

*EFFECTS OF AN ORAL HYGIENE PUNISHMENT PROCEDURE  
ON CHRONIC RUMINATION AND COLLATERAL BEHAVIORS  
IN MONOZYGOUS TWINS*

NIRBHAY N. SINGH, PATRICK J. MANNING,  
AND MARYANNE J. ANGELL

UNIVERSITY OF CANTERBURY, UNIVERSITY OF AUCKLAND MEDICAL SCHOOL,  
AND MANGERE HOSPITAL AND TRAINING SCHOOL, NEW ZEALAND

This study investigated the suppressive effects of an oral hygiene punishment procedure on the ruminative behavior of profoundly retarded monozygous twins. Rumination, fingers in mouth/tongue out, appropriate behavior, and stereotyped behavior were measured before and during treatment with oral hygiene. Treatment was introduced for each meal in succession across the twins in a multiple-baseline design. Results showed that the rate of rumination of both twins was dramatically reduced to very low levels and stereotyped behavior increased spontaneously with the introduction of oral hygiene. Maintenance data showed that response reduction was maintained over a six-month period and, when compared to baseline levels, increased rates of socially appropriate behavior were evident in both children.

**DESCRIPTORS:** rumination, oral hygiene, stereotyped behavior, monozygous twins, retarded children

Rumination is observed in about 6% of institutionalized mentally retarded persons (Singh, 1981). It has been defined as the regurgitation of previously ingested food and its reconsumption and/or drooling from the mouth. In some cases, this disorder can be life-threatening due to prolonged malnutrition, dehydration, and a lowered resistance to disease. Furthermore, it may lead to social ostracism and a gradual decay of the patient's teeth.

Several behavioral techniques have been found to be effective in controlling rumination. These include the presentation of response-contingent aversive stimuli (e.g., electric shock,

lemon juice, pepper sauce, oral antiseptic, over-correction), extinction, food satiation, and differential reinforcement procedures (see Singh, 1981, for a review). Because rumination responds to a variety of techniques, it is ethically and clinically appropriate to use a procedure that is least restrictive (May, Risley, Twardosz, Friedman, Bijou, Wexler et al., 1975). However, more aversive techniques have to be used in cases where procedures regarded as least restrictive are either exceedingly slow acting or produce clinically insignificant reductions in the response rate.

In a recent study, Foxx, Snyder, and Schroeder (1979) used food satiation and an oral hygiene punishment procedure to treat rumination by two profoundly retarded persons. Although some initial response suppression was achieved through food satiation alone, near-zero levels of rumination were achieved with satiation plus an oral hygiene procedure. Although the efficacy of food satiation has been demonstrated previously (Jackson, Johnson, Ackron, and Crowley, 1975),

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This study was completed while Patrick Manning was on a Medical Research Council (MRC) Summer Scholarship at Mangere Hospital and Training School. The authors thank Desmond J. Woods, Alan Chapman and the nursing staff of Unit 9, Mangere Hospital and Training School for their continuing support, and Judy Singh for her assistance in the preparation of the manuscript. Reprint requests should be directed to Nirbhay Singh, Department of Psychology, University of Canterbury, Private Bag, Christchurch 1, New Zealand.

Foxx *et al.* (1979) are the only authors that report using the oral hygiene procedure. However, since oral hygiene was paired with satiation, its exact role in the treatment of rumination remains to be determined. As attested to by Foxx *et al.*, the oral hygiene punishment procedure has several advantages over other behavioral procedures (e.g., it uses oral antiseptic which not only cleans the patient's gums and teeth, but also eliminates foul-smelling breath), but its general efficacy needs further documentation.

The present study was designed to evaluate the effects of the Foxx *et al.* (1979) oral hygiene procedure on the ruminative behavior of two profoundly retarded persons (monozygous twins). A secondary aim was to assess the effects of the procedure on the social and stereotyped behaviors of the twins.

## METHOD

### *Participants*

A pair of 17-year-old profoundly retarded monozygous twins (Paul and David) participated in the study. The etiology of their retardation was not known. Their social age on the Vineland Social Maturity Scale was 1.35 yr and their behavioral age on the Fairview Self-Help Scale was 7.9 mo. Neither had any speech (Fairview Language age of 5 mo); both displayed minimal recognition of staff and peers; and both required constant nursing care. Both were small (height and weight) for their age. The twins had been institutionalized since the age of 3 yr 11 mo and began ruminating when they were 6 yr 6 mo. Although both boys ruminated throughout the day, they were at their worst for about an hour following each meal. Various techniques, including thickened food, food satiation, and drugs (e.g., Thioridazine, Haloperidol, and Eumydrin), had been previously used to control their rumination but all met with only limited success. Informed consent from the residential authorities was obtained, using the Cook, Altman, and Haavik (1978) guidelines, before treatment was initiated.

### *Response Definitions*

A preliminary behavioral analysis showed that the twins' behavior could be conveniently categorized and observed under the following headings:

1. *Rumination*: any upward movement of the throat accompanied by the cheeks puffing as they fill with vomitus, or the chewing or drooling of previously ingested food.

2. *Fingers in mouth/tongue out*: placing of fingers in the mouth or pushing out of the tongue to make oneself vomit.

3. *Appropriate behavior*: smiling, appropriate speech or laughter, appropriate toy play, interaction with staff and other residents.

4. *Stereotyped behavior*: consisting of (a) self-stimulation (rocking, waving, or rubbing parts of the body); (b) object manipulation (repeated rubbing, rotating or tapping objects/toys); and (c) self-injury (hitting or biting oneself).

### *Measurement and Reliability*

An interval-recording technique was used in which each session was divided into 360 10-sec observation intervals. Observations were scheduled for 1 hr immediately following each meal. Each observation session lasted 1 hr excluding the time the twin spent in treatment.

Data were collected by one of a pool of six observers, all ward staff, randomly assigned on a daily basis. All had practiced recording the target behaviors for 8 wk prior to the study, with baseline observations being initiated only when their interobserver agreement with a randomly assigned partner was above 85%. Furthermore, interobserver agreement was assessed on 20% of the days during the experimental conditions, with at least two checks in each condition for each child.

The exact agreement-response intervals only method (Repp, Deitz, Boles, Deitz, & Repp, 1976) was used to calculate the percentage of interobserver agreement. An agreement was defined as an interval in which both observers recorded the occurrence of the same behavior. A

disagreement was defined as an interval in which either one observer recorded the occurrence of a target behavior and the other did not, or recorded a different target behavior. Only those intervals in which at least one observer recorded a response were used in the computation of reliability scores. Percent agreement between observers was computed by dividing the number of intervals with agreement by the sum of the agreements and disagreements, and the quotient multiplied by 100. Mean interobserver agreement (with ranges in parentheses) for rumination, fingers in mouth/tongue out, appropriate behavior, and stereotyped behavior for Paul were 92% (87-93), 89% (86-91), 91% (87-94), and 92% (86-94). For David the scores were 93% (90-94), 90% (88-93), 88% (86-92), and 93% (86-94).

#### *Experimental Design*

A multiple baseline across subjects and situations (meals) was used to evaluate the effects and side effects of an oral hygiene procedure. Treatment was introduced in succession after lunch, breakfast, and dinner and was introduced first for Paul and then for David in the following manner:

1. *Lunch: Paul*—6 days baseline, 66 days treatment; *David*—12 days baseline, 60 days treatment.
2. *Breakfast: Paul*—18 days baseline, 54 days treatment; *David*—24 days baseline, 48 days treatment.
3. *Dinner: Paul*—30 days baseline, 42 days treatment; *David*—36 days baseline, 36 days treatment.

A 6-mo maintenance phase was instituted following the experimental conditions.

#### *Experimental Conditions*

The twins were treated in the dining room of their ward during the experimental conditions and throughout the ward during the maintenance phase.

*Baseline.* The target behaviors were recorded for an hour following each meal. No programmed contingencies were in effect for these behaviors during baseline.

*Oral hygiene.* The Foxx et al. (1979) procedure was used. Each instance of rumination resulted in the child being verbally reprimanded ("No"), required to clean his teeth for 2 min with a toothbrush that had been soaked in oral antiseptic (Listerine), and then wipe his lips with a facecloth that had been dipped in the Listerine. Physical prompts were used if the twins resisted executing the procedure. Fingers in mouth/tongue out did not result in treatment with the oral hygiene procedure.

*Maintenance.* All staff on the ward were trained in the use of the oral hygiene procedure before maintenance procedures were instituted. During this phase, the treatment procedure was implemented throughout the twins' entire day and data were collected throughout the day. Maintenance data were collected for 6 mo after which David was transferred to another ward and Paul was included in another project (Singh & Aman, 1981).

## RESULTS

The percentage of intervals of rumination and stereotyped behavior for both twins throughout the study is presented in Figure 1. The overall phase means for rumination, fingers in mouth/tongue out, appropriate behavior, and stereotyped behavior are given in Table 1.

During baseline both twins showed steady high rates of rumination and low rates of the other behaviors. The introduction of oral hygiene resulted in a dramatic reduction of rumination in both twins and a spontaneous increase in their rate of stereotyped behavior. Fingers in mouth/tongue out increased slightly in both twins but not to clinically significant levels. Although the level of Paul's socially appropriate behavior was low during the baseline, it decreased even further (by about 40%) during oral hygiene. With David, however, there was

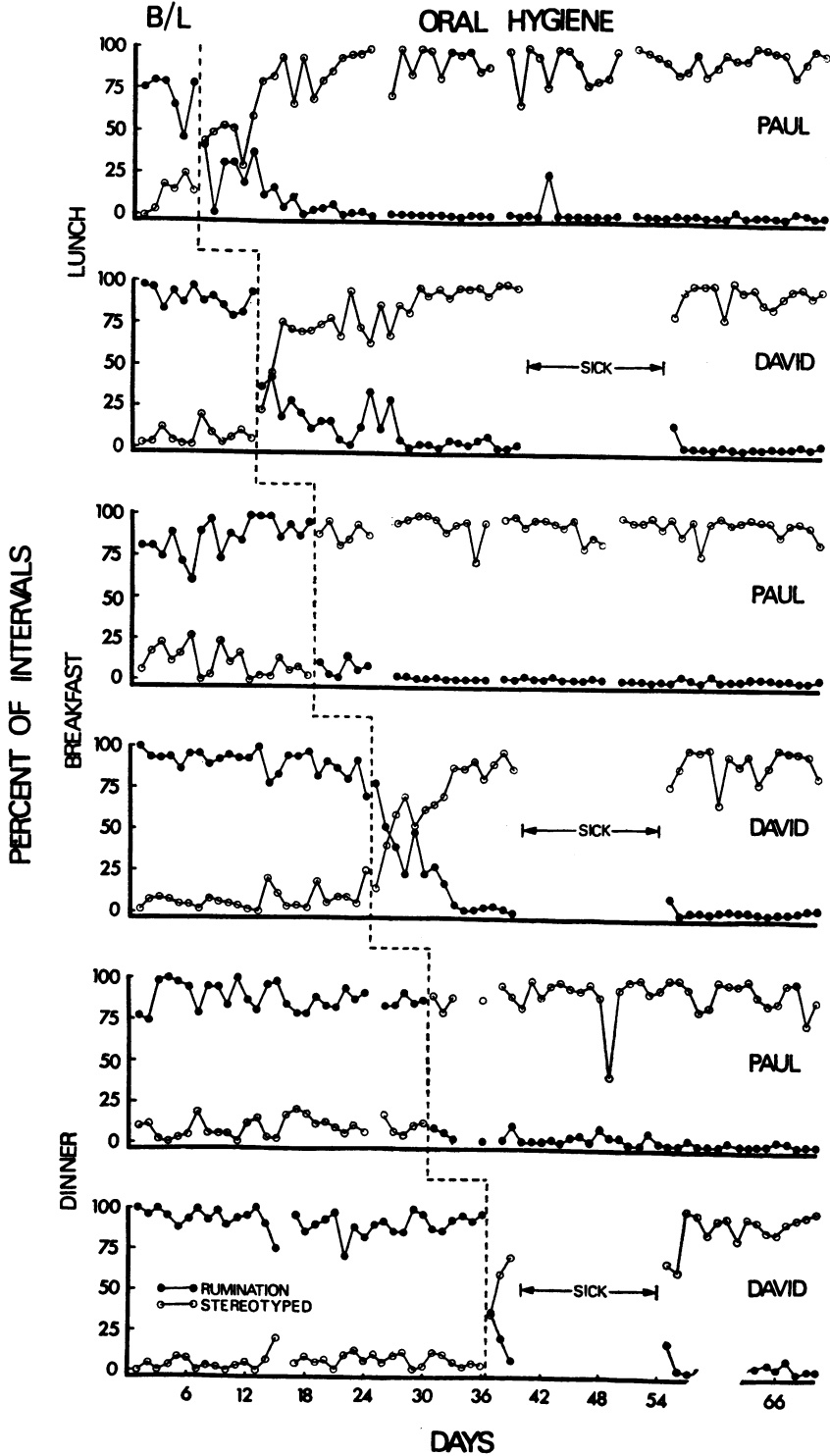


Fig. 1. Percentage of intervals of rumination and stereotyped behavior across experimental conditions.

Table 1  
Mean Percentage of Intervals of Observed Behaviors Across Experimental Conditions

Experimental Condition	Behaviors					
	Rumination	Fingers in Mouth/Tongue Out	Appropriate Behavior	Self-Stimulation	Object Manipulation	Self-Injury
<b>I. PAUL</b>						
<i>Baseline</i>						
Lunch	71.7	2.5	13.2	12.1	0.5	0.0
Breakfast	86.1	0.6	3.0	10.0	0.2	0.1
Dinner	87.8	1.7	1.9	8.3	0.2	0.1
Mean	81.9	1.6	6.0	10.1	0.3	0.1
<i>Oral Hygiene</i>						
Lunch	4.4	5.1	3.9	85.9	0.7	0.0
Breakfast	1.9	3.1	2.0	93.0	0.0	0.0
Dinner	2.6	1.8	5.5	89.7	0.2	0.2
Mean	3.0	3.3	3.8	89.5	0.3	0.1
<i>Maintenance</i>	1.9	0.4	14.3	83.0	0.4	0.0
<b>II. DAVID</b>						
<i>Baseline</i>						
Lunch	89.0	2.2	2.3	6.1	0.4	0.0
Breakfast	90.1	2.0	1.0	6.4	0.5	0.0
Dinner	91.8	2.3	0.5	4.9	0.5	0.0
Mean	90.3	2.2	1.2	5.8	0.5	0.0
<i>Oral Hygiene</i>						
Lunch	7.8	3.3	3.3	85.0	0.6	0.0
Breakfast	10.6	1.5	6.7	80.5	0.7	0.0
Dinner	5.9	3.4	5.5	84.6	0.6	0.0
Mean	8.1	2.7	5.2	83.4	0.6	0.0
<i>Maintenance</i>	1.8	0.4	5.7	91.3	0.8	0.0

a marked increase in appropriate behavior during oral hygiene, to about four times its baseline rate.

The maintenance data showed that the twins' rate of rumination was suppressed even further during the 6-mo period following the termination of the experimental phase. David's appropriate behavior was maintained at about the same level as during oral hygiene. On the other hand, there was a slight increase in Paul's appropriate behaviors during this phase.

## DISCUSSION

The present results provide a clear demonstration of the therapeutic effects of oral hygiene punishment on the ruminative behavior of two profoundly retarded persons. The major findings

of this study are that the oral hygiene procedure resulted in a marked decrease in rumination and a marked increase in stereotyped behaviors. This study extends the findings of Foxx et al. (1979) by showing that the oral hygiene component of their food satiation-oral hygiene treatment package is, by itself, a potent response-reduction technique. As noted by Foxx et al., oral hygiene has several beneficial side effects as well (e.g. improves teeth and gums, and controls breath odor and decaying teeth, which makes it a generally useful procedure for the treatment of rumination).

Of particular interest in this study was the effect of oral hygiene on the collateral behaviors of the twins. The results were somewhat unclear in this regard. For both Paul and David, reduction in rumination also resulted in a spontaneous

increase in stereotyped behavior. As shown in Table 1, a marked increase in the rate of self-stimulation accounted for most of the change in the twins' stereotyped behavior. No clinically significant changes in rate were observed in either object manipulation or self-injurious behavior. Although we do not know the reason for the covariation between rumination and stereotyped behavior, our ward attendants found self-stimulation to be less of a management problem than rumination.

Whether a similar covariation was found by Foxx *et al.* (1979) is not known, since only the rate of rumination was measured in their study. However, other studies using aversive procedures have reported similar negative side effects. For example, Becker, Turner, and Sajwaj (1978) reported the occurrence of head slaps, rocking, and head weaving during lemon juice therapy for rumination which virtually disappeared during follow-up. In the present study, there was only a minimal reduction of such side effects during maintenance.

In summary, this study demonstrated the efficacy of the oral hygiene procedure in the suppression of ruminative behavior in monozygous twins. Although this procedure appears to have certain advantages over the usually used aversive techniques, little clinical data are available at present on the use of this technique. Further research is needed to examine the parameters of this procedure and its efficacy in the long term. Finally, future research should investigate the possibility of combining oral hygiene with a procedure to reinforce socially appropriate behaviors so that rumination may be eliminated from

an individual's behavioral repertoire. Such a treatment was planned but could not be undertaken in the present study because the twins were not available after the programmed maintenance phase.

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Received March 31, 1981

Final acceptance September 10, 1981