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CORE® Reading Expert

Syntax: A New Frontier in Addressing the Common Core State Standards

by Dale Webster, Ph.D., CORE Chief Academic Officer

Last November's International Dyslexia Association (IDA) conference offered an informative reading comprehension symposium facilitated by Dr. Kate Cain from Lancaster University in the United Kingdom. She is currently one of several educational researchers who make up the Language and Reading Research Consortium (LRRC). This consortium is leading the effort (and making some promising advancements) to uncover the processes and difficulties of reading comprehension. The last three decades of research have brought much clarity to the field for how word-level processes support reading comprehension; however, the complexities of reading comprehension still present many unanswered questions.

A reading research model known as the Simple View of Reading (Gough and Tunmer 1986) separates reading comprehension into two components: word recognition and language comprehension. This model is not to imply that reading is simple, but that variation in reading ability can be captured by these two components. Researchers have more clearly identified what dimensions support language comprehension and how they interact and support each other to allow comprehension. Language comprehension is distinguished further in a graphic adapted from Cain and her colleagues at the LRRC and Scarborough's Reading Rope Model (2001).

Time is running out, but it's not too late to register!

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The Common Core State Standards and other state standards require that students learn to closely read more challenging texts. Yet the majority of teachers still teach with instructional-level texts. Attendees will leave with specific techniques to make challenging text comprehensible and will learn an instructional model for close reading to make teaching more effective and increase student learning.

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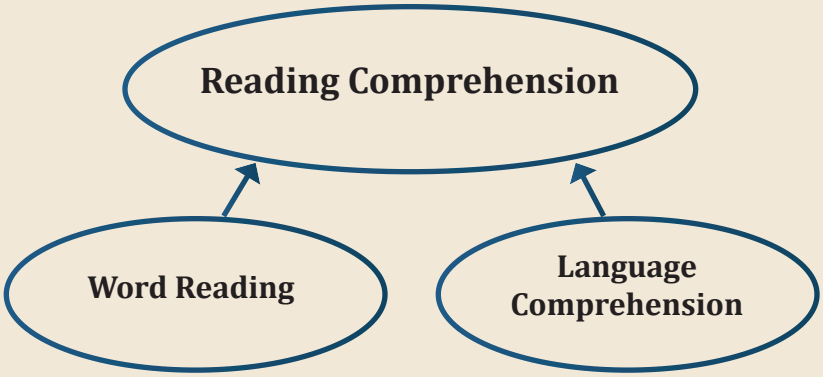
Syntax: A New Frontier in Addressing the Common Core State Standards (cont.)



- activating word meanings
- understanding sentences
- making inferences
- comprehension monitoring
- understanding text structure

The five dimensions supporting language comprehension along with strong word reading skills work together to form a mental model of what we read. While we know that reading comprehension difficulties can stem from weaknesses in the word reading component, we also know more clearly now that difficulties in reading comprehension can be caused by weaknesses in one or all of these language comprehension dimensions, what researchers refer to as specific language impairment (SLI). Researchers are currently testing interventions in these dimensions.

This issue of the *Reading Expert* will focus on understanding sentences and some ways to help better develop this dimension. Up until recently, grammar and syntax instruction have received scant consideration in reading research. Academics have long argued that the sentence is the major processing unit of language and syntax (word order) defines the sentence (Scott 2014), and studies suggest that syntax plays a role in predicting reading comprehension (Adlof, Catts, and Lee 2010). Dr. Mary Schleppegrell at the University of Michigan is a leader in the field of academic language, linguistics, and second-language development. She and her colleagues encourage teachers to provide *functional language analysis*, which is the systematic analysis of language patterns and meanings of those patterns in challenging text. In light of the Common Core's demand for more complex text, this functional language analysis is a way to deconstruct complex text to make it more comprehensible to students. In addition, a small research base is developing to support functional language analysis as a type of intervention.

The summer 2013 edition of IDA's *Perspectives on Language* provides a focus on syntax. (We highly recommend purchasing this edition from the IDA website: www.interdys.org.) In this edition, Mary Schleppegrell writes an article, "Exploring Language and Meaning in Complex Text," that exemplifies functional language analysis. In this article Dr. Schleppegrell argues that to successfully support reading complex text as advocated by the Common Core State Standards, teachers should incorporate three strategies into their teaching:

1. Explore how authors present *agency*, who or what is acting in the text.
2. Identify conjunctions and explore how they connect ideas in a sentence.
3. Track the words through which characters and concepts are introduced and developed, known as *chains of reference*.

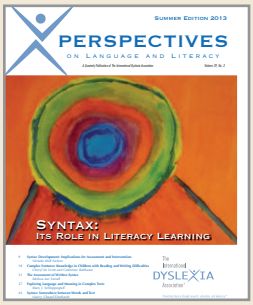
Syntax: A New Frontier in Addressing the Common Core State Standards (cont.)

These three strategies draw upon systemic functional linguistics, of which functional grammar is a part.

To address agency, Schleppegrell suggests that at the elementary level, agency (who or what is doing the action) is obscured by text that is written in passive voice. By asking who is doing the action, teachers can draw students' attention to the differences between active and passive voice to better comprehend. At the secondary level, nominalizations obscure agency. Nominalizations take a process (a verb) such as *destroying* and turn it into a noun (*destruction*). Schleppegrell argues that "complex texts are packed with nominalizations that condense a lot of information into a single word or phrase" (p. 38). She exemplifies the phrase, "The *destruction* of the buffalo," and how in this instance it is not clear who is doing the action. It requires the reader to fill in missing information, maybe presented earlier in the text, or maybe not. In this instance, having teachers notice the missing information and asking students to identify who destroyed the buffalo will help to identify agency.

To address conjunctions, Schleppegrell recommends that teachers help elementary students identify conjunctions such as *although*, *however*, *thus*, *but*, and others used in complex texts to help them understand the author's line of reasoning. Students need opportunities to recognize how authors use these conjunctions and how they shape the meanings presented in the clauses they connect (p. 39). Using an example of a secondary history text, Schleppegrell presents the idea that sometimes verbs can, like conjunctions, convey causal logic. This makes text even more challenging as, in these cases, there are no conjunctions to identify. For example, in the sentence "The destruction of the buffalo and removal of Native Americans to reservations emptied the land for grazing cattle," the verb *emptied* serves as the causal signal.

To address chains of reference, Schleppegrell suggests that elementary readers often don't recognize when authors use pronouns and synonyms to refer to a character or concept that was introduced earlier in the text. "Teachers can help students recognize such reference chains by identifying a key character or concept and tracing its development across a text. By tracking reference and highlighting the chains of reference, students gain insights into how complex texts are constructed and how information develops in a text" (p. 40).



There are other strategies to support syntax instruction presented in other articles in the summer 2013 edition of *Perspectives*, but we wanted to share this one in particular as it speaks to the complexities of our language and the need for teacher support to address functional language analysis in their classrooms. CORE's training entitled *Language Conventions and Writing Fundamentals* addresses grammar and syntax from a functional language perspective at both the elementary and secondary levels and can be a resource to support analysis of complex text.

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Three Approaches for Developing Numerical Fluencies

by Dean Ballard, CORE Mathematics Director

The term *fluency* is applied several times in the Common Core State Standards for Mathematics (CCSSM) and briefly described in the statement below from the lead paragraph to the Standards for Mathematical Practice:

> *. . . procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately)*
>
> CCSSM, p. 6

What does "flexibly, accurately, efficiently, and appropriately" mean? It certainly means that students are expected to have speed and accuracy with number facts, simple calculations, and procedures. However, fluency is more than memorization. Students must be fluent with skills such as mental math, estimation, use of counting strategies, and application of relationships between operations in order to compute answers, apply properties to new number sets, and extend properties into algebra. Fluency implies versatility and flexibility with numbers, such as knowing that 7 can be 2 + 5 or 6 + 1, and that 3/8 is the same as three 1/8s, and being able to use such equivalencies where appropriate. Fluency also means recognizing that $(x + 4)(2x + 5)$ involves the same mathematics as 23×45.

Fluency as just described cannot be accomplished simply through worksheet drills. To support developing this type of fluency, it is essential to include three distinct but interdependent approaches: development through conceptual understanding, development through fact and procedural practice, and development through problem solving. None of these three alone is sufficient, however, based on brain research and findings from cognitive scientists all are necessary.

> *Our ability to think would be limited indeed if there were not ways to overcome the space constraint of working memory. One of the more important mechanisms is the development of automaticity. When cognitive processes . . . become automatic, they demand very little space in working memory, they occur rapidly, and they often occur without conscious effort.*
>
> Daniel Willingham, *American Educator*, Spring 2004

> *When students get very little time for, or training in, elaborative rehearsal, they resort more frequently to rote rehearsal for nearly all processing. Consequently, they fail to make the associations or discover the relationships that only elaborative rehearsal can provide.*
>
> David A. Sousa, 2008

Build on a Foundation of Conceptual Understanding

Fluency begins on a foundation of conceptual understanding. Understanding how and why numbers fit together the way they do, how quantities arise and are connected, and how properties from one set of numbers applies to another set of numbers are the types of conceptual understandings that help lead to fluency with numbers and operations. Consider the following "fluency" standard from the CCSSM.

Standard 1.OA.6 in the CCSSM is often referred to as one of the "fluency" standards. It begins by stating that students will "Add and subtract within 20, demonstrating fluency for addition and subtraction within 10." The same standard also describes four skills that are related to this fluency:

- Use strategies such as counting on; making ten
- Decomposing a number leading to a ten
- Using the relationship between addition and subtraction
- Creating equivalent but easier or known sums

Three Approaches for Developing Numerical Fluencies (cont.)

These are skills that develop through concrete and visual work with numbers—activities that build conceptual understanding. While these skills help lead toward automaticity within 20, they are also important stepping stones in developing the ability to use numbers flexibly and appropriately. Development of conceptual understanding, being able to make sense of numbers, is necessary for fluency.

> *Brain scans have shown that when new learning is readily comprehensible (sense) and can be connected to past experiences (meaning), there is substantially more cerebral activity followed by dramatically improved retention (Maquire, Frith, and Morris 1999).*
>
> Sousa, 2008

Fluency Requires Practice

A foundation of conceptual understanding, though necessary, is not sufficient for building fluency. Fluency requires practice. Probably this is the most common approach for building fluency that teachers and students have experienced. It is also our first resort when we notice students have not met fluency requirements from previous grades. The easiest math resources to find on the Internet are worksheets that help supply teachers, parents, and students with an unlimited stock of drills for practice on number facts and operations. The Institute of Education Sciences (IES) Practice Guide, *Assisting Students Struggling with Mathematics* (IES 2009), recommends that "Interventions at all grade levels should devote about 10 minutes in each session to building fluent retrieval of basic arithmetic facts." Three key takeaways from this recommendation are as follows:

1. Students need practice on number facts.
2. Practice needs to occur regularly.
3. Practice sessions should be relatively brief (about 10 minutes, not 50 minutes at a time).

Aside from program materials and the abundance of worksheets available for use, we have found two additional strategies provide great added value to student practice for fluency. One strategy is using gaming opportunities for practice. One such gaming website we have found to be exciting both for teachers and students is called ArcAdemics.com. On this website, students compete against other students in real-time gaming situations and get corrective feedback for wrong answers at the completion of each game. Although there is a charge for a class signup on this website after the initial 30-day free trial, it is relatively inexpensive compared to other intervention resources. It is well worth checking out.

A second strategy is to add deeper-level questions to drills that focus on strategic thinking about numbers. For example, one sixth-grade class we observed this year was given a worksheet for adding together two 2-digit numbers from 10 to 20. The worksheet had 100 cells for entering sums from unordered lists of numbers given along the sides of worksheet. Students were given five minutes to determine as many sums as they could. After the five minutes, students were asked to write down which sums were easiest to determine and why, and to describe some strategies they used to figure out some of the sums. Then students briefly discussed this with a partner and with the whole class. These deeper questions made students think about the process of adding the numbers right after practicing adding numbers. Therefore, not only was the practice itself building fluency, but the follow-up activity of thinking about this practice continued to build that fluency. As Willingham points out, we need to think about what we are doing in order to remember it.

> *Memories are formed as the residue of thought. You remember what you think about, but not every fleeting thought—only those matters to which you really devote some attention.*
>
> Daniel Willingham, 2008

Three Approaches for Developing Numerical Fluencies (cont.)

Fluency Through Problem Solving

Fluency can also be built through certain types of problem-solving activities. In these problems, students get lots of practice with number facts without realizing they are practicing at all. For example, consider the following problem:

Create Equations with the Digits 1–9

Create as many equations as you can with the following conditions:

- Use the digits 1–9 to create many different equations.
- Use some or all of the digits in each equation.
- Do not use any digit more than once within any single equation.
- Do not use the digit zero.
- You may use any math operation, including exponents.

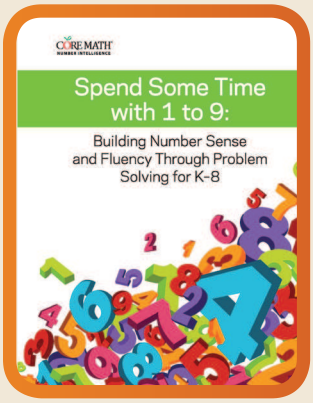
For example,

$8 \div 4 = 5 - 3$ → uses the digits 3, 5, 4, and 8

$5 + 6 \times 4 = 29 \times 1$ → uses the digits 1, 2, 4, 5, 6, and 9

Extension: Try to create an equation that uses as many digits as possible.

This problem is from CORE's *Spend Some Time with 1 to 9* books (K–8 version, 2014), which consist entirely of problems for building number sense and fluency through problem-solving.



In this problem, students create many equations, adding, subtracting, multiplying, and dividing digits and numbers from 1 to 9 together. The outcome is a fun challenge with students focused on solving a given problem while at the same time getting lots of practice working with numbers. Once again, we see students not just practicing number facts, but also thinking about the numbers.

Research tells us that if students are to retain knowledge, this knowledge must be built with understanding, thought, and practice. We have described three approaches for building fluency, none of which is sufficient on its own. However, together they are powerful tools that will lead to fluency. Build fluency with your students through conceptual understanding, practice, and problem solving.

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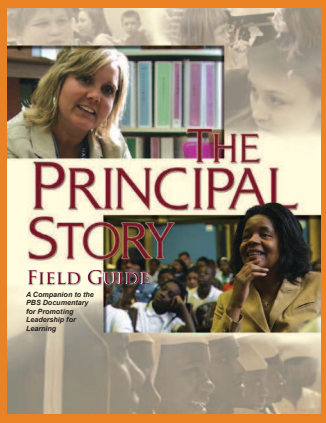
CORE Leadership Corner: *The Principal Story*

The job of the school principal, by all accounts, is one of the most—if not *the* most—challenging jobs in education. With the advent of state standards and accountability over the last two decades, principals have been challenged to be not only organized building managers, but also knowledgeable instructional leaders. Being a principal in today's education realm requires a very complex set of skills that require ongoing learning and support.

The Wallace Foundation is a philanthropic organization committed to fostering improvements in learning and enrichment for disadvantaged children and engagement with the arts for everyone. The Foundation's website has a wealth of resources regarding school leadership, including a 2013 report entitled "School Principal as Leader: Guiding Schools to Better Teaching and Learning." The report can be found at http://www.wallacefoundation.org/knowledge-center/school-leadership/effective-principal-leadership/Documents/The-School-Principal-as-Leader-Guiding-Schools-to-Better-Teaching-and-Learning-2nd-Ed.pdf.

In addition, The Wallace Foundation is sponsoring The Principal Story Project on its website. The *Principal Story* is a critically acclaimed PBS documentary about the work of principals. This film and its accompanying field guide, published by the National Staff Development Council, provide an excellent resource for instructional leaders charged with training and mentoring principals. Principals reading this can review the videos and field guide to think about the questions on their own or, better yet, with a small team of principal colleagues. The Wallace Foundation website houses links to clips from the PBS documentary, the field guide, and other resources to support school leaders.



The Principal Story video clips and other resources by the Wallace Foundation:
http://www.wallacefoundation.org/principal-story/Pages/default.aspx

The Principal Story Field Guide:
http://learningforward.org/docs/pdf/principal-story-field-guide.pdf?sfvrsn=0

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