Early Intensive Behavioral Intervention:
Why It’s Important & How to Do It Well

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Early Intensive Behavioral Intervention
What is EIBI?

• An effective, behavior analysis-based approach for children with an autism spectrum disorder to remediate deficits with a strong focus on language
Early Intensive Behavioral Intervention

- Treatment begins as soon as the child is diagnosed with a Pervasive Developmental Disorder typically between 2 to 3 years.
Early **Intensive** Behavioral Intervention

- Initially, one-to-one treatment for 30 to 40 hours, extended over approximately 18 months with subsequent social skills development and school enrolment
ABA Outcomes for Autism

Increases in IQ Scores

Hours per Week of Treatment

$r = .79$

$p < .02$
Early Intensive Behavioral Intervention

- Uses objective and accurate measurement of the behavior of interest
Early Intensive Behavioral Intervention

• Individualized Teaching Procedures
• Individualized Curriculum
• Individualized Data Collection Assessing Progress of each Skill
• On-going Hands-on Staff Training
• Parent Training
Why a Behavioral Intervention?
Outcome Research on ABA for Autism

- Lovaas (1987)
- Smith (2000)
- Sallows (2005)
- Howard (2005)
- Cohen (2006)
- Eikeseth (2007)
- Zachor (2007)
- Remington (2007)
- Perry (2008)
Outcome Research on ABA for Autism

- Conclusions of outcome research
  - Every published study demonstrated very large treatment effects
  - Replicated across research groups, across university vs. community settings, and across continents
  - **Intensity matters**: at least 30 hours per week of one to one intervention for more than a year produces best outcomes
  - **Duration matters**: two or more years of intervention
How Effective is ABA for Autism?

- An analysis was conducted by Jacobson, Mulick, and Green (1998) using information from the state of Pennsylvania available at the end of 1996.
- In any group of children receiving EIBI, between 20% and 50% will achieve normal functioning and require no specialized services after entering elementary school. About 10% will make small gains and require intensive special education and adult services (minimal effect group). The remainder will make moderate gains and need nonintensive special education and adult services (partial effect group).
- Without EIBI, most people with autism need lifelong special services.
Support for ABA in Autism Treatment

• Surgeon General
• NY State Department of Health
• National Academy of Sciences
• American Academy of Pediatrics

“The effectiveness of ABA-based intervention in ASDs has been well documented through 5 decades of research by using single-subject methodology and in controlled studies of comprehensive early intensive behavioral intervention programs in university and community settings. Children who receive early intensive behavioral treatment have been shown to make substantial, sustained gains in IQ, language, academic performance, and adaptive behavior as well as some measures of social behavior, and their outcomes have been significantly better than those of children in control groups."
Estimated Savings Per Child
3-22 Years

• The average annual cost of EIBI is estimated at $33,000 per child. The average duration is estimated to be three years.
• Children who realize partial or minimal effects will use family support services to age 22, i.e. for 18 years.
• Average savings to the educational system per child from age 3 to 22 range from $298,651 to $274,709 depending upon the proportion of children - 20, 30, 40 or 50% - who achieve normal functioning levels.

Cost-Benefit Analysis of EIBI

- Average lifetime cost for a person with autism is over $4 million
- Average cost of Early, Intensive ABA is $150,000 over about 3 years
- Average lifetime savings from ABA Treatment is between $1.6 and $2.7 million
Applied Behavior Analysis
Applied Behavior Analysis

- A science
- Teaching procedures are derived from learning principles
- Teaching procedures are systematically applied
- Teaching procedure geared to improve socially significant behavior
- Requires experimental demonstration that the teaching procedures employed were responsible for the improvement in behavior
What is ABA?

- Applied Behavior Analysis
- ABA is the use of scientific principles of learning and motivation to teach effectively
- The core concept is that the consequences of what we do affect what we learn and what we will do in the future
Behavior Analysis & Interventions

• Focus is on behavior
• Measurement of behavior change
• Emphasis on current environmental events
  Antecedents ➔ Behaviors ➔ Consequences
• Behaviors are defined by their dimensions or properties
• Intervention procedures are clearly described
• Intervention implemented by people in everyday life
The ABC’s of Behavior

- **Antecedents (before)**
  - Events that precede a behavior
    - The phone rings

- **Behavior**
  - The behavior itself
    - Pick up the receiver / say “hello”

- **Consequences (after)**
  - Outcomes of performing the behavior
    - Hear the other person speak
Why Does Behavior Occur?

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Rings</td>
<td>Answer Phone</td>
<td>Speak to Friend</td>
</tr>
</tbody>
</table>
A

Understanding Antecedents
Antecedents

- What comes BEFORE
- Sometimes called the “trigger”
- “WH” questions
  - Who was there?
  - When did it happen?
  - Where did it happen?
  - What was happening?
Understanding Behavior
What is Behavior?

- Behavior is what people do and say
  - Specific, observable, measurable
  - Walk, talk, read, eat, write, cry, tantrum
Characteristics of Behavior

• Behavior serves the individual
  • Behaviors that are reinforced (rewarded) are repeated
  • If a behavior is occurring, then it is working somehow for that individual

• Behavior can be measured
  • Frequency (how many times)
  • Intensity (how severe)
  • Duration (how long)
  • Latency (response time)
Understanding Consequences
Consequences

• What happens AFTER
  • The result

• Consequences can either increase or decrease behavior

• Provide important information about WHY the behavior occurs
# Reinforcement & Punishment

<table>
<thead>
<tr>
<th></th>
<th>Increases Behavior</th>
<th>Decreases Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Give or Gain</strong></td>
<td>Positive Reinforcement</td>
<td>Positive Punishment</td>
</tr>
<tr>
<td>(+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Remove or Avoid</strong></td>
<td>Negative Reinforcement</td>
<td>Negative Punishment</td>
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</tbody>
</table>
How to Intervene
Comprehensive ABA Programs

- Earliest versions of ABA programs focused mostly on discrete trial intervention (DTI)
- Comprehensive ABA programs now include a variety of behavioral teaching strategies
  - DTI
  - Natural Environment Training (NET)
  - Verbal Behavior
  - Challenging behavior
  - Data collection
  - Programming for generalization
Comprehensive ABA Programs

- Skills Assessment (e.g. ABLLS-R, VB-MAAP)
- Teaching program (e.g. DTI)
- Functional Behavioral Assessment
- Function-based Behavior Intervention Plan
- Must include parents
Three-Term Contingency

- Sometimes called a Discrete Trial
- Single opportunity for an organism to respond

Antecedent $\rightarrow$ Behavior $\rightarrow$ Consequence
Discriminative Stimulus $\rightarrow$ Response $\rightarrow$ Reinforcer or Punisher

$S^D \rightarrow R \rightarrow S^R$ or $S^P$

| Ringing Phone | Answering the Phone | Contact Friend/Family |
Discrete Trial Teaching/Instruction

- Discrete = Clear beginning and clear end
- Part of ABA, not synonymous
- Breaks learning down into small, teachable steps
- Teaches skills in a highly structured, systematic way
- Generally includes a great deal of repetition
- Uses the 3-term contingency to teach new skills

\[
\begin{align*}
\text{Antecedent} & \rightarrow \text{Behavior} & \rightarrow \text{Consequence} \\
SD & \rightarrow R & SR \text{ or } SP
\end{align*}
\]

| “Touch your nose.” | Touching nose | Praise/Tangible |
SD or Discriminative Stimulus

- Indicates the availability of reinforcement for a certain behavior
- In the context of discrete trial:
  - Is usually the direction/instruction
  - Is predetermined and consistent
  - Is given in statement form
  - Is given in a clear, strong, neutral voice
Response

• Correct

• Incorrect

• No response
<table>
<thead>
<tr>
<th>Discriminative Stimulus</th>
<th>Response</th>
<th>Reinforcer or Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S^D$</td>
<td>Correct $\rightarrow$</td>
<td>$S^R$</td>
</tr>
<tr>
<td>$S^D$</td>
<td>Incorrect $\rightarrow$</td>
<td>$C$</td>
</tr>
<tr>
<td>$S^D$</td>
<td>No Response $\rightarrow$</td>
<td>$C$</td>
</tr>
</tbody>
</table>
Error Correction Procedure

• Decreases the likelihood of the response in the future
• Immediately follows an incorrect response
• Is given with a neutral face/voice
• Alerts the learner that a mistake was made

• Examples:
  • “Try again.”
  • “No.”
  • “This is touching blue.”

• Ends the discrete trial
• Is followed by restarting the discrete trial with the same target.
Reinforcement Procedure

• Increases the likelihood of the response in the future
• Immediately follows a correct response
• Primary—Generally Edibles
• Secondary—Generally Praise
  • Make great use of face/voice
  • Be descriptive
  • Vary language, tone, and volume
• Ends the discrete trial—Can be followed by the same target, a new target, or the end of the sitting.
Teaching Imitation Using DTI

• Starts with simple responses (e.g., clapping).

• Each trial starts with the therapist saying “Do this” and then modeling the target response.

• Any approximation of clapping, results in delivery of a preferred reinforcer (e.g., toy).

• Otherwise, the therapist guides the child’s hands to complete the response and then begins the next trial.
Teaching Imitation Using DTI

• Once the first response is mastered, the same procedure would be used to teach a second response (e.g., waving).

• After two responses are mastered in individual sessions, they would alternately be presented in the same session (e.g., “Do this” [clapping]; “Do this” [waving]).

• Over time, additional responses are added until the child immediately imitates any new action the therapist does following the prompt, “Do this.”
Discrete Trial Intervention
Reinforcement
Choosing Reinforcers

• Gather information
  • Ask the learner
  • Ask the learner’s parent or teacher
  • Observe the learner
• Conduct a preference assessment
Preference Assessments

**Step 1**: Interview the parent with the RAISD to list the kinds of things that the child likes

**Step 2**: Get the actual items the parent nominated as highly preferred

**Step 3**: Conduct the preference assessment

**Step 4**: Rank the items from high to low based on what the child chose
Types of Preference Assessments

• **Single-item type** – Present each item from the group one at a time

• **Paired type** – Present all items 2 at a time and let the child choose between the 2.

• **Group type** – Present all items together and let the child select items from the group
Group Preference Assessment

- Multiple Stimulus without replacement (MSWO) developed by DeLeon and Iwata (1996)
  - Compared three different preference assessments (PC method, MSWR, & MSWO)
  - Results obtained from MSWO were comparable to that obtained by the PC method
## Multiple Stimulus Without Replacement

<table>
<thead>
<tr>
<th>Trial</th>
<th>Set 1</th>
<th>Set 2</th>
<th>Set 3</th>
<th>Set 4</th>
<th>Set 5</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
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<tr>
<td>2</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
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<tr>
<td>3</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
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<tr>
<td>4</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
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<tr>
<td>5</td>
<td>A B C D E</td>
<td>A B C D E</td>
<td>A B C D E</td>
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### Summary:

<table>
<thead>
<tr>
<th>Food Items</th>
<th>Set 1</th>
<th>Set 2</th>
<th>Set 3</th>
<th>Set 4</th>
<th>Set 5</th>
<th>Total ( % )</th>
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</thead>
<tbody>
<tr>
<td>A: _________</td>
<td>______</td>
<td>______</td>
<td>______</td>
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<td>______</td>
<td>(____ )</td>
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<td># Selections:</td>
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<tr>
<td>B: _________</td>
<td>______</td>
<td>______</td>
<td>______</td>
<td>______</td>
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<td>(____ )</td>
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<tr>
<td># Trials:</td>
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<tr>
<td>C: _________</td>
<td>______</td>
<td>______</td>
<td>______</td>
<td>______</td>
<td>______</td>
<td>(____ )</td>
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<td># Selections:</td>
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<td># Trials:</td>
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<tr>
<td>D: _________</td>
<td>______</td>
<td>______</td>
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<td># Selections:</td>
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<td># Trials:</td>
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<tr>
<td>E: _________</td>
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<td>(____ )</td>
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<tr>
<td># Trials:</td>
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</tbody>
</table>
Paired-Choice Preference Assessment

- Developed by Fisher et al. (1992, 1996)
  - Take 5-10 top items from the RAISD
  - Each item is paired once with every other item
  - Two items presented concurrently; the participant was prompted to choose one
    - The participants had to emit a choice
## Paired Preference Assessment

<table>
<thead>
<tr>
<th>Trials</th>
<th>Pairs</th>
<th>Trials</th>
<th>Pairs</th>
<th>Trials</th>
<th>Pairs</th>
<th>Trials</th>
<th>Pairs</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>A vs. B</td>
<td>8</td>
<td>F vs. H</td>
<td>15</td>
<td>C vs. G</td>
<td>22</td>
<td>B vs. H</td>
</tr>
<tr>
<td>2</td>
<td>C vs. D</td>
<td>9</td>
<td>A vs. D</td>
<td>16</td>
<td>D vs. H</td>
<td>23</td>
<td>C vs. E</td>
</tr>
<tr>
<td>3</td>
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<td>10</td>
<td>B vs. C</td>
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<td>A vs. F</td>
<td>24</td>
<td>D vs. F</td>
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<tr>
<td>4</td>
<td>G vs. H</td>
<td>11</td>
<td>E vs. H</td>
<td>18</td>
<td>B vs. E</td>
<td>25</td>
<td>A vs. H</td>
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<tr>
<td>5</td>
<td>A vs. C</td>
<td>12</td>
<td>F vs. G</td>
<td>19</td>
<td>C vs. H</td>
<td>26</td>
<td>B vs. G</td>
</tr>
<tr>
<td>6</td>
<td>B vs. D</td>
<td>13</td>
<td>A vs. E</td>
<td>20</td>
<td>D vs. G</td>
<td>27</td>
<td>C vs. F</td>
</tr>
<tr>
<td>7</td>
<td>E vs. G</td>
<td>14</td>
<td>B vs. F</td>
<td>21</td>
<td>A vs. G</td>
<td>28</td>
<td>D vs. E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foods</th>
<th># Times Selected</th>
<th>Foods</th>
<th># Times Selected</th>
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</thead>
<tbody>
<tr>
<td>A:___________</td>
<td>____</td>
<td>E:___________</td>
<td>____</td>
</tr>
<tr>
<td>B:___________</td>
<td>____</td>
<td>F:___________</td>
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<tr>
<td>C:___________</td>
<td>____</td>
<td>G:___________</td>
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<tr>
<td>D:___________</td>
<td>____</td>
<td>H:___________</td>
<td>____</td>
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</tbody>
</table>
Paired Preference Assessment
Results

<table>
<thead>
<tr>
<th>Items</th>
<th>Percentage of trials chosen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cookie</td>
<td>100</td>
</tr>
<tr>
<td>Raisin</td>
<td>50</td>
</tr>
<tr>
<td>Apple</td>
<td>30</td>
</tr>
<tr>
<td>Chip</td>
<td>20</td>
</tr>
<tr>
<td>Chocolate</td>
<td>10</td>
</tr>
</tbody>
</table>
Schedule of Reinforcement

- Schedule = How often you reinforce a behavior
- Can be fixed or varied
- Can be based on number of behaviors or duration of behavior
- New behavior
Reinforcement Strategies

• Differential Reinforcement
• Premack Principle
• Token System
Prompting
Stimulus Control

• Increased probability of a behavior in the presence of a stimulus
• Prompts initially have stimulus control over behavior
• Fading the prompt transfers stimulus control to the intended SD
General Prompting Strategies

- Know if you are prompting before you deliver the SD
- Deliver the prompt as close as possible to the SD
- Prompt only as much as necessary
- Be consistent with prompts
- Don’t unintentionally prompt
- Prerequisite skills
- The prompting procedure that you use will depend on the skill being taught

Discriminative Stimulus $\rightarrow$ Response $\rightarrow$ Reinforcer or Punisher

SD $\rightarrow$ R $\rightarrow$ SR or SP
Specific Prompting Strategies

• Verbal Prompt
• Visual Prompt
  • Gestural
  • Model
  • Within Stimulus
• Physical Prompt
• Environmental Prompt
  • Positional/Location/Geographic
General Strategies for Prompt Fading

• What is prompt fading?
• Why fade prompts?
• Fade prompts as soon as you can do so without losing the response being taught
• Three ways to fade prompts
  • Gradually
  • Momentum
  • Time Delay
• The fading procedure that you use will depend on the prompt you are using
• The pace depends upon the learner
• Response weakening
Specific Strategies for Prompt Fading

- Verbal Prompt
- Visual
  - Gestural Prompt
  - Model Prompt
  - Within Stimulus
- Physical Prompt
- Environmental
  - Positional/Location/Geographic
Fading a Prompt—Demonstration
Generalization
What is Generalization?

A target skill or behavior is considered generalized if it continues to be demonstrated over time under various conditions.

Look for generalization across:

- Settings
- People
- Materials
- S’s
- Behaviors
Generalization

• Comprehensive ABA programs must explicitly focus on generalization
• Generalization does NOT occur automatically
• Generalization is NOT an afterthought or side-effect
• Generalization is THE central goal of intervention
How to Facilitate Generalization

• Teach behaviors in natural settings
• Use a variety of caregivers
• Train in a variety of settings
• Train using a variety of materials
• Train using a variety of SD’s
How to Facilitate Generalization

• Shift quickly from artificial cues and reinforcers to more natural reinforcers
• Shift from reinforcing every correct response to intermittently reinforcing
• Gradually increase delays in delivery of reinforcement
• Reinforce instances of generalization
Logistics and Funding
Logistics

- Team
  - Consultant
  - Therapists
    - Line
    - Lead
- Speech/OT/PT
- School Staff
Consultant

• At least a Masters in Behavior Analysis or a related field
• Board Certified Behavior Analyst (BACB)
• Previous high-quality work creating & implementing evidence-based interventions with a great number of different children
• Previous high-quality work creating & implementing evidence-based interventions with children similar to yours
Therapists

- Dependability
- Eagerness to learn
- Even demeanor
- Willingness to take feedback

- Intensive Training ➔ Ongoing Supervision
## Scheduling

<table>
<thead>
<tr>
<th>Time Block</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00-10:00</td>
<td>Susan</td>
<td>Susan</td>
<td>Susan</td>
<td>Susan</td>
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<tr>
<td>10:30-12:30</td>
<td>Mary</td>
<td>Tom</td>
<td>Mary</td>
<td>Tom</td>
<td>Mary</td>
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<tr>
<td>1:00-3:00</td>
<td>Ali</td>
<td>Ali</td>
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<td>Ali</td>
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<tr>
<td>3:30-5:30</td>
<td>Jessie</td>
<td>Ashley</td>
<td>Jessie</td>
<td>Ashley</td>
<td>Jessie</td>
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<td>Time Block</td>
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<tr>
<td>8:00-10:00</td>
<td>Susan</td>
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<td>Susan</td>
<td>Susan</td>
<td>Susan</td>
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<tr>
<td>10:30-12:30</td>
<td>Mary</td>
<td>Tom</td>
<td>Mary</td>
<td>Tom</td>
<td>Mary</td>
<td>Jessie</td>
<td>Jessie</td>
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<tr>
<td>1:00-3:00</td>
<td>Ali</td>
<td>Ali</td>
<td>Ali</td>
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<td>Ashley</td>
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<td>3:30-5:30</td>
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</table>
Unfortunately, you have what we call 'no insurance.'
Funding Sources

- Private Pay
- Insurance
- Waiver
- Litigation
How Best to Spend the Money

- Consultant
- Therapists—Volunteers
  - Family
  - Church
  - Parenting/Social Groups
  - Local Colleges
  - Fliers