


# SOFTWARE SOLUTIONS FOR AUDITORY AND LANGUAGE PROCESSING



Presented by  
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## LISTENING IS...

- Not synonymous with hearing.
- A process — hearing, perceiving, and interpreting sound.
- Fundamental for language and learning.

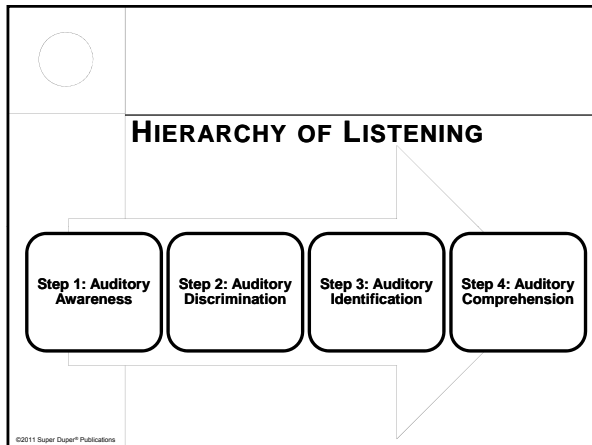
## LISTENING SKILLS...

- Begin to develop prenatally.
- Become more complex, refined, and sophisticated with experience.




(Bellis, 2003; Clark, 2008; Flexer, 1999; Kelly, 2004; Johnson et al., 1997; Nevins & Garber, 2006; Roeser & Downs, 2004; Sharma et al., 2009; Stredler-Brown & Johnson, 2004).

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## STEP 1: AUDITORY AWARENESS

- Auditory Awareness
- Sound Localization
- Auditory Attention/Auditory Figure-Ground



(Abrams, 1995; Arabin & van Straaten, 2006; ASHA, 2009; Blackburn, 2007; Gomes et al., 2000; Rhoades, 2003; Roeser & Downs, 2004)

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## STEP 2: AUDITORY DISCRIMINATION

<ul style="list-style-type: none"> <li>• Environmental sounds</li> <li>• Suprasegmentals (Prosody)             <ul style="list-style-type: none"> <li>○ Stress</li> <li>○ Duration</li> <li>○ Rate</li> <li>○ Pitch</li> <li>○ Intensity</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Segmentals             <ul style="list-style-type: none"> <li>○ Formant Frequencies</li> <li>○ Voice</li> <li>○ Place</li> <li>○ Manner</li> </ul> </li> </ul>
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(ASHA, 2009; Gomes et al., 2000; Rhoades, 2003; Roeser & Downs, 2004; Stredler-Brown & Johnson, 2004)


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## STEP 3: AUDITORY IDENTIFICATION

- Auditory Identification (Auditory Association)
- Auditory Feedback/Self-Monitoring
- Phonological Awareness (Auditory Analysis)

(ASHA, 2009; Bellis, 2003; Catts, 1991; Cochlear Americas, 2009; Gomes et al., 2000; Rhoades, 2003; Roeser & Downs, 2004; Schuele & Boudreau, 2008; Sterling-Orth, 2004; Stredler-Brown & Johnson, 2004; Torgesen, 2002; Torgesen et al., 1994)


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	<p><b>STEP 4: AUDITORY COMPREHENSION</b></p> <ul style="list-style-type: none"> <li>• Auditory Comprehension</li> <li>• Auditory Closure</li> <li>• Auditory Memory</li> <li>• Linguistic Auditory Processing</li> </ul> 
<small>©2011 Super Duper® Publications (Bellis, 2003; Cochlear Americas, 2009; Johnson et al., 1997; Roeser &amp; Downs, 2004; Stredler-Brown &amp; Johnson, 2004) (Bellis, 2003; Roeser &amp; Downs, 2004; Stredler-Brown &amp; Johnson, 2004)</small>	

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	<p><b>AUDITORY PROCESSING</b></p> <ul style="list-style-type: none"> <li>• Perception and interpretation of sound information</li> <li>• Auditory deficit not the result of other higher-order cognitive, language, or related disorders</li> </ul> <p><b>LANGUAGE PROCESSING</b></p> <ul style="list-style-type: none"> <li>• Attaching meaning to groups of sounds and symbols that form words, sentences, and stories in order to understand spoken and written language</li> </ul>
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	<p><b>AUDITORY PROCESSING &amp; LANGUAGE PROCESSING</b></p> <ul style="list-style-type: none"> <li>• Not synonymous</li> <li>• May lead to similar behavioral symptoms</li> <li>• Difficulties often unnoticed until school-age</li> <li>• The point at which auditory processing stops and language processing begins remains unclear.</li> <li>• <b>Given current understanding of language disorders and of central auditory processing, techniques that facilitate language competence are likely to improve auditory processing and vice versa (Bellis, 2009).</b></li> </ul>
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	<p><b>COMMON CHARACTERISTICS OF PROCESSING DISORDERS</b></p> <ul style="list-style-type: none"> <li>• Breakdown beyond physical hearing acuity</li> <li>• Difficulty attending to auditory information (especially in noisy environment)</li> <li>• Need for extra time to process</li> <li>• Difficulty retaining verbal information</li> <li>• Problems understanding and retaining multi-level information (multi-step directions)</li> <li>• Language difficulties</li> <li>• Low academic performance</li> <li>• Behavioral issues</li> <li>• Difficulty with phonological awareness, reading &amp; spelling</li> </ul>
<small>©2011 Super Duper® Publications (Bellis, 2003; Kelly, 2004; Johnson et al., 1997; Roeser &amp; Downs, 2004)</small>	

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	<p><b>THE CHALLENGE</b></p> <p>Processing is not separate from attention, memory, or cognition!</p> 
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	<p><b>REMEDIATION</b></p> <ul style="list-style-type: none"> <li>• Much research on diagnosis, etiology, and treatment is still warranted</li> <li>• Neuroplasticity — the brain's ability to reorganize</li> <li>• Direct, theory-based, frequent, intensive</li> <li>• Deficit-specific, individualized</li> </ul>
<small>©2011 Super Duper® Publications (Beck &amp; Juel, 2002; Catts, 1991; Flexer, 1999; Schuele &amp; Boudreau, 2008; Torgesen, 2002)</small>	

**SYSTEMATIC APPROACHES TO TARGETING AUDITORY AND LANGUAGE PROCESSING**

- Part 1: Targeting Phonological Awareness (Auditory Analysis)
- Part 2: Targeting Auditory Comprehension of Verbal Directions and Basic Concepts
- Part 3: Targeting Sequencing
- Part 4: Targeting Auditory Memory

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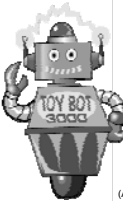
**TARGETING PHONOLOGICAL AWARENESS**

**Shallow Phonological Awareness:**

- Sentence segmentation
- Syllable blending
- Syllable segmentation
- Rhyming
- Alliteration

**Deep Phonological Awareness: Phonemic Awareness (Phonemic Analysis)**

- Phoneme blending
- Phoneme segmentation and identification
- Phoneme deletion
- Phoneme addition
- Phoneme manipulation




(Anthony et al., 2003; Catts, 1991; Gerber et al., 2008; Hatcher & Hulme, 1999; McGuinness, 2005; Roeser & Downs, 2004; Schuele & Boudreau, 2006; Schreiber, 2008; Stanovich, 1992; Sterling-Orth, 2004; Torgesen, 2002; Torgesen et al., 1994)

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**PHONOLOGICAL AWARENESS RESEARCH**

- Related to later reading ability
- Phonemic awareness is strongest indicator
- At-risk or low literacy achievers need direct instruction
- 20% of children fail to acquire phonological awareness even in stable learning environment

**PHONEMIC AWARENESS VS. PHONICS**

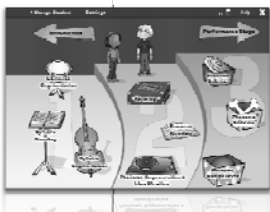


- Phonemic Awareness is different than phonics
- Gives meaning to alphabetic language

(Beck & Juel, 2002; Catts, Fey, Tomblin, & Zhang, 2002; Lyon, 1998; Torgesen, 2002; Scarborough, 1998; Sharma et al., 2009; Torgesen, Wagner, & Rashotte, 1994)

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**WEBBER® HEARBUILDER® PHONOLOGICAL AWARENESS**



- Systematic (developed, arranged/ordered, and methodical)
- Direct (active-learning environment for student)
- Theory-based (based on latest research and theory in APD, phonological awareness, computer-assisted learning)
- Intensive (multiple levels of difficulty with minimal increments for each skill)

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**WEBBER® HEARBUILDER® PHONOLOGICAL AWARENESS**

**Nine areas of phonological awareness:**

- Sentence Segmentation
- Syllable Blending
- Syllable Segmentation
- Rhyming
- Phoneme Blending
- Phoneme Segmentation and Identification
- Phoneme Deletion
- Phoneme Addition
- Phoneme Manipulation

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**SOFTWARE DEMONSTRATION**



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**CLARK COUNTY SCHOOL DISTRICT PILOT STUDY**

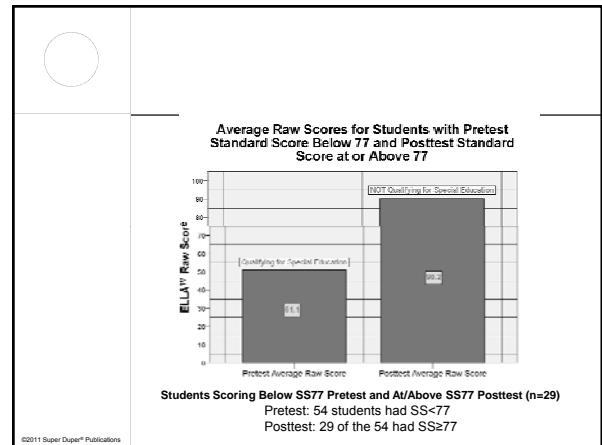
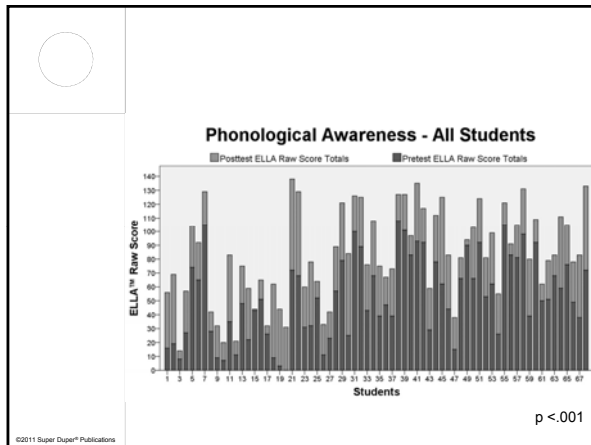
- CCSD staff trained by Super Duper in January 2010
- Pretested February 2010; posttested May 2010
- Participants: 68 students (39 male, 29 female)
  - preK: 5
  - K: 16
  - 1<sup>st</sup> grade: 24
  - 2<sup>nd</sup> grade: 11
  - 3<sup>rd</sup> grade: 10
  - 4<sup>th</sup> grade: 2
- Race:
  - 72.06% Hispanic
  - 17.65% Black
  - 8.82% White
  - 1.47% Other
- Diagnoses:
  - No IEP/RTI: 32
  - LD and/or LI: 24
  - MR: 4
  - DD: 3
  - ASD: 1
  - Other: 4

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**CLARK COUNTY SCHOOL DISTRICT PILOT STUDY**

- Pre/Posttesting: ELLA® Section 1 – Phonological Awareness and Flexibility:
  - Letter-Sound Identification
  - Initial Sound Identification
  - Segmenting
  - Substitution
  - Rhyming
  - Blending
  - Deletion
- Administered by Clark County School District SLPs
- Software use: 2 x 30 or 3 x 20 min/week for at least 8 weeks
- Level 9 highest level attained on all tasks
- Average number of computer sessions: 18.76
- Full report: <http://www.hearbuilder.com/pdf/HBPResearch.pdf>

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**FEEDBACK FROM THE CLARK COUNTY SLPs:**

- The **graphics and fun activities** (i.e., catching notes, dog jumping through hoop, toys on conveyor belts, etc.) kept the students' level of interest.
- Phonological Awareness **relates to the curriculum** in kindergarten. It reinforced what the students were already learning in the classroom.
- Resource teacher indicated she could **definitely see improvement** in sound segmentation and blending.
- The graphics were very engaging and the students enjoyed the **fun "added" activities** at the end of some games (catching falling notes, making the dog jump, etc.).
- **Great information** for present levels.
- **Reinforces standards** in the curriculum to allow for practice of skills taught in a class.
- **Easy to use.**

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**PART 2: TARGETING FOLLOWING AUDITORY DIRECTIONS**

- Important for behavior
- Important for social interaction
- Important for academics
- Requires ability to perceive, interpret, and retain auditory information
- Requires a strong knowledge of basic concepts


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**WHAT ARE BASIC CONCEPTS?**

- **Basic colors** (red, blue, green)
- **Directions** (through, around)
- **Quantities** (three, few, many)
- **Sequences** (first, next, finally)
- **Shapes** (round, square)
- **Size** (large, small)
- **Social/Emotional States** (happy, sad)
- **Characteristics** (old, new)
- **Textures** (rough, smooth)
- **Time** (late, early)
- **Spatial Relationships and Positions** (front, behind, top, bottom)

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**MORNING ROUTINE:  
HOW MANY BASIC CONCEPTS?**



"First, put your lunch money in the red bowl on the small table next to my desk. If you brought your lunch, put it into the bin by the door. Next, hang your coat on the lower hook and your backpack on the top hook. Then, have a seat at your desk, get out your writing folder, and wait quietly for me to come around and check it."

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**MORNING ROUTINE:  
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**COMMON TYPES OF DIRECTIONS**

- Multi-leveled information (e.g., "...small, red table next to my desk...")
- Multi-step and sequential information (e.g., "First... Next... Then...")



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**WEBBER® HEARBUILDER®  
FOLLOWING DIRECTIONS**



- Systematic (developed, arranged/ordered, and methodical)
- Direct (active-learning environment for student)
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- Intensive (multiple levels of difficulty with minimal increments for each skill)

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**HEARBUILDER® FOLLOWING DIRECTIONS  
TARGETS 5 DIFFERENT TYPES OF DIRECTIONS**



**Five Multi-Level Activities**

- Basic Directions:** Click on the small red ball.
- Sequential Directions:** Put all the temperature gauges into all the blue in space and then give "Start".
- Quantitative and Spatial Directions:** Choose all of the red tracks.
- Temporal Directions:** Before the girl is older in the Zoo, put a giraffe in the Zoo.
- Conditional Directions:** If a car is in the Zoo, you can't get on the truck.

**BONUS GAMES!**  
More Games!  
Fun Games System - More Fun, Increased and entertained!


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**HEARBUILDER® FOLLOWING DIRECTIONS TARGETS 40 BASIC CONCEPTS**

- **Basic Colors** – red, blue, green, yellow
- **Quantities** – one, two, all, both, either, except, none, or, and, don't, not
- **Sequences** – first, second, third, then, next, last
- **Shapes** – circle, square, triangle, star
- **Size** – large, small
- **Time** – before, after
- **Spatial Relationships/Positions** – first, second, third, last, between, beside, next to, above, below
- **Condition** – hot, cold

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**SOFTWARE DEMONSTRATION**



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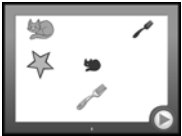
**CLARK COUNTY SCHOOL DISTRICT PILOT STUDY**

- CCSD staff trained by Super Duper in January 2010
- Pretested February 2010; posttested May 2010
- Participants: 54 students (38 male, 16 female)
  - preK: 19    ◦ 1<sup>st</sup> grade: 9    ◦ 3<sup>rd</sup> grade: 2    ◦ 5<sup>th</sup> grade: 2
  - K: 11    ◦ 2<sup>nd</sup> grade: 9    ◦ 4<sup>th</sup> grade: 2
- Race:
  - 33.33% Hispanic    ◦ 38.89% White
  - 16.67% Black    ◦ 11.11% Other
- Diagnoses:
  - ASD: 26    ◦ MR: 1    ◦ No IEP/Rtl: 2
  - LD and/or LI: 10    ◦ DD: 9    ◦ Other: 6
- Software use: 2 x 30 or 3 x 20 min. per week for at least 8 weeks
- Average number of computer sessions: 16.88
- Full report: <http://www.hearbuilder.com/pdf/HBFDRresearch.pdf>

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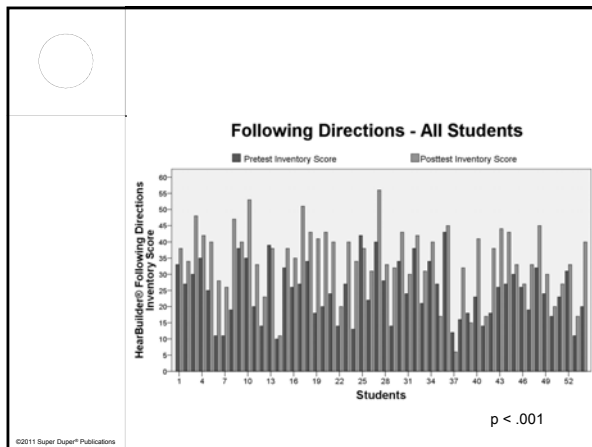
**WEBBER® FOLLOWING DIRECTIONS INVENTORY:**

- Created by Super Duper® Publications
- 63 questions:
  - Basic Directions
  - Sequential Directions
  - Quantitative & Spatial Directions
  - Temporal Directions
  - Conditional Directions
- Completed during one sitting
- Administered online
- Results submitted electronically



Student hears...  
"Click on the small fork."

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**FEEDBACK FROM THE CLARK COUNTY SLPs:**

- Following Directions targets the kinds of directions that students hear in the classroom and what is **included in district/state mandated tests**.
- Teaching the **language skills that are really needed** for students with language delays, i.e., direction words (over, under, beside, next to, etc.), negative sentences, sequential order.
- **Easy to use** for students.
- **Great data** for SLP.
- With the Following Directions program, the **breakdown of skills** addressed at each level is awesome. Information can be used to pinpoint where a child's strengths are and where they begin to struggle.


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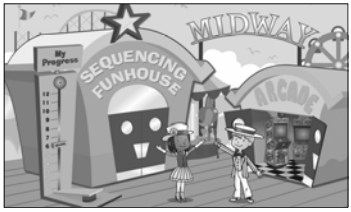
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	<p><b>PART 3: TARGETING SEQUENCING</b></p> <p><b>SEQUENCING REQUIRES ...</b></p> <ul style="list-style-type: none"> <li>• Understanding of cause and effect</li> <li>• Predicting</li> <li>• Understanding time/transition words</li> <li>• Knowledge of story grammar</li> <li>• Adequate reasoning and planning skills</li> </ul>
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	<p><b>SEQUENCING IS IMPACTED BY...</b></p> <ul style="list-style-type: none"> <li>• Executive functions</li> <li>• Memory (semantic or episodic)</li> <li>• Language</li> <li>• Auditory processing</li> <li>• Visual processing</li> </ul> 
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	<p><b>TEACHING SEQUENCING</b></p> <p>Sequencing helps students to . . .</p> <ul style="list-style-type: none"> <li>• Learn the steps of a process.</li> <li>• Know the tools used to complete a process.</li> <li>• Understand and use specific vocabulary.</li> <li>• Remember the steps of a process.</li> </ul>
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	<p><b>TEACHING SEQUENCING (CONT.)</b></p> <ul style="list-style-type: none"> <li>• Sequencing activities that include the manipulation of pictures, words, and sentences help build important literacy skills like reading left to right, comprehending important details, predicting, and identifying the important parts of a story.</li> <li>• Nearly every state and the <i>National Common Core Standards</i> include educational standards for describing the details of an event at nearly every grade level.</li> </ul>
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	<p><b>HEARBUILDER® SEQUENCING</b></p> <ul style="list-style-type: none"> <li>• Grades K-6</li> <li>• Targets comprehension and critical thinking</li> <li>• Start with 2-step sequences and progress to 6-step sequences</li> <li>• Customize options to include/exclude: pictures, audio, text</li> <li>• Monitor progress and track data for an unlimited number of students</li> <li>• Sequence Stories or Instructions</li> <li>• Set levels of difficulty</li> <li>• Add background noise at any level and adjust volume for each student</li> </ul> 
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## PART 4: TARGETING AUDITORY MEMORY

- Memory impacts a person's ability to perform almost any activity.
- Memory is how "knowledge is encoded, stored, and later retrieved."
- Even mild memory deficits can impact a student's success.

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## TYPES OF MEMORY

- Long-term memory
- Short-term memory
- Working memory
- Auditory memory
- Visual memory



HearBuilder® Auditory Memory targets auditory memory and working memory by teaching students to use research-based strategies.

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## AUDITORY MEMORY

- The ability to take in information that is presented orally, process it, retain it in one's mind, and then recall it.
- Auditory memory requires working memory.
- Working memory: "The management, manipulation, and transformation of information drawn from short-term memory and long-term memory."

(Bellis, 2003; Dehn, 2008; Roeser & Downs, 2004; Stredler-Brown & Johnson, 2004)

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## DEVELOPMENT OF AUDITORY MEMORY


- Infants use auditory memory to imitate speech.
- By age 4 can recall three digits; by age 12, six digits
- Between ages 4 -14, working memory and short-term memory increase by two to three times.
- As children become older, use of memory strategies becomes more frequent, consistent, and complex.

## DEVELOPMENT OF WORKING MEMORY

- Working memory increases in capacity and span, becoming more accurate, processing more quickly, and handling more information at a time.
- Short-term memory span is partially dependent on the efficiency of working memory.

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## WORKING MEMORY AND LEARNING



- Memory is highly correlated with intelligence and achievement.

Working memory capacity has significant relationships with

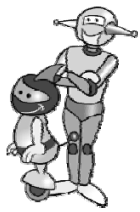
- reading decoding
- language comprehension
- spelling
- following directions
- vocabulary development
- note taking
- GPA

(Engle, Tuholski, Laughlin, and Conway, 1999)


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## AUDITORY MEMORY DEFICITS



- Remembering multi-step directions
- Relating new information to prior knowledge
- Oral language comprehension
- Taking notes while listening
- Verbal fluid reasoning
- Written expression
- Oral expression




(Dehn, 2008)



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	<p><b>STRATEGIC INTERVENTIONS</b></p> <ul style="list-style-type: none"> <li>• Most people naturally develop and use strategies to improve their memory performance.</li> <li>• Those with deficits and weakness need direct teaching which can improve working memory performance.</li> </ul> <p><b>TYPES OF STRATEGIES</b></p> <ul style="list-style-type: none"> <li>• Verbal Rehearsal</li> <li>• Elaborative Rehearsal</li> <li>• Chunking</li> <li>• Relational Strategies</li> </ul> 
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	<p><b>EFFECTIVE STRATEGY TEACHING</b></p> <ul style="list-style-type: none"> <li>• One-on-one brief, focused sessions over several weeks.</li> <li>• Teach one strategy at a time.</li> <li>• Explain purpose and rationale.</li> <li>• Explain and model the steps of the strategy.</li> <li>• Provide plenty of practice and offer feedback.</li> <li>• Teach cues to help remember the strategy.</li> <li>• Provide positive reinforcement and data tracking.</li> <li>• Encourage children to monitor and evaluate strategy use.</li> <li>• Encourage generalization across sessions.</li> </ul>
<small>©2011 Super Duper® Publications</small>	<small>(Dehn, 2008)</small>

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	<p><b>HEARBUILDER® AUDITORY MEMORY</b></p> <ul style="list-style-type: none"> <li>• Grades K-8</li> <li>• Memory for Numbers (3-7 digits)</li> <li>• Memory for Words (3-5 words organized by syllable)</li> <li>• Memory for Details (1-5 details)</li> <li>• Auditory Closure (Sentence Completion)</li> <li>• Memory for WH Information (2-4 sentences/2-4 questions)</li> </ul> 
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	<p><b>SOFTWARE DEMONSTRATION</b></p> 

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	<p><b>FEATURES OF THE <i>HEARBUILDER</i>® PROFESSIONAL SOFTWARE SERIES</b></p> <ul style="list-style-type: none"> <li>• Measurable learning objectives for every level</li> <li>• Customizable</li> <li>• Set, change, monitor levels of difficulty</li> <li>• Add background noise</li> <li>• Data-tracking for unlimited number of students</li> <li>• Customizable and printable reports</li> </ul>
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	<p><b>VISIT <a href="http://WWW.HEARBUILDER.COM">WWW.HEARBUILDER.COM</a></b></p> <ul style="list-style-type: none"> <li>• Research basis</li> <li>• Report of the Clark County School District pilot studies for Phonological Awareness and Following Directions</li> <li>• Correlations to state language arts standards</li> <li>• Interactive demos ("Try It Out")</li> <li>• System requirements</li> <li>• Awards and Product Reviews</li> <li>• List of upcoming presentations across the country</li> <li>• Super Duper® Publications is on Facebook &amp; Twitter</li> </ul> 
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	<p><b>QUESTIONS?</b></p> <p>slphelp@superduperinc.com</p> <p>1-800-277-8737</p> <p>www.superduperinc.com</p>  A cartoon character with a large head, wide eyes, and a thoughtful expression. They have dark, curly hair and are wearing a grey shirt and dark pants. Three question marks are floating above their head, indicating they are confused or thinking.

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