

INVENTION RECORD AND REPORT

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Compiler - Bernard Z. Friedlander, Ph.D.

Date: February 15, 1971

1. Brief descriptive title: RHYTHMAT 70-A--an instrumental device for precise measurement of rhythmic matching and rhythmic memory in human.

2. Full name of inventor, home address, and position:

Bernard Z. Friedlander, Ph.D.
86 Craigmoor Road
West Hartford, Conn. 06107

Position:

Present: Professor of Psychology, University of Hartford, West Hartford, Conn.
Director, Infant/Child Language Research Laboratory

Past: (1967-1970)
Lecturer, Research Associate
School of Education
University of Wisconsin
Madison, Wisconsin

3. Source of grant, contract or award funds contributing to invention, and amount:

Division of Research
Maternal and Child Health Services
Health Services and Mental Health Administration
Department of Health, Education, and Welfare

This invention was realized during Year 3 of the project entitled "Automated Language Tests and Enrichment for Deaf Infants." The total agency support for this project during Year 2 was \$123,468.

4. Recommendation of inventor as to whether patent protection should be sought:

It is difficult for me to imagine any commercial or other reason that would justify the trouble and expense of pursuing patent protection for this invention.

5. Object or results to be achieved by the practice of this invention:

The purpose of the invention is to make it possible to regulate precise temporal parameters of the presentation of visual and auditory signals and to make precise measurements of an individual's response to these signals in terms of rhythmic matching and rhythmic memory. Prior research and observation suggest that the ability to match and remember rhythmic patterns may be related to the integrity or disorders of functioning of the central nervous system with respect to competence in mediating precise time and rhythm relationships. It is anticipated that the invention can make a contribution to improved techniques for measuring these functions in a fashion that may have significance for the identification and possible treatment of these disorders in children and, possibly, in adults.

6. Outline of means discovered for achieving above objects. Point out means which are essential, others which are important or useful, and any critical limitations on any of these:

6. (cont.)

An electronic network of moderately high sophistication acts like a metronome in which the pulse rate and pulse width are adjustable over a wide range. This metronome activates visual and auditory signals. It is a subject's task to match these signals with responses on an elaborated telegraph key. Another major form of adjustability in the circuit is the adjustment of the matching interval during which the subject must respond to the metronome signal in order for a response to be classified as correct.

Another electronic network codes and stores the response information and displays it on digital readouts when display is called for by a master channeling switch. Various other circuits are employed to regulate pitch, loudness, and intensity of the auditory and visual signals, and to shunt metronome signals to and other rhythmic signals from an associated audio tape recorder. The system is also interfaced with units designed to present and accept tactile signals and responses (for use with subjects with disabling degrees of deafness and/or blindness) and with devices capable of making on-line recordings of signals and responses.

Another main feature of the system is a switching network that regulates the transition from overt to covert rhythmic signals. This transition is essential in selective presentation of matching and memory rhythm performance tasks.

7. Chronology of principal events in conception and development:

- a) Preliminary notes--subsequently lost--estimated to have been drawn up in 1959 or 1960.
- b) Professional correspondence, January-April, 1967, with Professor Jean Mayer, Harvard University; later correspondence with Dr. P. H. Wolff, Judge Baker Guidance Clinic, Boston, Mass., September, 1967.
- c) Memo entitled RHYTHMAT, Model 67-A: An automatic system for measuring rhythmic matching and rhythmic memory in normal and handicapped children and adults. Prepared and circulated in February, 1967.
- d) A working model of the invention was completed in Madison, Wisconsin, in August, 1970, and the instrumentation was put in service in September, 1970. It has been used almost continuously in the conduct of various experimental programs.

8. Date and place of publication of disclosure of invention:

The memo cited in 7C was widely distributed to a number of persons. This memo was prepared while the inventor was on the staff of Case Western Reserve University, Cleveland, Ohio. There is no list of the persons to whom the memo was distributed.

9. Background of published information and practice in the field of the invention:

There is a very substantial literature on the general subject of rhythmic performance, but as far as is known the invention calls upon substantially different modes of presenting signals and recording responses from any of those in past or current use. A highly selective list of references related to the general problem of rhythm testing is included here with no suggestion that this list includes an adequate sampling of studies in this field.

9. (cont.)

Time and Rhythm Perception References

Fraisse, P. The Psychology of Time. New York: Harper and Row, 1963.

Gault, R.H. and Goodfellow, L.D. An empirical comparison on audition, vision, and touch in the discrimination of temporal patterns and ability to reproduce them. Journal of General Psychology, 1938, 18, 41 - 47.

Gilliand, A.R. and Humphreys, D.W. Age, sex, method and intervals as variables in time estimation. Journal of Genetic Psychology, 1943, 63, 123 - 130.

Hirsch, I.J. and Sherrick, C.E. Perceived order in different sense modalities. Journal of Experimental Psychology, 1961, 62, 423 - 432.

Karlovich, R.S. and Graham, J.T. Effects of pure tone synchronous and delayed auditory feedback on keytapping performance to a programmed visual stimulus. Journal of Speech and Hearing Research, 1966, 9, 596 - 603.

_____ Auditorily paced keytapping performance during synchronous, decreased, and delayed visual feedback. Perceptual and Motor Skills, 1968, 26, 731 - 743.

Rileigh, Kathryn K. Perception of rhythm by subjects with normal and deficient hearing. Unpublished doctoral dissertation, Vanderbilt University, 1970.

Rosenbusch, M.H. and Gardner, D.B. Reproduction of visual and auditory rhythm patterns by children. Perceptual and Motor Skills, 1968, 26, 1271 - 1276.

Rudnick, M., Sterritt, G.M. and Flax, M. Auditory and visual rhythm perception and reading ability. Child Development, 1967, 38, 581 - 587.

Wallace, M. and Rabin, A.I. Temporal experience. Psychological Bulletin, 1960, 57, 213 - 236.

Woodrow, H. Time perception. In Stevens, S.S. (Ed.) Handbook of Experimental Psychology. New York: Wiley, 1951.

10. Features embodied in this invention which would not have been obvious to or readily foreseeable by the typical skilled worker in the field:

- a) interface between the RHYTHMAT System and the associated audio tape recorder.
- b) automatic switching network that regulates the transition from overt to covert rhythmic signals.

Signature of Compiler

Bernard Z. Friedlander

Signature of Inventor

Date

Witness to Inventor's Signature

Bernard Z. Friedlander 2/22/71

Kathryn K. Rileigh 2/22/71