Theoretical Basis and Application of Massed Practice Exercises for the Elimination of Tooth Grinding Habits

by

WILLIAM A. AYER*
MARVIN P. LEVIN†

Traditional attempts to eliminate bruxing and clenching habits have involved the equilibration of the patient's dentition, the wearing of night guards, and in extreme instances referral of the patient for psychiatric treatment. However, these approaches, by and large, have been remarkable for their lack of success in eliminating pathologic grinding habits.

Recent efforts by Ayer and Gale1 and Ayer and Levin2 appear to offer a promising method for extinguishing these habits based on a psychologic technique known as massed practice therapy. With this approach, the patient's nocturnal grinding habits were treated by having him repeatedly clench his teeth together during the waking hours. At a 1-month posttreatment appointment, the patients indicated that they were still free of the habit.

The recent findings of Rugh and Solberg3 have provided additional support for the efficacy of this therapeutic modality.

The purpose of the present paper is to describe in greater detail the theoretical model on which massed practice is based and also to update the original studies by providing data on the outcome of treatment at 1 year follow-up. This is particularly important in light of the fact that few bruxism studies tend to report long term follow-ups.

Theoretical Model

Typically, efforts to deal with psychologic aspects of particular dental problems have done so within the Freudian psychoanalytic theoretical framework. Although there is enormous literature in this area, its utility to the dental practitioner has been uniquely minimal.4 Within the field of psychology, other models exist which are considerably stronger scientifically than the psychoanalytic paradigm. The model from which massed practice therapy derives is just such an example. It has its foundation in a body of hypotheses collectively known as learning theory. The latter is of particular importance today because from it is derived a number of practical methods for altering various behaviors such as stuttering, sexual deviations, fingersucking, and tooth grinding habits.5 The effectiveness of the behavior therapist's approach to eliminating many different kinds of pathologic practices has been widely documented in the psychologic literature.6,7

Interestingly, given the basic theoretical premises regarding the nature of learning, several seemingly different but equally effective treatment techniques can be derived from them. The choice of a specific technique—from a variety of available ones—must be made by the clinician in order to accomplish the specific behavior changes desired in the most economical fashion. This selection process has assumed greater importance in modern behavior therapy, which now recognizes the necessity of applying different approaches to different problems rather than one specific approach to all problems.

Theoretical Constructs

Massed practice therapy derives from the formulations of Hull8 and involves the following constructs involved in conditioning or learning: 8Hr = habit strength; 8D = drive; 8Ir = reactive inhibition; 8Ir = conditioned inhibition. These constructs were related by Hull in the following equations:

\[ E_r = (H_r \cdot D)\]
\[ \bar{E}_r = (E_r) - (I_r + J_r)\]

The reaction potential, 8Er, represents the organism's excitatory capacity for responding and is a function of habit strength times drive. Effective reaction potential, 8Er, denotes the actual ability (actual performance capacity) of the organism to emit a response when both excitatory and inhibitory forces are summated. Habit strength (8Hr), once the habit or skill has been acquired, is present whether the organism is responding or not. For example the dentist has a habit strength in terms of performing a dental injection whether that skill is currently being utilized or not. Drive (8D) represents an activator or motivator, and Hull believed that all drives at any one time were additive to produce a momentary drive strength. Operating concomitantly with these driving forces are inhibitory forces, the magnitude of which determined the effective action potential (or actual performance capacity). When a response is made, forces are developed which mitigate against the repetition of the response. This he termed reactive inhibition, 8Ir, and a subsequent response could not be made until it had dissipated. This concept is quite similar to the refractory period concept in physiology. During this refractory period, Hull believed that the reactive inhibition would
dissipate and give rise to a unit of conditioned inhibition ($I_c$) which he conceived as a kind of negative habit strength which was incompatible with his habit strength or $H_r$. Theoretically reactive inhibition, $I_r$, may be viewed as an uncomfortable or noxious drive state, the absence or dissipation of which is reinforcing; and whatever responses are made during the resting period will be strengthened or reinforced (or conditioned). It is important to note that the significant response that is being made during the dissipation period is that of no response. Thus, the behavior therapist is in a position, on the basis of these two theoretical constructs, to eliminate a habit by having an individual engage in prolonged massed practice of the undesirable habit. Simply, the engaging in the habit becomes uncomfortable or fatiguing. Its cessation becomes reinforcing so that eventually the habit is eliminated, and the practice of not engaging in the habit becomes reinforcing. Dunlap successfully employed this paradigm to eliminate thumbsucking, nailbiting, masturbation, and various other habits.\textsuperscript{10}

**Massed Practice Therapy for Parafunctional Grinding Habits**

The technique reported by Ayer and Gale\textsuperscript{1} and refined by Ayer and Levin\textsuperscript{2} required the patients to clench their teeth together as vigorously as possible for 5 seconds and then to relax the jaw for 5 seconds. This practice was to be repeated five times for one block of trials. Six blocks were carried out each day for 2 weeks. A chart was provided to record the trials as they were completed. Initial findings indicated that 11 of 14 female patients reported they no longer bruxed at the end of 2 weeks, and the habit of bruxing appeared to drop out about the 10th night. They were asked to continue the practice for the total 2-week period, initially in order that the habit of not grinding would be further strengthened.

A study by Rugh and Solberg\textsuperscript{3} of bruxist patients involved measuring nocturnal masseter muscle electrical activity in 15 patients. One group was required to clench the teeth vigorously together 100 times six times daily. Another group was required to chew gum 1.5 minutes six times daily, and a placebo group merely clenched the fist and arms 100 times six times daily. Both treatment groups produced significantly greater reductions in nocturnal masseter muscle activity than did the placebo group, thus permitting the inference that the oral exercises significantly reduced the grinding habits as measured by the electrical activity. It is interesting to note that one might hypothesize a decrease in gum chewing frequency among the gum chewing treatment group on the basis of the previously presented theoretical framework. However, this was not evaluated.

**Follow-up Data**

The ultimate issue involving any treatment modality has to do with its long term success. Thirty-three patients (20 females and 13 males) were placed on the massed practiced regimen and evaluated at 1-month, 6-month, and 1-year intervals. At 1 month, 78.7% of the subjects reported they no longer ground their teeth. This percentage dropped slightly to 75.5% at the end of 6-months and was maintained through the 1-year follow-up (Fig. 1). These percentages held for both male and female subjects when analyzed by sex. Of particular interest are those persons for whom the exercise schedule was ineffective. Originally, teenagers were considered to be relatively nonamenable to the technique because of the tediousness of the schedule of exercises. It is entirely likely that adherence to the program and ultimate success is more a reflection of the personality structure of the individual. Presently, the authors are attempting to identify personality components which may be common to those patients who successfully employ this paradigm and those who do not. Preliminary work with Rotter's Internal-External Locus of Control Scale\textsuperscript{4} suggests that the internal personality responds more favorably to massed practice than does the external personality. The internal is an individual who is characterized by feelings and activities directed at having control of the events that occur in his life. Externals, however, feel that whatever happens to them is a result of chance or fate; and any self-initiated activities are irrelevant. If this preliminary finding holds, then it suggests that different therapeutic techniques must be employed for the extinction of the same habit in different patients. As noted previously, current psychologic theory is becoming increasingly cognizant of this possibility.

**Occclusal Adjustment**

Although elimination of occlusal prematurities in patients with parafunctional grinding habits has been utilized extensively, little information exists as to its effectiveness. None the less, it would seem judicious to eliminate any gross prematurities prior to placing the patient on the massed practice schedule. If the patient has been treated repeatedly by equilibration, this step is then unnecessary.

![Figure 1. Percentage success rates over time.](image-url)
SUMMARY

A psychologic technique known as massed practice therapy has been applied to treat tooth grinding and clenching habits. The theoretical model was presented and discussed. In addition, 1-year posttreatment results were reported, in which the habit was eliminated in 75.5% of the 33 patients in the study.

REFERENCES


52nd Ann Mt Int Assoc Dent Res, Atlanta, Ga., 1974.

Announcements

COLUMBIA UNIVERSITY SCHOOL OF DENTAL AND ORAL SURGERY

Columbia University School of Dental and Oral Surgery announces the following continuing education courses:

Title: Adjunctive Orthodontics: Tooth Movement Related to Periodontics and Restorative Dentistry.
Faculty: Drs. Arnold Geiger and Milton Klempert.
Date: May 30, 1975

An orthodontist and a periodontist join to discuss etiology and diagnosis of malocclusion, indications and contraindications for tooth movement, appliance design, tooth movement as an adjunct to occlusal and periodontal therapy, bone changes, stabilization.

Title: Occlusion, A Periodontist's View: Selective Grinding of the Natural Dentition as a Means of Modifying Occlusal Forces.
Faculty: Dr. Robert Gottsegen
Date: June 5, 1975

A procedure for selective grinding of the periodontally involved dentition will be described, and its usefulness, in part or in whole, to general restorative dentistry and less involved dentitions will be discussed. This practical procedure will serve as a framework for bringing together many aspects of occlusal therapy.

Title: Modern Periodontics: An Essential Component of Enlightened General Dental Practice.
Faculty: Dr. Robert Gottsegen
Date: June 6, 1975

The course has as its central theme the need for a periodontal awareness and a knowledge of periodontics in every aspect of general dental practice. Current theory and newer therapeutic techniques will be discussed.

Title: Incorporating Preventive Dentistry into General Practice.
Faculty: Drs. Irwin D. Mandel, Daniel H. Fine and Robert S. Breakstone
Date: June 13, 1975

The scientific background of the prevention of dental diseases will be thoroughly discussed as a means of presenting the strategy of putting it into practice in general dentistry and in periodontics. Caries and periodontal disease will both be covered as well as diet control and preventive restorative dentistry.

For further information contact: Dr. Robert Gottsegen, Director of Continuing Dental Education, Columbia University School of Dental and Oral Surgery, 630 West 168th Street, New York, New York 10032.

THE AMERICAN BOARD OF ORAL PATHOLOGY

The examination for certification by the American Board of Oral Pathology will be held on October 14th and 15th 1975, in Bethesda, Maryland. Information and application forms may be obtained from the Secretary, Dr. Henry H. Scofield, Department of Oral Pathology, Georgetown University School of Dentistry, 3900 Reservoir Road, N.W., Washington, D.C. Applications for the examination must be received in the office of the Secretary by 1 July.

THE UNIVERSITY OF WASHINGTON SCHOOLS OF MEDICINE AND DENTISTRY

The University of Washington Schools of Medicine and Dentistry offer a training program of 1 to 3 years duration to individuals holding degrees in biologic or physical science, dentistry, medicine, or veterinary medicine. The multidisciplinary program is directed toward training in the content and use of modern ideas and methods of molecular biology, drawn especially from experimental pathology, microbiology-immunology, and connective tissue biochemistry, in investigation of chronic inflammatory disease. Stipend support ranges from $10,000 to $14,000 per annum. Application may be made through the program director Dr. Roy C. Page, Department of Pathology, University of Washington, Seattle, Washington 98195.