A Comparison of Similar Versus Dissimilar Competing Response Practice in the Treatment of Muscle Tics

Ellen L. Sharenow

Western Michigan University

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A COMPARISON OF SIMILAR VERSUS DISSIMILAR COMPETING RESPONSE PRACTICE IN THE TREATMENT OF MUSCLE TICS

by

Ellen L. Sharenow

A Thesis
Submitted to the
Faculty of The Graduate College
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requirements for the
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Kalamazoo, Michigan
December 1985
A COMPARISON OF SIMILAR VERSUS DISSIMILAR COMPETING RESPONSE PRACTICE IN THE TREATMENT OF MUSCLE TICS

Ellen L. Sharenow, M.A.
Western Michigan University, 1985

Miltenberger, Fuqua, and McKinley (1985) reported that the competing response component of the habit reversal treatment package (Azrin & Nunn, 1973) when presented alone was as effective as the entire habit reversal procedure in suppressing muscle tics. In a related study, Miltenberger and Fuqua (1985, in press) reported that the performance of the competing response contingent on the occurrence of a variety of nervous habits resulted in greater response suppression than the non-contingent performance of the competing response. In an effort to determine whether the topography of the competing response was important to the reported effects, this study compared the suppression of muscle tics by a competing response that was topographically similar to the muscle tic with the effects of a competing response that was topographically dissimilar to the muscle tic. Four subjects engaged in competing responses (either similar or dissimilar) contingent on the occurrence of a muscle tic. The results showed a decrease in muscle tic frequency with the introduction of either treatment, suggesting that the topography of the competing response may not be crucial for response suppression.
ACKNOWLEDGEMENTS

Without the support of some very special individuals, the execution and completion of this thesis would not have been possible. Although the list is extensive, each contribution was significant and therefore warrants full acknowledgement.

I would like to gratefully acknowledge the guidance, support and expertise of Dr. R. Wayne Fuqua, who served as my advisor during the course of this thesis. His cogent comments and suggestions shaped the substance and style of the research project as well as the final written form. I would also like to gratefully acknowledge Dr. Raymond Miltenberger, whose prior research in this area, conducted with Dr. Fuqua, was the impetus for this study. I would like to extend a special thank you to him for all the hard work, helpful guidance and consultation he provided me. A very special thank you goes to my four assistants, Joan Kuipers, Julie Paul, Susan Roy, and Cheri Stein, who spent countless hours scoring videotapes. Without their dependable help, execution of the study would have been impossible. I am very grateful to Kenneth Hearn, who spent much time and care in designing the computer program that aided in the calculation of interobserver agreement. I am also indebted to Elbert Blakely whose perceptive comments and thoughtful encouragement were invaluable to me during the writing of this thesis.

Finally, my deepest appreciation and thanks go to my parents for their unceasing love, understanding and support. Their commitment to
my education has always been unwavering. I dedicate this thesis to them.

Ellen L. Sharenow
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A variety of techniques has been used to treat muscle tics and nervous habits. Some of these techniques have included negative or massed practice (Yates, 1958; St. James & Powell, 1979), self-monitoring (Billings, 1978; MacNamara, 1972), drug therapy (Challas & Brauer, 1963), reinforcement and time-out contingencies (Varni, Boyd, & Cataldo, 1978), and a variety of aversive techniques (Bucher, 1968; Bayer, 1972; Daniels, 1974; Lamontagne, 1978).

Several theoretical models, in conjunction with concomitant methods of treatment for muscle tics, have been proposed and tested. According to these various models, nervous habits and tics are maintained by impulse channeling in a psychodynamic model (Mahler & Luke, 1946), tension reduction in a Hullian model (Yates, 1958), and operant reinforcement in a behavioral model (Brierly, 1967). In 1973, Azrin and Nunn proposed that nervous habits and tics "persist because of response chaining, limited awareness, excessive practice and social tolerance" (p. 619). Based on this theory they developed the habit reversal procedure which consisted of the following 10 components: (a) response description, (b) response detection, (c) early warning, (d) competing response practice, (e) situation awareness training, (f) habit inconvenience review, (g) social support, (h) public display, (i) generalization training, and (j) symbolic rehearsal.

Employing this procedure, a number of researchers reported substantial
reductions in the frequency of muscle tics (Azrin & Nunn, 1973; Azrin, Nunn, & Franz, 1980b; Finney, Rapoff, Hall, & Christophersen, 1983). Habit reversal has also been demonstrated to be effective in decreasing a range of nervous habits including nailbiting (Nunn & Azrin, 1976; Delparto, Aleh, Bambusch, & Barclay, 1977; Azrin, Nunn, & Franz, 1980a), hairpulling (Rosenbaum & Ayllon, 1981b; Azrin, Nunn, & Franz, 1980c), thumbsucking (Azrin, Nunn, & Franz-Renshaw, 1980), bruxism (Rosenbaum & Ayllon, 1981c), writer's cramp (Greenberg, 1983), neurodermatitis (Rosenbaum & Ayllon, 1981a), and a variety of oral habits (Azrin, Nunn, & Franz-Renshaw, 1982). Many of the aforementioned studies are characterized by one or more of the following methodological weaknesses: relying on self-report exclusively (e.g., Rosenbaum & Ayllon, 1981a), poor or nonexistent interobserver agreement (e.g., Azrin, Nunn, & Franz-Renshaw, 1980), and baseline phases of insufficient length that obviate a criterion of steady state responding prior to a condition change, thus limiting conclusions regarding the effectiveness of the habit reversal procedure (Azrin, Nunn, & Franz-Renshaw, 1982). However, despite these methodological weaknesses, this compilation of studies strongly suggests that the habit reversal procedure is a viable treatment method for reducing nervous habits and muscle tics.

In an effort to simplify this multicomponent procedure, other researchers have attempted to identify the salient components of the habit reversal treatment package. Ladouceur (1979) compared habit reversal, habit reversal plus self-monitoring, self-monitoring alone, and self-monitoring plus daily graphing and found they were equally effective in reducing nailbiting as measured by judges' ratings of
nail length. Using a more rigorous measurement system, De L. Horne and Wilkenson (1980) compared three variations of the habit reversal procedure and identified the competing response component as crucial for response reduction. Ollendick (1981) found that self-monitoring alone reduced the frequency of tic behavior in one subject and that self-monitoring plus competing response training eradicated the tic behavior of another subject. Finney et al. (1983) effectively reduced muscle tics with a simplified habit reversal package that included the following five components: (a) awareness training, where the client is taught to identify tic behavior; (b) competing response training, where the tic movement is interrupted by a response that physically competes with the tic response; (c) relaxation training; (d) social support procedures; and (e) habit inconvenience review, where the client lists all the negative aspects of engaging in tic behavior. Finally, Miltenberger, Fuqua, and McKinley (1985) demonstrated that awareness training plus competing response training alone were just as effective as the five-component habit reversal program described by Finney et al. (1983) in reducing the frequency of muscle tics.

Competing response training requires the client to engage in a competing response that is incompatible with the muscle tic contingent on the occurrence of the muscle tic. According to Azrin and Nunn (1973), this response should be "opposite or incompatible to that of the tic behavior or nervous habit, capable of being maintained for several minutes, produce heightened awareness by an isometric tensing of the muscles and strengthen the muscles antagonistic to the
tic movement" (p. 623). In an effort to separate the role of the response contingency from the muscle strengthening effect of the competing response procedure, Miltenberger and Fuqua (in press) compared the effects of a response contingent competing response procedure with a procedure requiring the non-contingent practice of a competing response. The results of their study indicated that non-contingent competing response practice was ineffective in decreasing nervous habits and contingent competing response practice was effective in reducing the target behavior(s). The necessity of the contingent relationship between the competing response and the muscle tic suggests the effectiveness of the contingent competing response procedure was based on a punishment process.

Despite the isolation of the competing response component as the salient variable in the habit reversal procedure and the clarification of the necessity of the response contingency, the mechanism of action elemental to the efficacy of the contingent competing response remained unclear. Contingent practice of the similar competing response sometimes involved performance of a behavior which was effortful, incompatible with the muscle tic or nervous habit, disruptive of ongoing activities and potentially embarrassing when performed in public. If response incompatibility, disruption and social embarrassment are irrelevant to the effectiveness of the competing response procedure, then competing responses which are topographically dissimilar to the muscle tic but still effortful should suppress muscle tics without the inconvenience of disruption and social embarrassment. Furthermore, if a dissimilar competing response proved as effective
as a similar competing response in suppressing the tic, this would provide further support for the speculation that the competing response was best conceptualized as a punishment procedure involving effortful or low probability behavior as a punisher. Therefore, the degree to which the topography of the competing response is crucial to its effectiveness is an important issue for theoretical and practical reasons.

The factors responsible for the effectiveness of the response contingent practice of a competing response were further analyzed in the present study by comparing procedures in which the topography of the competing response was similar to the tic behavior with procedures in which the topography of the competing response was dissimilar to the tic behavior.
CHAPTER II

METHOD

Subjects

Subjects with muscle tics were solicited through a local newspaper article describing the study. Of the 6 subjects who responded to the ad, 4 were selected, based on their willingness to participate in the study and the presence of muscle tics. Subjects 2 and 4 both had multiple tic behaviors and were assigned to the dissimilar competing response and the similar competing response treatments respectively. Subjects 1 and 3 were both assigned to the dissimilar competing response treatment. Listed below is a description of each subject and his or her accompanying muscle tic.

Subject 1, a 66 year old widow who lived alone, had a facial tic involving a lateral movement of the jaw, similar to a chewing motion. She had experienced the tic since root canal surgery 8 years ago. Her dentist diagnosed the problem as degenerative arthritis in the right mandibular joint. She had had back surgery for bone spurs 5 years earlier and was currently taking medication for a heart condition.

Subject 2 was a 32 year old man with multiple tics. The two most prevalent were head and arm jerking. Head jerking consisted of a lateral shaking movement. Arm jerking consisted of a flapping movement with the arms bent at the elbows. Onset of the tics occurred
at age 12 when he reported growing 6 inches in 2 months. He reported his mother also exhibited tic behavior. Previous treatment attempts included hypnosis and drug therapy (Prolixin) with no measurable success. He was married, with two children, was in good health and worked as a licensed practical nurse.

Subject 3, a 24 year old male, had a facial tic consisting of nostril flaring. The onset of the tic occurred in childhood. He was single and in good health. He was working toward a Master's degree in psychology.

Subject 4, a 40 year old male with multiple tics, exhibited head jerking in all directions, excessive eyeblinking and eyebrow twitching. The head jerking started in 1971 while he was driving through the mountains. The time of onset for the other tics was unknown. Previous treatment attempts included relaxation exercises, which were unsuccessful. He was completing his doctorate in education in addition to working as a schoolteacher. He was married, with two children, and in good health.

Subjects 1, 2, and 3 initially received dissimilar contingent competing response training. Subject 4 received similar contingent competing response training. Subjects 1 and 2 received similar contingent competing response training after completion of dissimilar contingent competing response training.

Setting

All sessions were conducted at an out-patient clinic affiliated with the Psychology Department of Western Michigan University.
Subjects met with a doctoral graduate student who served as therapist. A meeting room (3.5 m x 5 m) containing office furniture and videotape equipment was used for all observation and treatment sessions.

Response Definition and Data Collection

Clinical observation sessions lasting 10 minutes each were conducted during baseline and after the treatment session on the average of three times a week for 16 weeks. All clinical sessions were videotaped. The videotapes were scored by four student assistants who were naive to the conditions of the study. A tic behavior was recorded when it coincided with the response definition listed in Table 1.

Depending on the tic, a frequency method (mouth twitch of S1, nostril flare of S3, head jerk and eyebrow twitch of S4) or partial-interval scoring method (head jerk and arm jerk of S2) was used (Bailey & Bostow, 1979). A special recording method was used to score eyeblinks for S4. Only those eyeblinks occurring with an inter-response-time (IRT) less than 3 seconds were scored as muscle tics. Tic behavior was scored every 6 seconds.
Table 1
Muscle Tic Definitions and Their Corresponding Competing Response

<table>
<thead>
<tr>
<th>Subject</th>
<th>Definition</th>
<th>Competing Response</th>
</tr>
</thead>
</table>
| 1       | Mouth Twitch - any movement of the lower jaw from side to side, similar to a chewing motion | a. Tighten right bicep (DCR)  
          |            | b. Clench left fist (DCR)  
          |            | c. Clench Jaw (SCR) |
| 2       | Head Jerk - jerking motion of head from side to side or up and down | a. Tighten left calf muscle (DCR)  
          |            | b. Tighten neck muscles by bringing chin into neck (SCR) |
|         | Arm Jerk - Flapping motion with arms bent at elbows | a. Tighten right calf muscle (DCR)  
          |            | b. Tighten arm muscles by pressing index fingers and thumbs together (SCR) |
| 3       | Nostril Flare | a. Clench left fist (DCR) |
| 4       | Head Jerk - jerking motion of head from side to side or up and down | a. Tighten neck muscles by bringing chin into neck (SCR) |
Table 1—continued

<table>
<thead>
<tr>
<th>Eyeblink - one blink</th>
<th>a. Open eyes wide and blink deliberately every 5 seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than every 3 seconds</td>
<td>seconds (SCR)</td>
</tr>
<tr>
<td>Eyebrow Twitch - upward motion of one or both brows</td>
<td>b. Knit brows together by tightening muscles in forehead (SCR)</td>
</tr>
</tbody>
</table>

Note. SCR = similar competing response; DCR = dissimilar competing response.

---

Interobserver Agreement

A second observer independently scored 33% of the videotaped sessions. Two methods of interobserver agreement were used. Frequency-within-interval agreement scores were obtained for individual intervals by dividing the scores from each interval for both observers. Session agreement scores were then computed by summing the percent scores for each interval, dividing by the number of intervals scored, and multiplying by 100. Interobserver agreement scores for frequency data ranged from 84% to 100% with an average of 95% across all sessions. Partial-interval agreement scores for each session were computed by dividing the total number of agreements for occurrences and nonoccurrences by the total number of agreements plus disagreements and multiplying by 100. These agreement scores ranged from 86% to 100% with an average of 96% across all sessions.
Experimental Design

After an initial baseline phase of variable length, Subjects 1 and 2 were first exposed to the dissimilar competing response procedure and, in an effort to further suppress their respective muscle tics, were later exposed to the similar competing response phase. After an initial baseline, Subject 3 achieved complete suppression of his muscle tic during the dissimilar competing response phase, thus preempting later exposure to the similar competing response phase. Experimental conditions were introduced in a multiple baseline across behaviors design for Subjects 1, 2, and 3. Additionally, a multiple baseline across behaviors design was used in applying the two treatment procedures to the two distinct muscle tics displayed by Subject 2. Subject 4 was exposed to a baseline condition and then the similar competing response phase in a multiple baseline across behaviors design.

Procedure

Baseline

Subjects met individually with the therapist for all observation and treatment sessions. In the initial session, the therapist described the experiment, obtained informed consent and videotaped the subject while he or she engaged in a variety of activities such as talking to the experimenter, answering a questionnaire (Aero & Weiner, 1981), or watching television. Videotapes from this initial session were used to identify the activities that provoked high tic rates for
each subject and to develop response definitions for scoring purposes. In later baseline and observation sessions the subjects engaged in their individually determined provoking activity for 10 minutes. Table 2 lists each subject's provoking activity. All questionnaire material was destroyed at the end of the study without further analysis.

Table 2
Subjects and Their Individual Activities

<table>
<thead>
<tr>
<th>Subject</th>
<th>Provoking Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Watching television</td>
</tr>
<tr>
<td>2</td>
<td>Talking to therapist</td>
</tr>
<tr>
<td>3</td>
<td>Questionnaire, talking to therapist</td>
</tr>
<tr>
<td>4</td>
<td>Talking on the phone to wife</td>
</tr>
</tbody>
</table>

In an effort to equalize expectancy effects, all subjects received a rationale for the use of competing response practice that emphasized the experimental nature of the study in comparing two methods of reducing muscle tic behavior. No rationale was given as to why the treatment would work, nor were subjects given specific details of the similar and dissimilar competing response procedure. Subjects were told that if one method proved to be unsuccessful, they would receive the alternate treatment. During baseline sessions muscle tics were
ignored by the therapist and subjects were instructed to abstain from any self-initiated procedures that might alter muscle tics. Subjects did not self-record muscle tics.

**Awareness Training and Competing Response Practice**

Awareness training included: (a) a rationale for the competing response procedure; (b) response description of the tic, where the subject described his or her tic while viewing a portion of the videotape; (c) response detection, where the subject identified occurrences of the tic behavior on videotape and in session; and (d) probing for antecedents, where the subject identified stimuli and setting events prior to the onset of a muscle tic. Initially, awareness training lasted until the subject could identify 10 consecutive instances of tic behavior or for 10 minutes. Training time was later extended to 20 minutes when no subject reached the detection criterion. In addition, booster sessions were conducted to increase awareness of tic behavior. Each subject received at least one booster session shortly after competing response training. The booster session format was identical to the training format.

Depending on the subject and the experimental condition, subjects were instructed to engage in a similar or dissimilar competing response for 3 minutes after each occurrence of a muscle tic. Competing responses that used the same muscle group as the tic and those that used a muscle group unrelated to the tic were referred to as similar and dissimilar competing responses respectively. Table 1 lists the individualized competing responses for each subject.
After the treatment session, subjects were given a sheet of instructions that reiterated the procedures outlined in the session. Subjects were given a series of 3 x 5 in. (7.62 x 12.7 cm) index cards and were instructed to record every instance of a tic and accompanying competing response behavior throughout the week. Self-report data were collected by each subject to supplement clinical observation data. Tic occurrences and competing responses were tallied in separate columns. Data were recorded on one card and were delivered to the therapist on a weekly basis.

Post-Treatment Observation Sessions

Subsequent observation sessions consisted of the 10-minute videotape assessment and a discussion period where the client could voice any concerns or problems. The therapist did not offer any advice other than continued use of the competing response procedure.

Consistency of the Independent Variables

The therapist followed a written outline of instructions during the awareness and competing response training to insure consistency of treatment for all subjects. Subjects were trained to identify tic behavior and engage in a contingent competing response. From observation in session, all subjects engaged in the prescribed competing response contingent on a muscle tic. However, subjects were not able to detect 10 consecutive instances of tic behavior; consequently, training for the identification of tic behaviors was terminated after
20 minutes. In subsequent booster sessions, detection of tic behavior(s) did not reach the prescribed criterion level for any subject.

Expectancy Effects

Subjects were asked to rate their level of expectancy for treatment gains on each procedure (similar and dissimilar) on a Likert-type scale ranging from 1 to 5, where 1 designated no expected change and 5 designated a great amount of expected change.

Follow-Up

At various intervals during the year, subjects returned for a follow-up observation session which consisted of the 10-minute videotape assessment and discussion period. Except for Subject 3, who achieved complete suppression of his tic, all subjects reported at every follow-up session continued, periodic use of similar contingent competing responses.

Social Validation

At the completion of the study, subjects were asked to fill out a treatment questionnaire regarding their satisfaction with the treatment and assessment of their improvement. In addition, questions concerning distress and distraction level were also included. A Likert-type scale ranging from 1 to 5 was utilized. Generally, all subjects were satisfied with their treatment progress and therapeutic gains. The results indicate, however, that although improvements had
been made, continued muscle tic activity was rated as slightly uncomfortable and noticeable. The results are presented in Table 3.

Table 3
Mean Ratings on Treatment Satisfaction Questionnaire

1. Please rate how satisfied you are with your progress in the program.

<table>
<thead>
<tr>
<th></th>
<th>very dissatisfied</th>
<th>neutral</th>
<th>satisfied</th>
<th>very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

2. As a result of the treatment program I am experiencing my tic:

<table>
<thead>
<tr>
<th></th>
<th>more than treatment</th>
<th>the same as treatment</th>
<th>less than treatment</th>
<th>much less than treatment</th>
<th>not at all treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Before treatment my tic distressed me:

<table>
<thead>
<tr>
<th></th>
<th>very much</th>
<th>much</th>
<th>not much</th>
<th>very little</th>
<th>not at all little</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

4. Since receiving treatment my tic distressed me:

<table>
<thead>
<tr>
<th></th>
<th>very much</th>
<th>much</th>
<th>not much</th>
<th>very little</th>
<th>not at all little</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

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5. **Before treatment** for my tic, being around other people made me feel:

|       | very | uncomfortable | slightly | neutral | not uncomfortable | uncomfor- | at all |
|-------|------|---------------|----------|---------|--------------------|----------|
|       |      |               |          |         |                    | table     |
| 1     | 2    | 3             | 4        | 5       |

6. **Since receiving treatment** for my tic, being around other people makes me feel:

|       | very | uncomfortable | slightly | neutral | not uncomfortable | uncomfor- | at all |
|-------|------|---------------|----------|---------|--------------------|----------|
|       |      |               |          |         |                    | table     |
| 1     | 2    | 3             | 4        | 5       |

7. **Before treatment** I think my tic was distracting to other people:

<table>
<thead>
<tr>
<th></th>
<th>very</th>
<th>not</th>
<th>very</th>
<th>not</th>
</tr>
</thead>
<tbody>
<tr>
<td>much</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

8. **Since receiving treatment** I think my tic is distracting to other people:

<table>
<thead>
<tr>
<th></th>
<th>very</th>
<th>not</th>
<th>very</th>
<th>not</th>
</tr>
</thead>
<tbody>
<tr>
<td>much</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

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CHAPTER III

RESULTS

The results for the subjects receiving dissimilar contingent competing response training and the subject receiving similar contingent competing response training are depicted in Figures 1 and 2. Mean levels were computed by averaging data from the last 5 session days in each condition. Percent decreases or increases of mean rates can be seen in Appendix A.

All subjects showed a decrease in muscle tic frequency with the initial introduction of either similar or dissimilar competing response treatment. With the introduction of dissimilar contingent competing response training, Subject 1's mouth twitching decreased rapidly from a baseline mean of 32.0/min to 6.8/min. During this phase the competing response was changed from tensing the right bicep to clenching the left hand after the subject reported pain in her right arm. A change to a similar contingent competing response was initiated when it was determined from observation of the videotape and the subject's report that she was already engaging in this behavior during the dissimilar competing response phase (i.e., she was clenching her jaw in addition to tensing her bicep). Her muscle tics continued to decline to a mean rate in the similar contingent phase of 3.9/min until session day 58 when her dentist prescribed a variety of mandibular and mouth exercises that included practice of the tic behavior itself. The mean level of tic behavior increased to 15.4/min.
Figure 1. Response Data for Subjects 1, 2, and 3 (A = change to a different dissimilar competing response; B = mandibular exercise).
Figure 2. Response Data for Subject 4.
in the similar contingent phase. Follow-up for Subject 1 showed the level of mouth twitching to be at 4.7/min at 2 weeks, 7.3/min at 5 weeks and 1.5/min at 9 months.

For Subject 2, who had multiple tics of head jerking and arm jerking, treatment was administered in a multiple baseline across behaviors design. During baseline head jerking was scored in 51% of the intervals observed. With dissimilar contingent competing response training the target behavior decreased to a mean level of 15% of the intervals. Similar contingent competing response training was introduced in an effort to further suppress tic behavior. However, the mean rate of responding in this phase increased to 21% of the intervals observed.

The baseline mean for arm jerking for Subject 2 was 23.4% of the intervals observed. In the dissimilar contingent competing response condition, arm jerking decreased to a level of 9%, with little variability. Subsequent similar contingent competing response training further reduced the mean level to 5.2%. An interdependency effect was detected when head jerking received dissimilar competing response training while arm jerking remained in the baseline condition. The baseline mean for arm jerking decreased from 60% to 23% when head jerking training was instituted. Shortly after completion of the study, the subject was diagnosed as suffering from Gilles de la Tourette's syndrome. He was placed on a drug regimen of Haldol, and he reported the cessation of all tic behavior. As a result, no further follow-ups were conducted.
Nostril flaring for Subject 3 occurred on an average of .3/min in baseline. Administration of dissimilar contingent competing response training lowered his rate to .1/min. Follow-ups for Subject 3 showed his rate of nostril flaring to be .4/min at 4 weeks and 0/min at 2 months, 5 months, and 9 months.

Subject 4 received similar contingent competing response training in a multiple baseline across behaviors design. The baseline mean rate for head jerking was 8.0/min. After similar contingent competing response training the target behavior was reduced to a mean level of 2.2/min. A follow-up 2 weeks later showed his level of tic behavior stable at 2.0/min. Subsequent follow-ups were unsuccessful due to equipment malfunction and client unavailability.

During baseline for Subject 4, eye blinks with less than a 3-second IRT were observed in 99.9% of the intervals. After similar contingent competing response training the mean dropped sharply to 7% with substantial variability in responding. Follow-up showed that his tic level had increased but was still low at 12%.

Finally, eyebrow twitching for Subject 4 had a mean baseline rate of 1.7/min. After similar contingent competing response training for eyebrows the target behavior dropped to a low level of .38/min. The response rate increased slightly to .6/min at a 2-week follow-up.

An interdependency among tic behaviors was also detected for Subject 4. Similar competing response training for eye blinking, the second of three tic behaviors treated, appeared to engender changes in both head jerking and eyebrow twitching. Head jerking, while
exposed to the similar contingent condition, increased from 1.0/min to a mean rate of 2.2/min with substantial variability in responding. Eyebrow twitching, while under the baseline condition, decreased from 3.0/min to .1/min and subsequently stabilized at a mean rate of 1.7/min.

The results of the Treatment Satisfaction Questionnaire are listed in Table 3. Subject 1 reported that prior to treatment her tic was highly distressing, very uncomfortable and very distracting to others. After treatment she reported very little distress, very little distraction from other people, a lower frequency of tic behavior and an overall high level of satisfaction. Subject 2 reported that his tics were highly distressing, uncomfortable and very distracting to others. After treatment he reported very little distress, very little distraction from other people, a lower frequency of tic behavior and an overall high level of satisfaction. Subject 3 reported that prior to treatment his tic was distressing, uncomfortable and somewhat distracting to others. After treatment he reported very little distress, very little distraction from other people, a lower frequency of tic behavior and an overall high level of satisfaction. Finally, Subject 4 reported that his tics were distressing, slightly uncomfortable, and not very distracting to other people. After treatment he reported a little distress, no distraction from other people, a lower frequency of tic behavior and an overall medium level of satisfaction.
Compliance with Treatment

Compliance with the treatment regimen was monitored through the use of the daily 3 x 5 in. (7.62 x 12.7 cm) card on which subjects recorded occurrences of their tic behavior and subsequent engagement in the competing response. All subjects reported consistent application of the treatment procedure outside the clinical setting (e.g., 80% to 100% of detected tics were conseqated). However, the subjects consistently reported lower levels of muscle tics (ranging from 0 to 26 per day) during self-observation than the levels scored from the videotapes in the clinical observation sessions, suggesting that some tics were not detected and hence not followed by the relevant competing response. An alternative explanation is that clinical sessions were designed to evoke high rate tic behavior; therefore, the self-reported data outside the clinical setting, although lower than the clinical data, were nevertheless accurate. Also, consistent application of the competing response during clinical observation was difficult to determine because some of the competing responses involved movements that were either inaccessible or too subtle for detection by the video equipment.

Subjects 1, 2, and 4 reported continued use of the similar contingent competing response procedure at follow-up. Subject 3, who achieved complete suppression of his tic, reported no continued use of the procedure.
Treatment Expectancy

Treatment expectancy was rated on a 5-point Likert-type scale on which 1 was labeled as "expect no change" and 5 was labeled as "expect great change." For three subjects who received dissimilar competing response training, little or medium expectancy for change was reported. For three subjects who received similar competing response training a medium to great expectancy for change was reported.
CHAPTER IV

DISCUSSION

The data in Figures 1 and 2 suggest that initial application of the competing response procedure (similar or dissimilar) engendered reductions in tic behavior for all subjects, including total suppression for Subject 3. Both procedures produced equivalent percent reductions in tic behavior. Furthermore, the addition of similar contingent competing response training subsequent to dissimilar contingent competing response training did not produce further decelerative effects for Subjects 1 and 2. These results suggest that within limits, the topography of the contingent competing response, whether similar or dissimilar, may not be crucial for response suppression.

It is interesting to note that for the two subjects with multiple tic behaviors the data suggest an interdependency among the individualtics. Specifically, for Subject 2, there was a decrease in the baseline response level of arm jerking when the head jerking received dissimilar contingent competing response training. In the case of Subject 4, when eye blinking received similar contingent competing response training, head jerking temporarily increased and eyebrow twitching temporarily decreased. There are a number of explanations for these observations. First, the multiple tic behaviors, although not topographically similar with the exception of eye blinking and eyebrow twitching of Subject 4, may be functionally related, perhaps as part of a response chain such that alterations in one response may
disrupt the chain prior to the occurrence of the other response. Second, having to maintain awareness of a variety of tic behaviors and engage in multiple competing responses may hinder or interfere with overall awareness of tic behaviors and implementation of competing responses in general, thereby reducing the frequency of competing response implementation. Finally, the competing response itself may act as a punisher, thereby decreasing the rate of all tics, including those not yet scheduled for intervention that accidentally occur prior to the emission of the competing response for a different muscle tic. Needless to say, the above explanations are speculative, but the possibility of interaction across muscle tics warrants careful attention in future clinical applications or experiments.

For the two subjects who received both similar and dissimilar competing response training, it is interesting to note that although dissimilar competing response was to be minimally aversive and socially inconspicuous so that the client would be motivated to carry it out, both preferred to engage in the similar competing response upon completion of the study. This finding may be due to the fact that similar competing response training was the last condition presented and subjects merely continued using it, or perhaps both subjects preferred to engage in that method because they believed it to be the more powerful procedure. Both explanations are speculative.

As mentioned previously, some time after the conclusion of the study, Subject 2 was diagnosed as suffering from Gilles de la Tourette's syndrome, a disorder characterized by multiple muscle tics and emission of involuntary noises (Turner & Morrison, 1982). A variety
of procedures used to treat this disorder have included drugs (Challas & Brauer, 1963), massed practice (Clark, 1966), massed practice and cue-controlled relaxation (Turpin & Powell, 1984), self-monitoring and reciprocal inhibition (Thomas, Abrams, & Johnson, 1971), token economy, relaxation and verbal praise (Rosen & Wesner, 1973), and reinforcement of incompatible behaviors (Doleys & Kurtz, 1974). Yet, application of the habit reversal procedure or variants thereof have not been tested specifically with this population. Although drugs, specifically Haloperidol (Haldol), continue to be widely used in the treatment of Tourette's syndrome (Turner & Morrison, 1982). While a deceleration of arm and head jerking was evidenced during both competing response phases, the subject reported total suppression of tic behavior only after administration of Haloperidol. These self-reports were not verified by direct observation in the clinic. Because this drug does have immediate and long-term negative side effects such as sleepiness and tardive diskenesthesia (Long, 1980), the application of the competing response procedure with Tourette's syndrome merits further investigation.

It is also important to mention some of the problems and limitations of the study. The small number of subjects involved in the experiment prevented between group statistical comparisons. Another limitation involved the confounding of awareness training and contingent competing response training. Subjects were trained to detect an occurrence of a tic as a prerequisite to engaging in a competing response contingent on the occurrence of their tic. Therefore, contingent competing response training cannot be instituted without
previous detection by the subject that the tic has occurred. Numerous studies have suggested that increased awareness or self-monitoring of muscle tic behavior can reduce tic frequency (Varni et al., 1978; Billings, 1978; Ollendick, 1981). Another limitation is that no subjects attained the training criterion of identifying 10 consecutive tic occurrences during the training session. Furthermore, it seems unlikely that their effectiveness in identifying tics in the natural environment would be any greater. This assumption may be further supported by the discrepancies between self-report data of muscle tic levels and levels observed during clinical observation session. However, the discrepancies must be interpreted cautiously because session activities were especially selected to provoke high levels of tics and thus the reported discrepancies may accurately reflect actual differences in tic levels. In any event, undetected and thus unconsequated tics may decrease the effectiveness of the competing response training.

Additionally, the design did not assay the relative efficacy of similar and dissimilar competing response training. For Subjects 1 and 2, similar followed dissimilar competing response training and therefore the observed effects of similar training may be a function of being applied after dissimilar training. Lastly, adherence to the procedure (i.e., integrity of the independent variable) during clinical observations was difficult to determine because some of the competing responses involved movements which were inaccessible or too subtle for detection by the video equipment. Away from the clinical
setting, adherence to the procedure was determined by self-report alone, the veracity and accuracy of which are questionable.

Failure to achieve complete suppression in all but one subject (Subject 3, nostril flare) may have been due to a number of factors. All subjects evidenced roughly equivalent mean percent decreases (e.g., 66% to 86%) of tic behavior upon initiation of competing response training whether similar or dissimilar; therefore, low rate tics may have been more amenable to complete suppression than high rate tics. An alternative explanation, as mentioned previously, was that all subjects did not attain a high level of awareness detection in session and therefore did not engage in the contingent competing response at a rate necessary for complete response suppression.

Despite these limitations, the results of this study suggest that the contingent competing response, regardless of topography, was aversive or punishing as evidenced by the decelerative effects on tic behavior. However, Azrin and Nunn's (1973) formulation of a competing response procedure was not identified as a punishment process but was instead derived from an overcorrection rationale wherein the client engaged in a behavior opposite to that of the problem behavior contingent on its occurrence. Nevertheless, Miltenberger and Fuqua (1981) point out in their article on overcorrection, "Despite claims to the contrary, overcorrection is most parsimoniously classified as a punishment procedure" (p. 131). Further support for the notion that contingent competing response training may involve a punishment process is that emission of dissimilar competing responses, unlike similar competing responses, decreased the rate of tic behavior
without strengthening antagonistic muscles or interfering with tic behavior itself.

The results of this study support and extend those by Miltenberger and Fuqua (1985, in press). The study replicates the effectiveness of the contingent competing response component of the habit reversal procedure in reducing the frequency of muscle tics. Also, it suggests that the topography of the competing response may not be crucial to the response suppression effects of contingent competing responses. Furthermore, the results suggest that contingent competing response training may be efficacious in reducing tic frequency for those afflicted with Gilles de la Tourette's syndrome. If punishment is to be the verified mechanism of action for tic suppression, further research is required that would separate the singular effects of awareness training from those of awareness training and competing response training.
BIBLIOGRAPHY


