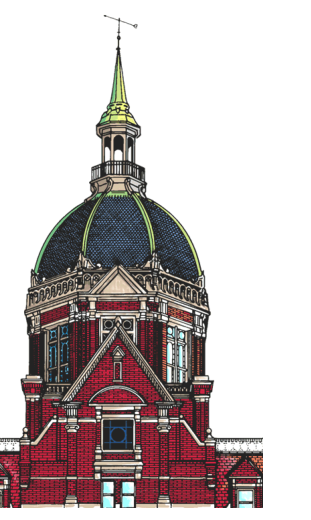


TRAINING SPEECH SOUNDS IN NON-VERBAL AUTISM: A CASE STUDY



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Abstract

Between one-third and one-half of all individuals with autism never develop functional speech, and it is rare for a truly nonverbal individual to become verbal after the age of 5. We studied whether it was possible to establish oral communication in a non-verbal teenager with autism, and which method(s) for doing so seemed to be most successful. The subject, AI (not his real initials), was 13 years old at the start of the study. He was in a full-time home-based educational program, with 1:1 teaching. The basic goals were (a) to teach the subject to make vocalizations voluntarily in a communicative situation, then (b) to use consonants and vowels already in the individual’s repertoire as “words” for specific communicative needs. The basic methods used were (1) assessment of stereotypic vocalizations, (2) modeling and reinforcement of successive approximations of the targeted speech sound, and (3) maintenance of reliably produced speech sounds. Training was done during both scheduled classroom instruction and outside activities. Results: In 26 months, the subject learned to reliably use and imitate the consonants /p,f,s,t,θ/ (“p,f,s,t,th”) as word approximations for communication. In the latter part of this period, he began imitating the production of the short vowels: /æ,ʌ,ɛ,ɪ/ (“a,u,e,i”) and the long vowel /e/ (“a”) as well as the consonant-vowel combination of /hæ/ (“h” plus short a”). Results suggest that this intervention led to the establishment of volitional speech-like abilities in an older individual with autism.

Background and Basic Issues

Studies report between one-third (Bryson, 1996) and one-half (Lord & Paul, 1997) of all individuals diagnosed with autism never learn to speak. Moreover, it is rare for nonverbal individuals to acquire speech capabilities after the age of five or so, judging either by parental report (Williams, 1990) or by case studies (e.g., Thomke,1977). There have been very few detailed reports of how older individuals with autism might be taught speech (Thomke,1977). We made such an attempt, based upon what seemed to be reasonable psycholinguistic and educational principles, but also sensitive to the effectiveness of the strategies that were tried. Overall, we had the following goals.

- Teach the subject to imitate single consonant and consonant/vowel sounds to request a preferred item/activity.
- Teach the subject to independently produce single consonant and consonant vowel sounds to request a preferred item.
- Identify potential key elements in implementing such an intervention.

Methods

Subject

- Nonverbal, low-functioning, 16 year old male with autism, A.I. (not real initials)
- Preschool Language Series (PLS III) score 18 at age 12 (1998)
- Peabody Picture Vocabulary Test (PPVT) standard score 19 at age 12 and 23 at age 16

General Tasks and Procedures

- Retrospective study done as part of student’s educational program. Informed consent given in accord with JHMI IRB requirements.
- All consonant and vowel sounds targeted were functionally important for AI’s communication needs.
- Consonant and vowel sounds were presented in discrete trial format and during incidental teaching opportunities in the home-school setting and at the speech-language pathologist’s office.
- Rewarded with preferred items corresponding with the targeted sound (i.e., AI imitated /p/ and received a pretzel).
- Preferred items beginning with the targeted sound were presented directly to AI or visually available in his environment.
- Consonants and consonant/vowel combinations were initially imitated by the instructor, then faded to lead in phrases such as “what do you want?” or “tell me,” to visual presentation of the item.
- Shaping procedures were used for sounds such that the criterion for reward became more stringent as closer approximations of the target sounds were produced.
- Verbal and touch prompts used for all consonant and vowel sounds were faded to facilitate independence.
- Incorrect response would immediately be followed with an error correction procedure. The instructor would model the targeted sound and/or provide a visual/touch prompt*.
- If AI did not produce the targeted sound after two attempts, the instructor went to an unrelated task (body part ID) or another consonant or vowel sound and then reintroduced targeted sound.
- New sounds were introduced once a previous sound was reliably produced two consecutive days.
- All speech sessions were recorded on a video/DVD camcorder and data were collected on data sheets. Both were used in the data analysis of this study.

*See specific tasks for prompts used

Verbal/Visual/Tactile Cues for Specific Consonants and Vowels

1. /p/: the touch prompt of putting lips together with index finger and thumb was used to shape sound. Rewards included pop, Pez®, pretzels, pillow and play.
2. /f/: a tissue for AI to blow on was used to shape this sound as well as the verbal prompt “teeth on bottom lip.” Rewards included Fruit Loops®, fruit chews, and finished.
3. /s/: the verbal prompt, “smile and blow” or “teeth together” was used to shape this sound. Rewards included sour candy, sesame candy, and Skittles®.
4. /t/: the touch prompt strategy putting two fingers to teeth was used to shape this sound. This touch prompt was also used to increase awareness of having the tongue touch the alveolar ridge. Rewards included Tic Tacs® and Teddy Grahams®.
5. /θ/ “th”: the verbal prompt, “tongue out and blow” to shape this sound. Instructional sessions included use of /θ/ for “thirsty,” “this” and 3 Musketeers®.
6. /m/: introduced without a prompt as humming was already part of AI’s repertoire. Rewards included M&Ms® and Mentos®. /m/ was discontinued due to lack of progress and then reintroduced as AI’s repertoire and ability to imitate increased.

Data Collection and Analysis

- Session identifiers, presentation of preferred items, correct, incorrect or prompted responses, level of prompting, and specific sounds (vowels and/or consonants) produced by AI were recorded.
- Four video sessions and three previous home-base data collection sheets were analyzed throughout the 26-month period to create 7 samples.
 - All 7 sessions sampled ranged in duration from 8-20 minutes long.
 - Samples 1 to 5 were selected 3-6 months apart, due to slower acquisition rates and AI’s absence due to holidays and family vacation.
 - Samples 5 to 7 were selected 1-2 weeks apart, due to faster acquisition rates.
- Data collected from video observations were organized into 5 categories and scored as Correct (+) or Incorrect (-).
 - 1) Lead in only (What do you want? Tell me”)
 - 2) Lead in + Prompt (teacher gave verbal model, teacher used touch prompt, gave verbal reminder)
 - 3) Prompt only
 - 4) Presence of item (teacher held item up to AI) + expectant look
 - 5) Independent response (student initiated, elicited teacher’s attention/may have included student self-prompting.
 - o Data extracted from the video observations were combined as (+) or (-) across all 5 categories. Categories were only used to observe emergence of independent speech production versus speech production produced as imitation or type of prompt used.

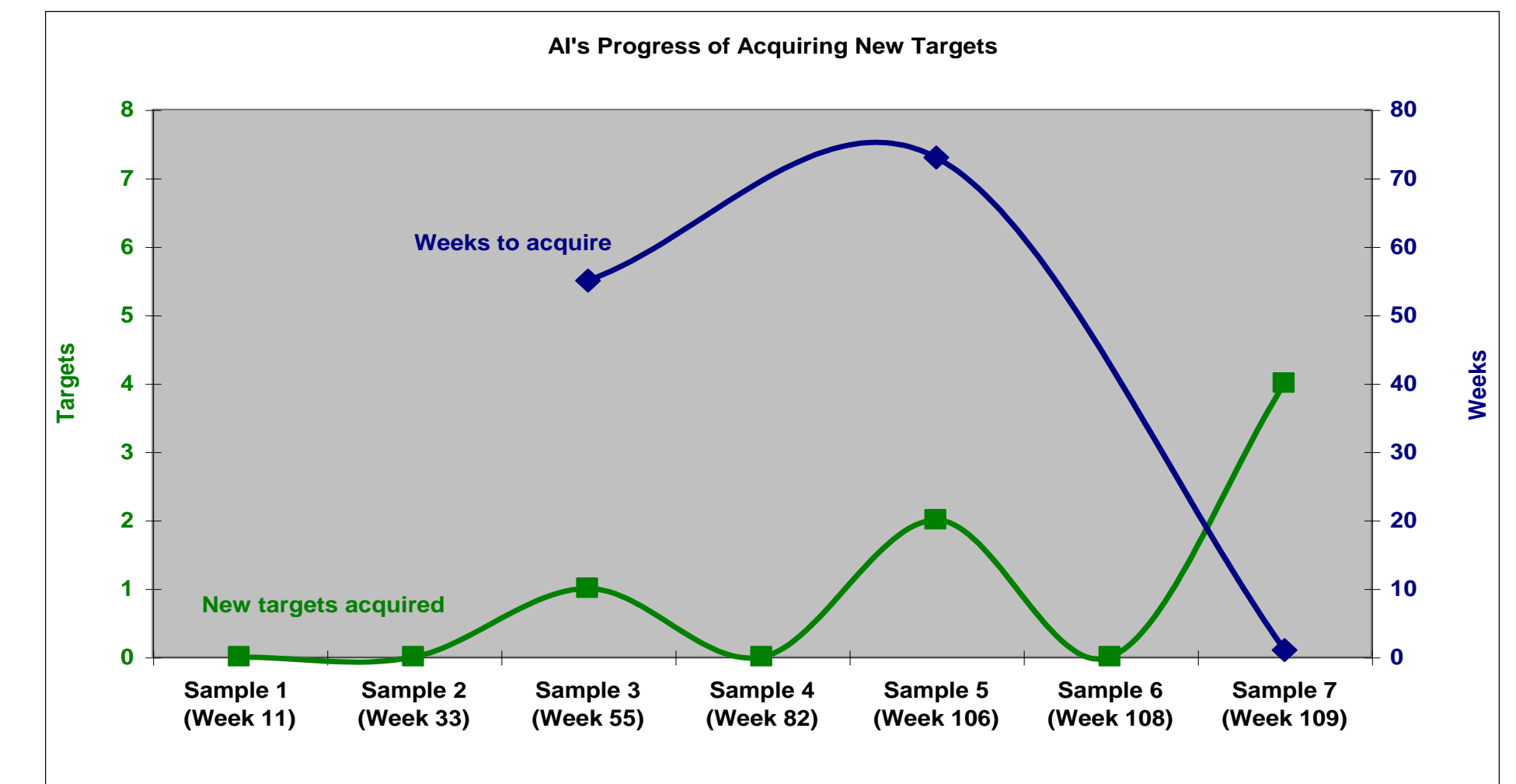
- Data collected from home-base data sheets were scored as Correct, Incorrect or Prompted. Correct, Incorrect or Prompted scoring was defined by the following criteria:
 - 1) Definition of Correct: The targeted response was made within two attempts with or without AI using a self-prompt (touching his own lips).
 - 2) Definition of Prompted: Responses included the instructor giving AI a lead in such as “What do you want?, modeling the consonant, using a touch prompt or a verbal reminder such as “lips together”. Prompted responses were plotted the same as Incorrect if less than two attempts were made by AI and the targeted response was correctly produced.
 - 3) Definition of Incorrect: More than two attempts were made by AI (attempts included no response or response using an incorrect consonant). Prompted responses were plotted the same as Incorrect if more than two attempts were made by AI and the targeted response was correctly produced.

Results

- Approximately 364 total sessions across the 11 sounds introduced in a 26-month time period.
 - 76 speech-language office sessions.
 - 288 home-school sessions.
 - Incidental teaching opportunities are not included in the analysis of sessions because incidental teaching trials were taken throughout the day, averaging 40-50 trials per week.
 - Invalid trials were not included in data analysis. Trials recorded as invalid were defined as trials in which the sound AI produced was unclear due to video quality or the instructor or student’s face could not be viewed and level of prompting could not be recorded.
- AI scored 0% at baseline prior to the start of the 26-month training period for consonants /p, f, t, θ/.

Results (continued)

- Criteria of >=80% correct for one session was considered mastery.
- 7 new targets were acquired across the 7 sessions sampled.
 - 0 targets were acquired in Sample Session 1 (Week 11).
 - 0 targets were acquired in Sample Session 2 (Week 33).
 - 1 target was acquired in Sample Session 3 (Week 55).
 - 0 targets were acquired in Sample Session 4 (Week 82)
 - 2 targets were acquired in Sample Session 5 (Week 106).
 - 0 targets were acquired in Sample Session 6 (Week 108).
 - 4 targets were acquired in Sample Session 7 (Week 109).
- AI increased targets mastered and produced these targets at a faster rate than at the beginning of training (see data and graph below).



Target	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7
/p/	15/21	5/7	2/2	9/10	5/5	4/5	5/5
/f/	NI	0/17	3/4	2/11	5/5	2/2	4/5
/t/	NI	5/13	1/2	3/4	4/5	3/3	4/5
/s/	NI	NI	2/3	**	3/5	2/4	5/5
/θ/ "th"	5/5
/d/	NI	NI	NI	NI	NI	4/6	2/5
/b/	NI	NI	NI	NI	NI	2/5	5/5
/h/	NI	NI	NI	NI	NI	2/5	4/5

Newly acquired targets: 0, 0, 1, 0, 2, 0, 4

Weeks to acquire: n/a, n/a, 55, n/a, 73, 0, 1

Green text = target has met criteria of >=80%
NI=Not Introduced

Conclusions

- At least for this individual, we were able to show an increase in oral communication using consonants and vowels over a 26-month period.
- Many factors make the causal assignment and generality of these results tentative, including: the single-case nature of the data, the non-experimental design of the training, the limited range of tasks and materials, and factors such as the introduction of sign language 7 months into training and a general increase in the subject’s communicative opportunities in the educational setting.
- Nevertheless, this case study lends further support to the only very rarely documented possibility (e.g. Thomke,1977) that even older nonverbal individuals with autism may be taught speech-like communication, with targeted training and sufficient practice.
- There is evidence for continued acceleration of this individual’s rate of acquisition and use of speech sounds: During the end of the 26th month and into the current 27th month training period (not shown here), staff continued probing various voiced and voiceless sounds with minimal imitations of each. Sounds introduced included: /ʌ, ʃ, z, l, i, o/ (“uh, ch, z, l, e, o”). AI also began to produce consonant/vowel combinations together such as /hi, /bai, /bo (“h-ee, bye, b-oh”). AI had begun to spontaneously generalize the /b/ and /m/ sounds across school staff and household members (signing “bathroom” while producing the “b”, waving while saying “bye,” signing “music” while producing the “m” sound). Details provided in the handout.

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