Treating selective mutism in a paediatric rehabilitation patient by altering environmental reinforcement contingencies

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Accepted for publication: May 1999

Keywords selective mutism, behavioural rehabilitation, behavioural paediatrics, operant conditioning

Summary

Selective mutism is a disorder which can cause severe social and academic impairment, and for which a wide variety of treatment approaches have been used, with varying degrees of success. Selective mutism can be conceptualized as the lack of generalization of a class of operant responses (e.g. audible and comprehensible verbalizations) across environmental contexts. The rehabilitation hospital setting, in which the patient is seen daily by multiple people in multiple settings, is particularly well-suited for implementing a systematic behavioural intervention to establish verbal behaviour and simultaneously reinforce its generalization. Data are presented on a 7-year-old female admitted to a rehabilitation hospital following orthopaedic surgery, who met the DSM-IV diagnostic criterion for selective mutism. Additional medical diagnoses included cerebral palsy, microcephaly, and mild mental retardation. A behavioural programme was developed and implemented to reinforce differentially first any communication, then verbal communication across staff and settings. Results were evaluated using a modified multiple baseline across settings design, and demonstrate that verbal, written, and tangible reinforcement effectively increased verbal behaviour where it previously rarely occurred. Results are discussed in terms of the relationship between selective mutism, social phobia and related disorders. The theoretical roles of behavioural phenomena (discriminative stimuli, stimulus generalization) in the development and treatment of these disorders are discussed.

Introduction

Selective mutism is a disorder which can cause severe social and academic impairment, and for which a wide variety of treatment approaches, such as psychotherapy, family therapy, pharmacotherapy, speech therapy, and school intervention, have been utilized [1, 2]. The primary feature of selective mutism is the ‘consistent failure to speak in specific social situations (in which there is an expectation for speaking, e.g. at school) despite speaking in other situations’ [3].

Selective mutism has been conceptualized as a conflict or trauma-based disorder, treatable by identifying the conflict or trauma and by psychotherapy [4] as a biological disorder related to anxiety for which medication can be helpful [5] as a biobehavioural phenomenon warranting a multi-modal treatment approach [6], and as a condition which can be assessed and treated using behaviour analysis methods [7].

Behaviourally, selective mutism can be conceptualized as the lack of generalization of a skill or class of responses (e.g. producing audible verbalizations) across environmental contexts. Alternatively, selective mutism is an example of behaviour (speech) under highly specific stimulus control (e.g. occurs only in the presence of certain stimuli, such as familiar adults). The behavioural intervention of choice, therefore, would be to provide differential reinforcement of speech in the presence of a variety of stimuli (particularly social stimuli) currently not associated with reinforcement of speech. However, because, by definition, speech rarely (if at all) occurs under these circumstances, additional behaviour analysis techniques, specifically shaping, must be used. In the case of selective mutism, shaping consists of targeting a series of successive approximations, such as pointing, whispering, uttering single words, etc., for reinforcement. As the frequency of each of these approximations increases, more complex and normative approximations...
can be shaped until the target behaviour, normal speech across settings occurs and can be reinforced.

Behaviour modification programmes which include shaping have been effective in the treatment of varied classes of speech-related problems in different populations. For instance, shaping was used to produce a socially appropriate volume of speech in a 15-year-old girl with mild retardation, withdrawn behaviour, and few social skills [8] and has also been effective in producing speech in selectively mute, psychotic adults [9].

The rehabilitation hospital setting, in which the patient is seen daily by multiple people in multiple settings, is particularly well-suited for implementing a systematic behavioural intervention to shape verbal behaviour and simultaneously reinforce its generalization. In a recent case study, a behavioural programme was implemented to treat a paediatric rehabilitation patient with polymyositis and functional hypophonia, who met the DSM-IV criterion for conversion disorder. Differential reinforcement of increasingly complex vocalizations (from whispers and sounds to partial words, then to whole words at any volume, and finally to normal volume speech) resulted in the shaping of normal speech across settings and staff [10].

This case study presents data on the effectiveness of a behavioural programme consisting of differential reinforcement to treat selective mutism in a paediatric patient admitted to a rehabilitation hospital following orthopaedic surgery.

Method

CHILD AND SETTING

Mary was a 7-year-old female inpatient on a 15-bed paediatric rehabilitation unit. The unit specializes in acute medical and interdisciplinary rehabilitative therapies for children and adolescents with congenital or more recently acquired disabilities, especially central nervous system insult. Mary was admitted to the unit following orthopaedic surgery. In addition to meeting the DSM-IV diagnostic criterion for selective mutism, Mary was diagnosed with cerebral palsy, microcephaly, and mild mental retardation.

DEPENDENT MEASURES

Verbal speech was defined as any audible vocalization that was recognized by the therapist or observer as a word, phrase or sentence at normal conversational volume.

Non-verbal communication was defined as any observed occurrence of pointing, gesturing, nodding or shaking head to convey information to another person.

Percentage occurrence of communication

The occurrence of non-verbal and/or verbal communication was tracked using a total interval scoring criterion (occurred throughout the majority of the session), for 4 hour intervals on a daily schedule/pointsheet, by staff interacting with Mary in therapy and on the rehabilitation unit. The percentage of therapies in which speech occurred was calculated daily.

After discharge from the hospital and upon admission to a new school, classroom staff tracked the partial interval occurrence of verbal communication per class period (approximately 4 hour intervals) by use of a similar daily schedule/pointsheet. The percentage of intervals in which speech occurred were calculated on a weekly basis by school behavioural staff as part of a systematic weekly calculation of all target behavioural goals for each child in the class.

Frequency of verbalizations

In addition to therapist ratings of the occurrence of non-verbal and/or verbal communication, behaviour therapists conducted independent observations in one consistent setting (physical therapy). This frequency of communication measure was obtained in baseline (prior to any unit and rehabilitation therapist data collection or protocol implementation), and later when differential positive reinforcement of verbal communication only was implemented during physical therapy sessions.

Observer agreement

A second observer was present to record the frequency of target behaviour during four of the 13 (30.8%) direct observations conducted in physical therapy. The frequencies independently recorded by the two observers were compared using a Pearson product moment correlation, resulting in a correlation coefficient of $r = 0.99$.

Experimental Design

The results were evaluated using a modified multiple baseline across settings design.
PROCEDURES

Baseline

Upon Mary’s admission to the rehabilitation unit, behaviour therapists conducted intermittent observations to track the frequency of Mary’s non-verbal and verbal behaviour. Most observations were conducted in physical therapy, Mary’s most frequent type of therapy. According to medical chart review, family interview, and previous school staff report, Mary had a history of selective mutism. She was observed speaking in the presence of immediate family members and a few select peers and adults, but her overall lack of speech greatly impaired school performance, as well as opportunities for socialization. A variety of interventions (e.g. negative attention for absence of verbal behaviour, extinction of non-verbal communication) had been attempted to increase speech at school without success.

Differential reinforcement

In conjunction with the medical team and a speech pathologist, a behavioural programme was developed and implemented to reinforce communication differentially. A daily schedule data sheet was used by all therapists and staff to record observed non-verbal and verbal communication throughout the day, in ½ hour intervals. A ‘Comments’ column was included on the data sheet for staff to write additional positive feedback. All staff were instructed to provide Mary with verbal praise as they recorded observed target behaviours. At the end of each therapy day, a behaviour therapist reviewed the daily schedule data sheet with Mary, and provided verbal reinforcement and access to tangible reinforcement (computer games) for progress (e.g. increases in speech).

Based upon the review of collected data on non-verbal and verbal behaviour, target behavioural goals were modified and incorporated into the data sheet. First, Mary received positive feedback for any observed communication attempts either non-verbal or verbal as defined above. For instance, a therapist would say ‘Mary, I like the way you showed me what you want!’ if Mary pointed to an item, and would place a mark and would also possibly add positive comments on Mary’s data sheet. Mary would receive similar praise for gestures, head nods or shakes, whispering, or actual speech. At the end of each day, a behavioural therapist would review the data sheet with Mary and provide positive feedback on the collected data and staff comments (regardless of quantity or type of communication used). Mary was then provided with 1/2 hour of access to preferred games/learning activities on the computer.

Next, differential positive reinforcement (both immediate and delayed, as described above) was provided contingent on verbal communication only. While all communication (non-verbal and verbal) was still acknowledged and attended to functionally, only verbal communication resulted in the positive written feedback, review and praise from the behaviour therapist, and access to the computer.

During follow-up, school staff reinforced occurrence of non-verbal and verbal communication as tracked on a daily schedule/point sheet. In the school setting, Mary first received positive reinforcement for both non-verbal and verbal communication attempts, as it was anticipated that she would likely experience increased anxiety and possible difficulty maintaining her use of speech in this new setting. After this initial phase, verbal communication was again differentially reinforced.

Results

The resulting effects on Mary’s speech are displayed in figure 1. These results demonstrate that differential reinforcement in the form of written and spoken praise by rehabilitation staff and tangible reinforcement from the behaviour therapist was effective in shaping normal speech across settings.

During baseline, Mary exhibited a low frequency of verbal communication in the presence of physical therapists (figure 1, lower panel, first data series of solid circles; \(x = 5.6\) words/half-hour, range 0–26), even when her mother was present (\(x = 13.8\), open squares). During Reinforcement of any communication, 0 occurrences of verbal communication were observed across the day (figure 1, upper panel, first data series of solid circles). The percentage occurrence of verbal behaviour across the day increased to 64.1% (range 14.2–100) when verbal behaviour was differentially reinforced (upper panel, second series of solid circles). The percentage of intervals with occurrence of verbal communication was 100 in this same condition during a probe session when Mary’s mother was present (figure 1, upper panel, second data series, open square).

The mean frequency of verbalizations, as recorded by behavioural staff during physical therapy sessions, increased to 110.7 (figure 1, lower panel, second series of solid circles; range 53–121 words per ½ hour session) after differential reinforcement of speech was implemented. During one physical therapy session in which differential positive reinforcement was provided for verbal communication and Mary’s mother was present, the fre-
Frequency of verbalizations was greatest at 243 per 2/3 hour session (figure 1, lower panel, second data series, open square).

Data from post-discharge school follow-up measures indicated that the percentage occurrence of verbal behaviour averaged 84.4 (range 66.7–100), over 13 weeks, when verbal behaviour was differentially reinforced.

Discussion

The aetiology, presentation and treatment of selective mutism have been conceptualized by a variety of approaches. The psychodynamic approach would describe selective mutism as the neurotic loss of speech in certain situations which are symbolic of unresolved psychodynamic conflicts or past developmental trauma in a psychologically related situation [4]. This approach has recently been deemphasized [2]. A primarily biological approach would regard the same phenomenon as resulting from a constitutional disturbance of physiological arousal (as in a biochemically based anxiety disorder) with exacerbation under stressful social circumstances, while a biobehavioural perspective might assume both a physiological vulnerability and environmental conditioning, resulting in conditioned physiological arousal as might occur in a social or school phobia [5]. An operant behavioural conceptualization would hypothesize that the suppression of speech in certain situations results from insufficient reinforcement and/or punishment of verbal behaviour by the social environment under specific stimulus conditions [11]. The results of this case study are consistent with an
operant behavioural conceptualization and are discussed accordingly.

The basic principles and procedures necessary for describing an operant behavioural conceptualization have been presented in detail elsewhere by others [12, 13] However, the terms needed to present an operant conceptualization of this case are summarized here. Operant conditioning may involve reinforcement and/or punishment. When a behaviour is followed by an event that makes it more likely to occur in the future, reinforcement is said to have occurred. If the behaviour becomes less likely to occur again, it is said to have been punished. Differential reinforcement occurs when the reinforcing event is provided following certain targeted behaviours and not others. This process of differentially reinforcing some behaviour, while withholding reinforcement of other behaviour, can be used to change behaviour patterns or topographies gradually in a process referred to as ‘shaping’. When reinforcement is repeatedly provided in the presence of a certain signalling stimulus, that stimulus can result in a sudden change in behaviour when it is subsequently presented. Such a stimulus has been termed a discriminative or conditioned stimulus. Finally, stimulus generalization occurs when the behaviour changes in the same or a similar pattern to the one observed in the presence of the discriminative stimulus, when a similar but not identical stimulus is present [13].

Under conditions in the rehabilitation hospital or school when the social environment provided reinforcement for either non-verbal or verbal communication, Mary emitted almost exclusively non-verbal responses. This pattern of behaviour might result from a learning history of positive reinforcement for non-verbal communication and punishment of attempts to speak. These contingencies might naturally occur with a child having cerebral palsy for whom speech requires greater response effort than pointing, nodding or gesturing. Partial speech might be punished by a listener’s failure to respond or requests for repetition. However, in the case when Mary’s mother was present or the reinforcement contingencies for verbal versus non-verbal behaviour were altered to favour verbal communication exclusively, Mary increased her use of speech.

Mother’s presence was conceptualized as a discriminative or conditional stimulus, which had been frequently paired in the past with reinforcement for use of speech (however imperfect) and protection from punishing social consequences for non-normative speech. Theoretically, other familiar people (friends, family members) may have served a similar discriminative stimulus function and Mary’s frequency of verbal responding in their presence might have been systematically measured. The results could have been displayed as a stimulus generalization gradient [14].

The objective of the intervention was to alter the environmental reinforcement contingencies in the rehabilitation and educational settings to establish a new learning history with frequent reinforcement of speech by a variety of individuals in the presence of whom Mary’s current rate of speech was zero. In order for this to occur, it was necessary first to reinforce positively an entire class of communication responses (both non-verbal and any approximations of speech). When speech approximations were occurring frequently enough for Mary to experience any reinforcement for verbal behaviour, speech was then differentially reinforced, such that non-verbal communication was still acknowledged, but speech resulted in written, social, and tangible reinforcement. It is hypothesized that placing non-verbal communication on extinction as the only intervention would have failed, as it had in the past when attempted by others with good intentions. Failure would have been likely if there were no systematic provision for shaping and reinforcing speech. Frequent verbal prompting to produce speech on demand may be an aversive (e.g. punishing) stimulus for some children who would physically attempt to avoid or escape such demands. Therefore, there would be a decreased probability that speech would occur at all in the presence of the person prompting, just the opposite of the intended effect.

This case study demonstrates the benefits of a staged re-arrangement of environmental contingencies to change gradually the conditional probability of reinforcement for speech versus non-verbal communication in the presence of previously neutral or conditioned aversive social stimuli.

A further benefit of this type of structured behavioural programme to treat selective mutism is the applicability of treatment across staff and settings. The behavioural programme was effectively used in both the rehabilitation setting and in a new school setting upon discharge. This comprehensive approach can enhance stimulus generalization by quickly establishing a history of reinforcement associated with a wide variety of people and social situations. It has been the anecdotal observation that this conceptualization can also reduce negative staff attributions about behaviour (e.g. that the individual is being stubborn, non-compliant or lazy). The behavioural manifestation of selective mutism can often be frustrating to well-intended school or hospital staff who attempt various strategies to promote or provoke speech [15]. The operant conceptualization provides staff with a more objective means of talking
about this unusual behavioural phenomenon, and, more importantly, a consistent and positive strategy for responding to it.

References


