Spontaneous Communication in an Individual with Autism

Erin P. Loughlin[1], Zachary Fisher[1], Jennifer Thorne[1], Erin J. Pickett[1], and Barry Gordon[1,2]

[1]Cognitive Neurology/Neuropsychology, Department of Neurology, The Johns Hopkins University School of Medicine, Baltimore, MD; [2]Department of Cognitive Science, The Johns Hopkins University, Baltimore, MD

JOHNS HOPKINS
MEDICINE
SCHOOL OF MEDICINE

Abstract

Lack of speech is one of the hallmarks of many individuals with autism (Pickett et al., 2009), but even individuals who can speak are often surprisingly unable or unwilling to speak spontaneously. We hypothesized that, in one individual with late-developing speech, sparse spontaneous speech was caused by two major factors – oro-motor expressive difficulties, and his lack of appreciation for the situations in which spontaneous speech would have been useful. To address these two specific areas, we developed a training program that was begun at age 21:3. Over the 11 months of this training program, we succeeded in increasing the frequency of his spontaneous speech from 10 to 339 utterances per month, with evidence of increased intelligibility and increased length of utterance as well.

Introduction

Our subject had developed oral speech late (beginning at age 14). Over the subsequent years, he made considerable progress with oral speech production and auditory comprehension (O'Grady et al., IMFAR 2004, 2005). However, truly spontaneous speech was relatively uncommon even by age 21 and, when it occurred, was largely, if not almost exclusively, requests for reinforcing items. We hypothesized that two major factors limited his spontaneous speech: (1) his difficulties with oro-motor expression, which made it difficult for him to express words and utterances that he may have formulated; and (2) the fact that his initial training in speech had necessarily emphasized prompted and imitated responses, which led to a relative lack of exposure to teaching that would have fostered more spontaneous expressions. We sought to remedy both problems through a concerted training program, taking advantage of his full-time, home-schooled environment. Our specific end points were (1) to increase length of utterance , (2) to increase the intelligibility of expressive verbal communication, and (3) to increase the spontaneous use of words and phrases.

Methods

Subject

A.I. (not his real initials) is a regressive-type, low-functioning, and initially non-verbal male individual with autism whose characteristics have been previously described (O'Grady et al., IMFAR 2004, 2005). Although non-verbal for many years, he gradually became verbal starting at 14 years through an extensive training program (O'Grady et al., IMFAR 2004, 2005). He started by using individual consonants and vowels, with prompting, for communicative purposes. By age 16, he began using, with prompting, 1- to 3-word utterances with carrier phrases. By age 21:1, although his speech capabilities had continued to improve, his intelligibility and initiation of communication continued to be limited. All instructor-observed spontaneous utterances consisted of requests for reinforcing items. The focused efforts to improve A.I.'s spontaneous initiation and fluency with oral speech, described here, began at approximately age 21:3. All elements of the work reported here that were done for research purposes were approved by the Institutional Review Board of The Johns Hopkins Medical Institutions with appropriate consent/assent obtained.

Procedures

In the actual curriculum, processes designed to improve intelligibility and length of utterance were coupled with those designed to enhance spontaneity. For purposes of exposition here, we have attempted to distinguish to some extent between communication goals (Table 1) and actual teaching procedures (Table 2).

Target words and phrases were systematically chosen with respect to motor ability, language development, and reinforcing value at each stage of the individual's development. The five-step teaching procedure included (1) errorless exposure, (2) errorless prompting, (3) expansion of utterance to a two-word phrase, (4) use in novel context with delayed prompting, and (5) unprompted use in novel context (Table 2). These teaching procedures were guided by the literature on errorless learning, inclusive plan for generalization (Carter & Hotchkis, 2002), feedback (Maas et al., 2008; Hula et al., 2008), and effects of over-learning (Rohrer & Taylor, 2005). Intelligibility was addressed via the PROMPT method (Chumpelik & Hayden, 1984; Hayden, 2006) and the addition of manual signs.

To maximize spontaneous use, all targets chosen were those deemed relevant to A.I., his communication ability, and communication needs. Targets were embedded into direct instruction, leisure activities, and communicative interactions with all staff (Table 2).

Training was done for five days a week, except for one period of 2 weeks corresponding to a vacation time that occurred at age 21:11 (see Figure 1, age 21:11).

All sessions were audio- and video-recorded. In addition, instructors kept contemporaneous notebooks, including of times during outings when, for example, audio- and/or video-recording were not available. In addition, family reports were elicited for times when the student was not in the presence of instructors. The bulk of the data reported here came from audio- and video-recordings, supplemented by the other sources of information.

For the purposes reported here, an **utterance** is defined as an intelligible word or phrase that seemed to represent a unit of communication for the subject. An utterance was considered **spontaneous** only if no external cues were evident or, if there were a possible external cue, this was a static object (in which case, this always proved to be an object with reinforcing value). In addition to (1) the frequency of spontaneous utterances, data was also collected on (2) the intelligibility of A.I.'s utterances (as determined by ratings given by the instructors working with him, but also checked on an approximately bimonthly basis of direct observations by an SLP not directly associated with the training program, E.P.), and (3) the length and apparent flexibility of A.I.'s utterances.

The collection of data on A.I.'s speech had been an ongoing part of his education program, preceding the specific efforts reported here. However, by age 21:7, it became evident that both the training methods and reporting methods had to be adjusted to accommodate the student's varied utterances and his varied circumstances. After 2 months of refinement, the following system was implemented – beginning at age 21:9, instructors were observed for a 20-minute period interacting with A.I. during his lunchtime routine. The SLP (E.L.) recorded the types of communication used by the instructor, the number of spontaneous utterances by the student, prompting methods, and strategies for eliciting speech from A.I. The spontaneity continuum (Carter, 2002) was used to inform instructors of levels of spontaneity. Instructors were encouraged to utilize communication strategies that may elicit speech with less prompting. Observations and feedback meetings were conducted monthly, and instructors were encouraged to use the least-intrusive antecedent to elicit speech from the student.

Table 1: Communication Goals

Language Goal	Articulation Goal	Targets	Rationale
Increase vocabulary	Final consonant deletion; increase phonatory control	Give, Fast, Slow, Roof, Tired, More	Impeding actions, reinforcing items Articulation: PROMPT Stage II
Increase length of utterance	Increase jaw opening; increase phonatory control	No (object), On, In, Verb + object	Brown's morphemes and semantics Syntax development with known words Articulation: PROMPT Stages II, III
Social communication	Increase jaw grading; increase phonatory control	Hi, Bye, Look, Oh no	Treatment (see below) Articulation: PROMPT Stages II, III
WH questions	Increase phonatory control	Who, Where, When	Treatment (see below) Articulation: PROMPT Stage II

Primary Goal: For A.I. to use target words expressively to convey his wants, needs, and preferences and to request information.

Social Communication: At age 15, social reciprocation goals included responding with "hello" using a Chat PC. At age 21.3, A.I. inconsistently greeted familiar people with, "Hi (name)," and consistently used greetings/salutations when given a verbal prompt.

WH Questions: Answering questions about personal information was introduced at age 12. At age 21.3, by observational report, A.I. verbally answered the questions, "What is your name," and "Who do you live with?" Prior to implementation of the current curriculum, A.I. did not demonstrate the ability to use wh- questions to obtain information.

Table 2: Teaching Procedures for Increasing Spontaneity

Step	Procedure	Example	Criteria
1	Gain attention, model ASL and verbal	Instructor signs and says "Give." Student is attending.	50 trials
2	Gain attention, model ASL and verbal; errorlessly prompt student to repeat	Instructor signs and says "Give," while giving student a book. Student signs and says "Give."	50 trials
3	Gain attention, model ASL and verbal; errorlessly prompt student to repeat 2-word phrase	Instructor signs and says "Give book." Student signs and says "Give book."	50 trials
4a	Set up environment, gain attention, use prompting hierarchy to elicit 2-word phrase	Instructor holds remote. Student signs and says "Give remote."	100% of 3 trials with novel targets
4b	SLP targets articulation via PROMPT method; instructors target articulation with drill practice	Reinforcing items in visual field. Student attempts to access items. SLP uses PROMPT to elicit "Give phone."	100% of 3 trials with novel targets
5	Set up environment, gain attention, use prompting hierarchy to elicit 2-word phrase	Instructor holds student's phone; student says "Give phone."	Intelligible use with novel instructor

Prompting Hierarchy: Set up a communicative interaction and/or need for student to communicate response
1. Gestural Prompt – wait up to 10 sec for response
2. Model Prompt – wait up to 10 sec for response
3. Partial Physical Prompt – wait up to 10 sec for response
4. Full Prompt – wait up to 10 sec for response
5. Model Expected Response

Results

As demonstrated in Figure 1, with the implementation of the modified teaching program and the modified reporting program, gradual, progressive improvements in the frequency of spontaneous utterances were observed. (Note that we cannot completely exclude the contributions of the enhanced reporting system to the improvements recorded, but the magnitude of the improvements far exceeds what might be attributed to the changes in the reporting system alone, which were implemented starting at age 21:9).

The intelligibility of trained items was generally felt to increase during training periods. The maximal length of utterances increased from 3 to 7 words during the course of this training program. A.I. also demonstrated what was thought to be greater flexibility in combining targets independently with commonly heard phrases, e.g., "Give me phone," or "I want to sit on couch."

The maintenance of gains was a definite problem. When words or phrases that had been mastered were faded out of the teaching schedule and replaced with new ones for training, the subject's facility with previously learned words or phrases appeared to deteriorate. There was a decrease in their spontaneous use, and, when they were used, the quality of articulation was typically reduced.
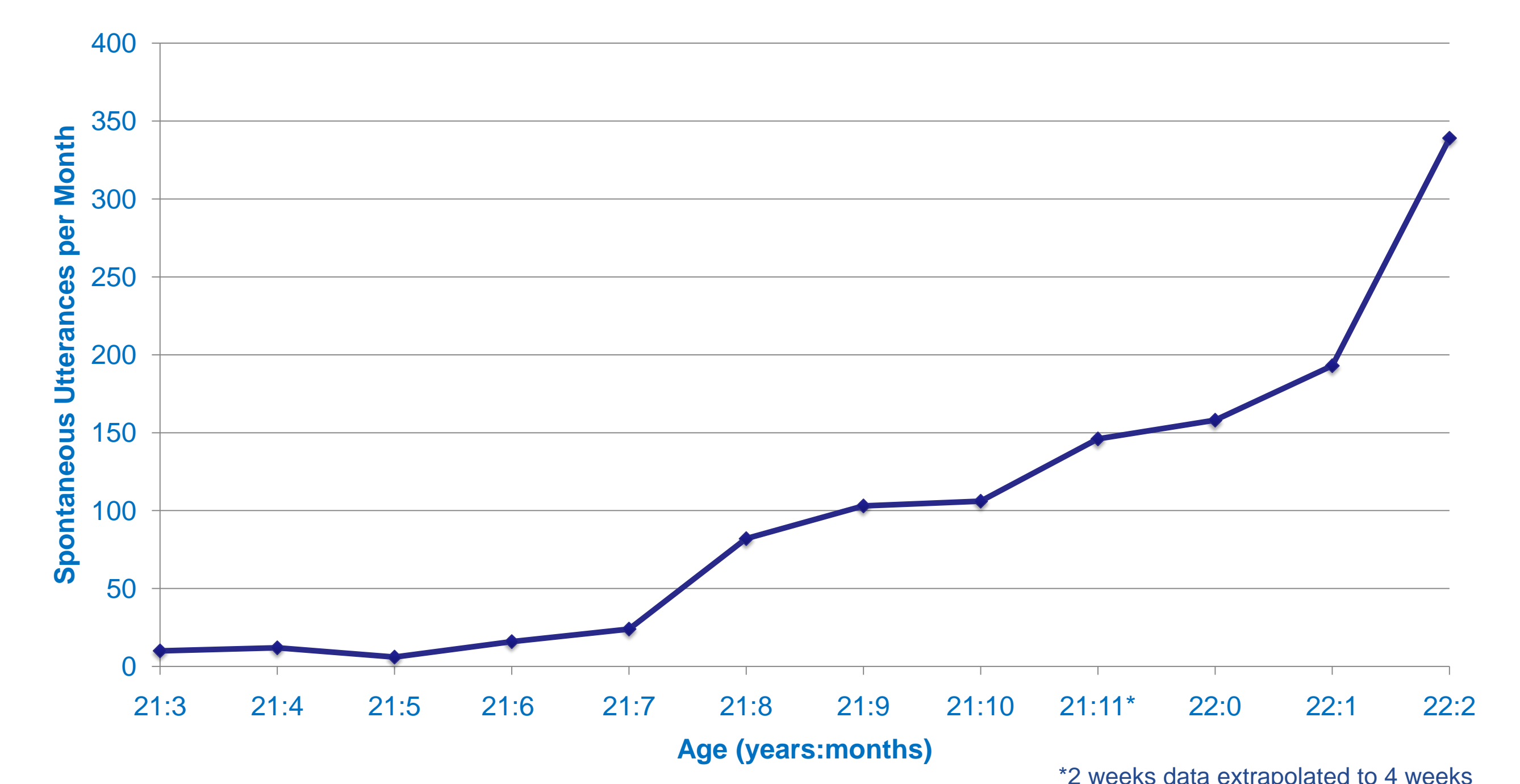

Figure 1. Frequency of Spontaneous Utterances

*2 weeks data extrapolated to 4 weeks

Discussion and Conclusions

There are many possible reasons why individuals with autism may have little or no spontaneous speech (e.g., Carter, 2002). Our observations of one individual led us to hypothesize that two issues were crucial in his particular case – difficulties with articulation, and a relative lack of specific training in spontaneous communication (the latter due to the focus that had been required to teach speech production initially). We, therefore, created a training program targeting these two factors simultaneously. In this program, the same words and/or phrases were targeted concurrently for intelligibility, functional communication, and receptive language. Target words/phrases were taught in their naturally occurring environment, and their spontaneous use resulted in contextual reinforcement.

We hypothesize that it was the ever-evolving coordination, at each stage of the training effort, between (a) the choice of relevant and reinforcing communication targets and (b) considerations as to which targets could potentially be achieved, given his oro-motor capabilities, that helped his spontaneous speech improve at the rate and degree that it did. Although a single-case study such as this one cannot, of course, prove either the underlying hypotheses, nor the utility of the training program, these improvements do provide some support for both.

Regardless of the specific basis or bases for these results, they do suggest that it is possible to improve spontaneity of speech even in a case that would have been expected to pose the greatest challenge for demonstrating spontaneity. Therefore, these results suggest that such improvements may be possible in other individuals with autism who have limited or no spontaneous speech at baseline.

References

Carter M, Hotchkis GD (2002) A conceptual analysis of communicative spontaneity. J Intellect Devel Disabil 27, 168-90.

Carter M (2002) Communicative spontaneity in individuals with high support needs: an exploratory consideration of causation. Int J Disabil Devel Educ 49 (3), 225-42.

Chumpelik D (1984) The PROMPT system of therapy: theoretical framework and applications for developmental apraxia of speech. Semin Speech Lang 5 (2), 139-56.

Hayden D (2006) The PROMPT model: use and application for children with mixed phonological-motor impairment. Adv Speech-Lang Pathol 8, 265-81.

Hula S, Robin D, Mass D, Ballard K, Schmidt R (2008) Effects of feedback frequency and timing on acquisition, retention and transfer of speech skills in acquired apraxia of speech. J Speech Lang Hear Res 51, 1088-13.

Maas E, Robin D, Hula S, Wulf G, Ballard K, Schmidt K (2008) Principles of motor learning in treatment of motor speech disorders. Am J Speech Lang Pathol 17, 277-98.

O'Grady J, Juska J, Pullara O, Bejoian L, Gordon B (2004) Training speech sounds in nonverbal autism. Presented at IMFAR 2004.

O'Grady J, Thorne J, Juska J, Pullara O, Bejoian L, Gordon B (2005) Achieving speech production in a nonverbal adolescent with autism. Presented at IMFAR 2005.

Pickett E, Pullara O, O'Grady J, Gordon B (2009). Speech acquisition in older nonverbal individuals with autism: a review of features, methods, and prognosis. Cogn Behav Neurol 22 (1), 1-21.

Rohrer D, Taylor K (2005) The effect of overlearning on long-term retention. Appl Cogn Psychol 19, 361-74.