Applied Behavior Analysis (ABA) is a technique that has been shown to help children with autism. One element of ABA is behavior shaping, which focuses on taking an observed behavior and modifying it to match a target behavior. The idea presented in this poster is to apply technology assisted ABA therapies to improve speech development in children with delays. The solution incorporates a portable device and software that analyzes and modifies a child’s recorded vocalizations to provide a feedback loop. We envision developing software to identify a child’s vocabulary of sounds, matching the sounds to a target word, and modifying the sounds so that they are closer approximations to the desired target words. We believe that by hearing their own (modified) voice in an ABA setting, the child will be able to master the target words. This work is very early and experimental. Ultimately we envision a tablet-type device displaying an image that matches the target word and real-time shaping of the word by software on the device. In a single session, an ABA therapist would be able to work through multiple improvements of the child’s approximation of a target word with the device providing an instantaneous model of the word.

ABA Application

What is Behavior Analysis?

Commonly referred to as ABA, it is the scientific study of behavior based on the work of B.F. Skinner in the 1930s.

- Application of systematic environmental modifications to produce socially significant improvements in behavior.
- Empirically validated based on scientific research.
- The subject matter is behavior.
- Individualized treatment approach.
- Focuses on objectively defined observable behavior.
- Treatment of choice for autistic behavior starting in the 1980s.

Characteristics of ABA

- Applied - socially significant
- Behavioral - observable, measurable
- Analytic - demonstrates a functional relationship between the manipulated events and the behavior
- Technical - procedures identified and precisely defined
- Conceptually Systematic - behavior changes are described in terms of relevant basic principles
- Effective - must improve the behavior to a practical degree
- Generality - lasts over time and appears in other environments

ABA Discrete Trial

- Break a task into small, discrete tasks
- 3-term contingency of ABA: Antecedents, Behavior, and Consequences.
- Conducted in a formal training setting, such as a table top
  1. Trainer presents discriminative stimulus - the antecedent (SD)
  2. Child gives response - the behavior (R)
  3. Trainer delivers consequences - reinforcing stimulus (SR)
- Antecedents:
  - Verbal directives, environmental changes, presence or absence of people or stimuli, passage of time, etc.
- Reinforcer:
  - An event that follows a behavior and increases the rate of that behavior recurring

ABA Discrete Trial Teaching

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Determine a Target Word (Behavior)

After generating a distribution of the frequency of vocalizations, the goal of this step will be to select specific sounds from the vocabulary (the observed behavior). We envision that the child will have a set of vocalizations that occur more frequently and with higher quality. The next step is then to match the vocalization to a target word (the desired behavior). A therapist can listen to the vocalizations and select appropriate target words. Ultimately, we envision software that can assist in matching the vocalizations to potential target words.

Software and Portable Device to Assist in Applied Behavior Analysis (ABA) Therapy for Speech and Language Disorders

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References and Acknowledgements

1. Harris, Gerald D., ABC’s of ABA Workshop, Presented at Lone Star Association of Behavior Analysis (LSABA) SIG, Houston, TX, April 2012.

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