

## THE FUNCTIONS OF PSYCHIC FACTORS IN HEARING LOSS

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### I. Basic Concepts

In discussing our various research projects which touch on the psychology of hearing and hearing losses, we have found it helpful for communication to make explicit our assumptions, our definitions, and our methodological rationale. Accordingly, we will begin with two basic postulates — the first, a definition of **hearing**, and the second, a statement of the **unitary nature** of the human organism.

- A. **Hearing** — is defined as the entire sequence of events, initiated when a sound stimulus reaches the tympanum, and concluded when the organism has completed a meaningful response to that stimulus.
- B. **The Human Organism** — is assumed to be a single psychophysiological unit, with the functioning of all systems interrelated, so that, e.g., any physiologic state that can be defined is accompanied by a definable psychological state, and vice versa.

This broad definition of hearing is chosen because any narrower view requires us to select some part of the entire hearing act as being 'more essential' than other parts — a selection which we find arbitrary and indefensible. We have felt it necessary to state our wholistic view of the human organism in order to renounce positively the dualistic implications of such concepts as „non-organic" or „purely organic" hearing losses. The psyche is a construct, a verbal abstraction, by which one particular set of neuronal processes is artificially isolated from other central nervous system functions. Psychological techniques and knowledge being based on easily observable actions and verbal reports have developed more rapidly than has the minute exploration of those subtle and infinitesimal neural modifications (taking place in a normally inviolable organism) which provide the substrate of psychologic phenomena. Therefore, it is practically justifiable — even necessary — if one wishes to make use of psychological generalizations, to speak of them as if they were distinct from the neural events which are their physical actualities. But key terms and assumptions in basic research cannot depend on the validity of this verbal 'independence'; i.e., we cannot base our study on the concept that „psychic" and „organic" actually refer to independent classes of events. Especially, we cannot use the criterion of „no organic findings" to define a „psychic hearing loss"; such a procedure assumes that the psyche is not only independent of the organism which expresses and experiences



it, but that they are actually antagonistic — that if one is operating, the other cannot!

If we propose to explore hearing in its full complexity, clearly no one discipline possesses the knowledge, the tools, and — above all — the breadth of perspective to conduct such a study. Accordingly, our research program draws from many disciplines: audiology, internal medicine, neurology, otology, physiology, psychology, and Social Service, acting as a multi-disciplinary team. Each discipline examines subjects and records diagnostic impressions independently, and these independent findings are integrated at team conferences. Figure I is a schematic representation of our concept of the hearing act, listing some of the types of evidence used to assess the intactness of each point along the arc. Figure II illustrates our scoring chart, and the 'weightings' given to the judgements of each of the disciplines, at each point, contributing to the weighted mean score at the bottom.

Patients asked to serve as subjects are drawn at random from the files of a Chicago Speech and Hearing Service. Of these, approximately 2/3 have agreed to participate. Subjects in our present population have been studied for periods ranging from 1 to 5 years. The subjects are hospitalized and tested by each discipline, according to the test battery suggested by team members. On the basis of the integrated findings, a therapy program is designed, and the subject is retested (audiometrically and psychologically, as well as by the discipline responsible for each particular therapy) before and after each separate treatment period.

We have hypothesized that there are three general psychological conditions necessary to psychic interference in audition.

1. **Availability \***. Psychic availability of the symptom refers to the existence in the life history of the person, of a model for the experience of deafness or the behavior of deafness, such that the person is able to recall (or imitate) either the subjective feelings of hearing deficit, or the outward appearance of hearing deficit (i.e., either the experience or the behavior of deafness must be available in the subject's subjective or expressive repertoire).
2. **Necessity**: The psychic necessity for the symptom refers to the existence in the person of designatable conflicts, which cannot be resolved in any more economical way\*\*, and which can be resolved uniquely by this auditory loss.

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\*) Availability remains the least well-defined factor, either in terms of psychic theory or of neurophysiological mechanisms. We have, however, some clinical evidence of the occurrence and some clues as to the possible psychodynamics of such learned psychic modifications (as altered perceptual functions), through an investigation of another learned psychic modification — folie a deux — which has been demonstrated to be transmitted through close interpersonal interaction.

\*\*) We accept here (as indeed elsewhere) the general psychoanalytic viewpoint, which tells us, among other things, that a psychodynamic solution to a problem tends to be as efficient as possible, granting the individual's interpretation of the problem, and within the limits of the alternative solutions possible for that individual, i.e., psychodynamic solutions do not waste psychic energy.

FIGURE 3

EVALUATION OF PSYCHIC COMPONENTS OF HEARING LOSS

AUDIOMETRIC INDEX	PSYCHOLOGIC INDEX
<p>1. <b>Z</b> = SPEECH RECEPTION - STANDARD AUDIO-METRIC THRESHOLDS (SRT - SAT)</p> $Z = \frac{1}{2} \frac{(SRT - SAT)_{DE} + (SRT - SAT)_{FF}}{2}$	<p>1. <b>N</b> = NECESSITY (STRONG CONFLICTS) IN TERMS OF DEFENSIVE ENERGY UNRESOLVED CONFLICTS FELT-DISCOMFORT</p>
<p>2. <b>Y</b> = DIFFERENCE BETWEEN SAT. AND CORRESPONDING POINT ON STRAIGHT LINE CONNECTING HIGH AND LOW FREQUENCY THRESHOLDS (A)</p> $Y = \frac{1}{2} \frac{\sum (SAT - A)_{DE}}{N-2}$	<p>2. <b>I</b> = IRREALITY (LOOSENING OF REALITY TIES)</p>
<p>3. <b>X</b> = DOERFLER - STEWART TEST</p> <p style="text-align: center;"><small>N<sub>0</sub> = NOISE NECESSARY TO MASK INTELLIGIBLE SPEECH</small></p> $X = SRT + 20 - N_0$	<p>3. <b>M</b> = MAINTENANCE (GAINS OFFERED BY SYMPTOM) IN TERMS OF NEED SATISFACTION AND AVOIDANCE OF NEGATIVE SITUATIONS</p> <p style="text-align: center;">(IN THE PRESENCE OF)</p>
<p>4. <b>W</b> = DIFFERENCE BETWEEN SAT. AND ELECTRODERMAL THRESHOLDS (EDR)</p> $W = \frac{\sum (SAT - EDR)}{N}$	<p>4. <b>A</b> = AVAILABILITY. THE EXISTENCE IN THE HISTORY MATERIAL OF A CLEAR MODEL FOR THE EXPERIENCE OR THE BEHAVIOR OF DEAFNESS</p>
<p>5. <b>V</b> = DIFFERENCE BETWEEN SAT. AND ELECTROENCEPHALIC THRESHOLD (EER)</p> $V = \frac{\sum (SAT - EER)}{N}$	
$\frac{V+W+X+Y+Z}{5} = \psi_1$	<p style="text-align: center;">CORRELATED WITH</p> $\psi_2 = N+I+M(+A)$

3. **Maintenance:** Psychic maintenance refers to the current gains and gratifications which the person receives from the symptom, and which balance its cost, to him, in participation and communication with his environment.

Using Psychological Tests (principally, the Thematic Apperception Test) to rate these factors (with confirmation of availability by social service history), the subjects were scored independently according to an audiologic and a psychologic „Index of Psychogenicity” (figure 3), and the scores statistically compared (figure 4). These estimates of the quantity of psychic interference were also compared with medical and physiological patterns provided by the hospital test battery, so that we might learn what total organismic patterns — if any — compose the complex which we call 'strong psychic interference'.

The findings of the pilot study are being utilized in the larger study now underway. We are also attempting to explore the **way in which** the psychic factors we find may act to cause an interference in the hearing act. The unitary organism concept warns us from the start that we will have difficulty extricating from the totality of the presenting pattern the emotional contributions to hearing losses; these emotional factors are certain to be accom-

FIGURE 4

Psychologic/Audiometric Estimates of Psychic Involvement

	Psych* 1	Psych* 2	Psych* 3	1 & 2	1 & 3	2 & 3	Total	Speech freq.	Low freq.	Total**	Sp & Low
Psych 1		0.587	0.671	0.899	0.889	0.707	0.861	<b>0.798</b>	<b>0.762</b>	<b>0.811</b>	<b>0.825</b>
Psych 2			0.607	0.888	0.654	0.863	0.828	0.137	0.463	0.336	0.317
Psych 3				0.718	0.937	0.926	0.903	0.516	0.598	0.564	0.589
1 & 2					0.867	0.880	0.948	0.529	<b>0.689</b>	<b>0.646</b>	<b>0.644</b>
1 & 3						0.908	0.966	<b>0.697</b>	<b>0.731</b>	<b>0.733</b>	<b>0.755</b>
2 & 3							0.969	0.394	<b>0.601</b>	0.519	0.526
Total								0.564	<b>0.701</b>	<b>0.659</b>	<b>0.669</b>
Sp. f.									0.790	0.937	0.946
Low f.										0.940	0.946
Total											0.993
Sp. & Low											0.993

\* Psych-1 refers to the group of indices which bear on psychic necessity: Defensive operations, unresolved conflicts, discomfort, and decompensation.

\* Psych-2 refers to the group of indices which express loosening of reality ties: i.e. irrationality, immunity from reality demands, and unrewardingness of reality.

\* Psych-3 refers to the Maintenance factors — those which select and maintain perceptual impairment specifically as the primary adjustive mechanism: i.e. self-injury, succorance needs, consistent self-concept, removal of temptation and distraction, and direct evidence of perceptual blocking.

\*\* The audiometric designations are self explanatory, except for the „total“, which includes high frequency data in those five subjects for whom high-frequency threshold were taken.

panied by (to be another expression of) complex physiological events. Even if we allow the concept of a „purely psychologic“ as a true description, at a given moment, chronic or/and intense functional states are bound to eventuate in structural, „organic“ changes, so that what began as an 'emotional' impairment will at the very least **become** 'organic' if enough time elapses. The several ways we have of looking at the psyche **in action**, in the hearing act are:

- 1. Response of the individual to restoration of hearing:** if the psyche can be said to need hearing loss, then certain predictable stresses will be called forth by 'organic repairs' (surgery, drug therapy, hearing aid amplification, etc.) which will be predictable, on the basis of the needs allegedly served by the hearing loss, and will be discernible in post-therapeutic testing, as **anxiety** or as **righting operations** for restoring equilibrium.
- 2. Reversal of hearing loss of short duration**, (which has been thought to be largely emotionally based), by describable psychotherapeutic procedures (working through of particular problem areas resulting in improved hearing and comprehension); this is probably applicable principally to children, in whom the functional changes have had less opportunity to crystallize.
- 3. Worsening of hearing with intensifying of the emotional "causal constellation"**.
- 4. Investigations of the effects on hearing of experimental changes of attitudes in normal subjects.**

Since we test all subjects before and after each planned therapy, we are able to record evidence of changes with hearing restoration, although the numbers are still too small for confidence. The results in these individuals support our general hypotheses, and tend to follow these predicted courses of the unique personality dynamics, in the treated individuals.

The few attempts which have been made in individual psychotherapy with children who were felt to have severe emotional handicaps as a significant causal factor in the hearing losses have been confirmatory. A program of group psychotherapy, with concurrent parental group therapy, will be initiated this summer.

Through „hearing diaries“, plus periodic retesting and family contact, we have been able to keep in touch with the everyday lives of subjects. In the cases where crisis has brought the parallel courses (of hearing environmental events) into sharp focus, we have found considerable support for our hypotheses. Analysis of the diaries, and integration of these findings with the vicissitudes of hearing (as shown in the diaries themselves, and in the retests) is currently underway, and scheduled for presentation in the fall.

Two experimental (hypnotic) studies in normal hearing have been performed, to investigate the processes conducive to **improved** hearing. Willingness to act on minimal cues (to be wrong, to guess) is one factor which has been isolated by this method, and further research is planned.

We have also some confirmation for the paradigm which we have evolved as representing the actual psychic sequence of events in the hearing process. Psychological tests were analyzed, in terms of this model, using some independently generated and validated hypotheses about the differential func-





tions of the three frequency ranges (low, speech, high). The audiometric 'predictions' derived from the analysis agree surprisingly well with actual audiometric performance (Figures 5 and 6).

FIGURE 6  
**CORRELATION OF PSYCHOLOGICAL „INTERFERENCE SCORES”  
 WITH AUDIOMETRIC THRESHOLDS**

Patients	Frequencies (cycles/sec)	X Audiometric Thresholds in decibels	Y Psychic inter- ference in score points	r
Pt. 1 (CB)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	39.0 53.0 41.5	4.92 15.17 8.42	.992*
Pt. 2 (FS)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	81.0 96.0 100.0	5.25 9.92 11.67	.982
Pt. 3 (MK)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	61.5 94.0 100.0	2.75 10.25 11.50	.996*
Pt. 4 (GM)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	70.0 75.0 81.5	4.60 7.60 10.10	.998*
Pt. 5 (JP)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	74.0 69.0 56.5	8.25 7.75 6.50	.998*
Pt. 6 (RD)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	-2.5 -2.5 12.5	5.67 8.42 10.42	.916
Pt. 7 (PP)	Lows (30-800) Speech (800-4KC) Highs (4KC-16KC)	32.5 58.5 65.0	3.17 10.67 12.17	.997*
Overall				.416 (.43 re- quired for signifi- cance)

\* Significant at the .05 level.  
 Résumé français pas reçu.

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