

## 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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## HIERARCHY OF LISTENING



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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**

- Environmental sounds
- Suprasegmentals (Prosody)
  - Stress
  - Duration
  - Rate
  - Pitch
  - Intensity
- Segmentals
  - Formant Frequencies
  - Voice
  - Place
  - Manner

(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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**STEP 4: AUDITORY COMPREHENSION**

- Auditory Comprehension
- Auditory Closure
- Auditory Memory
- Linguistic Auditory Processing



(Bellis, 2003; Cochlear Americas, 2009; Johnson et al., 1997; Roeser & Downs, 2004; Stredler-Brown & Johnson, 2004) (Bellis, 2003; Roeser & Downs, 2004; Stredler-Brown & Johnson, 2004)

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**AUDITORY PROCESSING**

- Perception and interpretation of sound information
- Auditory deficit not the result of other higher-order cognitive, language, or related disorders

**LANGUAGE PROCESSING**

- Attaching meaning to groups of sounds and symbols that form words, sentences, and stories in order to understand spoken and written language

(Cochlear Americas, 2009; Johnson et al., 1997; Nevins & Garber, 2006; Roeser & Downs, 2004; Stredler-Brown & Johnson, 2004)

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**AUDITORY PROCESSING & LANGUAGE PROCESSING**

- Not synonymous
- May lead to similar behavioral symptoms
- Difficulties often unnoticed until school-age
- The point at which auditory processing stops and language processing begins remains unclear.
- **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).**

(ASHA 2004, 2005; Bellis, 2004, 2009)

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### COMMON CHARACTERISTICS OF PROCESSING DISORDERS

- Breakdown beyond physical hearing acuity
- Difficulty attending to auditory information (especially in noisy environment)
- Need for extra time to process
- Difficulty retaining verbal information
- Problems understanding and retaining multi-level information (multi-step directions)
- Language difficulties
- Low academic performance
- Behavioral issues
- Difficulty with phonological awareness, reading & spelling

(Bellis, 2003; Kelly, 2004; Johnson et al., 1997; Roeser & Downs, 2004)

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### THE CHALLENGE

Processing is not separate from attention, memory, or cognition!



(Bellis, 2003; Kelly, 2004; Johnson et al., 1997; Roeser & Downs, 2004)

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### REMIEDIATION

- Much research on diagnosis, etiology, and treatment is still warranted
- Neuroplasticity — the brain's ability to reorganize
- Direct, theory-based, frequent, intensive
- Deficit-specific, individualized

(Beck & Juul, 2002; Catts, 1991; Flexer, 1999; Schuele & Boudreau, 2008; Torgesen, 2002)

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**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

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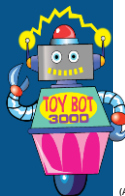
**TARGETING PHONOLOGICAL AWARENESS**

**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; Geirber et al., 2008; Hatcher & Hulme, 1999; McGuinness, 2005; Roeser & Downs, 2004; Schuele & Boudreau, 2008; 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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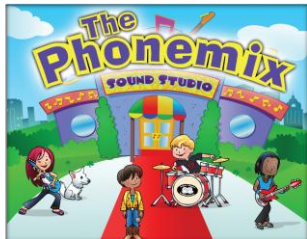
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### SOFTWARE DEMONSTRATION




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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/Rtl: 32
  - LD and/or Lr: 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/HBPAResearch.pdf>

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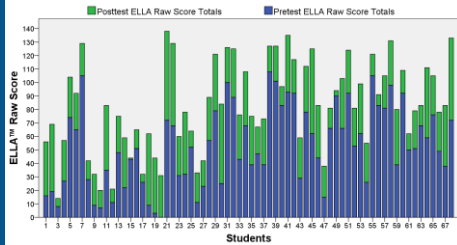
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**Phonological Awareness - All Students**



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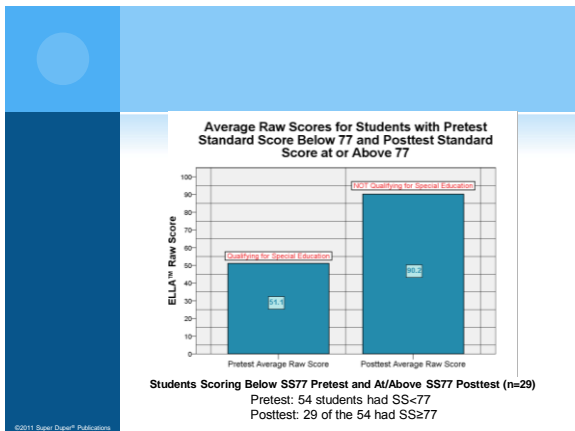
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### FEEDBACK FROM THE CLARK COUNTY SLPs:

- 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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### Suburban Elementary School in Southern California

**School Demographics\*:**

Black or African American 9.4%	White (not Hispanic) 46.6%
American Indian or Alaska Native 0.1%	Two or More Races 2.5%
Native Hawaiian or Pacific Islander 0.6%	Filipino 1.0%
Hispanic or Latino 33.1%	Asian 6.8%
English Learners 14.0%	Socioeconomically Disadvantaged 33.0%

**Used HearBuilder® Phonological Awareness software in the classroom February through May 2011 for 60 minutes/week**  
**Participants: 9 - K, 6 - 1<sup>st</sup> grade, 6 - 2<sup>nd</sup> grade, 3 - SDC (1<sup>st</sup>/2<sup>nd</sup>)**  
**Pre-/posttested with school's Phonemic Awareness Inventory**, which includes Discrimination, Rhyming Recognition, Rhyming Application, Syllable Counting, Syllable Segmentation, Oral Synthesis, Approximation, Phoneme Isolation, Segmentation, Deletion, Substitution

\*from School Accountability Report Card Published During 2010-11

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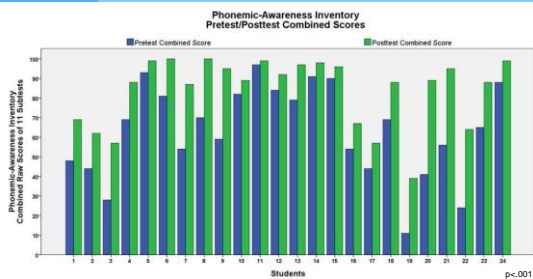
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## Suburban Elementary School in Southern California



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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: 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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### 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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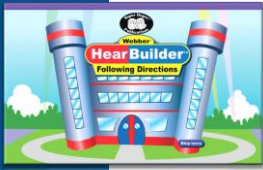
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## WEBBER® HEARBUILDER® FOLLOWING DIRECTIONS



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

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

Basic

Sequential

Quantitative and Spatial

Temporal

Conditional

Five Multi-Level Activities

<p><b>1</b></p>  <p><b>Basic Directions</b> Click on the small, red car.</p>	<p><b>2</b></p>  <p><b>Sequential Directions</b> First see the response to card, and set the shape to square, and then press "Next."</p>	<p><b>3</b></p>  <p><b>Quantitative and Spatial Directions</b> Choose all of the red trucks.</p>
<p><b>4</b></p>  <p><b>Temporal Directions</b> Before you put a robot in the box, put a giraffe in the box.</p>	<p><b>5</b></p>  <p><b>Conditional Directions</b> If a robot is in the box, put the box on the truck.</p>	<p style="font-size: 2em; font-weight: bold; color: yellow;">BONUS GAMES!</p> <p><b>Bonus Games</b> Fun bonus games keep kids motivated and entertained!</p>

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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/HBFDResearch.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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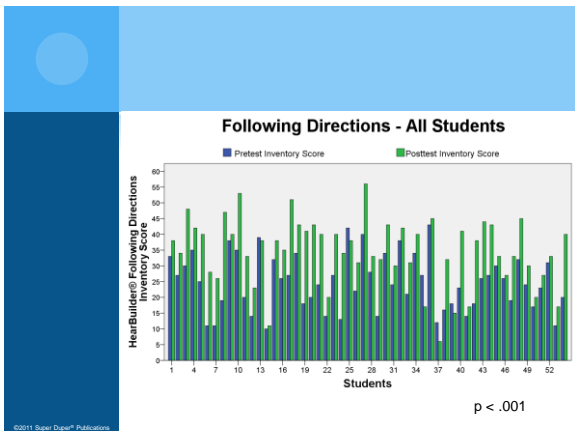
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**FEEDBACK FROM THE CLARK COUNTY SLPs:**

- 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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**A Suburban Elementary School in Central South Carolina**

- Program overseen by the school speech-language pathologist
- School demographics\*:
  - 67% White, not Hispanic      • 29% Black, not Hispanic
  - 2% Hispanic                      • 2% Asian/Pacific Islander
  - 22% students in this school are eligible for free/reduced-price lunch
- Used HBFD for Tier 2 intervention with kindergarten students
- Took revised version (58 questions total) of FDI
- Pretested kindergarten students in late September 2010
- Selected Tier 2 kindergarten students to work with the software based on FDI pretest scores ( $\leq 25\%$ ) and teacher reports
- 21 students pretested, worked with HBFD, and posttested
- Used software for 2 x 30 minutes/week in the computer lab
- Posttested students January 5, 2011

\*from NCES, 2008-2009

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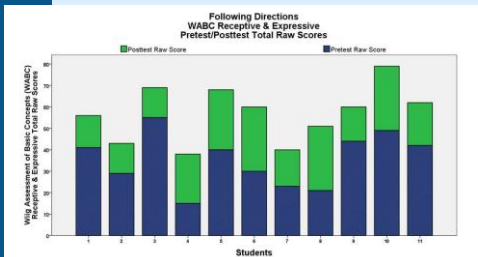
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## Suburban Elementary School in Southern California



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## FEATURES OF THE *HEARBUILDER*® PROFESSIONAL SOFTWARE SERIES

- Measurable learning objectives for every level
- Customizable
- Set, change, monitor levels of difficulty
- Add background noise
- Data-tracking for unlimited number of students
- Customizable and printable reports

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## VISIT [WWW.HEARBUILDER.COM](http://WWW.HEARBUILDER.COM)

- Research basis
- Report of the Clark County School District pilot studies for Phonological Awareness and Following Directions
- Correlations to state language arts standards
- Interactive demos ("Try It Out")
- System requirements
- Awards and Product Reviews
- List of upcoming presentations across the country
- Super Duper® Publications is on Facebook & Twitter



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