

BIOGRAPHY

Edmund Jacobson, M.D., Ph.D.: The Founder of Scientific Relaxation

Arnold H. Gessel, M.D.

Abstract: This biographic article is based on the chronological review of a sample of the major publications of Edmund Jacobson, and is written from a personal perspective.

INTRODUCTION

Edmund Jacobson, Ph.D., M.D., LL.D. (1888-1983) is best known as the originator of relaxation techniques. "Progressive Relaxation," the title of one of his major books, is widely recognized as a synonym for sophisticated relaxation training. Few, however, are fully aware of the scope of his investigations into the interaction of body and mind, and the theoretical and clinical foundation he constructed. His long, productive life extended from the era of the smoked-drum kymograph to the age of the computer; his contributions, taken in their totality, create the basis for a comprehensive discipline of neuromuscular psychophysiology. This article is based on the chronological review of a sample of Jacobson's major publications, and it is written from the perspective of my personal knowledge of him, beginning with a tutorial he generously granted me from 1965 through 1968. Starting in 1932, he had commuted once a month from his home in Chicago to spend a few days in New York. There, as a young psychiatrist recently out of training, I spent a day with him on each of these trips.

BEGINNINGS

Jacobson dates his interest in nervous excitability to the age of ten. A serious hotel fire broke out in his home in Chicago; his lasting impression was of the frightened behavior of people afterwards. Jacobson decided that when he went to college, he would study all that was known of nervous excitability and its treatment. Indeed when he graduated from Northwestern University in 1908, he began graduate studies in philosophy and psychology at Harvard, where William James held what is considered to have been the first professor-

ship in the United States specifically dedicated to psychology. In addition to his authorship of the James-Lange theory of the peripheral origins of the emotional experience, James had also written on relaxation, and according to Jacobson, claimed to have received instruction in relaxation from a Swedenborgian nurse.

Jacobson, however, was outspokenly unflattering in his description of James, considering him to be an exceedingly nervous individual. Jacobson was frustrated at being unable to find any information on the topic of nervous behavior. He was finally able to locate a report of investigations into the startle reaction by a French psychologist, which gave him not only a beginning for his own research but also an enduring respect for the French scientific community. His attention took a minor detour as a result of a discussion of the nature of truth during a class in symbolic logic. When the professor, Josiah Royce, asserted his opinion that the problem was unanswerable, Jacobson demonstrating a characteristic that would remain prominent throughout his life, picked up the challenge. As a result, "The Relational Account of Truth," his term thesis, became his first publication [1]. Jacobson then completed his doctoral thesis on inhibition [2], and received his Ph.D. in 1910. He then went to Cornell to work with Titchner as a fellow for a year, after which he returned to the University of Chicago to join Dr. A. J. Carlson in the Department of Physiology. He taught Physiology for one quarter, and went on to Rush Medical School. After he finished medical school, which was then part of the University of Chicago, he returned to the physiology department where he remained doing his researches until 1937, when he resigned and took his laboratory downtown (The Laboratory of Clinical Physiology). He remained there until his death (Elisabeth Jacobson, personal communication, 1989).

Prior to entering Cornell, he had achieved considerable knowledge and skill in the European technique of introspection known as the "method of examination," or the "Würzburg method." This was an investigational tool in common use in psychology during that time. Jacobson

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Arnold H. Gessel, M.D. is a psychiatrist practicing in Broomall, Pennsylvania. He is a leading authority in the clinical practice of biofeedback relaxation techniques.

hoped to find others at Cornell with similar skills to help in the studies he had planned. Once again, he was disappointed to find in the professor and the graduate students a "lack of training to observe what takes place internally during perception, understanding and thinking." Eventually, he was able to locate three young faculty members in psychology who had been well trained in these techniques and who were willing to join him in his experiments. This collaboration resulted in the publication of Jacobson's first major article: "On meaning and understanding" [3]. This is a difficult article for the modern reader because of its lengthy and detailed description of introspective reports, and it is likely to be overlooked in the event a copy should be found. However, on close inspection, it is most revealing.

"ON MEANING"

The purpose of the project was to investigate the processes of "perception of single letters, the understanding of words, and the understanding of sentences." Jacobson and his three collaborators acted as subjects (Ss). There were three categories of material: (1) cards printed with a single letter; (2) cards printed with a single word; and (3) cards printed with a brief sentence. The experimental task was for the S to open his eyes upon one of these cards, absorb as much of the experience as he judged possible to detail with accuracy and completeness, and then close his eyes and give his report. These observers had much to say of internal events transpiring in that very brief interval, including: (1) sensations of color; (2) auditory images of the sound of the letter; (3) sensations of contraction and relaxation of the speech apparatus; (4) eye movements; and (5) in one instance, an observer whose attention was diverted by a moving pendulum, reported kinesthetic images in the neck, as if following the swinging bob. Many of the reports were long and full of detail, providing a respectable account of the skills mastered by these early introspectionists.

In this article [3] by a young graduate student early in this century, there is much that, in retrospect, can be seen to foreshadow ideas that would grow and become fully developed in the ensuing years. Jacobson had sufficient interest in the techniques of introspection to undertake its modification for his own purposes. He was unsatisfied that the method of examination was sufficiently thorough, and he considered adding a "method of confrontation," which had been developed earlier in his own laboratory. For the sake of this project, Jacobson finally came up with several modifications of his own devising. It is introspection, not relaxation, which through modifications and expansion, eventually became progressive relaxation. Introspection continues to be the key to the mastery of the technique of progressive relaxation. Introspection is also one of the larger liabilities of the technique, providing, when behaviorism became the standard of the scientific method in psychology, a target for

Jacobson's critics.

This article [3] also shows academic underpinnings supplied by the time and place. The Greek philosophers were settled on the brain as the generator of emotions, but Descartes destroyed the Grecian calm by advocating a distinction between mind and body. The fallout was reverberating through Harvard at the turn of the century, with James much at the center of the disturbance. Jacobson did what most bright young graduate students in any age do; he designed an experiment to test the professor's thesis. Unlike most graduate students, however, Jacobson did not lay his project aside when he failed to produce a definitive result in the measurement of thought, which 90 years later, still waits to be measured.

Jacobson concluded that "for the most part, visual sensations aroused by the stimulus are not sufficient, of themselves, to constitute a perception of the particular letter; some additional process or processes must supervene." From a retrospective vantage point, we cleverly notice frequent reports of muscle events by the introspectors as retinal stimulations worked their way into comprehension, and predict that Jacobson will attach some particular importance to the motor system.

ENTER MEDICINE

After completing medical school and returning to the physiology department at the University of Chicago, he produced a series of studies exploring the treatment of gastric hyperacidity, esophageal irritability, arterial hypertension, and nervous excitability by relaxation training. These appeared between 1917 and 1924. These were medical conditions which Jacobson observed to be particularly connected to tension, and in fact represent three systems of significant psychosomatic vulnerability. During this time, relaxation training had emerged as a specific method, although it was not formally introduced as such until 1924 [4]. The success of this endeavor raised new and important questions. These clinical conditions do not involve skeletal muscles, but represent disruptions in the autonomic nervous system's ability to properly regulate visceral action. The first step was to show that muscular relaxation exerted a clearly demonstrable effect on the central nervous system.

THE KNEE-JERK: A CLINICAL CLASSIC

The knee-jerk response had become the yardstick of the organic and functional condition of the nervous system. It was found to be decreased during quietude and deep sleep, and Jacobson observed that it was usually increased during clinical examinations, particularly when the patient was told

to relax. Jacobson and his coworker Carlson tested seven Ss who had received extensive training in relaxation, first by measuring their responses while distracted, and again after allowing time to achieve deep relaxation. They observed that in those Ss who appeared most deeply relaxed, the knee-jerk was absent. In others, it was diminished. (Curiously, the effect of generalized muscular tension on the knee-jerk is taught in medical school: in case of difficulty, the patellar reflex can be reinforced by having the patient lock his hands together and pull.) They concluded that with trained voluntary relaxation, a degree of waking neuromuscular tonus lower than that of light sleep can be achieved [12].

ELECTROPHYSIOLOGICAL MEASUREMENTS

Since his early years, Jacobson was aware of the potential value of electrical measurements of muscular activities, and frustrated by their lack of availability. Féré had been able to detect fluctuations in a D'Arsonval or string galvanometer in connection with emotional changes, by passing a small, constant current through surface electrodes. This is the well-known psychogalvanic skin response (PGR). Some believed that similar deflections could be seen without the external current, raising the hope of detecting electrophysiological potentials. In 1912, Jacobson expressed interest in using the string galvanometer to that end, but he considered it to be insufficiently sensitive.

The "three electrode" (vacuum) tube, invented in 1907 by deForest, was, by 1921, improved and had been coupled as an amplifier with the string galvanometer. However, this was also found to be too primitive. Nevertheless, Jacobson was able to interest two members of Bell Telephone Laboratories. They developed and donated an amplifier that was sufficiently sensitive and stable to use with a string galvanometer and could respond to physiological currents. Photographic records were made by casting a shadow of the moving string on a passing strip of bromide paper. A description of the ensuing difficulties shows how some things never really change: a concern arose of electrical potential being generated by the electrodes. After much experimentation, nonpolarizable "reproducing" electrodes were developed by a silver-silver chloride process. (In 1968, when I visited Jacobson's laboratory, I learned that dimes had, at times, been successfully used. Unfortunately, this supply of inexpensive silver discs was soon gone.) Interference was discovered from motors of laboratory devices, elevators, the stirring machine, and the thermostat relay. Alternating current devices were replaced with direct ones, and lamps were unplugged. Shields were used for the instruments and the S, including galvanized iron plates under the couch. Internal stability of the instrument was enhanced by soldering the screw connections, then resoldering them, and attaching ground wires to the instruments. Electrode appli-

cations were covered with collodion to prevent evaporation of contact solution. The experimenter tried to move as little as possible. After all this, if the S was not well relaxed, prior to set-up, a surge of current would break the galvanometer string before any measurements could be made. Finally, this initial venture culminated by electrodes being fixed over the S's right biceps, and on the instruction to imagine bending his arm, the string deflected unmistakably [13].

During the next several years, both electronics and Jacobson's team of Bell Laboratories engineers made gradual progress. A publication in 1939 [14] announced the development of the device designated as the "neurovoltmeter." In 1940, this was followed by the next generation instrument, the "integrating neurovoltmeter" [15]. The original instrument, with its modifications and updates, continues to be usable (E. Jacobson, Jr., personal communication, 1989).

NEUROMUSCULAR STATES AND MENTAL ACTIVITIES

Once a reliable measuring device was operative, Jacobson returned to the relationship between the mind and the motor system. A series of studies, published in the *American Journal of Physiology* between January, 1930 and April, 1931 [16-22], followed the initial investigation cited above. These covered measurements of muscular activity during the imagining and recalling of various forms of activity. Together, they add to the thesis generated from the introspective work: that the motor system is an inseparable participant in the thought process. In 1927, Jacobson noted that well-trained Ss, after becoming thoroughly and deeply relaxed, all reported a period of diminution, or disappearance, of conscious processes [23]. They could not relax and reflect simultaneously. Jacobson later elaborated: "Tension is part and parcel of what we call the mind. Tension does not exist by itself, but is reflexly integrated into the total organism. The patterns in our muscles vary from moment to moment, consisting in part the modus operandi of our thinking and engage muscles variously all over our body, just as do our grossly visible movements. If a patient imagines he is rowing a boat, we see rhythmic patterns from the arms, shoulders, back and legs as he engages in this act of imagination. The movements ... are miniscule" [24].

THE "JACOBSON METHOD"

Although in 1915, Jacobson began using relaxation in the treatment of patients with tension disorders, it was not until 1924, with the publication of "The Technic of Progressive Relaxation" that he specifically described his didactic approach. In 1929, the first edition of "Progressive Relaxation" appeared [25]. The basic instructions are relatively

widely known, having appeared in several sources, including a small manual with a blue paper cover, published by the Foundation for Scientific Relaxation and originally sold in quantity lots to practitioners for about 35 cents [26]. The widely misused term "Jacobson's Method" is analogous to "methods" published for the study of musical instruments. The latter are technical manuals, usually written by a recognized teacher of the 19th Century or before. They usually begin with a brief description of the mechanics of the instrument, followed by a series of studies or "etudes" (often rendered in English as "exercises"), which, when thoroughly mastered, provide a technical foundation for the instrument. Then, the student may begin his musical education. Jacobson's "Method" similarly begins with a brief description of the mechanics of the motor system, followed by a series of studies that demonstrate the basic technical skills. The instructions, as in all good "methods", start simply and progressively introduce increasingly complex problems. For example:

1. **Lying in a quiet place, bend the hand back at the wrist and study the sensation arising from the act (the sensation in the forearm).** This first item of instruction is not relaxation but observation, the all-important ability to monitor tension, the basic element of action and behavior.
2. **Discontinue that activity, and observe the changes in sensation.** Practice relaxing, under the direction of awareness.

This maneuver is repeated twice more, allowing several minutes between each contraction. The remainder of the recommended hour of practice is spent lying quietly, essentially doing nothing. This doing of nothing is also a highly technical matter, including maintaining a light concentration, a slight focus of awareness on the proprioceptive senses, mainly on the muscle being studied in that session.

In successive periods, a similar approach is taken to the various muscle groups. Jacobson organized his training by geographic anatomy: limbs, the trunk, the neck, and the head. It was based on the gross movements of each major part. Every third practice session is to be a "zero period" dedicated to relaxation only, with no contraction being performed. After completing the body survey lying down, the whole process is repeated sitting up.

As with all good "methods," this one is a skeleton, providing the professional teacher with a textual aid for putting the necessary flesh on the appropriate bones. Muscles essentially are functionally the same; yet slight variations in movements or postures of different parts of the body carry great differences in meanings. These are far in excess of the physical changes involved. Jacobson expressed this in terms of a telephone message: the electric current is miniscule, however, the message could conceivably alter the fate of the world [E. Jacobson, Personal communication,

1968].

A nodal point in the process involves the speech and eye regions, representing language and visualization. Jacobson observed verbal and visual thought to be accompanied by measurable muscle activity in the relevant locations, suggesting that these "mental" acts are miniatures of overtly physical looking and talking [18,22]. The same relationship between mental representation and subliminal physical acting-out was investigated in broader kinds of imagery, such as in lifting a weight [17].

CONCLUSIONS

Jacobson began his work by adapting 19th Century introspective techniques to study the nature of the mind, adding piece by piece the training in relaxation, adaptation to medical treatment of stress-induced disorders, the building of a basic teaching method, and the presentation of the foundations of a theory of the thought process. The result was a concept of a functional interaction of the mental and motor systems. Thought and behavior, impulse and action are merely two components of the same whole. As a psychosomatic theory, it provides an approach to the unsolved problem of "the means of transducing psychological or social experiences into pathogenic physiology" [19]. The motor system directly influences autonomic activation with its privileged access to the blood supply. When chronically activated, these motor system patterns can induce selective set-point distortions in autonomic regulation. The symptom picture will depend largely on the nature of these distortions, which in turn will depend largely on the nature of the behavior.

The essential picture was in place by the early 1930's. As the years passed, he expanded and extended this work in many directions. Notable were natural childbirth [20]; and the introduction of relaxation in the school system, dentistry, and the military. He studied the relaxation of athletes, and many of his trainees are athletic coaches. He continued to carry on his studies and clinical work throughout his life. He added computerization to the integrating neurovoltmeter, searching for the temporal sequence of mental and muscular events. Alongside the manifold inquiries in physiology and psychosomatic treatment, the questions of the ultimate nature of the mind and of truth, which first engaged him at Harvard under William James, were the subject of his last book, *The Human Mind* [21], released in 1983, the year he died.

The legacy he left the clinician lies in rebuilding in each therapeutic encounter the sequence that took place in history, beginning with the teaching of muscle-sense awareness. This introspection-driven "analysis of efforts" provides a powerful tool to reveal heretofore unconscious representations and interpretations, as well as the protracted efforts on

their behalf; and cognitive and behavioral analysis from a single process. The removal of aberrant neural flows to and from the motor system reduces drives to the autonomic system and other central structures, and by presenting a valid rather than an elevated baseline of activation, allows readaptation towards functional normalcy to take place.

This is not a quick fix based on hooking a client up to a "biofeedback machine" and handing him tapes that play soothing noises or tell him that he is getting relaxed. It demands from the outset that both the therapist and the patient be able and willing to relate to a complex system. A good many patients presenting psychosomatic complaints are unwilling or unable to collaborate effectively, and another significant group are socially dependent on their symptoms through a variety of agendas, consulting only to obtain certification of incurability. On the "provider" side, many are eagerly grasping the opportunity for quick and unregulated access to a billable procedure within the "health care industry". The potential benefits of this system must be evaluated by studying the results of properly conducted procedures in a properly selected patient group [18]. There is much valuable work to be done subjecting Jacobson's observations to the kind of scrutiny that the scientific and medical communities will be willing to accept as evidence of their validity and effectiveness.

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