controlling for LNF? i.e. Is RAN the same thing as LNF?
3. Are the three RAN measures equal in their predictive validity?

Analysis Plan

- One goal of Acadience Measures is the prediction of later reading outcomes and the identification of students who are at risk of difficulty learning to read
- We will examine RAN with an eye towards predicting later reading outcomes
- In order to examine the unique prediction of RAN, we need to control for RCS and LNF

The Problem of Missingness

- In this study, we had two sources of missing data
  - One is built into RAN
  - Those who were missing RAN Numbers did better on RAN Letters
  - The other comes from the data that were collected
- Students with RAN scored slightly higher
- We used Full Information Maximum Likelihood to estimate regressions because of better performance with missing data
**Research Question 1**

Does RAN predict later reading outcomes, controlling for concurrent RCS?

---

**Concurrent Correlations**

<table>
<thead>
<tr>
<th>RAN Measure</th>
<th>Grade K BOY RCS</th>
<th>Grade K BOY LNF</th>
<th>Grade K MOY RCS</th>
<th>Grade K MOY LNF</th>
<th>Grade K EOY RCS</th>
<th>Grade K EOY LNF</th>
<th>Grade 1 BOY RCS</th>
<th>Grade 1 BOY LNF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>-0.60</td>
<td>-0.59</td>
<td>-0.45</td>
<td>-0.50</td>
<td>-0.64</td>
<td>-0.68</td>
<td>-0.61</td>
<td>-0.68</td>
</tr>
<tr>
<td>Objects</td>
<td>-0.47</td>
<td>-0.47</td>
<td>-0.32</td>
<td>-0.34</td>
<td>-0.52</td>
<td>-0.54</td>
<td>-0.48</td>
<td>-0.54</td>
</tr>
<tr>
<td>Letters</td>
<td>-0.62</td>
<td>-0.61</td>
<td>-0.54</td>
<td>-0.57</td>
<td>-0.63</td>
<td>-0.69</td>
<td>-0.65</td>
<td>-0.71</td>
</tr>
<tr>
<td>Numbers</td>
<td>-0.55</td>
<td>-0.56</td>
<td>-0.53</td>
<td>-0.57</td>
<td>-0.64</td>
<td>-0.68</td>
<td>-0.62</td>
<td>-0.69</td>
</tr>
</tbody>
</table>

---

**Predictive Validity of RAN**

Total controlling for RCS
Research Question 2

Does RAN predict later reading outcomes, controlling for concurrent LNF?

Predictive Validity of RAN Total controlling for LNF

Research Question 3

Are the three RAN measures equal in their predictive validity?

Predictive Validity of Individual RAN Measures Controlling for RCS BOY to MOY
Predictive Validity of Individual RAN Measures Controlling for RCS BOY to EOY

What does this incremental validity mean for classification accuracy (AUCs)?

<table>
<thead>
<tr>
<th>Linkage</th>
<th>None</th>
<th>RCS Only</th>
<th>RCS + RAN</th>
<th>LNF Only</th>
<th>LNF + RAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>K BOY -&gt; K MOY</td>
<td>.50</td>
<td>.69</td>
<td>.76</td>
<td>.63</td>
<td>.74</td>
</tr>
<tr>
<td>K BOY -&gt; K EOY</td>
<td>.50</td>
<td>.66</td>
<td>.75</td>
<td>.65</td>
<td>.75</td>
</tr>
<tr>
<td>K MOY -&gt; K EOY</td>
<td>.50</td>
<td>.83</td>
<td>.85</td>
<td>.83</td>
<td>.85</td>
</tr>
<tr>
<td>K MOY -&gt; G1 BOY</td>
<td>.50</td>
<td>.80</td>
<td>.84</td>
<td>.80</td>
<td>.83</td>
</tr>
<tr>
<td>K EOY -&gt; G1 BOY</td>
<td>.50</td>
<td>.88</td>
<td>.90</td>
<td>.86</td>
<td>.87</td>
</tr>
</tbody>
</table>

- We see a substantial improvement in classification accuracy at BOY, but a marginal improvement by the end of year
- This means the earlier we get the information contained in RAN, the more benefit we get

Conclusions

- RAN is a significant and powerful predictor of future reading outcomes, and increases the accuracy of predictions about future reading performance, in particular at the beginning of Kindergarten.
- RAN predicts later reading outcomes, controlling for LNF. RAN and LNF are not the same.
- RAN Objects doesn’t seem as efficacious as Letters and Numbers
- Teaching RAN is not advisable – has not found to improve outcomes.
Implications for Dyslexia Screening

Definitive indicators of risk for dyslexia and other reading difficulties include a combination of

1. Difficulty with essential reading skills on measures of accurate and fluent reading, word reading and decoding, and especially phonological processing including phonemic awareness and phonics, and
2. Sustained lack of adequate progress in learning the essential reading skills, when provided with
3. When provided with generally effective classroom instruction.

Other indicators of risk include

(1) Rapid Automated Naming (RAN) ★
(2) Spelling

Discussion – Next Steps

- Examine cut-points for risk
- Further explore reliability and validity
- Provide revised guidance to educators

Final Thoughts

1. Screening decisions for dyslexia should occur in the context of a decision-making model that emphasizes
   - Prevention
   - Early Intervention
   - Remediation
2. Good decisions improve outcomes for students.
   1. Prioritize things we can do something about.
   2. Do something about them.
3. It’s not enough to evaluate the student, we must also evaluate the instruction the student is receiving.

Questions?

Contact Acadience Learning for more information

info@acadiencelearning.org
References


Resources

Dyslexia Screening and the Use of Acadience® Reading

voyagersopris.com/dyslexia