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A STUDY OF THE EFFECTIVENESS OF VARIOUS  
METHODS OF MUSCULAR RELAXATION

A thesis presented in partial fulfilment  
of the requirements for the degree of Master of  
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ABSTRACT

This study was designed to compare the effectiveness of four different methods of skeletal muscle relaxation.

Twenty four male, undergraduate student volunteers were recruited for this study, the age range was 18 to 31 years.

The Experiment was conducted in two sections as time did not allow for the training of 24 Subjects concurrently. Section I was conducted over weeks one to eight inclusive and Section II was conducted over weeks nine to thirteen inclusive.

All Subjects received two pre-test sessions which involved the measuring and recording of the level of tension which was present in three muscle groups, the occipitofrontalis, the right sternocleidomastoid and the right biceps.

Muscle tension was measured using a Disa 3-channel Electromyogram, and recorded using a multichannel ultra-violet recorder.

The Subjects were assigned to training groups (four Subjects per group) on the basis of visual inspection of the records, those with the highest levels of tension recorded were assigned at random between the groups, similarly those with medium levels of tension and those with low levels of tension were assigned at random to the groups.

The training methods in Section I were, Progressive Relaxation, Jacobson (1938) and Control Group C. The training methods in Section II were, Muscle Relaxation, Wolpe (1969), Metronome Conditioned Relaxation, Brady (1973) and Control Group F.

When the training sessions were completed, each Subject received two post-test sessions, which were of the same format as the pre-test sessions.

The data recorded was then scored and converted into an integrated E.M.G. Analysis of the results indicated that in most cases there was little, if any reliability between scores on pre-test I and pre-test II thus further quantitative analysis of the data was not appropriate. Graphic representation was made of group means for comparison between pre-test II and post-test I.

It was expected that training in some of the methods would produce complete muscle relaxation, (or no tension as measured on the Electromyograph recordings.) The Subjects inability to achieve voluntary muscle relaxation may have been attributed to several factors in the design of the experiment. The Subjects were trained in a different room to the pre-test, post-test room. The recording from the muscle groups during pre-test, post-test sessions may well have interfered with the Subjects ability to relax. The stimuli presented to the Subjects during the testing sessions also appeared to contribute towards the Subjects inability to relax.

The Experimenter's observations of the Subjects during the latter stages of training indicated that the Subjects in Jacobson's Garmany's and Wolpe's methods all appeared to achieve some level of relaxation which was not reflected in the results recorded.

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## INTRODUCTION

Petersen (1972) reported that " Jacobson's (1938) method of progressive relaxation appears to be a slow process, but nevertheless, a highly successful and rewarding one."

One limitation of the study was the fact that it was reported :  
" at no time was the experimenter absolutely certain that the subject had obtained complete skeletal muscle relaxation." (S.M.R.)

An Electromyogram provided opportunity for a more thorough investigation of the level of relaxation Jacobson's method appeared to produce. It was expected that E.M.G. recordings would provide more objective data that Jacobson's method produced a deep level of S.M.R.

S.M.R. was used originally by the medical profession with no formal training in Psychology, such as Jacobson (1938) and Schultz (1959). Initially rest was prescribed as an adjunct to nervous hypertension, other nervous symptoms and also for post-operative treatment. Observation of patients showed that optimal resting or relaxation was not obtained this way, there was still skeletal movement. Thus the value of prescribing rest alone, may well be questioned. Jacobson (1938) lists the therapeutic use of progressive relaxation (p.419) using self report of patient, and therapists report of the success in alleviating 27 different physical and psychosomatic disorders.

Relaxation techniques of varying form have practical application today in the clinical setting either as part of a psychotherapeutic process, e.g. Wolpe's (1949) Systematic Desensitization or as a technique in itself.



The technique of S.M.R. is still being applied in the clinical setting when other techniques such as transcendental meditation and yoga have considerable predominance and acceptance in the community, and whose teachers and students claim outstanding effects, such as physical and psychological quiescence as a result of their respective methods. This may be due to the fact that new methods are often regarded with suspicion, and also the opportunity for therapists to learn the techniques may not be present.

Apart from the clinical applications of S.M.R. just mentioned it also has importance in psychophysiology.

Jacobson (1938) states his interest in relaxation was stimulated by research in 1908 at Harvard in the area of neuromuscular tension. By this time Sherrington was investigating the motor and sensory pathways of muscles. The importance of the physiology of the motor system can be seen when one considers the fact that all movement is brought about by contraction or tension in the skeletal musculature. ( Without this capacity for movement, the organism would be virtually defunct ).

Muscle tension may be unambiguously defined as motor unit firing. Electromyography makes it possible to record and measure the electrical activity associated with the firing of motor units.

The term "muscle tension" defined above must not be confused, as it often is in the literature, with the feel of normal healthy muscle tissue which is firm when palpated, as compared to the feel of the flaccid muscle of a paralysed person. In this study, tension refers to motor unit firing, that is, an increase in tension between the origin and insertion of the muscle. This tension may give rise to shortening of the muscle, or an isotonic contraction, this action results in displacement at the joint over which the muscle lies. On the other hand, if there is

external resistance, or an antagonistic muscle contracting to an equal degree, there will be no displacement at the joint, this is known as an isometric contraction. An isometric contraction may not always be observed through visual inspection, but with practise it becomes possible to identify quite small amounts of tension in a muscle by palpation of the area.

The use of the Electromyogram is the only possible method of ascertaining with any degree of confidence, that there is complete relaxation, or no tension present in a muscle.

Many experimenters claim to use a shortened version of Jacobson's method. An attempt was made to evaluate some of these other methods in this study.

Autogenic training, as set out by Luthe (1962) was considered but was discarded due to the fact that training took four to ten months.

The muscle relaxation described by Lazarus (1971) was not sufficiently definitive in stating length of time for training, and not detailed enough for this study.

Hypnosis and yoga were not used to obtain S.M.R. because the expertise to use these techniques was not available to the Experimenter, who felt it was necessary to remain the sole person to train all Subjects in this study.

Wolpe's (1969) method of relaxation as used as part of the process of systematic desensitization was felt to be an important method to evaluate as Wolpe (1969) states " The method of relaxation taught is essentially that of Jacobson (1938), but instruction is completed in the course of about six interviews, in marked contrast to Jacobson's very prolonged training schedules." ( p. 100 ) Wolpe admits his method is far shorter than Jacobson's, but doesn't point

out that his method is also a departure from Jacobson's in another very important aspect, that is that Wolpe instructs his subjects in the location of the tension they should feel. Jacobson, in contrast, requires his subjects to identify and locate the sensations of tension for themselves.

A method of Muscle Relaxation by Garmany (1952) was chosen because this method did in fact use the same principles as that of Jacobson's (1938) but also incorporated controlled breathing exercises in contrast to Jacobson who aimed to " free the respiration from voluntary influence." ( p. 60 )

The final method which was considered and decided suitable for evaluation in this study was that of Metronome Conditioned Relaxation, by Brady (1973). This method incorporated the use of a metronome constantly ticking at the rate of 60 beats per minute along with instruction to " relax and let-go of the muscles", this was pre-recorded on a cassette tape. The instruction and tone of this method appeared to be along the lines of that of a type of hypnotic inducement.

Of the four methods chosen for investigation, ( Jacobson, Wolpe, Garmany and Brady ), each one varies from the other in the way the subjects are taught to identify the sensation and location of tension in the muscles. Each one varies in the way the subjects are instructed to relax.

Each method varies in the number of skeletal muscles covered and the amount of time spent on each muscle group before moving on to the next one. This last point may be one of the most crucial factors to be given consideration when comparing the four methods. Jacobson (1938) most clearly allows for the method to be carried out at a pace suitable for each particular Subject. The Experimenter does not move on to a new muscle group until the subject

has had sufficient time and practice to correctly identify the sensation of tension present, and then to let this tension go, or to relax. In contrast to this method, Brady (1973) covers all the major muscle groups in the body in eight steps, allowing only a few minutes to tense, then relax each group of muscles in turn.

All four methods are similar in the respect that the subjects are required to practise relaxation on their own each day, and most important, that the respective authors all claim to achieve the same result, that is, S.M.R.

A large portion of evaluation of S.M.R. is in the area of its use as part of a process of Systematic Desensitization, Wolpe (1958). Mathews (1971) reports measures taken of the effectiveness of S.M.R. many of these used EKG recordings, but also used measures of heart rate, respiration rate and skin resistance, Mathews found contradictions in the results, in all cases it may well be questioned that there were insufficient training sessions to produce S.M.R. It could also be questioned, why such emphasis was placed on the other physiological measures such as heart and respiration rate and skin resistance when it has elsewhere been suggested that these do not vary systematically in any one individual, Duffy (1962).

Valins (1970) suggests that the effect of muscular relaxation in systematic desensitization is from self instruction or instruction from a prestigious person, which leads the Subject to believe, incorrectly, that their efforts were successful and that they are relaxed. This fact may well be taken into consideration in relation to the methods used in the present study, especially when considering the two shortest methods, Wolpe's (1969) and Brady's (1973) when the time taken in training falls considerably short of Jacobson's (1938) full length procedure. N.B.

Jacobson does refer to briefer methods of relaxation, these are not investigated in this study.

To some extent, the suggestion that Valins (1970) makes, that a subject may incorrectly believe he is relaxed cannot occur when using Jacobson's method due to the fact that the subject is required to locate the sensation of tension in the muscles then let this tension go, the subject has to do the work, while the Experimenter is there to guide the subject in the right direction, at the same time, the Experimenter checks that a muscle is relaxed by palpation of the area and passive movement if possible. E.M.G. recordings may be taken as a final check that the subject is in fact relaxing.

The previous study by Petersen (1972) gave the expectation that Jacobson's method was superior to the other methods investigated in the present study, mainly because of the thoroughness and detail of his technique, and also the requirement for the Subject to learn the technique with encouragement from the Experimenter, but without the element of suggestion.

It was also felt that Garmany's (1952) may possibly produce some S.M.R. in the Subjects as this method appeared more similar to Jacobson's (1938) than the other two methods chosen.

The purpose of this present study was to evaluate Jacobson's technique of S.M.R. in comparison to other techniques.