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FUNCTIONAL ANALYSIS OF TARDIVE DYSKINESIA: IMPLICATIONS FOR ASSESSMENT AND TREATMENT

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We conducted an analogue functional analysis contrasting motor tasks with varying types of social consequences for movements associated with tardive dyskinesia (TD) in 2 men who had been diagnosed with developmental disabilities and TD. Our findings suggest that TD-related movements were not a function of social reinforcement contingencies. However, motor-activation tasks decreased TD-related movements, suggesting a possible novel intervention.

DESCRIPTORS: tardive dyskinesia, motor-activation tasks, functional analysis, developmental disabilities, mental retardation

The most often prescribed class of medication for people with developmental disabilities has been antipsychotics (e.g., haloperidol) (Valdovinos, Schroeder, & Kim, 2003). Among the undesirable side effects of antipsychotic medication is tardive dyskinesia (TD). TD is a disorder characterized by uncontrollable movements of the tongue, jaw, trunk, or extremities for which there is no effective intervention.

Recently, Valdovinos, Roberts, and Kennedy (2004) analyzed whether dyskinetic movements come under control of social consequences. Four conditions were studied using an analogue functional analysis (i.e., alone, attention, control, and demand conditions). Valdovinos et al. reported low rates of TD-related movements in the control and demand conditions, but higher rates were observed in the alone and attention conditions.

One possible interpretation of the Valdovinos et al. (2004) findings is that TD-related movements came under the control of social reinforcement in the attention condition and occurred for other reasons in the alone condition. Hence, the behavior was multiply determined. However, neither the attention nor alone condition required any motor movements to be emitted, whereas in the demand and control conditions, motor movements were elements of the procedure. Thus, it is unclear whether the increases in TD-related movements in the alone and attention conditions represented multiply determined behaviors or some motor-activation effect associated with the demand and control conditions.

In the current study, we tested the motor-activation hypothesis. We manipulated task requirements in the attention and demand conditions. Under some conditions, the attention and demand tasks required limb movements, but in other conditions limb movements were not required. If TD movements increased and decreased in relation to the motor-activation tasks but not programmed social contingencies, this would confirm that the findings of Valdovinos et al. (2004) were due to motor activation and not social reinforcement and suggest a novel intervention for reducing TD movements.

METHOD

Participants and setting. Two men who had been diagnosed with mild mental retardation

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and TD participated in this study. John was a 52-year-old African-American who was taking 600 mg of clozapine (an atypical antipsychotic) and 2 mg of benztropine (an anticholinergic). Keith was a 53-year-old African-American who was taking 10 mg of olanzapine (an atypical antipsychotic). These men had previously participated in the Valdovinos et al. (2004) study. All sessions were conducted in a quiet room with one table and several chairs.

Response definition, measurement, and interobserver agreement. Dyskinetic movements for John included shoulder torsion, athetoid-myokymic fingers, pill rolling, ankle flexion, toe movement, grimaces, blinking, athetoid-myokymic-lateral tongue, and lip puckering. Dyskinetic movements for Keith included lip puckering, grimacing, athetoid-myokymic-lateral tongue, rapid eye blinking, shoulder torsion, ankle flexion, and toe movement.

All sessions were videotaped, and occurrences of dyskinetic movements were subsequently scored using a 10-s partial-interval paper-and-pencil system. Interobserver agreement was calculated by dividing the number of agreements (occurrence and nonoccurrence) by the number of agreements plus disagreements and multiplying by 100%. Agreement was obtained for 31% of all sessions. Mean agreement scores for John and Keith were 95% (range, 82% to 100%) and 90% (range, 78% to 99%), respectively.

Design and procedure. Analogue functional analyses (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) were conducted using an ABCBC design combined with a multielement design (Kennedy, 2005). Sessions were conducted once per week for John and once per day for Keith. Each condition was 5 min long, with a 1-min break between conditions. All contingent events were for TD movements.

Conditions during baseline were the same as those used in Valdovinos et al. (2004) and included alone, attention for TD, control, and demand. In the alone condition, access to preferred activities or social stimulation was withheld, and there were no consequences delivered for TD movements. During attention for TD, unless the participant engaged in TD movements, social interaction was withheld. When the participant engaged in TD movements, the researcher provided attention in the form of a social comment (e.g., "I like that shirt you're wearing"). During the control condition, attention and preferred activities (e.g., looking at books) were delivered to the participant. In the demand condition, the participant was presented with demands that required the use of his hands (e.g., sorting cards by color, lining up dominos, or folding towels) and was prompted to actively engage with the items. If the participant completed the task, he was praised and presented with another task. If he engaged in TD movements, the materials were removed for 15 s and then a new task was presented. Additional conditions included attention for no TD, motor demand for no TD, and verbal demand. During attention for no TD, 15 s of attention in the form of statements (e.g., "It's a nice day today") was provided for the absence of TD movements. During motor demand for no TD, a motor task (i.e., providing access to a book) was presented for 15 s for the absence of TD movements. The verbal demand condition involved the presentation of questions that required verbal responses. If TD movements occurred, the participant was told not to answer the question and given a 15-s break.

RESULTS AND DISCUSSION

The results of the analogue functional analyses are shown in Figure 1. For John, during baseline, the highest percentage of dyskinetic movements occurred during the alone and attention for TD conditions, whereas the lowest percentages of dyskinetic movements occurred in the control and demand conditions. As the sessions continued and the delivery of attention was manipulated, no differences in TD movements were noted between attention for TD (M = 88%)

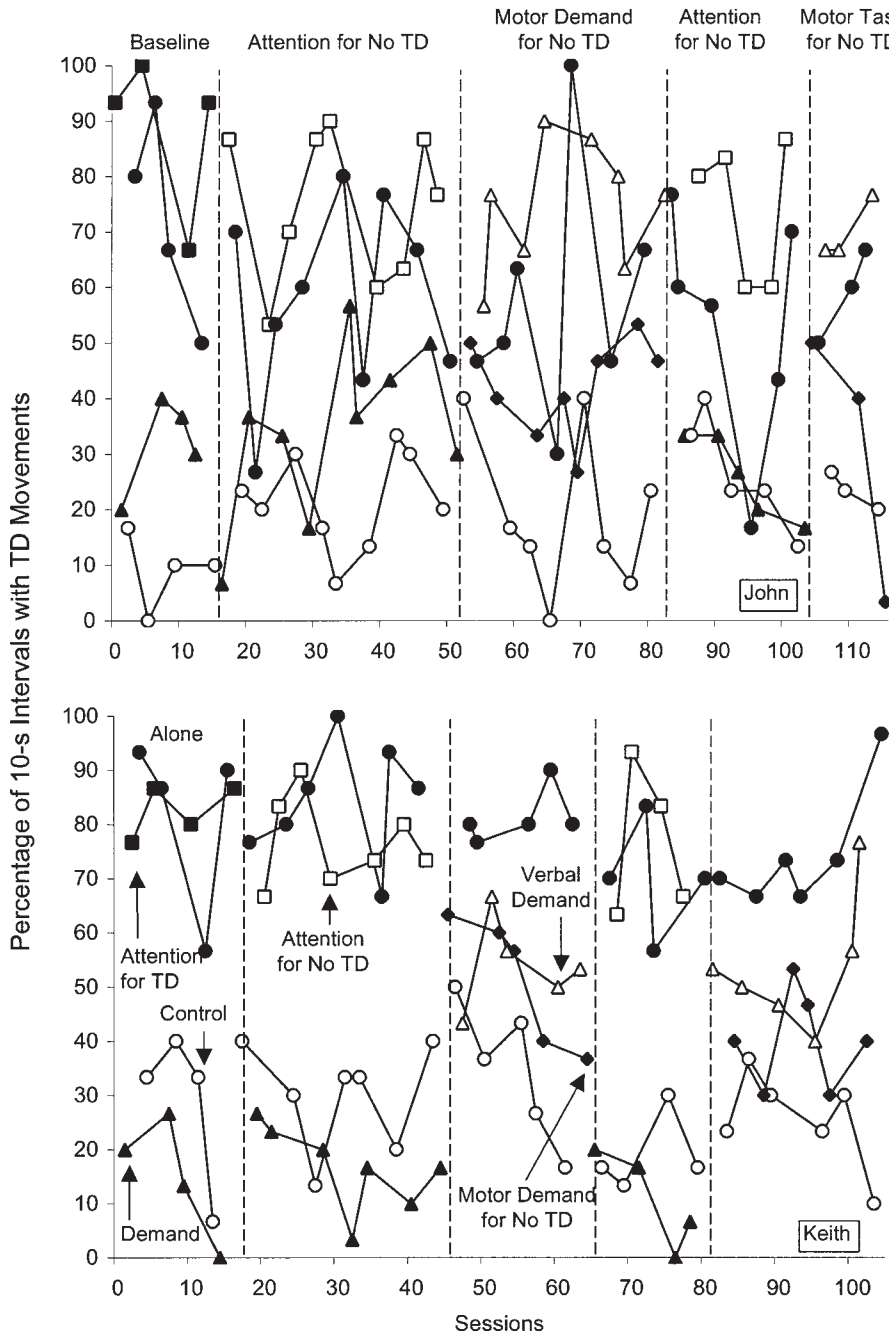

Figure 1. Percentage of 10-s intervals of dyskinetic movements for John (top) and Keith (bottom) during alternating conditions of attention for no TD (attention delivered contingent on the absence of TD movement) and motor tasks for no TD (motor-activation tasks provided contingent on the absence of TD movement).

and attention for no TD (M = 75%). During motor demand for no TD, there was a decrease in TD movements (M = 39%) compared to attention for no TD (M = 75%). In addition, there was an increase in TD movements during verbal demand (M = 73%)

in relation to those obtained in the demand condition ($M = 31\%$).

For Keith, there were higher percentages of dyskinetic movements during the alone and attention for TD conditions than in the control and demand conditions. Little difference was observed between responding during attention for TD ($M = 83\%$) and attention for no TD ($M = 77\%$). Furthermore, during motor demand for no TD, TD decreased ($M = 45\%$) compared to attention for TD. When verbal demands were presented instead of motor demands, dyskinetic movements increased in the verbal demand condition ($M = 54\%$) relative to the demand condition ($M = 15\%$).

Our results indicate that social reinforcement contingencies did not serve as positive or negative reinforcers for TD movements for these 2 individuals. Instead, the increases and decreases in TD movements were a function of the motor-activation tasks. When demands required verbal responses, TD movements increased; when opportunities to engage in activities required limb movement, TD movements decreased. We replicated the results of Valdovinos et al. (2004) and showed that competing motor-activation tasks, rather than social reinforcement contingencies, were responsible for the frequency of TD movements observed. This finding suggests that motor-activation tasks may be used to reduce TD movements when social reinforcers are not identified as maintaining variables for these behaviors.

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