

## Understanding Ideas: Listening



### Attention: Processing Controls

Curtindale, L., Laurie-Rose, C., Bennett-Murphy, L., & Hull, S. (2007). Sensory modality, temperament, and the development of sustained attention: A vigilance study in children and adults. *Developmental Psychology, 43*, 576-589.

- In more stimulating auditory conditions, children described as having more reactive temperaments detected fewer listening targets than those described as less reactive.
- Highly temperamentally reactive children experience difficulty modulating their responses under highly stimulating conditions, becoming disengaged from listening tasks.

Im-Bolter, N., Johnson, J., & Pascual-Leone, J. (2006). Processing limitations in children with specific language impairment: The role of executive function. *Child Development, 77*, 1822-1841.

- Attention capacity and attentional interruption were examined in 45 children with language weaknesses and 45 children with normally developing language, aged 7 to 12 years.
- Attention predicted language competence.

Schneider, B. A., Li, L., & Daneman, M. (2007). How competing speech interferes with speech comprehension in everyday listening situations. *Journal of American Academy of Audiology, 18*, 559-572.

- Listeners often complain that they have trouble following conversations in noisy settings.
- Distracting sound sources produce interference called “energetic masking.”
- Meaningful sound sources, such as competing speech, interfere with the processing of the target speech and are often called informational masking.



### Attention: Mental Energy Controls

Davis, M. H., Coleman, M. R., Absalom, A. R., Rodd, J. M., Johnsrude, I. S., Matta, B. F., Owen, A. M., & Menon, D. K. (2007). Dissociating speech perception and comprehension at reduced levels of awareness. *Proceeding of the National Academy of Sciences of the United States of America, 104*, 16032-16037.

## Understanding Ideas: Listening

- Volunteers were scanned while listening to sentences containing ambiguous words, matched sentences without ambiguous words, and signal-correlated noise.
- During three scanning sessions, participants were non-sedated (awake), lightly sedated (a slowed response to conversation), and deeply sedated.
- Perceptual processes that contribute to speech comprehension can be differentially affected at reduced levels of awareness.



### Language: Receptive

Goh, C. C. M. (2000). A cognitive perspective on language learners' listening comprehension problems. *System*, 28, 55-75.

- Perceptual processing is the encoding of the acoustic message (may also be written).
- When listening, one segments phonemes from the continuous speech stream.
- The listener might be able to make literal sense of an utterance, yet still not understand the real intent of that utterance.

Wingfield, A. & Tun, P. A. (2007). Cognitive supports and cognitive constraints on comprehension of spoken language. *Journal of American Academy of Audiology*, 18, 548-558.

- Listeners analyze speech to identify lexical elements the sounds represent.
- Listeners also differentiate elements of sentences (or parts of speech).
- Thematic role assignment is the process of relating elements to the theme of the sentence.
- Similar assignments are made at the discourse level.



### Memory: Active Working

Was, C. A., & Woltz, D. J. (2007). Reexamining the relationship between working memory and comprehension: The role of available long-term memory. *Journal of Memory and Language*, 56, 86-106.

- Direct effects of working memory on listening comprehension were significant.
- Available long term memory also appears to be part of the cognitive workspace.

## Understanding Ideas: Listening

Wingfield, A. & Tun, P. A. (2007). Cognitive supports and cognitive constraints on comprehension of spoken language. *Journal of American Academy of Audiology, 18*, 548-558.

- Speech processing involves a working memory system to hold temporarily the phrases and clauses of complex sentences in order to determine meaning.



### Higher Order Cognition: Conceptualization

Goh, C. C. M. (2000). A cognitive perspective on language learners' listening comprehension problems. *System, 28*, 55-75.

- During parsing, words are transformed into a mental representation of the combined meaning of these words.
- This mental representation is related to existing knowledge stored as propositions or schemata.
- The listener may draw different types of inferences to complete the interpretation or use the mental representation to respond to the speaker.

Norris, D., Cutler, A., McQueen, J. M. & Butterfield, S. (2006). Phonological and conceptual activation in speech comprehension. *Cognitive Psychology, 53*, 146-193.

- Speech comprehension involves the ongoing construction of a conceptual interpretation of the current utterance.
- Speech comprehension seems to involve separate activation of phonological word representations and of conceptual word representations.
- Both of these types of representations are distinct from long-term memory representations of word form and meaning.



### Temporal-Sequential Ordering

Otten, M., Nieuwland, M. S., & Van Berkum, J. J. (2007). Great expectations: Specific lexical anticipation influences the processing of spoken language. *BioMed Central Neuroscience, 8*, 89.

- When listening to discourse centered on a specific noun, people make specific predictions about the remainder of the story as it unfolds.

## **Understanding Ideas: Listening**

- Predictions are based on word-based automatic activation and the message of the discourse.

## Understanding Ideas: Reading



### Language: Receptive

Verhoeven, L., Van Leeuwe, L. (2008). Predication of the development of reading

comprehension: A longitudinal study. *Applied Cognitive Psychology, 22*, 407-423. doi:

10.1002/acp.1414

- Knowledge of word forms and word meanings (i.e. vocabulary) predicts the development of reading comprehension.
- Listening comprehension predicts reading comprehension.

Botting, N., Simkin, Z. & Conti-Ramsde, G. (2006). Associated reading skills in children with a

history of Specific Language Impairment (SLI). *Reading and Writing, 19*, 77-98.

- Language at age 7 is predictive of reading ability at age 11.
- Students' understanding of expressive and receptive syntax, or the structural aspects of language, contributed to this association between language at 7 and reading at 11.
- Children with language difficulties at age 11 had significant problems with reading that persisted throughout high school.

Nagy, W., Berninger, V., & Abbott, R. (2006). Contributions of morphology beyond phonology

to literacy outcomes of upper elementary and middle-school students. *Journal of*

*Educational Psychology, 98* (1), 134-147.

- The literacy skills that are required in school (reading text for meaning, spelling, and decoding complex words) are accomplished as a result of both phonological processing and morphological insight.

Ouellette, G. (2006). What's meaning got to do with it: The role of vocabulary in word reading

and reading comprehension? *Journal of Educational Psychology, 98* (3), 554-566.

- Depth of vocabulary knowledge predicts reading comprehension

## Understanding Ideas: Reading



### Memory: Active Working

Seigneuric, A., & Ehrlich, M. (2005). Contribution of working memory capacity to children's reading comprehension: A longitudinal investigation. *Reading and Writing, 18*, 617-656.

- Working memory capacity emerged as a direct predictor of reading comprehension
- As word recognition becomes automated throughout the early grade levels, working memory is an important determinant of reading comprehension.

Swanson, H., & Jerman, O. (2007). The influence of working memory on reading growth in subgroups of children with reading disabilities. *Journal of Experimental Child Psychology, 96*, 249-283. doi: 10.1016/j.jecp.2006.12.004

- Children who are less skilled readers showed lower levels of working memory performance than did skilled readers



### Memory: Long Term Access

Weekes, B., Hamilton, S., Oakhill, J., & Holliday, R. (2007). False recollection in children with reading comprehension difficulties. *Cognition, 106*, 222-233. doi: 10.1016/j.cognition.2007.01.005

- Children with reading comprehension difficulties have semantic skill weaknesses which restrict their ability to represent and store verbal information and impair their performance on memory tasks.
- Students with reading comprehension difficulties are less sensitive to abstract semantic association between words because of impaired gist memory (memory for the meaning content of experience).



### Attention: Processing Controls

Leech, R., Aydelott, J., Symons, G., Carnevale, J., & Dick, F. (2007). The development of sentence interpretation: effects of perceptual, attentional and semantic interference. *Developmental Science*. doi:10.1111/j.1467-7687.2007.00628.x

- Attention, perception, and higher-level language processing are interdependent and develop gradually throughout childhood.

## Understanding Ideas: Reading

- Young children experienced difficulty comprehending difficult sentence types under conditions with high attentional demands, like school classrooms.

Zentall, S. (1993). Research on the educational implications of attention deficit hyperactivity disorder. *Exceptional Children, 60* (2), 143-154.

- Attention deficits have implications for some reading problems; for example, teachers may observe difficulties in comprehension only when the passage is long, or the students may have a strong vocabulary but weak comprehension – since vocabulary does not involve sustained attention.

Keene, E.O., & Zimmerman, S. (1997). *Mosaic of thought: Teaching reading comprehension in a reader's workshop*. Portsmouth, NH: Heinemann.

- Successful readers monitor their comprehension while reading and make immediate decisions about what is important in text.



### Higher Order Cognition: Applied Reasoning

Kendeou, P., Bohn-Gettler, C., White, M., van den Broek, P. (2008). Children's inference generation across different media. *Journal of Research in Reading, 31* (3), 259-272. doi: 10.1111/j.1467-9817.2008.00370.x

- Children's ability to generate inferences significantly predicted their narrative comprehension over and above basic language abilities
- Inference generation involves higher-order cognition.
- Inference generation is an important component of successful reading comprehension.

Rapp, D., & Kendeou, P. (2007). Revising what readers know: Updating text representations during narrative comprehension. *Memory & Cognition, 35* (8), 2019-2032.

- Reading comprehension involves not just encoding new information in memory, but also revising information that is already known. As narrative plots unfold, readers revise the expectations they formed when reading earlier portions of the text in order to successfully comprehend later events.

## Understanding Ideas: Reading

Lych, J., & van den Broek, P. (2007). Understanding the glue of narrative structure: Children's on- and off-line inferences about characters' goals. *Cognitive Development* 22 (2007) 323–340.

- Because characters' goals play a key role in the structure of narratives, the ability to make inferences about goals is a very important part of narrative comprehension.
- Children as young as 6 years old are attuned to characters' goals in narrative structure, and they engage in thinking while they listen to narratives and form coherent mental representations of them.



### Higher Order Cognition: Conceptualization

Guthrie, J., Van Meter, P., Hancock, G., Alao, S., Anderson, E., & McCann, A. (1998). Does concept-oriented reading instruction increase strategy use and conceptual learning from text? *Journal of Educational Psychology*, 90 (2), 261-278.

- Reading instruction with a concept orientation leads to improved conceptual knowledge and conceptual transfer (e.g., thinking from text to text).
- Students using these developed strategies were likely to form conceptual knowledge, including physical concepts' features, relations among features, and high-level ideas.

Guastello, E. F., Beasley, M., & Sinatra, C. (2000). Concept mapping effects on science content comprehension of low-achieving inner-city seventh graders. *Remedial & Special Education*, 21, 356-364.

- This study examined concept mapping that connected major and minor concept ideas.
- Concept mapping can significantly improve comprehension scores.
- Constructing semantic or concept maps can build cognitive schema to assimilate and relate new information.

Nesbit, J. C. & Adesope, O. O. (2006). Learning with concept and knowledge maps: A meta-analysis. *Review of Educational Research*, 76, 413-448.

- This meta-analysis reviewed studies involving concept diagrams.
- Ranging from grades 4 to postsecondary grades, the use of concept maps was associated with increased knowledge retention.

## Understanding Ideas: Reading



### Spatial Ordering

Keene, E.O., Zimmermann, S. (1997). Mosaic of thought: Teaching reading comprehension in a reader's workshop. Portsmouth, NH: Heinemann.

- A strategy for enhancing reading comprehension is to create visual images from text.

Potelle, H. & Rouet, J. (2003). Effects of content representation and readers' prior knowledge on the comprehension of hypertext. *Journal of Human-Computer Studies*, 58, 327-345.

- For readers with limited background knowledge, hierarchical representations facilitate the construction of a representation of the relations between the information points.
- Representations displaying only basic relationships may be beneficial to readers with limited background knowledge.
- More sophisticated representations, such as concept maps may be appropriate only for readers with extensive background knowledge.

## Producing and Communicating Ideas: Writing



### Language: Expressive

Beers, S. F., & Nagy, W. E. (2007). Syntactic complexity as a predictor of adolescent writing quality: Which measures? Which genre? *Reading and Writing, 22*, 185-200.

- Syntactic complexity is related to text quality for adolescent writers (participants were 41 seventh and eighth graders), but this relationship is dependent upon text genre and the specific measure of syntactic complexity.
- Writing requires, among other things, skilled sentence construction.
- Production of complex sentences is a necessary but not sufficient condition for writing high quality texts.

Johnson, D. J. (1993). Relationships between oral and written language. *School Psychology Review, 22*, 595.

- Word retrieval problems affect written language.
- Students who do not understand the morphological rule system may spell words phonetically without attending to the base word.
- Writing requires more specificity and sense of audience than does speaking.



### Attention: Mental Energy Controls

Tucha, O., L. Mecklinger, et al. (2006). Attention and movement execution during handwriting. *Human Movement Science, 25*, 536-552.

- In the present experiment a deterioration of accuracy was found following total sleep deprivation which led to a significant increase of both commission errors and omission errors.



### Attention: Production Controls

Altemeir, L., Jones, J., Abbott, R. D., & Berninger, V. W. (2006). Executive functions in becoming writing readers and reading writers: Note taking and report writing in third and fifth graders. *Developmental Neuropsychology, 29*, 161-173.

- Results from a study including 3<sup>rd</sup> and 5<sup>th</sup> graders added to prior research that executive functions like inhibition and planning contribute to writing.

## Producing and Communicating Ideas: Writing

Torrance, M., Fidalgo, R., & García, J. (2007). The teachability and effectiveness of cognitive self-regulation in sixth-grade writers. *Learning and Instruction, 17*, 265-285.

- Sixth-grade students participated in classroom-based training in cognitive strategies for preplanning.
- Training resulted in a substantial and sustained increase in preplanning as a result of the intervention.
- Product measures indicated a substantial and sustained increase in text quality.

Saddler, B. (2006). Increasing story-writing ability through self-regulated strategy development: Effects on young writers with learning disabilities. *Learning Disability Quarterly, 29*, 291-305.

- Six 2<sup>nd</sup> grade students who experienced difficulty with story writing were taught a strategy for planning and writing stories.
- Stories written by the students at post-instruction and maintenance became more complete, longer, and qualitatively better.
- Planning time at post-instruction and maintenance increased.



### Memory: Active Working

Olive, T., Kellogg, R. T., & Piolat, A. (2008). Verbal, visual, and spatial working memory demands during text composition. *Applied Psycholinguistics, 29*, 669-687.

- Text composition places large demands on working memory.
- Composing a text places as much demand on visual working memory as on verbal working memory.

Olive, T. (2004). Working memory in writing: Empirical evidence from the dual-task technique. *European Psychologist, 9*, 32-42.

- Working memory is needed for resource allocation, step-by-step management, and parallel coordination of the writing processes.
- The more efficient the writing processes, the less they require resources from working memory and the more resources are available for activating other processes.
- Verbal working memory is needed for sentence generation and visual working memory is needed for planning and image-based conceptual content.

## Producing and Communicating Ideas: Writing



### Neuromotor Functions: Graphomotor

Berninger, V. W., Ruthberg, J. E., Abbott, R. D., Garcia, N., Anderson-Youngstrom, M., Brooks, A., & Fulton, C. (2006). Tier 1 and tier 2 early intervention for handwriting and composing. *Journal of School Psychology, 44*, 3-30.

- Legible and automatic letter writing is necessary for meeting high level composition standards and passing high stakes tests in writing, though other processes are involved as well.
- Characteristics of legibility include spacing between words, spacing between letters in words, alignment, letter size, and slant.

Berninger, V. W., Abbott, R. D., Jones, J., Wolf, B. J., Gould, L., Anderson-Youngstrom, M., Shimada, S., & Apel, K. (2006). Early development of language by hand: Composing, reading, listening, and speaking connections; three letter-writing modes; and fast mapping in spelling. *Developmental Neuropsychology, 29*, 61-92.

- A longitudinal study involving 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> graders showed that manuscript writing, cursive writing, and keyboarding are only moderately correlated.
- In general, accuracy was higher for keyboarding than for manuscript writing or cursive writing which consistently was less accurate and slower.
- The more complex sequential motor movements needed to form the loops and connecting strokes of cursive writing place more demands on graphomotor function.

Chartrel, E., & Vinter, A. (2008). The impact of spatio-temporal constraints on cursive letter handwriting in children. *Learning and Instruction, 18*, 537-547.

- When children experience difficulties in the very act of performing handwriting movements they have difficulties producing texts.



### Higher Order Cognition: Conceptualization

Goetz, E. T., Sadoski, M., Stricker, A. G., White, T. S., & Wang, Z. (2007). The role of imagery in the production of written definitions. *Reading Psychology, 28*, 241-256.

- Concrete, highly imaginable words promoted the use of imagery in writing, which in turn led to the production of better definitions.

## Producing and Communicating Ideas: Writing

- Imagery ratings were significant predictors of quality of written definitions.



### Spatial Ordering

Olive, T., Kellogg, R. T., & Piolat, A. (2008). Verbal, visual, and spatial working memory demands during text composition. *Applied Psycholinguistics*, 29, 669-687.

- Spatial demands of writing may find their source in the mental representation of spatial layout of the text as well as in the use of visual strategies (linear, hierarchical, concept maps).



### Temporal-Sequential Ordering

Espin, C., Shin, J., & Deno, S.L. (2000). Identifying indicators of written expression proficiency for middle school students. *The Journal of Special Education*, 34, 140-153.

- Correct minus incorrect word sequences was the most reliable and valid predictor of student writing proficiency, as measured by teacher ratings and a district writing test

Troia, G.A., Graham, S., & Harris, K.R. (1999). Teaching students with learning disabilities to mindfully plan when writing. *Exceptional Children*, 65, 235-252.

- Instruction that included coaching on sequencing ideas led to improved schematic structure of stories and longer papers for students with writing difficulty; improvements generalized to persuasive essay writing and were generally maintained over time.

## Producing and Communicating Ideas: Oral



### Language: Expressive

Hong, Z., & Aiex, N. K. (1995). Oral language development across the curriculum, k-12. *Eric Digest, 107*.

- Oral language is essential for engagement in intellectual dialogue, and for the communication of ideas.
- Oral language is one of the important means of learning and acquiring knowledge.
- Classroom talk can be directed more towards the goals of exploring ideas found in texts and sharpening thoughts (speaking to learn).

Magee, P. A., & Newcomer, P. L. (1978). The relationship between oral language skills and academic achievement of learning disabled children. *Learning Disability Quarterly, 1*, 63-67.

- The academic problems experienced by many struggling learners are closely associated with the difficulties they experience in oral language.



### Social Cognition

Swenson, L. M., & Strough, J. (2008). Adolescents' collaboration in the classroom: Do peer relationships or gender matter? *Psychology in the Schools, 45*, 715-728.

- Students who do not have many friends may find it particularly challenging to deal with the social demands of working with a peer to solve a problem or complete a task.
- When interactions were marked by conflict, adolescents may have failed to learn *why* answers were correct.
- Conflict may have been disruptive such that students did not effectively use their time and lost focus on the task.



### Higher Order Cognition: Creative Thinking

Wheeler, S., Waite, S. J., & Bromfield, C. (2002). Promoting creative thinking through the use of ICT. *Journal of Computer Assisted Learning, 18*, 367-378.

- Without the ability to think in a creative manner, children would be lacking in the necessary transferable skills to engage in personal and professional life.

## Producing and Communicating Ideas: Oral

- Students with learning difficulties struggle with collaborative work involving creative action.



### Attention: Production Controls

Waldron, V. R. (1994). Interpersonal construct differentiation and conversational planning: An examination of two cognitive accounts for the production of competent verbal disagreement tactics. *Human Communication Research, 21*, 3-35.

- The results from this study indicate that quality of communication planning (an aspect of attention) is a predictor of communication competence in conflict situations.

Villemarette-Pittman, N. R., Stanford, M. S., & Greve, K. W. (2002). Language and executive function in self-reported impulsive aggression. *Personality and Individual Differences, 34*, 1533-1544.

- Difficulty in planning and organizing speech may produce profound, socially dysfunctional effects.



### Memory: Long Term Encoding

Pine, K. J., & Messer, D. J. (1998). Group collaboration effects and the explicitness of children's knowledge. *Cognitive Development, 13*, 109-126.

- Students with limited knowledge on a scientific topic did not benefit from group discussion when with children at different knowledge levels.



### Memory: Long Term Access

Volet, S., Summers, M., & Thurman, J. (2009). High-level co-regulation in collaborative learning: How does it emerge and how is it sustained? *Learning and Instruction, 19*, 128-143.

- Distributed task-relevant knowledge increases high-level contributions to constructing knowledge in student work groups.

## Producing and Communicating Ideas: Oral



### Memory: Active Working

Daneman, M. (1991). Working memory as a predictor of verbal fluency. *Journal of Psycholinguistic Research*, 20, 445-464.

- Fluency at generating a speech was related to the speaker's working memory.
- This study provides evidence for the involvement of working memory in the fluency and creativity with which speakers use more complex language.