FUNCTIONAL ASSESSMENT AND TREATMENT OF PERSEVERATIVE SPEECH ABOUT RESTRICTED TOPICS IN AN ADOLESCENT WITH ASPERGER SYNDROME

WAYNE W. FISHER, NICOLE M. RODRIGUEZ, AND TODD M. OWEN

UNIVERSITY OF NEBRASKA MEDICAL CENTER'S MUNROE MEYER INSTITUTE

A functional analysis showed that a 14-year-old boy with Asperger syndrome displayed perseverative speech (or "restricted interests") reinforced by attention. To promote appropriate speech in a turn-taking format, we implemented differential reinforcement (DR) of nonperseverative speech and DR of on-topic speech within a multiple schedule with stimuli that signaled the contingencies in effect and who was to select the topic. Both treatments reduced perseverative speech, but only DR of on-topic speech increased appropriate turn taking during conversation. Treatment effects were maintained when implemented by family members and novel therapists.

    Key words: Asperger syndrome, autism, circumscribed interests, perseverative speech, restricted interests

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In Hans Asperger's original paper describing Asperger syndrome (1944/1991), he noted that the children displayed intense and highly focused interests on specific topics about which they could recite a remarkable amount of information. In the broad literature on Asperger syndrome, these restricted or circumscribed interests are typically inferred based on the observation that individuals who had been diagnosed with Asperger syndrome often display perseverative speech on restricted topics (repeatedly talking about one or a few specific topics, e.g., trains; Attwood, 1998). Among individuals with autism spectrum disorders (ASD), perseverative speech on restricted topics tends to be relatively stable over time, difficult to redirect, and occupies a large portion of the individual's conversational activities. Family members, peers, and other listeners may find perseverative speech aversive, which, over time, may reduce opportunities for social interaction and interfere with the development and maintenance of social relationships (Attwood, 1998).

Repetitive behavior emitted by individuals with ASD is often maintained by automatic reinforcement (Rapp & Vollmer, 2005), but this may not be the case for perseverative speech on restricted topics. That is, perseverative speech is typically directed toward another person (a listener), and thus may be more likely to serve a social function. For example, Rehfeldt and Chambers (2003) showed that for a man with autism, perseverative speech (i.e., repeatedly talking about sirens) was reinforced by attention. Differential reinforcement (DR) increased appropriate speech and decreased perseverative speech. The purposes of the current study were (a) to further explore social attention as a potential maintaining consequence for perseverative speech and (b) to extend Rehfeldt and Chambers's findings by showing that DR in the context of a multiple schedule could be used to increase talking about an appropriate topic (selected by the listener) in a turn-taking format.

METHOD

Participant and Setting

Derek was a 14-year-old boy who had been diagnosed with Asperger syndrome, neurofibromatosis, and syringomyelia. He was in the 8th grade and attended a combination of special and regular education classrooms. He spoke in

full sentences, followed multistep instructions, and did not engage in vocal stereotypy (repetitive nonconversational vocalizations). Sessions were conducted in a room (3 m by 3 m) equipped with a table, two chairs, and a one-way observation panel.

Data Collection and Interobserver Agreement

Trained observers used laptop computers to collect data on the duration of perseverative and nonperseverative speech during the functional analysis and duration of perseverative, on-topic, and total speech during the treatment analysis (nonperseverative speech could be derived from these other measures for the treatment analysis). *Perseverative speech* was defined as talking about specific comic-book characters (e.g., Batman, Star Wars, Pokémon) or violent topics (e.g., fighting or shooting). Speech related to any other topic was defined as *nonperseverative*. Key words such as the names of characters (e.g., Batman, Joker) or related places or things (e.g., Bat Cave, Bat Mobile) marked the onset of perseverative speech; a shift in topic to persons, places, or things unrelated to Derek's restricted interests marked the offset of perseverative speech.

We identified two desirable treatment outcomes: (a) a decrease in perseverative speech and (b) an increase in on-topic speech. *On-topic speech* was defined as talking about the topic selected by the therapist. The percentage of speech that was perseverative or on topic was calculated by dividing the duration of each type of speech by the duration of total speech (e.g., 200 s of perseverative speech divided by 250 s of total speech = 80% perseverative speech). It should be noted that perseverative and on-topic speech were not mutually exclusive. For example, if the topic was winter activities, Derek's response could be on topic and nonperseverative (e.g., "I like to go sledding") or on topic and perseverative (e.g., "Batman likes to go sledding").

A second observer independently collected data for 57% of sessions. Interobserver agreement was calculated by dividing the shorter recorded duration by the longer recorded duration (e.g., 6 s recorded by Observer 1 divided by 8 s recorded by Observer 2 = 0.75) within each successive 10-s interval in a session. These ratios were then averaged across intervals and the resulting mean was converted to a percentage. Mean agreement was 89% (range, 10% to 100%) for perseverative speech, 93% (range, 63% to 100%) for on-topic speech, and 85% (range, 25% to 100%) for total speech. Agreement was below 60% on fewer than three sessions and included sessions in which one observer collected data live and the other observer collected data from a video.

Functional Analysis

We conducted an efficient functional analysis in which attention and ignore conditions were implemented within an ABA reversal design because Derek's caregiver reported that his perseverative speech was highly persistent and continued until it produced attention from others. Sessions lasted 5 min. Attention sessions began with the therapist asking Derek what he would like to talk about. Throughout the session, the therapist provided attention contingent on Derek's talking, regardless of the topic he selected (i.e., attention was delivered for both perseverative and nonperseverative speech). Specifically, the therapist provided brief naturalistic responses (e.g., "I like that movie too"; "That sounds like a cool TV show") or asked open-ended questions (e.g., "What happened next?"; "Who is your favorite character?") in response to Derek's statements. During ignore sessions, the therapist entered the room, stood by the wall, and ignored all of Derek's responses (i.e., no eye contact; no attention for talking). The therapist did not initiate conversation or provide any other instructions prior to ignore sessions.

Treatment Analysis

This analysis consisted of three conditions: Baseline, DR of nonperseverative speech, and DR of on-topic speech. Sessions lasted 10 min, and

the therapist provided contingency-specifying instructions prior to each session. For example, before DR nonperseverative sessions, the therapist said, "When the card is green, we can talk about whatever you like. When the card is red, I'm going to tell you what topic I want to talk about. If you talk about [restricted interests], I'm going to turn around and ignore you for a bit. If you talk about something appropriate for 30 s, then I will change the card to green, and it will be your turn to pick a topic again."

Baseline. Procedures were the same as in the attention condition of the functional analysis.

DR of nonperseverative speech. Each session involved a multiple schedule with two alternating components. The purpose of these two components was to teach Derek that he could talk about a topic of his choosing when it was his turn but that he should switch topics and talk about a topic of the therapist's choosing when it was the therapist's turn. Sessions began with 60 s of Derek's turn, which was signaled by a green card (S^D). Thereafter, he received 60-s access to his turn contingent on 30 s of nonperseverative speech (cumulative) during the therapist's turn, which was signaled by a red card (S^Δ). The cumulative duration of nonperseverative speech was measured with a stopwatch to determine when Derek had met the 30-s response requirement.

During Derek's turn, the therapist presented a green card and asked him what he would like to talk about. The therapist provided attention contingent on talking, independent of the topic (identical to the attention condition of the functional analysis). During the therapist's turn, the therapist presented a red card, said, "It is my turn. I want to talk about—," and then initiated conversation on a nonperseverative topic randomly selected from a pregenerated list (e.g., outdoor activities, favorite foods). Contingent on nonperseverative speech (regardless of whether this speech corresponded to the topic selected by the therapist), the therapist delivered spoken attention relevant to his comments (e.g., "I like

swimming too"). If Derek spoke about a perseverative topic, the therapist stopped the stopwatch and turned his or her back on Derek until he resumed nonperseverative speech.

DR of on-topic speech. This condition was identical to DR of nonperseverative speech, except that during the therapist's turn Derek received DR (i.e., immediate attention, the switch to Derek's turn) only for speech that was both on topic and nonperseverative. The therapist turned his or her back (and stopped the stopwatch) when Derek displayed either speech that was perseverative or nonperseverative but not on topic. In addition, toward the end of the study, the discriminative stimuli for the multiple schedule were changed from colored cards to the presence (S^D) or absence (S^Δ) of a wristband worn by the therapist. This change was done to make the treatment more practical and socially acceptable for use in the natural environment. We also assessed (a) maintenance of the treatment effects across time and (b) implementation by Derek's mother, brother, and novel therapists. Training for these individuals consisted of (a) observations of sessions in which the therapist implemented the treatment procedures, (b) vocal and written instructions prior to sessions, and (c) feedback following sessions.

RESULTS AND DISCUSSION

Results of the functional analysis (Figure 1) indicated that perseverative speech was sensitive to contingent attention as reinforcement. In addition, Derek allocated almost all of his speech to perseverative topics during the attention phases even though nonperseverative speech also produced attention, indicating a response bias toward perseverative speech.

During the treatment analysis (Figure 2), baseline levels of perseverative speech were high and stable. In the second phase (DR nonperseverative), Derek's perseverative and nonperseverative speech came under clear discriminative control of the multiple schedule.
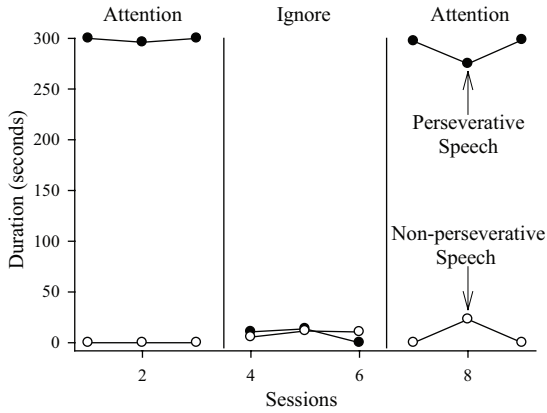
Figure 1. Levels of perseverative and nonperseverative speech during the attention and ignore conditions of the functional analysis.

(Nonperseverative speech is not shown in Figure 2, but the percentage of nonperseverative speech is equal to the percentage of perseverative speech subtracted from 100.) During Derek's turn, he displayed high but somewhat variable levels of perseverative speech, similar to baseline for the treatment analysis and the attention condition of the functional analysis. By contrast, during the therapist's turn, perseverative speech decreased to near-zero levels, and thus almost all of Derek's speech was nonperseverative; however, only a small percentage of that speech was on topic.

Although Derek switched from perseverative to nonperseverative speech during the therapist's turn, he rarely talked about the topic selected by the therapist, as can be seen by the low levels of on-topic speech. However, in the third phase (DR on topic), all three responses came under clear discriminative control of the multiple schedule. That is, on-topic and nonperseverative speech were high and perseverative speech was low during the therapist's turn, and the opposite pattern was observed during Derek's turn. Subsequent applications of DR nonperseverative
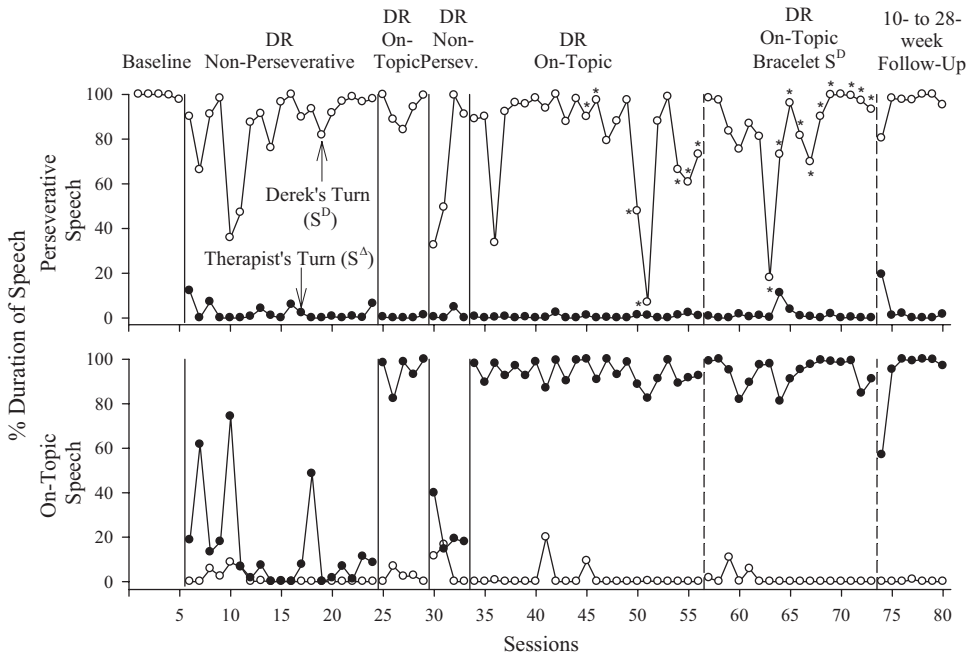

Figure 2. Treatment analysis data. The top panel shows the percentage of speech that was perseverative. The bottom panel shows the percentage of speech that was on topic. Asterisks denote sessions conducted by Derek's mother (Sessions 45 to 56), novel therapists (Sessions 63 to 69), and brother (Sessions 71 to 73).

(Phase 4) and DR on topic (Phase 5) closely replicated the results of Phases 2 and 3, respectively. In the sixth phase, when we changed the S^D and S^Δ to the presence and absence of a wristband worn by the therapist, the effects of DR on topic remained consistent with prior applications. Finally, the effects of DR on topic were maintained during all follow-up visits up to 28 weeks and also when Derek's mother, brother, and novel therapists implemented this treatment.

The current results replicate those of Rehfeldt and Chambers (2003) by showing that perseverative speech (on restricted topics) can be sensitive to contingent attention as reinforcement and that function-based DR can markedly reduce such speech. We extended those findings by also showing that DR in the context of a multiple schedule could be used to increase speaking about an appropriate, alternative topic selected by the listener in a turn-taking format. The current results also extend research showing that access to the opportunity to engage in stereotypy or with restricted interest items can serve as reinforcement for appropriate behavior (e.g., Charlop-Christy & Haymes, 1998; Hanley, Iwata, Thompson, & Lindberg, 2000). In the current study, access to the opportunity to converse about restricted interest topics was programmed as reinforcement for appropriate conversational behavior (talking about the topic selected by the listener), although the independent effects of this contingency were not evaluated.

These findings, as well as directions for future research, should be considered relative to the following limitations of the current study. First, potential functions of perseverative speech other than attention were not evaluated during the functional analysis. Second, baseline data were not collected prior to treatment with family members and novel therapists. However, it should be noted that functional control of Derek's perseverative, nonperseverative, and on-topic speech was established via the multiple schedule. That is, each change from Derek's turn to the therapist's turn represented a reversal of the treatment contingencies, and his response patterns changed accordingly. Finally, the treatment consisted of four components: (a) immediate DR with therapist attention; (b) a multiple schedule that signaled when nonperseverative and on-topic speech produced attention; (c) a contingency that required 30 s of cumulative on-topic speech before Derek's turn resumed; and (d) salient contingent withdrawal of attention (the therapist turned away from Derek) contingent on perseverative or off-topic speech. Future research should include a component analysis to determine the relative contributions of each of these treatment elements.

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