THE AUDITORY ENVIRONMENT OF THE YOUNG CHILD

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Be not afeard; the isle is full of noises,
Sounds, and sweet airs, that give delight and hurt not.
Sometimes a thousand twangling instruments
Will hum about mine ears; and sometime voices...

The Tempest, Act III, Scene II

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CHAPTER 1.

NEED FOR THE PRESENT STUDY.

"We do not know much about auditory perception and we find little of assistance in the textbooks," say Strauss and Kephart (1955) in introducing their discuasion on auditory perception and oligophasia in children. In similar vein Myklebust (1954) also deplores this state of affairs: "Research evidence is meagre concerning the genetic development of hearing, and comparative difficulty of sounds perceptually is unknown". Not only is this true, he says, for the normal development of auditory perception; it holds as well for auditory pathologies:

> "There is no discussion in the literature concerning auditory agnosia in children... (namely) the incapacity to understand the meaning of environmental sounds in general. For example, such sounds as the ringing of a telephone, an automobile horn, or the common sounds associated with the preparation of food .... "

Considering the attention devoted to even the relatively minor developmental aspects of the child's overt behaviour, it is astonishing that the study of his reactions to the all-pervasive auditory environment has been so universally neglected. It is surely not due to lack of the technical means; we have had the "know-how" for thirty years or more, and since the invention of the tape-recorder only the most rudimentary degree of expertise is required to subject the child to controlled acoustic stimulation.

The fact is that psychologists concerned with the development of perception seem consistently to have asked, "How does the child <u>see</u> his world?" rather than how he <u>hears</u> it. This is especially true of the world of non-linguistic sounds, which is both the precursor and the concomitant of the world of language. Non-linguistic sounds include those produced by human and non-human agencies, and may be vocal

or non-vocal. The importance of this sector of the environment is difficult to overemphasize. "Vision", say Gesell and Amatruda (1947) (although the dictum is supported by nothing but anecdotal evidence) "is the intellectual sense. Hearing to a considerable degree is a social as well as an intellectual sense". Based on his considerable clinical experience of children with auditory disorders, Myklebust has provided a more explicit analysis of the contrast between the two modalities:

> "Hearing is essentially mandatory because the individual cannot close his ears as he can his eyes; this is of considerable importance when contrasting the psychology of seeing and hearing. Hearing, apparently, more than any other sense, serves as a means of resolving subjective needs and external circumstances. Through hearing the organism is in continuous contact with the outer world ... Hearing more continuously than vision alerts man to the friendliness or to the danger of his environment ... Being largely limited to a seen and a felt world means that the world (of the deaf child) remains more unreal and unexplored experientially. This has profound implications for his development perceptually, conceptually and emotionally".

It seems that at least three important areas of psychological functioning are liable to impairment as a result of complete or partial hearing disability; the cognitive, the sociocultural and the affective-conative (all of which are of course closely interrelated). Again the source of our information is "clinical evidence" and a priori constructions.

In the following passage Myklebust stresses the importance of the child's adjustment to the non-linguistic acoustic environment:

> "In addition to his inability to hear vocal sounds and to use verbal language, the child with impaired hearing acuity is deprived of basic contact with his environment in other ways. He is deprived of hearing all sounds, not only speech. He does not hear the sounds made in preparation to feed him, or any of the other sounds which are so common in the environment of the normal infant ... Although some sounds are frightening to him all sounds serve to put the individual into realistic contact with his environment throughout his life-span, including the time when he is asleep".

The importance of the auditory environment in the infant's normal development is similarly emphasized by Gesell and Amatruda:

> "The sound of approaching footsteps awakens anticipations and assurance. The clicking of the spoon in a bowl comes to mean food. The whole web of the child's environment is permeated almost continuously with sounds: episodic sounds, routine sounds, occasional sounds, emergency sounds, sounds of varying quality and intensity which enter into the very substance and patterning of his psychological environment".

In the areas of symbolic development and concept formation Myklebust comments that "because his mental life lacks the normal structuring effect of audition, (the deaf child) remains more concrete. He is less capable of abstract dehaviour which is highly dependent on auditory symbolism and ability to verbalize".

"Auditory symbolism" need not necessarily apply only to words. Any pattern of acoustic configuration can acquire meaning, i.e. can become a <u>sign</u>. Words are one class of such signs. Goldstein (1948) has drawn attention to the <u>phoneme</u> as the unit of auditory configuration in

speech. Language comprehension must depend crucially on the development of the ability to perceive, discriminate between and interpret different acoustic patterns (Strauss & Kephart, p. 108). Yet the nature of this development is still hidden ~~to~~ from us.

As for the personal-social area of development, again both vocal and non-vocal sounds play an important role. In being deprived of human sounds, both linguistic and otherwise, this sector of the deaf child's development may suffer grievous damage:

> "Deafness immediately imposes a restricting factor relative to the child's ability to relate to his mother and other family members. The human voice is capable of an undetermined variety of inflections, intonations and modulations. Children with normal hearing are continuously reacting to these verbal productions of their parents; not only what is said, but how it is said, is meaningful to the process of interaction ... and profoundly significant in structuring and ascribing meaning to social situations."

But it is not only the vocalizations of his associates which, in normal development, contribute to the child's social awareness:

> "Social awareness is peculiarly dependent on hearing. Not only for following conversation, the most significant aspect of social perceptions, but to hear all other types of sounds. All sound derives from the environment and is highly social. Sounds of traffic, telephones, dogs barking, trains, airplanes, automobiles or the wind, have social importance. They supplement the visual experience of normal children. Inasmuch as the child with peripheral deafness does not have such

> auditory experience, he behaves on the basis of his partial, incomplete social awareness which he acquires chiefly through vision ... His social and emotional contact with people is superficial, tenuous and subject to unusual prerequisites. As a result he remains on the periphery of the social situation".

Myklebust also maintains that the auditory environment is the carrier of a large part of the cultural impact on the child:

> "It is reasonable to assume that cultural stereotypes are maintained from father to son partially on the basis of the non-verbalized meanings of what is said to children. Clinical experience with young children with marked peripheral deafness suggests that much of this type of cultural impact is lacking in their personality organization and development. They are remote, isolated and undeveloped in this respect, with a corresponding effect on their early behaviour".

On the role of auditory signs in the development of the child's ego through the process of identification, Myklebust has this to say;

> "The process of identification is much more difficult for the child who does not hear (or who is auditorilly agnostic) and who does not find it possible to communicate normally with his parents ... This inability (to identify) might derive from his symbolic disorder and resultant incapacity to internalize his environment. Social perception is to a considerable extent the internalization of environmental social

> forces. Furthermore it entails ability to perceive and to react to many cues and subtleties simultaneously ... The peripherally deaf child is retarded in his ego development; more time is required for him to make a distinction between himself and his world. His experience in undifferentiated and less integrated as compared with the normal and his personality is lacking in structure".

When it comes to the child's affective-conative organization, i.e. his ability to seek help from his associates and to keep a reasonable rein over his desires and impulses, Myklebust's observations are again pertinent:

> "The peripherally deaf child is retarded in his attitudinal and emotional development ... He is more immature in ability to make his wants known and, thereby, he is more diffusely and randomly subject to impulsiveness with associated misunderstanding on the part of his peers".

When it is remembered that scarcely a single one of the many weighty and thought-provoking propositions quoted above has been subjected to any kind of objective investigation, especially in connection with the normal development of how the child hears his world, any doubts about the need for such a study must vanish.

To conclude this section, mention may be made of the general role of the auditory modality, both phylogenetically and ontogenetically. In the former case, Beatty (1932) says that "hearing is, comparatively, a newcomer. It occurs rarely among insects, and exists only in the most rudimentary form among fishes". But human ontogeny, far from recapitulating this, may in fact be said to reverse it.* There would thus be a special need to study non-linguistic auditory capacities as being more basic, both phylogenetically

* Quoting Hetzer, Murphy, Murphy and Newcomb (1937) comment that the young infant "hears actively, i.e. listens, before he sees actively, or looks."

and ontogenetically, than linguistic comprehension. Finally, it is evident that with the accelerating appearance in our modern industrial society of diverse sound- and noise-producing agencies, increased demands are being made on the individual's auditory discrimination (and stamina!) so that factual information concerning its development during childhood is essential.

SUMMARY.

The case is presented for the urgent need to obtain objective empirical evidence on the nature and development of the child's perception of his auditory environment. Extensive quotations indicate that what is held about the auditory perception of the normal young child is mainly conjecture (albeit of an enlightened kind) based on clinical experience of children with auditory disorders.

CHAPTER 2.

AIMS AND OBJECTS.

The basic aim of this study is to explore the nature and development of the child's ability to perceive, understand and interpret auditory stimuli from which ordinary linguistic cues have been eliminated or in which they have been severely reduced. The term "non-linguistic" as it will be used here needs clarification. It refers to the use of any acoustic material except the conventional vocal symbols of everyday speech. Thus, it does not exclude human vocalizations as such, but only those which carry the semantic content of the language of the individual or subject. Confusion is possible over this issue because of the wide definition of language currently held. Thus the first definition supplied by English and English (1958) is "any form of intercommunicative behaviour, verbal or non-verbal". To demarcate our area of interest more precisely it is necessary to attempt an a priori classification of the total acoustic environment of an individual of a given language and culture. Such analysis reveals the following groups and sub-groups:-

A. SOUNDS OF SPECIFICALLY HUMAN ORIGIN.

(1) Vocal Sounds.

(a) The human voice in ordinary speech, couched in the individual's own language, with manifest semantic content.

(b) The human voice in speech, with linguistic content concealed or disguised, including:

(i) speech couched in gibberish or nonsense words;

(ii) speech couched in a language not understood by the individual considered, and

(iii) ordinary speech (in the individual's own language) of reduced audibility, whether through masking, distortion, lowering of intensity or any other means.

(c) The human voice in song,

(i) with overt linguistic content, and

(ii) with linguistic content concealed or disguised (foreign language, lallation or reduced audibility).

(d) Non-verbal human vocalizations, e.g. crying, laughing, coughing, groaning, gargling, etc.

(2) Non-Vocal Human Sounds.

(a) Orally produced (e.g. sighing, whistling, snoring, wheezing, etc.).

(b) Manually produced (e.g. snapping fingers, clapping hands, etc.).

(c) Produced by other means (e.g. walking, running, etc.).

B. SOUNDS OF NON-HUMAN ORIGIN BUT OF HUMAN MEDIATION.

(1) Mechanical sounds and noises (e.g. vehicles, machines, implements, utensils, and any other noise-generating mechanisms operated directly or indirectly by human agency).

(2) Instrumental music.

C. SOUNDS OF NON-HUMAN ORIGIN OR MEDIATION.

(1) Animal sounds, domestic or wild, whether vocally produced or otherwise

(2) Inanimate matural sounds (e.g. wind, rain, thunder, surf, etc.).

Having mapped out this heterogeneous territory, it is necessary to lay down criteria for the choice of the experimental stimulus material. Our initial specification

that only "non-linguistic" sounds are to be considered implies the exclusion of classes (1) (a) and (1) (c) (i), i.e. the use of conventional words, in the language of the subject, whether spoken or sung. For reasons of economy and expediency, however, it is necessary to narrow the field still further. It is proposed to exclude, firstly, those sounds which the young child is unlikely to have encountered, and secondly, those sounds which he may well have encountered but which are judged to lie outside his immediate sociocultural frame of reference. All this boils down to choosing sounds mainly from the child's everyday environment.

Having decided on the broad choice of stimulus material, it becomes necessary to specify the kind of response, or area of psychological functioning, which is of interest. Three fields seem to be specially pertinent, cognition, empathy and projection.

A. COGNITION.

The primary aim here is to discover the extent to which the young child is able to recognise various objects and events in the auditory environment and, having done so, to ascribe to them appropriate sociocultural contexts.

B. EMPATHY.

Here the object is to assess the degree of sensitivity with which the child reacts to, and interprets, the emotional components of human vocalization and speech.

C. PROJECTION.

The third aim is to discover the nature and extent of the child's projections and apperceptions, both when presented with the two types of stimuli above, and in reaction to specially prepared items of an ambiguous and unstructured nature.

In order to avoid prolixity, these three categories of the study will henceforth be referred to as Auditory Cognition, Auditory Empathy and Auditory Projection respectively.

Some basic questions which arise in connection with Auditory Cognition, and which this study will hope to throw light on, are: How is this function related to intellectual factors, particularly in the area of language and perception? What light does it throw on the social development of the child? What is its relation to age? Are there sex differences in connection with different stimuli?

With regard to Auditory Empathy, enquiry will be focussed on (a) relation to age and sex, (b) relation to patterns of training in the home, (c) relation to the child's degree of receptiveness to communications from others.

In the case of Auditory Projection, interest will centre on the kinds of projections which are made to auditory stimuli and their contrast with projections made to corresponding visual stimuli.

SUMMARY.

The basic objective of the study is set down as an exploratory investigation into the nature and development of the child's ability to understand and interpret the non-linguistic sector of his auditory environment. Three aspects of this ability are to be emphasized: Auditory Cognition, concerned with the child's acquaintance with, and interpretation of, everyday environmental sounds; Auditory Empathy, which stresses the child's sensitivity to vocally-expressed emotions; and Auditory Projection, which is concerned with his reactions to unfamiliar, ambiguous and unstructured material. In each case, specific issues are mentioned on which, it is hoped, the study will throw some light.

CHAPTER 3.

SURVEY OF THE LITERATURE.

Having indicated the need for the present investigation and having broadly defined its aims and objects, it is desirable now to provide a review of published material considered to have a bearing on the general theme of the study. Although most of this material has no direct relevance to the specific objects of the enquiry, it forms a necessary foundation and perspective.

There is a contrast between the material reviewed in Chapter 1 and that to be outlined now. In the former case, we were concerned with illustrating the lack of data and theory; here the emphasis will be on bringing together and collating what little pertinent information and theory do exist.

The following is a summary of Strauss and Kephart's (1955) account of the psychophysical basis of auditory perception.

The sensation of sound is a function of physical vibrations (usually in the air) of a certain range of frequencies, namely between about 20 and 20,000 cycles per second. These vibration frequencies are transmitted from the air to the cochleal fluid in the ear. The vibration of this fluid sets up neural impulses in the organs of corti, in the inner ear.

From the impulses thus generated the individual is able to determine the frequency of the vibration (experienced as pitch) the intensity of the vibration, (experienced as loudness), and the time phases of the stimulation (experienced as pulses, beats or rhythms). Particular sounds are composed of combinations of these qualities. The perceptual problem is to organize certain characteristic combinations of pitch, intensity and time so that the resulting organized whole becomes a recognizable sound. This sound may be simple, as in the case of a pure

tone of only one frequency and a constant intensity, or it may be complex, involving a number of pitches and intensities and either constant or variable time relationships. "These characteristic sounds are perceived as having a quality of their own in much the same way that the figure which is made up of many parts comes to have a quality of its own in vision".

Thus, it is possible to organize out of a mass of auditory stimuli certain groups which stand out with a unique quality of their own and become recognizable by this unique quality. By means of these configurations it is possible to identify objects in the auditory environment. "The song of a canary, the backfire of a motor-car, the rustle of leaves, each have a form or pattern which distinguishes them" from the remainder of the auditory environment. Learning to make such discriminations is one of the most important elements in the development of auditory perception and language comprehension.

We may proceed now to the beginnings of auditory perception in the young infant and its later development. The following account attempts to extract and extrapolate from Piaget's general theory of perceptual development those aspects which are specially relevant to auditory perception.

Piaget (1950) divides the general perceptual and cognitive process into five stages, as summarized below:

(1) Sensory-motor Intelligence (birth to 1½ years).

Sensory-motor reflexes (e.g. grasping and sucking) from the earliest perceptual-motor schemata. These give way to the first habits or acquired adaptations and later to the first intelligent actions, although their basis is entirely autistic.

(2) Pre-conceptual Thought (1½ years to 4 years).

The first internal coordination takes place, involving the growth of a general "symbolic function", but this is of a highly concrete and egocentric character.

(3) Intuitive Thought (4 years to 7 years).

Generalized configurations take over from concrete images, but reasoning is still limited by perceptual dominance.

(4) "Concrete" Operational Thought (8 years to 11 years).

The child's thinking begins to be based on inductive abstraction in which the specific context of the situation no longer exerts its compelling effect.

(5) Formal Operational Thought (12 years on).

Here the child can manipulate ideas about ideas. Reflective reasoning and formal logical thinking become possible.

The infant's interest in sound, says Piaget, may be observed in the first days of life. In the beginning, however, it is no more than an audio-motor reflex. It cannot be called an acquired adaptation until the second month, "when the heard sound provokes a somewhat prolonged interruption" of an ongoing activity "and an actual search for its source". The familiar processes of accommodation, assimilation and organization are to be found in the circular vocal reactions of the child:

> "Accommodation comes first, because the circular reaction is an effort to re-discover the new sound discovered by chance. There is thus perpetual accommodation of the vocal organs to phonic reality perceived by hearing, even though this reality is the pro-duct of their own activity".

Assimilation is at first nothing more than the simple pleasure of hearing (circular reaction to the sound or assimilation through repetition). "Then, to the extent that there is discrimination of the sounds heard there is simultaneously generalizing assimilation (i.e. interest in increasingly varied sounds) or recognition of certain sounds".

Turning to coordinations between sight and hearing, Piaget regards their existence as certain from the third month on, whereas behaviour manifested during the second month is due to a simple accommodation of the head to the direction of the sound. Piaget debates whether the sound of the voice is a simple conditioned stimulus "or must we think that (it) constitutes a sign charged with meaning and is recognized by the child as going with the visual perception of someone's face?" He resolves the issue by saying that audiovisual coordination at this stage is located midway between the extremes of active and passive coordination, "so that the association between a sound and a visual perception is never a purely passive association, but it is not at the outset a relationship of understanding or recognition of meanings".

Piaget's (1955) discussion of the intercoordination of the assimilatory schemata of sight and hearing in connection with the development of object concept is also relevant. He says that the audiovisual coordinations established after the second month "endows sensory pictures with a greater degree of solidity than when they are perceived through a single kind of schemata: the fact of expecting to see something instils in the subject who listens to a sound a tendency to consider the visual image as existing before the perception". This contributes to arousing anticipations which provide the assurance of the solidity and coherence of the external world.

Piaget has no more to say about auditory object perception, but we may briefly recapitulate, and extend,

the account as follows:

After the stage of audio-motor reflexes, there occur the processes of assimilation, accommodation and organization of auditory schemata and their coordination with visual and other schemata. Then follows the preconceptual stage (up to 4 years) in which auditory signs give rise to relatively concrete images and representations. This gives way to the stage of "Intuitive Thinking" in which generalized auditory configurations replace discrete schemata representing concrete objects and events. Finally (from 8 years) the stage of "Operational Thought" is reached in which interpretation of the auditory environment will involve the higher cognitive processes of abstracting and reasoning.

This completes an admittedly patchwork account of the development of auditory cognition (i.e. the recognition and interpretation of objects and events in the auditory environment). We can turn now to the concept of Auditory Empathy.

Murphy, Murphy and Newcomb (1937) quote the work of Hetzer, Löwenfeld and Bühler on the reactions of infants to the vocally-expressed emotions of adults.

Löwenfeld (1927) reports that when the behaviour of the newborn in response to the human voice is experimentally compared with his behaviour in response to other sounds or noises (e.g. bell, rattle, paper being crushed, whistle, etc.), his reactions to the former are far less frequent and dependable; by the end of the first month, however, he is just as responsive to the human sounds as to the others, even if the latter are much louder:

> "In other words, the fact that the voice is a sound associated with human beings (and their ministrations) brings to it a a degree of attention out of proportion to its mere sensory stimulus value ... The earliest specific reaction to the voice is sucking; later ... the voice

> arouses a smile. Responses to the voice include vocal expressions popularly called sounds of pleasure, or sounds of discomfort and crying. The infant will react more frequently to emotionally-toned voices - such as those of persons speaking angrily or in a friendly way - than he will to ordinary conversation."

Stagner and Karwoski (1952) also comment on the sensitivity of the infant to emotionally-toned vocal sounds:

> "Especially important to the young child is the awareness of the emotional state of the adult. When we say that babies are extraordinarily sensitive to adult emotions, we need not impute any special talents to them. The child's comfort or discomfort, satisfaction or frustration, depends on the emotion of the mother particularly ... The mother who is frightened, angry or anxious may communicate such states to the infant without knowing it. She handles him more roughly, her motions are jerky, her voice changes timbre. Since these cues have great significance to the child, perception is speedy and accurate ... The voice seems to be particularly expressive of inner tensions".

However, there has been only one experimental investigation into the child's ability to identify different emotional states in the human voice, that of Gates (1927). The age range of her sample was 8 years to 13 years, which unfortunately excluded the pre-school child about whom it would have been so desirable to have such information. She related auditory capacity to the ability to identify emotions in facial expression. A recording was made of an actress repeating the letters of

the alphabet in tones of happiness, unhappiness, anger, fear, surprise, scorn, defiance, pity and suspicion. Gates'results showed a developmental increase of correct judgements. There was, however, a greater number of correct responses to the visual than to the auditory situation.

In a previous study, Gates (1923) reported on the growth of the ability to identify specific emotions by facial expression in photographs in which the age range of her sample was 3 to 14 years. This is worth mentioning, because it throws light on the empathic ability of pre-school children. Laughter was the only emotion recognized by over half of the children at age 3. It was not until age 6 that half of the children recognized pain; and anger, fear and surprise came later than that, with scorn the most difficult of all. Bruner and Tagiuri (1954) interpret these results as indicating that only the expressions of the grossest forms of emotional reaction are recognized on the basis of "innate capacity" and that discriminative capacity develops only with the social experience of the individual.

Four studies which have been concerned with the auditory empathy of adults may be briefly mentioned in order to gain an impression of the techniques used in this field.

Dusenberg and Knowrer (1939) made gramophone recordings of eight subjects (four men and four women) attempting to express, in turn, eleven emotional states while repeating the letters A - K. These were judged by four groups of subjects with a high (83%) mean percentage of accuracy.

Fairbanks and Pronovost (1938) gave a passage to six amateur male actors to read in four different ways, indicating in turn grief, anger, fear and indifference. These were recorded and played to 64 observers who were required to select the appropriate emotion from a check-list of 12 descriptions. High correlations

were found between the simulated emotions and the judgements made.

Fairbanks and Hoaglin (1941) prepared recordings of five simulated emotions, which were correctly identified 66 - 88% of the time by 64 adult judges.

Abramovitz (1961) recorded an actress' readings of six "nonsense passages" (i.e. couched in gibberish), representing anger, fear, depression, anxiety, grief and detachment, respectively. These were presented tachistophonically to 30 adult subjects, with cut-off intervals ranging from one second to fifteen seconds. In nearly all cases, subjects achieved very close to their maximum recognition scores within a one-second period.

When it comes to auditory projection, only one study (unpublished and unabstracted) has been traced, that of Husni (1952), which dealt with the "auditory perceptions and projections"of blind children. We are therefore again obliged to turn to work which has been done with adults in this connection.

Abramson (1963) comments on the preoccupation of psychologists with visual projective techniques, and the comparative neglect of auditory methods:

> "Hearing would appear to be more important than is generally credited in traditional approaches to personality study. Misperceptions of hearing are at least as common as those of vision, and seemingly they occur more frequently in the general population. Since vision tends to provide more continuing cues or reality checks than does audition, it seems logical that an auditory technique might give rise to less stimulus-bound responses and provide more opportunity for the expression of personalized material. It may

be noted here that, as reality contact weakens in the psychotic, auditory hallucinations appear earliest and most prevalently".

The belated realization of the importance of the auditory modality in personality and motivation study has resulted in a whole crop of auditory projective tests for adults, namely Shakow and Rosenzweig (1940), Stone (1950), Andreanu and Dentice (1951), Caplan (1952), Leal and Pascual (1952), Wilmer and Husni (1953), Ball and Bernadoni (1953), Braverman and Chevigny (1955), Davids and Murray (1955), Briggs and Wilmer (1956) and Palacios (1959).

One of the most promising of these, the Braverman-Chevigny Auditory Projective Test (APT), may be briefly described. It is recorded on both sides of two 33 r.p.m. gramophone records and consists of four parts:

(1) A series of twenty utterances by a single voice, in the nature of propounded riddles
(2) A series of eight sound effects
(3) A series of eleven interpersonal situations enacted by professional actors
(4) The eleven sequences of (3) spoken in nonsense language employing the same intonation and rhythm as when delivered in meaningful language.

Abramson compared this test with the TAT, using a sample of schizophrenic adults. "The APT proved to be fully as productive as the TAT in story length, in formal and structural characteristics, in identifications of hero figures, and in scorable needs and presses. The APT produced more themas of impersonal and interpersonal power drives, the TAT more themas of pleasure-seeking and retaining of affection".

SUMMARY

A review is presented of data and theories having a bearing on the general theme of the child's auditory perception. This includes a brief account of Piaget's theory of the development of auditory perception, some comments on the sensitivity of infants to emotional tones of the human voice, and a single experimental investigation into auditory empathy in children. Cognate topics include the psychophysics of audition, visual empathy in children, auditory empathy in adults and auditory projection in adults.

CHAPTER 4.

DESIGN AND SELECTION OF TEST MATERIAL.

There are apparently no tests of auditory perception for children with normal hearing acuity. Strauss (1945) and Strauss and Kephart (1955) held out the prospect of developing such a test in connection with the differential diagnosis of oligophasia, but no further reference to it has appeared in the literature. They described a pilot series of "forty sounds, meaningful sound combinations and noises, recorded on tape from the auditory environment and from records commercially provided for use by radio stations". Myklebust (1954) reviews a number of audiometric tests, of which some (Ewing and Ewing, 1944; Utley, 1950) employ "social sounds, of the type which surround the child daily". But as their purpose is quite different from the present one, in which auditory acuity is assumed to be normal, their design will not be discussed.

Three separate tests of auditory perception, corresponding to the three areas of the study, cognition, empathy and projection, had therefore to be designed and produced. These will now be described.

A. AUDITORY COGNITION.

The aim here was to procure in convenient recorded form a number of sound stimuli which would satisfy the following desiderata:-

(1) they should represent situations taken from everyday life

(2) they should be distinctive in form, in that, by adult standards, there should be no doubt about their objects of reference

(3) they should be sounds judged to fall within the sociocultural frame of reference of an average six-year-old urban child of white middle-class parents

(4) they should be as diverse in nature as the above requirements permitted.

The procedure adopted was to collect as many ostensibly suitable stimuli as possible and present them to a pilot group of eight children, ranging from five years to eight years. As a result of both their verbal reactions and their ability to match the auditory stimuli with their correct pictorial representations (see below) a group of fourteen sounds were finally decided upon. Twelve of these sounds were dubbed on to magnetic tape from existing commercial recordings of sound effects, while two were specially recorded for the purpose. The following is a list of these sounds, a full description of which is given in Appendix A:-

CPa	Aeroplane	(Practice stimulus)
CPb	Bubbles	(Practice stimulus)
C1	Motor-car starting	
C2	Telephone ringing	
C3	Sawing wood	
C4	School bell	
C5	Reveille bugle	
C6	Cock crowing	
C7	Bath sequence	
C8	Fire engine	
C9	Water being poured into glass	
C10	Typewriter	
C11	Clock ticking, then alarm	
C12	Machine guns	

It was decided that recognition of each item was to be assessed in two different ways (a) by the child's verbal identification, and (b) by his ability to select the correct one of a group of pictures. It was therefore necessary to prepare suitable illustrations. These were obtained from magazines, children's dictionaries, and encyclopaedias, or were directly photographed. A full list of these groups of illustrations is given in Appendix B, together with two photographed examples (CPa, "Aeroplane", and C12, "Machine guns"). The criteria adopted in select-

ing the illustrations were rather broad, and depended on the nature of the auditory stimulus. In general, a wide variety of pictures was sought, and in each group at least one animal was included because there seemed to be a tendency among the younger members of the pilot group to give the name of an animal when presented with a sound they could not identify.

These pictures were mounted on cardboard and backed with foam plastic. Each group was housed in a separate, shallow 8" x 11" tray. The reason for doing this will be made clear later.

B. AUDITORY EMPATHY.

Here the aim was to obtain a number of different vocalizations, representing a variety of emotions. The final list was decided on in the same way as was described above, except that in this case only two of the twelve stimuli were dubbed from existing recordings. The adult spoken passages were enacted by two drama students. The baby was recorded "live". The following is a list of those stimuli, a full description of which will be found in Appendix C:

E1	Baby crying	(angry)
E2	Baby laughing	(happy)
E3	Woman singing	(happy)
E4	Woman singing	(sad)
E5	Woman speaking	(sad)
E6	" "	(happy)
E7	" "	(frightened)
E8	" "	(angry)
E9	Man speaking	(happy)
E10	" "	(sad)
E11	" "	(angry)
E12	" "	(frightened)

The two songs were in foreign languages; the spoken passages were couched in nonsense words. Again, it was decided to have a dual method of assessment, and

suitable groups of pictures were accordingly obtained and prepared as described above. Full details of these illustrations, as well as a photographed example (E9 - E12, Man speaking), will be found in Appendix D.

C. AUDITORY PROJECTION.

After a great deal of trial-and-error, seven specially-recorded "episodes" were selected. These items were devised with the idea of calling forth particular themes and fantasies, corresponding in a certain degree to some of the items of the Children's Apperception Test, as indicated below:

P1 Dog barking
Door opens and shuts
Whisper: "Who's there?"
(general fears and anxieties)

P2 Children laughing and shouting
School bell
Child sobbing
(fears and anxieties related to the school situation)

P3 Door knocks (repeated three times)
Whisper: "Pretend we're not here".
Child giggling.
(illicit activities, sex-play)

P4 Children laughing and shouting
Man: "Be quiet, everyone!"
Silence
Man: "Now, who did this?"
Child giggling
(reactions to male authority, guilt feelings, aggression)

P5 Child: "Please can I?"
Woman: "No".
Child: "Why can't I?"
Woman: "You know why?"
(reactions to female authority, aggression).

P6 Man: "And what's the matter with you?"
Child: "I ... I can't do it".
Man: "Come here".
(reactions to male authority, feelings of inferiority).

P7 Whispers: "Should we?"
"No, wait"
"Oh, come on".
(peer relationships, illicit activities).

It will be noted that, of the three auditory tests, this is the only one in which overt linguistic signs are employed (P3 - P7). However, the statements do not define the underlying situations, which remain ambiguous and unstructured. Furthermore, in many cases the age and sex of the speakers were rendered indeterminate by the use of sobbing, giggling and whispers.

All recordings and dubbings were made with a tape-recorder having a frequency-response range of about 80 cycles per second to 16,000 cycles per second. This represents good fidelity of reproduction in the high-frequency range, but slightly less than optimum in the low-frequency range. An extension-speaker was fitted to the tape-recorder and housed in a gaily-decorated "magic box", the lid of which opened in such a way that the inside could be used as a "flannel-board" to which the specially-backed pictures selected by the child would adhere.

Details of the actual experimental procedure adopted in this connection will be found in Chapter 6.

D. VISUAL PROJECTIVE TEST.

Five items of the Children's Apperception Test were chosen. These were judged to correspond as closely as possible to the themes mentioned above. They were:

Card 1 (chicks) (sibling relationships, maternal authority)

Card 3 (Lion) (Male authority, aggression)
Card 5 (Bedroom) (Sex fantasies, guilt feelings)
Card 8 (Monkeys) (Maternal authority)
Card 10 (Spaniels) (Toilet situation, guilt feelings).

There is no one-to-one cofrespondence between these items and the auditory episodes. It is considered that no such correspondence is possible in view of the fundamental dissimilarity between the two types of stimulus material. There is, however, a fair overall equivalence.

E. INTELLIGENCE TEST.

The instrument chosen was the SRA Primary Mental Abilities for ages 5 to 7 (Thurstone and Thurstone, 1953), of which the Verbal-Meaning and Perceptual-Speed tests were to be administered.

The "Verbal-Meaning" ability is described by the authors as "the ability to understand ideas expressed in words". It is measured by four sub-tests, Vocabulary, Sentence completion, Paragraph Comprehension, and Auditory Discrimination. In each case the child indicates his response to the various tasks by marking one picture in a row. He is not required to make any verbal response. The test does not directly measure language performance, therefore, but language comprehension. The Vocabulary section is the largest and probably the most important of the four. It consists of 21 items, of which only 7 test the child's understanding of specific words (e.g. "mark the dome", "mark the artist") while 14 would seem rather to test the child's general knowledge (e.g. "which is the fastest way to send a letter to a far-off city?" "Which one of these animals is the strongest?") than his recognition vocabulary as such. (The authors have not, in fact, published the original factorial study on which the PMA 5-7 was based, so it is not possible to give their reason for having included these items under the head of "Vocabulary").

The test of Auditory Discrimination consists of 14 items in each of which the child is required to discriminate between two similar-sounding words (e.g. "soup and suit", "bear and pear") by marking an appropriate picture.

The "Perceptual-Speed" ability is described as "the ability to recoghize likenesses and differences between objects or symbols, quickly and accurately". It is tested by two sections, "Identical Pictures" and "Identical Forms". In both cases the task is to match a given picture or form by marking one of four figures alongside it. It is a speeded test, the time-limit being 1½ minutes and 2 minutes for 14 and 16 items respectively.

F. PARENTS OPINION INVENTORY.

In an attempt to relate the child's Auditory Empathy score to patterns of training in the home, an a priori parents attitude scale was devised. It was hypothesized that individual differences in the young child's sensitivity to vocally-expressed emotions are functionally related to the following factors:

(1) the child's constitutionally-determined temperamental reactivity

(2) the child's level of intelligence

(3) patterns of training in the home.

Of these three factors, only the last two seemed open to assessment. The first hypothesis is derived from observations of Bühler (1930) who has reported individual differences in temperamental reactivity which are noticeable so early in infancy that the effect of training is precluded. The second hypothesis is based on the work of Hunt (1928) who found fairly high positive correlations between intelligence and ability to identify emotion in facial expressions (i.e. "visual" empathy).

The third hypothesis derives from a study quoted

by Allport (1954) in which authoritarians were shown to be poorer judges of personality than non-authoritarians.

There is no obvious way of putting the first hypothesis to the test. The second hypothesis could easily be tested using the PMA measures as estimates of intelligence. There remained the third hypothesis regarding patterns of training in the home.

Several studies (e.g. Glidewell, 1961) have agreed that two of the main qualitative dimensions of parental training are (a) warmth-objectivity of general approach, and (b) inconsistency-rigidity of disciplining. It is hypothesized that, intelligence and temperamental reactivity being held constant, (a) the greater the parental warmth, the higher the child's empathy, and (b) the greater the rigidity of disciplining the lower the child's empathy. This formulation may be rationalized as follows:

(a) The child from a home in which parents are generous in their emotional expressiveness is exposed to greater varieties and greater intensities of such behaviour than the child from an objective, unemotional environment. It seems natural, therefore, to expect a greater degree of acquaintance with the outward signs of emotion in the former case than the latter.

(b) The child whose mother is inconsistent in her disciplining will be particularly obliged to watch for cues which convey to him what her mood happens to be at certain critical moments. He has no established rules to go by, e.g. "If I am rude, Mother always gets cross and punishes me". Sometimes Mother gets angry and sometimes not; one can, however, anticipate her reaction by watching her expression and listening to her voice. The child whose mother <u>always</u> punishes him when he is rude does not have to learn to make these discriminations; he knows that punishment is an invariable consequence of this particular misdemeanour, so he does not look for these cues and therefore does not develop the same degree of

sensitivity to them.

The "Parents Opinion Inventory" finally evolved to measure attitudes bearing on these two dimensions is described in Appendix E.

G. TEACHERS' RATINGS ON THE CHILD'S RECEPTIVITY.

The teacher was to be approached as follows:

"I would like a rating on each child with respect to his responsiveness or receptivity. How well are you able to make contact with him? How easy is it to "get through to him?" Try to gauge his real potential in this respect and ignore his actual achievement, standard of behaviour (naughtiness) and degree of intelligence as far as possible. Rate him on the following 4-point scale":

(1) Very easy to get through to. Very responsive.

(2) Fairly easy to get through to. Fairly responsive.

(3) Fairly difficult to get through to. Fairly unresponsive

(4) Very difficult to get through to. Very unresponsive.

It was hypothesized that the higher the child's Auditory Empathy score (intelligence and temperamental reactivity being held constant), the higher his receptivity rating. The rationale behind this hypothesis was that intelligence per se is necessary but not sufficient to ensure social alertness and openness to communications from others. At least one other factor is the degree of sensitivity to the undertones and overtones of speech.

SUMMARY.

The separate items of the test-material are described. Only two of these, the PMA 5-7 scale of intelligence and the Children's Apperception Test are standard diagnostic procedures. The others, including tests of auditory cognition, empathy and projection, a parents attitude scale and a teacher's rating scale were

specially devised for this study. Hypotheses relating Auditory Empathy (a) to intelligence, (b) to patterns of training in the home, and (c) to teachers' ratings on the child's receptivity are put forward.

CHAPTER 5.

SELECTION OF SAMPLE.

The main issue in connection with the selection of the experimental sample was its age range. Ideally - information on auditory perception development being so scanty - it would have been desirable to encompass the widest possible age range. But this would have entailed a variety of different experimental approaches to match different developmental levels. Such a procedure would have been inordinately complex and uneconomical. The objective therefore was rather to explore a circumscribed sector of the developmental field, and to fix the age-limits at points which would combine the maximum of theoretical interest with the maximum of practical convenience.

With this in view, an age-span of four years to seven years - or, more precisely, 48 months to 95 months - was decided upon. Three separate considerations contributed to this decision:

(1) This period covers the transitional phase from pre-school to primary school, in which the child's personal-social and intellectual horizons become expanded to the degree where he is ready for routine curriculum education.

(2) The period corresponds to Piaget's stage of "Intuitive Thought". At four the child begins to centre on general configurations rather than on individual concrete representations, and this process is normally completed by the end of the seventh year, when the transition occurs to the stage of "operational thought", in which logical thinking makes its appearance.

(3) On practical grounds, four years is about the earliest at which one can administer a test in a fairly routine fashion within a given time-limit.

The actual procedure adopted to obtain the group was as follows. The principals of several nursery schools and primary schools in the vicinity of the local Child Guidance Clinic were approached with the request that they supply the names and addresses of boys and girls who had turned four but had not yet turned eight. They were informed of the broad purpose of the investigation and an offer was made to submit individual reports on children, if desired. Four nursery schools and three primary schools responded favourably, and from them the addresses of 130 children were obtained. Circulars were sent to the parents of these children, worded as follows:

Dear Mr. & Mrs.

During the July holidays we are doing tests to assess the personality and intelligence of normal healthy young children. This will give us a great deal of useful information - which we are naturally glad to pass on to interested parents.

I should like to know whether you would let ..... come to the Clinic for these tests which require only a single session of about an hour to complete. Children love doing them, and they also receive a little prize at the end. When all the results have been analyzed, a report will be sent to you, if desired.

May I therefore ask whether you would like to complete and return the attached form so that I can make an appointment to suit you? A stamped addressed envelope is enclosed for your convenience.

Thank you for your co-operation.

Yours sincerely,

The parents of about 95 children applied to have the tests administered. Of these children, several had to be rejected on grounds of unsuitable age, home-language, etc. However, parents of many of those who were accepted

asked whether the tests could be done on other children (siblings and friends), and eventually appointments were made for 104 children, of whom 7 did not in the end make an appearance. In all, therefore, 97 children were tested, the results of only one of whom had to be discarded - on grounds of impaired auditory acuity. The composition of this sample will now be described.

(a) Socioeconomic Status.

The children were all urban English-speaking whites of South African parents living in the Cape Town area, whose occupations ranged from professional to clerical. Children of four and five years were nearly all from professional, semi-professional, managerial and business classes, while children of six and seven years included these classes, as well as clerical and skilled trades. There was therefore not an even distribution of socio-economic status throughout the age range. It could be said that the four and five-year group varied from middle to upper-middle class, while the six and seven-year group varied from lower-middle to upper-middle class.

(b) Age and Sex.

The distribution by age and sex is given in Table 5.1. Except for the five-year-olds, in which the sex ratio was fairly even, boys outnumbered girls by about 2 to 1. But the age distribution was fairly equitable otherwise, with averages (shown in months) very close to the mid-point of each year.

(c) Intelligence.

For each child a mental age corresponding to the aggregate obtained on the Verbal-Meaning and Perceptual-Speed tests of the PMA 5-7 was obtained and his corresponding quotient-score, assumed to be a fair estimate of his IQ, computed. The distribution of these quotient scores is shown in Table 5.2. Intelligence was average for six and seven years, rather above average for

AGE	MALE	FEMALE	TOTALS
FOUR	14 (55)	7 (57)	21 (56)
FIVE	16 (67)	14 (64)	30 (66)
SIX	16 (79)	7 (78)	23 (78)
SEVEN	14 (90)	8 (91)	22 (90)
TOTALS	60	36	96

Table 5.1 Distribution of sample by age and sex. The average chronological age in months for each year-group is shown in parentheses.

AGE	MALE	FEMALE	TOTAL
FOUR	118	120	119
FIVE	108	110	109
SIX	100	102	101
SEVEN	101	98	100

Table 5.2 Average quotient-scores for each age and sex group, based on aggregate of EMA 5-7 Verbal-Meaning and Perceptual-Speed mental age.

five years, and quite high (bright-average to superior) for four years. There was no sex difference in any age group.

SUMMARY

The procedure adopted in selecting the experimental sample is outlined. The composition of the four to seven-year group of 96 children is described in terms of socio-economic status, age, sex and intelligence.

CHAPTER 6.

EXPERIMENTAL PROCEDURE.

Each child was individually tested, during a single session, in a specially allotted room at the University's Child Guidance Clinic. The full battery required 40-45 minutes to administer, during which time the parent (usually mother) was asked to complete the attitude scale. A total of 90 children completed, in full, the tests of Auditory Cognition, Auditory Empathy, and the two PMA sub-tests. For reasons of time and economy, however, it was judged unnecessary to subject the whole of this group to the remaining projective tests; a sub-group of 52, therefore, continued with the Auditory Projection test and Children's Apperception Test. In the case of some of the more timid children (especially in the four-year-old and five-year-old group) the parent was obliged to be present during testing.

When the appointment was made with each parent, she was asked to tell her child that he was coming to do "games and puzzles" and that there were prizes to be won. The examiner maintained this "recreational" atmosphere outwardly, but the underlying approach was experimental and objective rather than idiographic. No coaxing or special encouragement was resorted to. The stimuli and instructions were presented in standard fashion (as described below) and if the child made no response or replied "I don't know", the next stimulus was presented without further ado.

Auditory Tests.

The full procedure adopted in administering the Auditory tests will be found in Appendix F. Children were introduced to the situation by saying, "This is a magic box. Here is a button. When I tell you to press this magic button you will hear all kinds of sounds and noises coming from the magic box. Would you like to hear

an aeroplane? Press the magic button and you will hear an aeroplane flying high in the sky". When the child understood the procedure, the experimental stimuli were presented as follows: "Press the magic button again. What can you hear? What sound is that?" His response constituted the "verbal identification". Whether this was correct or not, the illustrations corresponding to the given auditory stimulus were presented as follows: "Here are some pictures. Which is the right picture? Which picture is making that sound? Pick it up and stick it on here" (indicating the flannel-board). This response constituted his "picture-matching identification" and was intended to be independent of the verbal identification. But it was found during the pilot run that if the child (especially one of four or five years) made an incorrect verbal identification that corresponded to one of the illustrations, he immediately plumped for this picture, no matter what attempts were made to get him to listen to the sound afresh. (This phenomenon is discussed in Chapter 9 in terms of Piaget's concepts of centration and deeentration). During the experiment, therefore, any illustration corresponding to an incorrect verbal identification was removed from the relevant set before its presentation. In no case was the child directly told whether his response was correct or not.

Before allowing the child to identify the Auditory Cognition items by means of the picture-matching procedure, it was necessary, in the case of completely correct verbal identifications, to obtain his ascription of the relevant social context. This was done by saying "Tell me more about it. What is happening? Who is there? Why is he doing it? etc".

In the case of the Auditory Empathy items, the same general procedure was adopted. Thus, if stimulus E1 was correctly identified as "baby crying", the child was asked: "Is the baby frightened, or sad, or cross or happy?" If the child indicated one of these emotions the next thing was to establish what he attributed it to.

"Now, let's play a guessing game. You must guess why the baby is ..." In presenting the Empathy illustrations, however, pictures corresponding to incorrect verbal identifications were not removed, the reason being that there was no certainty that the child fully understood the difference between, say, "frightened" and "sad", or "sad" and "cross".

In the case of incorrect verbal identifications, the cognitive and empathy stimuli were repeated while the child selected a picture.

No illustrations were used in connection with the Auditory Projection items. Here the examiner addressed the child as follows: "This time, when I tell you to press the button, you will hear something happening somewhere. Listen carefully and tell me what is happening". In the case of an inadequate story the only prompting was to say: "And then? ... And then?" The auditory stimuli themselves were not repeated, no matter how meagre the response.

Children's Apperception Test.

The CAT cards were presented as follows: "Now we are going to play another game. I am going to show you some pictures. You must look at the picture and tell me what is happening. Make up a little story about it". When prompting was necessary, it was as follows: "Anything else? Is that all?"

PMA Sub-Tests.

The PMA tests were administered in accordance with the procedure laid down by the authors, with slight modifications resulting in faster performances on the Verbal-Meaning test, owing to individual testing.

In all cases the child was given a little present at the end of the testing session.

Finally, teachers were personally interviewed to

obtain "receptivity" ratings on their pupils.

SUMMARY

Details of the experimental procedure are presented. Each child was individually tested within a single session. The auditory procedures were designed so that they could be presented as "games", but the underlying approach was experimental and objective rather than idiographic. In the tests of Auditory Cognition and Auditory Empathy two methods of identification were used, verbal and picture-matching. Teachers were personally interviewed to obtain "receptivity" ratings. The parents attitude scale was completed while the child was being tested.

CHAPTER 7.

QUALITATIVE ANALYSIS OF RESULTS.

GENERAL.

Spontaneous reactions to the auditory stimuli ranged from delight and amusement to embarrassment and anxiety. The experimental procedure proved to be eminently suitable for securing and maintaining the child' s attention, except that some of the younger children found the full battery rather too long. The test of Auditory Cognition was clearly the one that was most enjoyed. Some of the vocal stimuli, however, seemed to bring about inhibition, shyness and, in a few cases, temporary refusal to continue. Before being given their prize, children were asked which "game" they liked best. Out of the total of 96, 63 replied"the magic box", 24 said "marking with the crayon", (i.e. the PMA) and the remainder said "I don't know".

In this chapter the results are analysed nominally or categorically, while in the next chapter they are scored along simple ordinal scales.

No stimulus was so difficult that none of the children could identify it; and none was so easy that all could identify it. From this point of view the age-range and the range of stimulus-difficulty proved to be very well matched.

A. AUDITORY COGNITION.

The basic analysis undertaken was in terms of manner and category of identification - both verbal and picture-matching - of each of the twelve environmental stimuli, for each age and sex group. These "breakdowns" are presented in Appendices G and H. Several derivative analyses have been based on these tables, and are presented below.

(1) Correct Identifications.

The order of difficulty of the environmental

stimuli in terms of the total number of children who were able to make correct identifications is shown in Table 7.1 and Table 7.2, corresponding to the verbal and picture-matching methods respectively. Table 7.3 compares the percentages of correct responders for each item in terms of the two methods of identification. The percentages of children at each age-level who were able to identify the stimuli correctly are presented in Tables 7.4 and 7.5. The lower age-limits at which at least 50% of children were able to identify the stimuli, by both means, are shown in Table 7.6. Several facts emerge from these tables, and will be briefly pointed out here before being discussed in Chapter 9.

(a) In the case of most items, with both types of response, there is a fairly steady progression in percentage of correct responders from four years to seven years. This is crystallized into what seems to be a definite developmental trend when all items in the test are taken collectively.

(b) The picture-matching method of identification proved to be considerably easier than the verbal method of identification in all but two of the items, Sawing Wood and Fire-Engine, for which the illustrations were of a distinctly inferior standard - in the one case a photograph that lacked clarity, and in the other a photograph that was too small.

(c) Although the order of difficulty of items is not the same for the verbal and picture-matching methods of identification, several clear indications can be discerned:

(i) the easiest items (70% of more correct identifications) were Telephone Ringing, Fire Engine and Car Starting.

(ii) the most difficult items (30% or less correct identifications) were Typewriter, Bath Sequence and Pouring Water.

(d (d) In terms of 50th percentile norms, two items

C2	TELEPHONE RINGING	77%	of all children
C8	FIRE ENGINE	73%	"
C1	CAR STARTING	70%	"
C3	SAWING WOOD	52%	"
C5	BUGLE REVEILLE	51%	"
C12	MACHINE GUNS	46%	"
C6	COCK CROWING	45%	"
C10	TYPEWRITER	29%	"
C11	ALARM CLOCK	22%	"
C4	SCHOOL BELL	14%	"
C7	BATH SEQUENCE	9%	"
C9	POURING WATER	7%	"

Table 7.1 Order of difficulty of the environmental stimuli in terms of the total number of children who were able to make correct verbal identifications.

C5	BUGLE REVEILLE	90%	correct responders
C2	TELEPHONE RINGING	88%	"
C1	CAR STARTING	74%	"
C8	FIRE ENGINE	71%	"
C12	MACHINE GUNS	67%	"
C6	COCK CROWING	66%	"
C4	SCHOOL BELL	66%	"
C11	ALARM CLOCK	56%	"
C3	SAWING WOOD	46%	"
C10	TYPEWRITER	32%	"
C9	POURING WATER	28%	"
C7	BATH SEQUENCE	18%	"

Table 7.2 Order of difficulty of the environmental stimuli in terms of the total number of children who were able to make correct picture-matching identifications.

		Percentages of Correct Responders	
		Verbal Identifications	Picture-matching Identifications
C1	CAR STARTING	70%	74%
C2	TELEPHONE RINGING	77%	88%
C3	SAWING WOOD	52%	46%
C4	SCHOOL BELL	14%	66%
C5	BUGLE	51%	90%
C6	COCK CROWING	45%	66%
C7	BATH SEQUENCE	9%	18%
C8	FIRE ENGINE	73%	71%
C9	POURING WATER	7%	28%
C10	TYPEWRITER	29%	32%
C11	ALARM CLOCK	22%	56%
C12	MACHINE GUNS	46%	67%

Table 7.3 Comparison of percentages of correct responders for each environmental stimulus in terms of (a) verbal and (b) picture-matching identifications

AGE	PHONE C2	F/ENG C8	CAR C1	SAW C3	BUG. C5	GUNS C12	COCK C6	TYPE C10	CLOCK C11	BELL C4	BATH C7	POURING C9	TOT.
FOUR	52%	77%	43%	38%	19%	24%	33%	9%	24%	0%	0%	0%	27%
FIVE	87%	67%	53%	53%	43%	33%	47%	23%	10%	10%	3%	13%	37%
SIX	78%	74%	96%	57%	65%	57%	52%	30%	26%	22%	18%	0%	48%
SEVEN	86%	82%	91%	59%	77%	73%	46%	55%	32%	23%	18%	9%	54%
TOTAL	77%	73%	70%	52%	51%	46%	45%	29%	22%	14%	9%	7%	41%

Table 7.4 Percentages of children at each age-level who were able, by verbal means, to identify correctly each environmental stim.

AGE	Bug. C5	PHONE C2	CAR C1	F/ENG C8	GUNS C12	COCK C6	BELL C4	CLOCK C11	SAW C3	TYPE C10	POURING C9	BATH C7	TOT.
FOUR	86%	72%	52%	43%	48%	72%	62%	43%	19%	10%	5%	0%	42%
FIVE	90%	93%	57%	63%	60%	57%	67%	47%	43%	17%	30%	23%	53%
SIX	87%	87%	95%	83%	74%	61%	48%	48%	61%	35%	30%	22%	61%
SEVEN	95%	96%	95%	95%	86%	77%	86%	91%	59%	73%	45%	23%	76%
TOTAL	90%	88%	74%	71%	67%	66%	66%	56%	46%	32%	28%	18%	58%

Table 7.5 Percentages of children at each age-level who were able, by means of picture-matching, to identify correctly each environmental stimulus.

MEDIANS +

AGE	Verbal Identifications	Picture-matching Identifications
FOUR YEARS	C2 PHONE C8 F/ENGINE	C2 PHONE C1 CAR C5 BUGLE C6 COCK C4 SCH. BELL
FIVE YEARS	C1 CAR C3 SAW	C8 F/ENGINE C12 GUNS
SIX YEARS	C5 BUGLE C6 COCK C12 GUNS	C3 SAW
SEVEN YEARS	C10 TYPEWRITER	C10 TYPEWRITER C11 ALARM CLOCK
ABOVE SEVEN YEAR LEVEL	C4 SCH. BELL C7 BATH C9 POURING C11 ALARM CLOCK	C7 BATH C9 POURING

Table 7.6 Lower age-limits at which at least 50% of children were able to identify the various environmental stimuli correctly (a) verbally and (b) by picture-matching.

proved to be above the seven-year level on both methods of identification, Bath Sequence and Pouring Water. Only one item, Telephone Ringing, fell within the scope of four-year-olds on both methods of identification.

(2) Misidentifications (mistaken responses).

Table 7.7 shows the most frequent verbal misidentifications made in response to the environmental stimuli. The most frequently-recurring misidentification was the designation of the following items as "steam-engine" (or some synonym): Car Starting, Sawing Wood, Typewriter, and Machine Guns. These were outright inaccuracies. On the other hand, some descriptions were incorrect in not being sufficiently specific rather than in being innacurate, e.g. "band" for Reveille Bugle, "hen or fowl" (unspecified) for Cock Crowing, "water running" (unspecified) for Bath Sequence, and "bubbles" or "splashing" for Pouring Water.

Table 7.8 gives the overall percentages of verbal responses broken down into three categories, (a) "Don't know, or no response", (b) "Completely or partially misidentified", and (c) "Completely correct", for each age group. There is a consistent age-trend in each category. "Don't know" responses decrease from a maximum of 19% at seven years. Similarly, misidentifications decrease from 54% to 37%.

(3) Sex Differences.

(a) Correct identifications of individual items: The responses of boys and girls throughout the age-range to each of the environmental stimuli were analysed for sex differences using a chi-square test. In only one case was a significant deviation from chance found, namely C12, Machine Guns, in which boys excelled ($P = .06$ for verbal identifications and $P = .01$ for picture-matching identifications).

(b) Correct identifications of groups of items: It will be noticed that the environmental stimuli, C1 to C12, may be classified according to whether they are usually

	STIMULUS:	MOST FREQUENTLY MISIDENTIFIED AS:
C1	CAR STARTING	Steam Engine
C2	TELEPHONE RINGING	Doorbell
C3	SAWING WOOD	Steam Engine
C4	SCHOOL BELL	Church Bell
C5	BUGLE REVEILLE	Band
C6	COCK CROWING	Hen or Fowl (Unspec.)
C7	BATH SEQUENCE	Water Running (Unspec.)
C8	FIRE ENGINE	Ambulance
C9	POURING WATER	Bubbles, Splashing (Unspec.)
C10	TYPEWRITER	Train
C11	ALARM CLOCK	Horse Trotting
C12	MACHINE GUNS	Steam Engine

Table 7.7 Most frequent verbal misidentifications (mistaken responses) made in connection with each environmental stimulus.

Age	OVERALL PERCENTAGES OF VERBAL RESPONSES			
	"Don't know" or No Response	Completely or Partially Misidentified	Completely Correct	Total
FOUR	19%	54%	27%	100%
FIVE	15%	48%	37%	100%
SIX	13%	39%	48%	100%
SEVEN	9%	37%	54%	100%

Table 7.8 Overall percentages of verbal responses broken down into three categories, (a) "Don't know", (b) Misidentified, and (c) Completely Correct, for each age group.

heard indoors or outdoors, with only one item, Sawing Wood, not falling clearly into either dichotamy. Basically indoor sounds are: Telephone Ringing, Bath Sequence, Pouring Water into Glass, Typewriter, and Clock Ringing, then Alarm. Sounds of extra-domestic origin are: Car Starting, School Bell, Reveille Bugle, Cock Crowing, Fire Engine and Machine Guns. Grouping these items together and making a chi-square analysis of collective sex difference, a clear trend emerged. Boys were found to be significantly better (P less than .01) at identifying outdoor sounds. (A significant difference in the same direction remained whether Sawing Wood was included as an indoor sound, as an outdoor sound, or both).

(c) Misidentifications of individual items: The same analysis was now repeated in terms of mistaken verbal responses made to each item. This time clear trends emerged in the case of two of the items, and a slight trend in another. More boys mistakenly identified Sawing Wood as "steam-engine" than did girls (P less than .05). Similarly, more boys than girls mistakenly identified Typewriter as "train", "car", "lorry", "boat", or "drums" (all items of masculine interest) (p less than .05). There was a very slight trend (P = .09) in which more girls mistakenly identified Fire-Engine as "ambulance".

(4) Social-Context Responses.

An analysis by age, sex and level of intelligence showing typical examples of interpretations of the social context ascribed to the environmental stimuli is given in Appendix J. A social context response was required only when the verbal identification was completely correct. Where the verbal identification was initially ambiguous, further questioning was resorted to until a more explicit response emerged. The criteria for a correct social-context response were:

(a) human agency or mediation to be explicitly indicated, and

(b) response not to be markedly inappropriate in a socio-cultural sense.
(An exception to (a) was C6, Cock Crowing, in which there is no human agency, but which has a definite socio-cultural significance with respect to time and sleep.

For each age- and sex-group the ratio of the number of correct social-context responses to completely correct verbal identifications was computed and is shown in Table 7.9. These "social-context ratios" were generally quite high, varying from a minimum of 63% for 4-year boys to a maximum of 87% for 7-year girls, with an overall aggregate of 76%. The overall figures (boys and girls) show a steady progression from 4 years to 7 years.

In analysing the social-context responses made to individual items, the only significant sex difference was in the case of C8, Fire Engine, in which boys excelled in ascribing the correct context (P less than .05). Boys again gave more correct social-context responses to outdoor sounds than girls (p less than .05), with no difference in the case of indoor sounds.

B. AUDITORY EMPATHY.

Again the initial analysis was made in terms of category of response, by age and sex, for each of the twelve vocalizations. In this case it should be noted that both methods of identification were of a multiple-choice form; in the one case this constituted the words "sad", "happy", "cross", and "frightened"; and in the other the pictures respresenting these states. These tables are presented in Appendices K and L. Derivative analyses based on these tables are presented below:

(1) Correct Identifications.

The order of difficulty of the vocal stimuli in terms of the total number of children who were able to make correct identifications is shown in Table 7.10 and Table 7.11, corresponding to the verbal and picture-

	MALES			FEMALES			TOTAL		
AGES	CORRECT VERBAL IDENTI-FICATIONS	CORRECT SOCIAL CONTEXT RESPONSES	RATIOS	CORRECT VERBAL IDENTI-FICATIONS	CORRECT SOCIAL CONTEXT RESPONSES	RATIOS	CORRECT VERBAL IDENTI-FICATIONS	CORRECT SOCIAL CONTEXT RESPONSES	RATIOS
FOUR	41	26	63%	24	16	67%	65	42	65%
FIVE	79	60	76%	55	37	67%	134	97	72%
SIX	90	67	74%	41	35	85%	131	102	78%
SEVEN	95	77	81%	47	41	87%	142	118	83%
TOTAL	305	230	75%	167	129	77%	472	359	76%

Table 7.9 Number of correct social-context responses, and ratios of correct social-context responses to correct verbal identifications, for each age and sex group.

E3	WOMAN SINGING (HAPPY)	86% correct responders
E6	WOMAN SPEAKING (HAPPY)	77% "
E8	WOMAN SPEAKING (CROSS)	75% "
E11	MAN SPEAKING (CROSS)	75% "
E9	MAN SPEAKING (HAPPY)	74% "
E2	BABY LAUGHING (HAPPY)	47% "
E10	MAN SPEAKING (SAD)	45% "
E12	MAN SPEAKING (FRIGHTENED)	40% "
E7	WOMAN SPEAKING (FRIGHTENED)	37% "
E4	WOMAN SINGING (SAD)	34% "
E5	WOMAN SPEAKING (SAD)	29% "
E1	BABY CRYING (CROSS)	15% "

Table 7.10 Order of difficulty of the vocal stimuli in terms of total number of children who were able to make correct <u>verbal</u> identifications.

E1	BABY CRYING	87% correct responders
E2	BABY LAUGHING	67% "
E6	WOMAN SPEAKING (HAPPY)	64% "
E11	MAN SPEAKING (CROSS)	48% "
E9	MAN SPEAKING (HAPPY)	46% "
E7	WOMAN SPEAKING (FRIGHTENED)	37% "
E8	WOMAN SPEAKING (CROSS)	36% "
E5	WOMAN SPEAKING (SAD)	33% "
E12	MAN SPEAKING (FRIGHTENED)	32% "
E10	MAN SPEAKING (SAD)	22% "

Table 7.11 Order of difficulty of the vocal stimuli in terms of the total number of children who were able to make correct <u>picture-matching</u> identifications.

matching method respectively. Table 7.12 compares the percentage of correct responders for each item in terms of the two methods of identification. The percentage of children at each age-level who were able to identify these stimuli correctly are presented in Tables 7.13 and 7.14. The lower age-limits at which at least 50% of children were able to identify the stimuli verbally are shown in Table 7.15. Several facts which emerge from these tables are noted below before being discussed in Chapter 9:

(a) In the case of most items, but especially with the verbal mode of response, there is a steady progression in percentage of correct responders from four years to seven years. In the verbal case, this consolidates into what seems to be a clear developmental trend when all items in the test are taken collectively.

(b) The picture-matching method of identifying the vocal stimuli proved, on the whole, to be more difficult for the children than the verbal method. The two marked exceptions were E1, "Baby crying (cross)" and E2, "Baby Laughing (happy)", where the outward behaviour was all that had to be correctly matched. The illustrations, in fact, proved to be confusing, especially to the younger children; so much so, that two of the stimuli, E3 and E4, Woman Singing (happy, and sad) were not scored by this method at all, because so many of the children said: "None of the ladies are singing", or they chose the one illustration in which the woman's mouth was open, even when the instructions were amended to: "Which lady would sing like that?" It seemed that, in general, the younger children were inclined to pick on irrelevant aspects of the pictorial stimulus when making their choice. Also, since there was only one set of "baby" illustrations, and one set each of adult illustrations, they were sometimes at a loss when they wanted to select a picture which they had already selected before. There should clearly have been a different set of pictures for each vocal stimulus, as was done in the case of the environmental stimuli.

	Percentages of Correct Responders	
	Verbal Identifi-cations	Picture Identi-fications
E1 BABY CRYING (CROSS)	15%	87%
E2 BABY LAUGHING (HAPPY)	47%	67%
E3 WOMAN SINGING (HAPPY)	86%	Not done
E4 WOMAN SINGING (SAD)	35%	Not done
E5 WOMAN SPEAKING (SAD)	29%	33%
E6 WOMAN SPEAKING (HAPPY)	77%	64%
E7 WOMAN SPEAKING (FRIGHTENED)	37%	37%
E8 WOMAN SPEAKING (CROSS)	75%	36%
E9 MAN SPEAKING (HAPPY)	74%	46%
E10 MAN SPEAKING (SAD)	45%	22%
E11 MAN SPEAKING (CROSS)	75%	48%
E12 MAN SPEAKING (FRIGHTENED)	40%	32%

Table 7.12 Comparison of percentages of correct responders, for each vocal stimulus, in terms of (a) verbal and (b) picture-matching identifications.

AGE	E3 WOMAN SINGING (HAPPY)	E6 WOMAN SPEAKING (HAPPY)	E8 WOMAN SPEAKING (CROSS)	E11 MAN SPEAKING (CROSS)	E9 MAN SPEAKING (HAPPY)	E2 BABY LAUGHING (HAPPY)	E10 MAN SPEAKING (SAD)	E12 MAN SPEAKING (FRIGHTENED)	E7 WOMAN SPEAKING (FRIGHTENED)	E4 WOMAN SINGING (SAD)	E5 WOMAN SPEAKING (SAD)	E1 BABY CRYING (CROSS)	OVERALL PERCENTAGES
4	47%	59%	65%	35%	59%	18%	18%	18%	24%	12%	6%	18%	25%
5	90%	73%	63%	77%	70%	43%	43%	20%	17%	23%	30%	3%	46%
6	96%	78%	74%	83%	74%	65%	57%	42%	61%	48%	30%	17%	61%
7	100%	95%	100%	95%	90%	57%	57%	81%	52%	57%	43%	29%	68%
8	86%	77%	75%	75%	74%	47%	45%	40%	37%	35%	29%	15%	50%

Table 7.13 Percentages of children at each age-level who were able, by verbal means, to identify correctly each vocal stimulus.

AGE	E1 CRY.	E2 LAUGH.	E6 W/HAPPY	E11 M/CR.	E9 M/HAPPY	E7 W/FR.	E8 W/CR.	E5 W/SAD	E12 M/FR.	E10 M/SAD
4	88%	47%	41%	41%	24%	47%	24%	6%	18%	24%
5	77%	60%	57%	33%	37%	33%	37%	23%	27%	13%
6	96%	74%	74%	52%	48%	26%	39%	39%	35%	22%
7	91%	86%	81%	72%	81%	48%	43%	62%	48%	33%
8	87%	67%	64%	48%	46%	37%	36%	33%	32%	22%

Table 7.14 Percentages of children at each age-level who were able, by means of picture-matching, to identify correctly each vocal stimulus.

FOUR YEARS	E6	WOMAN SPEAKING (HAPPY)
	E8	WOMAN SPEAKING (CROSS)
	E9	MAN SPEAKING (HAPPY)
FIVE YEARS	E3	WOMAN SINGING (HAPPY)
	E11	MAN SPEAKING (CROSS)
SIX YEARS	E2	BABY LAUGHING (HAPPY)
	E10	MAN SPEAKING (SAD)
	E7	WOMAN SPEAKING (FRIGHTENED)
SEVEN YEARS	E12	MAN SPEAKING (FRIGHTENED)
	E4	WOMAN SINGING (SAD)
ABOVE SEVEN YEAR LEVEL	E5	WOMAN SPEAKING (SAD)
	E1	BABY CRYING CROSS

Table 7.15 Lower age-limits at which at least 50% of children were able to identify, by verbal means, the various vocal stimuli.

STIMULUS:		MOST FREQUENTLY MISIDENTIFIED AS:
E1	BABY CRYING (CROSS)	Sad
E2	BABY LAUGHING (HAPPY)	Frightened
E3	WOMAN SINGING (HAPPY)	Cross
E4	WOMAN SINGING (SAD)	Happy
E5	WOMAN SPEAKING (SAD)	Happy
E6	WOMAN SPEAKING (HAPPY)	Cross
E7	WOMAN SPEAKING (FRIGHTENED)	Sad
E8	WOMAN SPEAKING (CROSS)	Happy
E9	MAN SPEAKING (HAPPY)	Cross
E10	MAN SPEAKING (SAD)	Happy
E11	MAN SPEAKING (CROSS)	Happy
E12	MAN SPEAKING (FRIGHTENED)	Cross/Sad (tie)

Table 7.16 Most frequent verbal misidentifications made in response to vocal stimuli.

(c) In terms of verbal identifications, the easiest items (70% of more correct identifications) were Woman Singing (happy), Woman Speaking (happy), Woman Speaking (cross), Man Speaking (cross) and Man Speaking (happy). By the same token the most difficult items (30% or less correct identifications) were Woman Speaking (sad) and Baby Crying (cross). In general, for the adult voices, Happy and Cross were identified much more readily than Frightened and Sad.

(d) In terms of the 50th percentile norms, two items proved to be above the seven-year level, Woman Speaking (sad) and Baby Crying (cross). Four- and five-year-olds coped easily with Happy and Cross (adults) but only six- and seven-year-olds were equal to Sad and Frightened. Woman Singing (happy) was within the capabilities of five-year-olds, but it was not until the seven-year level that Woman Singing (sad) was correctly identified by 50% or more of the group.

(2) Misidentifications.

Table 7.16 shows the most frequent verbal misidentifications made in response to the vocal stimuli. An interesting feature here is that, for a given adult emotion, exactly the same misidentification was made whether the speaker was male or female. Thus Sad was most frequently misidentified as Happy, Happy as Cross, Frightened as Sad, and Cross as Happy.

(3) Sex Differences.

No sex differences emerged, whether items were considered individually or in groups. There was, however, a slight trend ($P = .10$) in favour of girls' identifications of the "baby" vocalizations, and a similar trend ($P = .09$) in favour of boys' identifying adults' emotions.

(4) Causes Ascribed to Vocal Emotions.

An analysis by age, sex and level of intelligence of causes typically ascribed to the emotional content of the vocal stimuli is presented in Appendix M. This will

criterion adopted was that there should be a reasonable resemblance (a) as to the physical source of the sound, and (b) as to the perceived sound itself (as judged by the experimenter), between the actual stimulus object and the referent of the child's identification (whether verbal or pictorial).

There still remained the issue of how to score inaccurate verbal responses where the inaccuracy seemed to stem from a limited or faulty vocabulary rather than from a simple misidentification of the stimulus-object. The procedure decided upon was to ask the child the standard social-context questions normally reserved for completely correct responses. If the object was placed in its correct social context, the response was scored 2 or 1, depending on whether some ambiguity still remained or not.

The final scoring-system for both verbal and picture-matching responses to the twelve environmental stimuli, C1 to C12, will be found in Appendix P. Since credit was given independently for the two methods of identification, it was possible, on this scale, to earn a maximum of 48 points.

B. AUDITORY EMPATHY.

In drawing up a scaling procedure for this test, it was possible to draw upon previous work in this field. The scale used was one originally based on the Woodworth Scale of the Primary Dimensions of Emotional Expression (facial) (Woodworth and Schlosberg, 1955) and amended according to findings for vocally-expressed emotions (Abramovitz, 1961). This amended scale is circular, like the Woodworth scale, but unlike it, is linear and continuous rather than two-dimensional. It took the form shown in Figure 8.1.

The scale has no zero and no maximum in the ordinary sense. Scoring is achieved in terms of judgement-error, primarily, and this is converted to a figure corresponding to correctness of judgement. The maximum

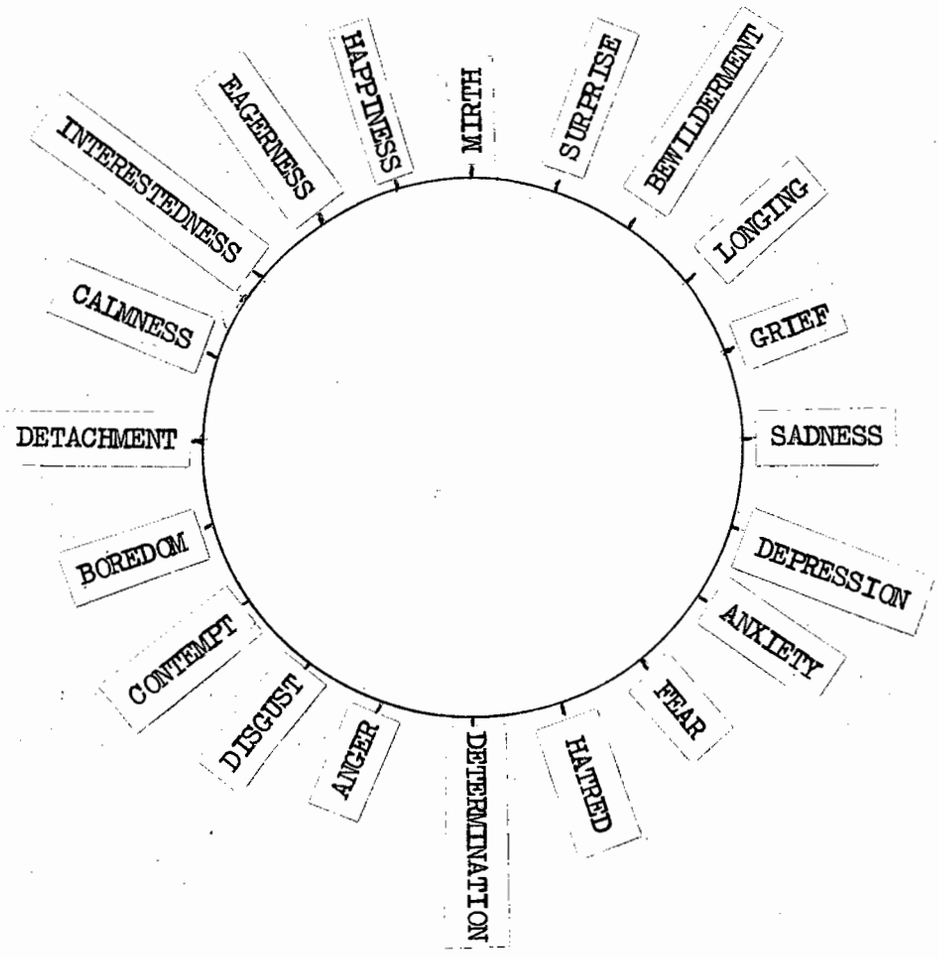


Figure 8.1 Graphic representation of the circular ordinal scale used to score Auditory Empathy responses. Scoring is achieved primarily in terms of judgment-error as determined by the distance (number of intervals) between the actual emotion and the reported emotion.

STIMULI		SCORES OBTAINED FOR INDICATED RESPONSES				
		"Happy"	"Sad"	"Frightened"	"Cross"	"Neutral
E1	CROSS	1	2	3	5	2
E2	HAPPY	5	2	0	1	3
E3	HAPPY	5	2	0	1	3
E4	SAD	2	5	3	2	1
E5	SAD	2	5	3	2	1
E6	HAPPY	5	2	0	1	3
E7	FRIGHTENED	0	3	5	3	0
E8	CROSS	1	2	3	5	2
E9	HAPPY	5	2	0	1	3
E10	SAD	2	5	3	2	1
E11	CROSS	1	2	3	5	2
E12	FRIGHTENED	0	3	5	3	0

Table 8.1 Scoring schedule for Auditory Empathy responses, based on circular scale of emotion.

judgement-error is made when the reported emotion is diametrically opposite the actual emotion on the circular scale, and this corresponds to a zero score in terms of correctness of judgement. A deviation of n categories (to either side of the correct emotion) was scored as n/2 errors, giving a maximum of 5, since there are 10 categories separating diametrically opposite points on the circular scale. The error-score was subtracted from 5 (the maximum), in order to obtain the correct-judgement score, and this was rounded off to a whole number. In terms of the vocal stimuli actually used in the Auditory Empathy test, this procedure resolves itself into scoring according to the schedule shown in Table 8.1. On this scale it was possible to earn a maximum of 60 points for each type of response method (verbal and picture-matching), giving a total of 120 points.

RESULTS.

A. AUDITORY COGNITION.

Table 8.2 shows the means of combined scores (verbal plus picture-matching) for each age and sex group. There is a progressive and orderly increase in these figures across the age-range.

The differences between the means of the male and female groups within each age group are not significant. This confirms the overall finding in the qualitative analysis of the results.

B. AUDITORY EMPATHY.

Table 8.3 shows the means of combined scores for each age and sex group. These figures show slightly less orderliness of progression than those for Auditory Cognition. Again there are no significant sex differences.

AGE	MALE	FEMALE	TOTALS
FOUR YEARS	20.9	21.3	21.0
FIVE YEARS	26.8	25.2	26.1
SIX YEARS	30.4	31.4	30.7
SEVEN YEARS	35.9	33.2	35.0

Table 8.2 Auditory Cognition. Means of combined scores (verbal plus picture-matching) for each age and sex group. Maximum score = 48

AGE	MALE	FEMALE	TOTALS
FOUR YEARS	64.7	65.0	64.8
FIVE YEARS	79.5	76.3	78.0
SIX YEARS	88.0	94.8	90.0
SEVEN YEARS	100.5	94.3	98.5

Table 8.3 Auditory Empathy. Means of combined scores (verbal plus picture-matching) for each age and sex group. Maximum score = 120

AGE	MALE	FEMALE	TOTALS
FOUR YEARS	86.1	85.6	86.0
FIVE YEARS	107.2	102.3	104.1
SIX YEARS	118.4	126.4	121.0
SEVEN YEARS	136.0	127.2	133.0

Table 8.4 Auditory Perception (Auditory Cognition plus Auditory Empathy scores). Means of combined scores for each age and sex group. Maximum score = 168

C. OVERALL AUDITORY SCORES.

The combined scores of each subject for Cognition and Empathy were added together to obtain a total auditory score (henceforth called "Auditory Perception" score). Table 8.4 shows the means of these scores for each age and sex group. Again no significant sex differences emerged.

The overall means at each age level for the three measures, Auditory Cognition, Auditory Empathy and Auditory Projection have been graphed against mean chronological age in Figure 8.2. These curves are remarkable for their smoothness, showing a clear developmental trend from four years to seven years.

CORRELATIONS.

Before embarking on a correlational analysis, it was necessary to determine the reliabilities of the various measures obtained. Split-half reliability coefficients were therefore computed for a group of 90 children for whom all the necessary scores were available. Table 8.5 gives these reliabilities.

It will be noticed that the verbal method of identification proved to be considerably more reliable than the picture-matching method in both types of auditory stimuli. Also, identification of the emotions in general gave more reliable scores than recognition of environmental sounds. This is probably related to the fact that a more elaborate scaling method was adopted in the latter case and that there was a narrower choice facing the subject.

In addition, the split-half reliability of the Vocabulary section of the PMA 5-7 was determined and found to be .867.

It was considered that these reliabilities were

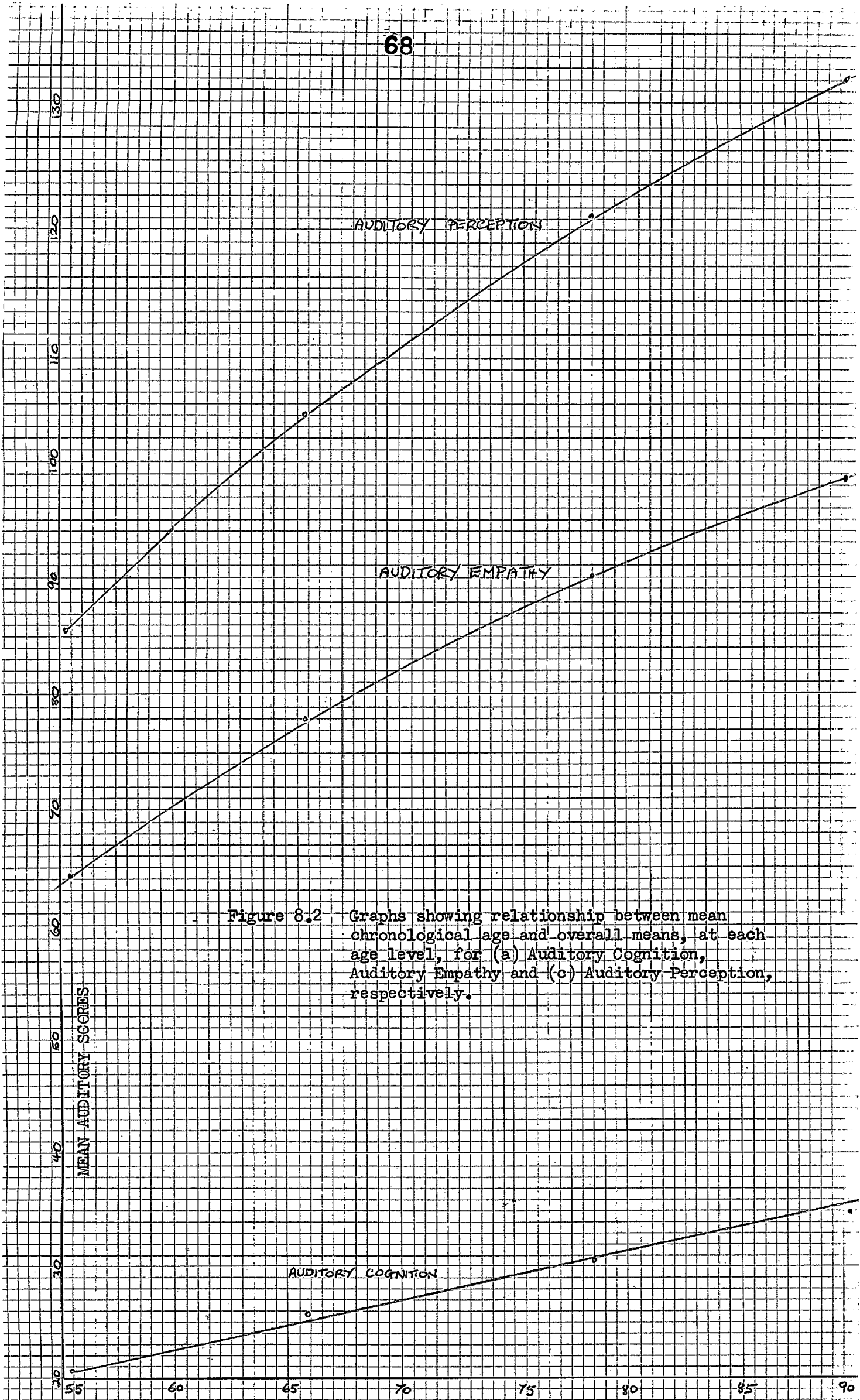


Figure 8.2 Graphs showing relationship between mean chronological age and overall means, at each age level, for (a) Auditory Cognition, Auditory Empathy and (c) Auditory Perception, respectively.

TEST	METHOD OF IDENTIFICATION	SPLIT-HALF RELIABILITY COEFFICIENT
AUDITORY COGNITION	Verbal	.706
AUDITORY COGNITION	Picture-matching	.542
AUDITORY COGNITION	Combined	.708
AUDITORY EMPATHY	Verbal	.809
AUDITORY EMPATHY	Picture-matching	.594
AUDITORY EMPATHY	Combined	.832
AUDITORY PERCEPTION	Verbal	.874
AUDITORY PERCEPTION	Picture-matching	.694
AUDITORY PERCEPTION	Combined	.863

Table 8.5 Split-half reliability coefficients for tests of Auditory Cognition, Auditory Empathy and Auditory Perception (Cognition + Empathy). N = 90

	PMA VOCAB.	PMA AUD. DISCR.	PMA VERBAL	PMA PERCEPT-UAL	VERBAL PERCEPT. M.A.	CHRON. AGE
AUDITORY COGNITION (VERBAL)	.498				.544	.479
AUDITORY COGNITION (PICTURES)	.608					.505
AUDITORY COGNITION (COMBINED)	.633	.171	.560	.508	.602	.586

Table 8.6 Correlation coefficients between Auditory Cognition, PMA tests and Chronological Age. N = 90

reasonably high, considering the small number of items in each test, and a correlational analysis was then undertaken.

AUDITORY COGNITION.

Table 8.6 shows correlation coefficients between Auditory Cognition, PMA tests and Chronological Age. It will be seen that, with the exception of the correlation between recognition of sounds and auditory discrimination for words (which is not significant), these coefficients are all moderately high, including those with chronological age. Chronological age may thus have been a factor responsible for the high correlations between the auditory tests and the PMA subtests, so it was clearly necessary to eliminate its effect by computing partial correlations, and this was accordingly done. Table 8.7 shows three correlation coefficients in each cell, firstly the overall uncorrected coefficient, secondly the corresponding partial correlations (underlined) eliminating the effect of chronological age, and thirdly the partial correlations corrected for attenuation (in parentheses) by taking into account the reliabilities of the respective tests (where these are available).

These correlations are significant at the 1% level of confidence, or better, except where otherwise stated.

It will be noticed that the picture-matching method of scoring shows the best promise of a fairly high correlation with Vocabulary, if the reliability of the former could be raised from its low value of .542.

The absence of correlation between Auditory Cognition and PMA Auditory Discrimination is no doubt accounted for by the fact that, with the individual administration of the PMA, most subjects scored at or near the ceiling of this test. As an instrument on its own it does not seem to have much value.

	PMA VOCAB.	PMA AUD. DISCR.	PMA VERBAL	PMA PERCEPT-UAL	VERBAL PERCEPT. M.A.	CHRON. AGE
AUDITORY COGNITION (VERBAL)	498 325 (416)				544 333	479
AUDITORY COGNITION (PICTURES)	608 463 (674)					505
AUDITORY COGNITION (COMBINED)	633 466 (595)	171 -127 n.s.	560 300	508 197 n.s.	602 332	586

Table 8.7 Correlation coefficients between Auditory Cognition and PMA tests, with effect of chronological age partialled out (underlined figure) and corrected for attenuation (figure in parentheses). N = 90
All values are significant at the 1% level or better except where otherwise indicated.

	PMA VOCAB.	PMA AUD. DISCR.	PMA VERBAL	PMA PERCEPT-UAL	VERBAL PERCEPT. M.A.	CHRON. AGE
AUDITORY EMPATHY (VERBAL)	510 297 (355)				680	586
AUDITORY EMPATHY (PICTURES)	493 320 (446)					476
AUDITORY EMPATHY (COMBINED)	531 289 (340)	310 032 n.s.	586 302	604 312	635 341	641

Table 8.8 Correlation coefficients between Auditory Empathy and PMA tests, with the effect of chronological age partialled out (underlined figure) and corrected for attenuation (figure in parentheses). N = 90
All values are better than or equal to the 1% level of confidence - except where otherwise indicated.

AUDITORY EMPATHY.

Table 8.8 shows correlations between Auditory Empathy and the PMA tests, with the effect of chronological age partialled out, and corrected for attenuation. All values are significant at the 1% level except where otherwise stated.

Here it will be seen that the partial correlations with Vocabulary, although positive, are rather lower than in the case of Auditory Cognition, but that the correlation with Perceptual-Speed, although small, is significant.

AUDITORY PERCEPTION.

Table 8.9 gives the correlations between Auditory Perception (Cognition plus Empathy) and the PMA tests, with the effect of chronological age partialled out, and corrected for attenuation. Again, all correlations are significant at the 1% level or better, except where otherwise stated.

The considerable correlation between the combined score of Auditory Perception and Vocabulary is a noteworthy feature of this table.

Table 8.10 shows the correlations between Auditory Cognition and Auditory Empathy. Again all correlations are significant at the 1% level or better.

The overall conclusion to be drawn from the correlations set out in Tables 8.8, 8.9 and 8.10 is that there is a common factor which has substantial loadings on (a) recognition of environmental sounds, (b) identification of vocally-expressed emotions, and (c) recognition vocabulary.

All these correlations have been brought together in Appendix Q.

	PMA VOCAB.	PMA AUD. DISCR.	PMA VERBAL	PMA PERCEPTUAL	VERBAL PERCEPT. M.A.	CHRON. AGE
AUDITORY PERCEPTION (VERBAL)	454 223 (258) (5%)				568 302	555
AUDITORY PERCEPTION (PICTURES)	597 397 (511)					623
AUDITORY PERCEPTION (COMBINED)	793 693 (802)	287 -049 n.s.	656 378	660 360	718 442	708

Table 8.9 Correlation coefficients between Auditory Perception (Cognition + Empathy) and PMA tests, with the effect of chronological age partialled out (underlined figure) and corrected for attenuation (figure in parentheses). N = 90. All values are significant at the 1% level of confidence or better, except where otherwise stated.

	AUDITORY EMPATHY (VERBAL)	AUDITORY EMPATHY (PICTURES)	AUDITORY EMPATHY (COMBINED)
AUDITORY COGNITION (VERBAL)	640 505 (668)		
AUDITORY COGNITION (PICTURES)		478 314 (554)	
AUDITORY COGNITION (COMBINED)			600 361 (471)

Table 8.10 Correlation coefficients between Auditory Cognition and Auditory Empathy, with the effect of chronological age partialled out (underlined figure) and corrected for attenuation (figure in parentheses). N = 90 All values are significant at the 1% level or better.

RELATION BETWEEN AUDITORY EMPATHY AND PARENTS' SCORES ON "WARMTH-OBJECTIVITY" AND "INCONSISTENCY-RIGIDITY".

These results were available for 52 of the 96 subjects.

The first step was to find the correlation between the warmth and inconsistency scores. This was found to be +.059, and was not significant. Whatever these two measures refer to, they are clearly independent entities, and this is in line with previous work on the bi-dimensional nature of these variables.

The next step was to express each child's Auditory Empathy score as a percentage of his mental age, thus obtaining a quotient score, analogous to the IQ, in which the child's Auditory Empathy is expressed relative to his mental age. In this way values ranging between 61 and 140 were obtained with a mean of 106.

These were correlated first with the "warmth-objectivity" scores, and then with the "inconsistency-rigidity" scores. The results were as follows:

Correlation Coefficients, N = 52.

Auditory Empathy Quotient	Warmth	Inconsistency
	-.112	-.037

These correlations are not significant, and the attempt to relate these variables was clearly a failure.

RELATION BETWEEN AUDITORY EMPATHY AND TEACHERS' RATINGS ON THE CHILD'S "RECEPTIVITY" OR "RESPONSIVENESS".

Two small schools were chosen whose teachers had spontaneously claimed to "know all the children individually" when they were originally asked for parents' addresses. A group of 39 children were obtained in this way and their Auditory Empathy quotients related to their teachers' ratings on the 4-point rating scale, using the contingency coefficient (McNemar, 1959), which permits one variable

to be expressed in a continuous fashion, while the other is expressed in a categorical fashion, as is the case here.

The computed result for the data obtained was a contingency coefficient of +.013, which is not significant.

This attempt, too, was not successful.

COMPARATIVE CONTENT ANALYSIS OF RESPONSES TO AUDITORY AND VISUAL PROJECTIVE ITEMS.

It was decided to confine the content analysis to two features of the subjects' verbal responses. Firstly, the number of words, per item, which were judged to express projections of a cognitive or ideational nature, and secondly, the number of words, per item, which were judged to express projections of either an emotional or a conative character.

For the ideational projections, the mean number of such words per auditory item was 1.039 and the mean number of such words per visual (CAT) item was 1.426 (N = 42).

These scores formed a highly skewed distribution and before deciding which non-parametric test to apply, it was necessary to establish whether there was any correlation between ideational projections on the auditory and on the visual items respectively. Accordingly, the Spearman Rank-Order Correlation coefficient was computed and a rho of +.497 was obtained which was significant at the 1% level. This shows that this type of projection is common to both types of stimulus material.

With this fairly large correlation, the test which seemed most applicable (according to McNemar) was the Sign Test (the Mann-Whitney U-Test was not applicable because there were too many tied ranks, and the Median Test was not applicable because the two measures were not independent). It was accordingly applied, and a chi-square of 2.1 was obtained, giving a two-tailed P of 0.15,

which indicated no significant difference between the number of ideational projections on the two types of test.

For the emotive and conative projections, the rank-order correlation coefficient between the auditory and visual items was rho = 0.107, which was not significant. This indicates that subjects who display this type of projection with one kind of stimulus material will not necessarily do so with the other kind.

The mean number of such projections per auditory item was 0.166 and the mean number of projections per CAT item was 0.088, or little more than half. However, applying the Median Test (which is suitable when the scores are uncorrelated), a chi-square of 2.38 is obtained, which on a two-tailed test is significant at about P = .12 only. A one-tailed test would have brought this significance up to P = .065.

There seems to be a trend here favouring a preponderance of emotive-conative projections to auditory stimuli over these to visual stimuli.

SUMMARY.

The proeedures are outlined whereby the responses to the tests of Auditory Cognition and Auditory Empathy are measured along simple ordinal scales. The scores thus obtained have fairly low reliabilities (especially with the picture-matching method) when taken individually but are fairly high when considered in combination. A pronounced developmental trend is again apparent through the age range and this is confirmed by fairly high correlations with chronological age. The results of intercorrelations with PMA tests are presented, the effect of chronological age being partialled out and the resulting values corrected for attenuation. The chief point to emerge was the fairly strong and positive intercorrelations between Auditory Cognition, Auditory Empathy and PMA

Vocabulary. No relationship was found between Auditory Empathy and (a) parental training variables as determined by the attitude scale constructed, or (b) teachers' ratings of the child's receptivity. A comparative content analysis of responses to the auditory and visual projective items is presented. A moderately high correlation was found for cognitive-ideational responses between the two types of projective material, but no correlation in the case of affective-conative responses. There was no significant difference in productivity between the two tests, although a trend was evident in the direction of more affective-conative responses to the auditory material.

CHAPTER 9.

DISCUSSION.

Before embarking on an assessment and evaluation of the results obtained, it is necessary to examine some aspects of the apparatus, procedure and experimental design in relation to the aims and objects of the study. In the case of a relatively unexplored field - as auditory perception undoubtedly is - it is very difficult to foresee all the difficulties and complications that are liable to arise during the course of experiment. The most important of these will now be discussed.

THE NATURE OF RECORDED SOUND.

A tacit assumption underlying the whole experimental design is that, in presenting the child with recorded auditory stimuli, we are merely holding up a mirror to the life-situation and that the characteristics of the original object and situation are thereby faithfully reflected. In fact, this assumption is, for a number of reasons, suspect.

In the first place, all reproduced sound is subject to a number of intrinsic distortions. These acoustic imperfections may be of several kinds and may occur with varying degrees of severity. Moreover, they usually occur concurrently rather than in isolation, and their collective effect may in certain circumstances be perceptually critical.

To begin with, there is the distortion introduced by reason of the reproducing system's inadequate frequency-response range. An ideal device should be able to reproduce the normally-heard frequency range, namely 20 to 20,000 cycles per second, without undue loss or gain in any region (Wilson, 1957). Also, there should be no "harmonic distortion" (which occurs when an original

tone is reproduced with an addition of a series of unwanted harmonics), or "intermodulation distortion" (which occurs when different tones, simultaneously recorded, interfere with each other instead of being reproduced clearly and separately). A third type of distortion is known as "volume distortion", which occurs when the reproduced sound is either appreciably louder, or appreciably softer, than one is accustomed to hear in the original.

Apart from the basic quality of the reproduced sound, there is the manner of its presentation. Environmental sounds usually have a specific spatial origin, which is divined by the process of auditory localization. Auditory localization depends partly on the cephalic reflex, the turning of the head in response to the heard sound (a response which is laid down early in infancy), and partly on binaural sensory differentiation. In the monophonic method of reproduction used, the whole element of spatial origin, and the correlative responses involved in auditory localization, is completely precluded. The subject sits in front of the single loudspeaker so that the direction of the sound coincides with the median plane of his head. Kinaesthetic stimuli and differential binaural stimuli, which would normally add to the basic acoustic stimulus, and assist in the process of recognition, do not have a chance of occurring.

THE COMPLEXITY OF THE AUDITORY ENVIRONMENT.

All perception is complex, but in the case of vision we are enormously assisted by the culturally-inherited process of graphic representation and symbolization. By means of pictorial art, the complexity of the visual field is narrowed down to its perceptually essential elements, and from an early age children learn to associate perceived objects with their stylized graphic forms. This is possible in vision, because it is possible to "freeze" the dynamic or temporal aspect of the visual

environment: in a static drawing time and movement can be implied; but they can never be manifestly expressed.

Now, with two exceptions, there is no analogous way in which the auditory environment can be represented by static symbols. The exceptions, of course, are speech and music, for which man has invented a complex code of visual symbols to represent auditory patterns. It is at least theoretically possible that this technique could be extended to the non-linguistic and non-musical acoustic environment, but there is no parallel system of encoding an acoustic stimulus by means of a simplifying auditory symbol.

In radio productions, where this problem is of prime importance, this simplification and condensation is introduced, not by overtly symbolic means, but by controlling the recording and reproduction of the various sounds in such a way that the separation of foreground and background is artificially emphasized by microphone-placement, volume-control, and so on. A whole assortment of auditory clichés has grown up around this device, which the listener presumably learns in the same way that other signs and conventions are acquired.

All this has important implications for the problem of presenting auditory stimulation to the child. There are no culturally-defined, standardized patterns which he is obliged to acquire in the course of adaptation to the acoustic environment. The result is that there is an embarrassingly wide choice of stimuli open to the experimenter. If he decides on a recording of a fire-engine he is obliged to consider that there is no unique "fire-engine sound". There are hundreds of different makes of fire-engines and one can record them in a myriad different ways. The same holds for as mundane a situation as "pouring water into a glass". How big a glass? What shape? How quickly is the action to take place? Where is the microphone to be placed during recording? At what

volume should the recording be played back?

This problem can become quite critical when the auditory stimulus is a human vocalization. In "producing" these sounds, the experimenter was struck by the different interpretations which could be placed by the actors on the different emotions called for. Thus "sadness" could be rendered with a variety of complexly varying undertones and overtones, covering grief, depression, resignation, pain, gloom, etc. There was no clear way of abstracting the essence of the concept of sadness in a manner that would be completely unambiguous to an average six-year-old, as the drawing of a table unequivocally conveys to him the core of its referent.

PICTORIAL METHOD OF IDENTIFYING THE AUDITORY STIMULI.

The reasons for supplementing the verbal method of identifying the auditory stimulus with a pictorial method are not hard to seek. The rationale of this technique was to ensure that misidentification could be attributed to misperception as such rather than to imperfect communication. But pictorial identification by itself would have left one in ignorance of the more important ability to recognize a sound without the help of a multiple-choice array of pictures. The objective therefore was to attempt to obtain two independent measures of the child's response to each of the sounds. This attempt was only partially successful. There are several reasons for saying this:

(1) After the presentation of the first set of pictures, subjects may have acquired an orientation to make their verbal responses in keeping with the previously-seen illustrations.

(2) When a subject's verbal misidentification coincided with one of the pictures in the multiple-choice group, this picture was removed prior to presentation of the pictures.

(3) The illustrations were not standardized as to number, size, style or clarity. Some were photographs, some were half-tone illustrations, some were stylized line-drawings. A few were quite poor in quality because nothing better could be obtained. Securing the services of a competent artist proved beyond the resources of the candidate.

(4) In the case of Auditory Empathy, there was not a separate and distinct set of pictures for each different vocal stimulus. One set of female figures served for all the women's voices, and one set of male figures served for all the men's voices. Also, they were photographic reproductions of actual people, with different clothes, in different postures, apparently doing different things. The danger that young children would centre on these irrelevant aspects of the pictorial stimulus proved to be a very real one.

CONTENT ANALYSIS VERSUS FORMAL OR MORPHOLOGICAL ANALYSIS OF RESULTS.

The underlying approach of the investigation has been nomothetic rather than idiographic, and all responses have been analysed "objectively", i.e. in terms of manifest content, rather than "in depth", in terms of their underlying structure and significance. The latter method is, of course, more difficult and time-consuming, but probably more valuable from certain points of view, especially in clinical and personality work. This holds especially in the case of the interpretation of projective responses.

EXPERIMENTAL DESIGN AND STATISTICAL ANALYSIS.

This study has been frankly exploratory. Except in the case of Auditory Empathy and its relation to parental training variables and to the child's trait of receptivity no specific hypotheses were hazarded because there has been so little previous work from which to derive any. This has meant that tests of significance have had to be based on

"two-tailed" probabilities, which entails the risk of accepting the null-hypothesis when it is in fact false (McNemar, 1959).

GENERAL EVALUATION OF THE EXPERIMENTAL PROCEDURE.

The method of administering the auditory stimuli was, on the whole, very successful. The grounds for making such a statement are two-fold: (a) the child's attention (in many cases absorption) was admirably secured and maintained by the devices of the "magic box", "magic button" and flannel-board, and (b) the results obtained show a remarkable overall stability, in spite of the many imperfections noted above.

After this brief review of some preliminary matters of general interest, attention can now be turned to the results themselves.

OVERALL DEVELOPMENTAL TRENDS.

An important characteristic of the results in the case of Auditory Cognition, Auditory Empathy, and Auditory Perception as a whole, is the evidence, provided both by the qualitative and the quantitative results, of a smooth, stable, developmental trend from the beginning of the fourth year to the end of the seventh. The fact that the four-year group was near to the basal level of the test, while the seven-year group approached the ceiling can be interpreted in one or both of two ways: (a) the test-difficulty happened to coincide to a remarkably close degree with the four-to seven-year developmental span, and/or (b) the four-to seven-year transition represents a definite stage in perceptual and cognitive growth. Without evidence on pre-four-year-old and post-seven-year-old auditory capacities, there is no way of being completely certain that we are dealing with a clearly-demarcated stage in development. The evidence although supporting the notion of such a developmental

stage, is not completely conclusive. This age-span is, of course, that covered by Piaget's stage of Intuitive Thought, in which configurational representations take over from pre-conceptual concrete images before making way for the further stages of logical and abstract thinking.

A further indication of the developmental progression of the various auditory capacities is their correlations with chronological age, which are all moderately high (between .59 and .71), but not so high that they do not permit the operation of individual differences at any given age level. This fact would make measures of auditory perception ideal for inclusion in tests of perceptual and cognitive development.

AUDITORY COGNITION.

Looking at the results obtained by a qualitative analysis of correct identifications, to begin with, it may be worth while to speculate why some items were found particularly easy, and some particularly difficult. It will be recalled that the easiest items of the twelve environmental sounds presented were "telephone ringing", "fire-engine" and "car Starting"; and that the most difficult were "typewriter", "bath sequence" and "pouring water". In attempting to account for these findings, five different factors can be shown to operate. They may be summed up as:

(a) frequency of prior stimulation
(b) distinctiveness and intensity of the stimulus
(c) distortion inherent in the reproduced sound
(d) relevance of the situation to the child's own behaviour, interests, values, etc. (incentive conditions).
(e) the subject's ability to make logical deductions.

These suppositions may be illustrated by reference to the three easiest and the three most difficult items:

(i) "Telephone ringing". This is a stimulus with which the average child of our white middle-class group must have

had a good deal of prior acquaintance. It is also a distinct acoustic pattern in which the constant repetition of the basic sound allows the child to check and confirm his first impression, or to recentre if his first impression was faulty.

(ii) "Fire-Engine." Although not heard nearly as frequently as a telephone, it is a stimulus (one of the few in the series presented) to which the young child has in the past reacted to in a very specific overt manner, namely by running out and looking (and asking innumerable questions). It therefore has incentive value, besides being acoustically distinct, with the repetition of the clanging bell against the background of the sirens making for an easily verifiable pattern.

(iii) "Car Starting". Here frequency of stimulation and distinctiveness of pattern, again with the element of repetition of the initial sound, account for its ease of recognition.

(iv) "Typewriter". Although the pattern here is distinct and repetitive, this is not a stimulus with which the young child is likely to have had much acquaintance and is not one which is relevant to his own needs or which has evoked any specific overt reaction in him.

(v) "Pouring Water". Here we have a stimulus which the child has probably heard very frequently and which is relevant to his needs and to which he may often have made specific overt responses. Why, then, did it prove so difficult to identify? The reason is probably two-fold: (a) It is very brief indeed, allowing little time for ascertainment and verification, (b) It is subject to considerable volume distortion in reproduction being much louder than one would normally experience and therefore likely to cause confusion.

(vi) "Bath Sequence". This is really a compound

stimulus consisting of three sections, (a) bath being run, (b) water being splashed around, and (c) sounds of lathering and washing. Some children were able to identify these sounds separately, but few were able to make the deduction that the situation represented what it did. One might expect an older group, capable of logical inference to be able to cope with this stimulus with less difficulty.

Turning now to the sex differences revealed in the test of Auditory Cognition, the most interesting fact to emerge is the superiority of boys in identifying outdoor sounds. The most likely reason for this is, of course, the relevance of these sounds to situations (culturally determined, no doubt) that are of interest to boys, and the motor reactions which they actually elicit (running to see what is happening, etc). The fact that girls did not show a superior ability in recognising indoor sounds is probably attributable to the fact that none of them is exclusively relevant to feminine interests.* In fact, sounds which might have such relevance, e.g. knitting, sewing-machine, washing dishes, etc., are not intense or specific enough acoustically, especially when reproduced by the means adopted.

The only item which by itself showed a sex difference (in favour of males) was "machine-guns", presumably indicating boys' greater acquaintance with radio and cinema productions incorporating such sounds.

In considering the nature of misidentifications, however, further sex differences seemed to reveal the operation of a differential set, orientation or disposition among the boys, who misperceived several stimuli in line with supposedly masculine interests.

The number of correct social-context responses as well as "social-context ratios" could be considered as indices of the expanding social horizons of the child. Most children who were able to identify a given environmental sound were also able to endow it with an appropriate social

*This may be one explanation for the well-known fact that most "high-fidelity" sound enthusiasts are men.

context. But the fact that many of the younger children were unable to do this (i.e. no response, or "I don't know") does not, of course, mean that they necessarily perceived the stimulus without a context, but that they were sometimes simply unable to communicate its nature. Again, the sex differences which emerged corresponded to the initial recognition of the items. Also, although most of the social-context responses were of a stereotyped nature, several individual responses seemed to show the operation of personal needs and orientations.

Taking all this evidence into account it seems clear that recognition of an event in the auditory environment is inseparable from an explicit or implicit awareness of its sociocultural significance.

AUDITORY EMPATHY.

In terms of correct identifications the easiest stimuli were Woman Singing (happy), Woman Speaking (happy), Woman Speaking (cross), Man Speaking (cross) and Man Speaking (happy). It is not difficult to account for the ease with which these items were recognised compared with the most difficult, Woman Speaking (sad) and Baby Crying (cross).

Taking Woman Singing (happy) first, this was clearly the operation of a stereotype, namely "she's happy because she's singing". This was confirmed by the number of misidentifications of Woman Singing (sad), especially among the younger children, where the emotion was also identified as "happy", and for the same reason.

The fact that Woman Speaking (happy) and Woman Speaking (cross) were easy to identify is probably attributable to two reasons: (a) young children, being thrown together with female adults (mother, nanny, teacher) more frequently than with male adults, are more acquainted with their characteristic vocal inflections and modulations, and (b) "happy" and "cross" are emotions very much more frequently encountered than "sad" and "frightened" because the latter tend to be concealed,

especially in front of young children.

It is of course not surprising that the emotion of the crying baby (cross) was not identified. As is well known, Sherman (1927) demonstrated that even adults who had had a good deal to do with infants were not able to discriminate emotional differences by differences in crying patterns.

When it comes to the question of sex differences in Auditory Empathy, one might have expected a more clear-cut differentiation than was obtained.* Hunt (1928) has demonstrated the superiority of secondary-school girls over boys in "social intelligence", which includes ability to identify emotions in facial expressions and has quoted the oft-repeated saying that women are more interested in people, whereas men are more interested in things and ideas. Yet, apart from slight tendencies favouring girls' recognition of the baby's emotions, it is the boys who have the slight edge generally. This aspect of the study clearly needs replication, with more refined techniques.

In scrutinizing the causes attributed to the ascribed emotion, it is apparent again that although many of a stereotyped nature, some may well indicate the operation of personal needs and fears. As an example, we may choose some of the causes attributed to the emotion of Baby Crying, where a host of very diverse responses were elicited:

"Sad - because he made a wee in his brooks"
"Sad - because somebody hurt her
"Sad - because his mother was'nt with him"
"Sad - because he's only small
"Sad - because he wants the food
"Sad - because somebody took away something of his"
"Sad - because she can't get her own way" (!)
"Sad - because it wanted to sleep"
"Frightened - because somebody's making a noise".

*But Gates (1927) found no sex differences with young children.

Another example worth mentioning is Woman Speaking (sad), to which the following responses occurred:

"Happy - because she's in church"
"Sad - because she's saying prayers in church" (!)
"Cross - because her children are naughty, that's why".
"Frightened - thinks her baby son is going to be killed".

One of the most frequent responses in the case of adults' passages was "saying prayers". This may be because the Church is the nearest thing to the Theatre in the life of the young child and is about the only institution accessible to him which provides an avenue for histrionic expression.

The lack of relationship between Auditory Empathy (as a quotient of mental age) and parents' scores on the emotionality and inconsistency dimensions of the attitude scale is not really surprising. Apart from the unknown reliability and/or validity of the two measures, it has already been noted that a trait such as empathy is intricately multi-determined. The same remarks go for the teachers' ratings of pupils' "receptivity" with the rider that such assessments are notoriously subject to halo-effects.

AUDITORY PROJECTION.

The many misperceptions, distortions and other non-veridical responses which were apparent in the tests of Auditory Cognition and Auditory Empathy might well have been subsumed under the heading of Projection.

One might also justifiably treat them as ego-centricity in Piaget's sense: there was evidence that inability to decentre was greater among the 4 - 5 year-olds than among the 6-7 year-olds, especially when, after making an incorrect verbal identification, they were asked to choose the correct picture.

Another phenomenon contributing to distortions which was not specifically recorded was that of perseveration, to which the younger, and duller, children seemed particularly predisposed. These phenomena could also be interpreted in terms of six directive-state hypotheses of modern social perception theory (Allport, F.H., 1955).

The episodic stimuli designed specifically to elicit projections and apperceptions were not equally suitable for all age groups. Certainly, the younger children were unable to retain the content of some of the episodes after a single hearing, and "I don't know" responses were frequent. Among children who were able to respond many gave bare repetitions or descriptions, but other reactions carried a specific ideational, emotional or conative content which seemed to indicate the operation of projective mechanisms.

Of the productive responses, the general impression to be gained is that stories in response to auditory stimuli were less stimulus-bound that those to visual stimuli and were also of a more intimately interpersonal type. The nature of these episodes is of course conducive to this state of affairs, since many of the vocalizations were indeterminate as to age and sex, and the passage was soon over, so that all kinds of misperceptions and apperceptions were possible.

In comparing the auditory and visual projections it is important to bear in mind that still pictures are not analogous to recorded sounds. The true visual analogue of a recorded sound is a silent motion picture. From this point of view the comparison with the CAT is unfair to the latter, but this is counterbalanced by the transient nature of the auditory stimuli (which were never repeated) as compared with the manifest and a-temporal nature of the pictures.

The remarkable fact to emerge from the comparative content analysis is the zero correlation with respect to the

specifically emotive-conative content of the stories. It seems, therefore, that one cannot speak of a child's "projectivity" (Murray, 1938) as a generalized trans-modality trait. The nature of the stimulus itself seems to play an important part in eliciting a productive response from one child, while not from another.

However, the overall conclusion concerning these kinds of projective techniques, in which an explicit verbal response is required, is that neither the auditory nor the visual type is suitable for a child much younger than seven. It would seem to be far more profitable, in such cases, to explore other modes of projective behaviour.

CORRELATIONS.

The most significant correlational finding was the moderately high mutual overlap existing between Auditory Cognition, Auditory Empathy and Recognition Vocabulary (which of all items in the PMA 5-7 test carries the greatest socio-cultural content). This is interpreted as indicating a common area of cognitive functioning concerning which three inferences can be drawn:

(i) it concerns the ability to perceive distinct patterns of aooustic configuration (in which the stimulus elements of pitch, harmonics, intensity and temporal relationships are probably the determining factors),

(ii) it is basically of a symbolic nature, in that it is related to the comprehension of a sign, and

(iii) it is the carrier of specific socio-cultural connotations.

The fact that there should be such a high correlation between linguistic and non-linguistic auditory configurations is considered to be a remarkable finding to which further reference in made under "Theoretical Implications" in the next chapter.

On the other hand, it is difficult to explain the lack of correlation between Auditory Cognition and Perceptual-Speed (when the effect of age is partialled out). On Piaget's theory of configurational perception during the 4-7 year stage of Intuitive Thought, one might have expected a positive relationship to emerge. The result may be due to the rather formalized (non-socio-cultural) nature of the Perceptual-Speed tasks and to the fact that it is a speeded test.

SUMMARY.

After a general discussion concerning the nature of recorded sound and the impossibility of symbolizing acoustic situations by "static" auditory means, some features of the experimental procedure were discussed, in particular the picture-matching technique. The results themselves were then interpreted and evaluated.

The following points are noteworthy:

(a) Pronounced developmental trends in the measures of Auditory Cognition and Auditory Empathy were clearly in evidence, while still permitting the operation of individual differences at any given age-level. There is evidence supporting, but not proving, the hypothesis that four to seven years constitutes a definite "stage" in perceptual and cognitive development (corresponding to Piaget's stage of "Intuitive Thought".)

(b) The reasons why some environmental stimuli were more easily recognized than others were attributed to five factors, (i) frequency of prior stimulation, (ii) distinctiveness and intensity of the stimulus, (iii) distortion inherent in the reproduced sound, (iv) relevances of the situation to the child's behaviour, interests and values, and (v) the child's ability to make logical deductions.

(c) Sex differences in identifying environmental stimuli

were in line with expected sex-attitudes.

(d) It is concluded that recognition of an event in the auditory environment is inseparable from an explicit or implicit awareness of its socio-cultural significance.

(e) The reasons why some vocal stimuli were more easily recognized than others is attributed mainly to the child's degree of prior acquaintance with similar vocalizations.

(f) The lack of relationship between Auditory Empathy and parental emotionality and inconsistency on the one hand and teachers' ratings on "receptivity" on the other hand is explained as a result of (i) unknown reliability and/or validity of the a priori scales, and (ii) the fact that empathy is an intricately multi-determined trait.

(g) The observed phenomena of centration and perseveration in response to the auditory stimuli are mentioned.

(h) The impression is noted that productive auditory projections were less stimulus-bound and of a more intimately interpersonal nature than corresponding visual projections.

(i) Because of the zero correlation between the auditory and visual projective techniques with respect to emotive-conative content, it is concluded that a generalized trans-modality trait of "projectivity" probably does not exist among children.

(j) It is concluded that neither auditory nor visual projective techniques involving verbalization are suitable for children under seven.

(k) The most significant intercorrelational overlap was between Auditory Cognition, Auditory Empathy and Recognition Vocabulary - which was interpreted as indicating, in that a common area of cognitive functioning (i) it concerns the ability to perceive distinct patterns of acoustic configuration, (ii) it is basically of a symbolic nature, and (iii) it is the carrier of specific socio-cultural connotations.

CHAPTER 10.

RESUMÉ AND CONCLUSIONS.

NEED FOR THE PRESENT STUDY.

Very little is known of how the child hears his world, rather than how he sees it. This applies especially to the world of non-linguistic sounds, whether of vocal, mechanical or other origin. Although some writers acknowledge the importance of the auditory modality as an avenue of communication for the young child, the evidence for most of their statements is based on clinical experience of children with auditory disorders, rather than on objective experimental data.

AIMS AND OBJECTS.

In order to make the enquiry as comprehensive as possible, three areas of psychological functioning were marked out: Cognition, Empathy and Projection. The first aim concerned the child's ability to recognize objects and events in the auditory environment and to ascribe to them an appropriate social context. The second aim was to assess the degree of sensitivity with which he reacts to and interprets the emotional components of human vocalization and speech. The third aim was to discover the nature and extent of the child's projections and apperceptions, both when presented with the two types of stimuli above, as well as in reaction to specially-prepared items of an ambiguous and unstructured nature.

DESIGN AND SELECTION OF TEST MATERIAL.

For the test of Auditory Cognition, the experimental stimuli were twelve sounds recorded from the everyday environment. Recognition of each item was to be assessed in two ways, verbally and by means of picture-matching.

The test of Auditory Empathy consisted of various vocalizations, including a baby crying and laughing, and male and female adults singing and speaking. Four emotions were covered: Happy, Sad, Frightened and Cross. The sung passages were in foreign languages; the spoken passages were couched in gibberish.

The test of Auditory Projection included seven recorded episodes which, it was presumed, might call forth themes of aggression, anxiety, sex-play, male authority, female authority and peer-relationships. They included both sound-effects and dialogue presented in such a way that the underlying situation was left unexpressed. In certain cases the age and sex of the speaker was rendered indeterminate by the use of whispering, giggling and sobbing.

An attitude scale was devised to obtain measures of parental warmth-objectivity and inconsistency-rigidity. It was hypothesized that, other factors being held constant, the greater the parents' warmth, and the lower the parents' rigidity, the greater the child's empathy. the greater the child's empathy

A four-point scale was devised, aimed at obtaining a rating from the child's teacher of his receptivity to communication. It was hypothesized that the higher this rating the greater his empathy.

SELECTION OF SAMPLE.

96 children, 60 boys and 36 girls, aged between 4 years and 7 years, formed the experimental group. The socio-economic status of parents (all white English-speaking South Africans living in the Cape Town area) varied from lower-middle to upper-middle class. Intelligence was average for the 6-7 year group, and rather above average for the 4-5 year group.

by age, sex and level of intelligence.

C. AUDITORY PROJECTIONS.

An analysis of typical productive responses to the special projective items was presented, again by age, sex and level of intelligence.

QUANTITATIVE ANALYSIS OF RESULTS.

A. AUDITORY COGNITON.

A three-point scoring system was devised, the application of which revealed a steady age-trend, but no sex differences.

B. AUDITORY EMPATHY.

A continuous, circular, ordinal scale, based on the Woodworth Scale of Primary Dimensions of Emotional Expression, was applied. A marked developmental trend was again shown, but no sex differences.

C. RELIABILITIES.

Split-half reliabilities varied from .54 and .59 for picture-matching scores to .71 and .81 for verbal scores, with an overall reliability of .86 for the two tests combined (Auditory Perception).

D. CORRELATIONS.

Three sets of coefficients were computed, (a) overall, (b) partial (eliminating the effect of chronological age), and (c) corrected for attenuation. There were moderately high mutual intercorrelations (P less than .01) between Auditory Cognition, Auditory Empathy and PMA Vocabulary.

No relationship was found between Auditory Empathy and parental scores on warmth-objectivity or inconsistency-rigidity. Likewise, a zero correlation was found between Auditory Empathy and teachers' ratings

on the child's "receptivity".

DISCUSSION AND CONCLUSIONS.

OVERALL DEVELOPMENTAL TRENDS.

The fact that the four-year group was near to the basal level of the test, while the seven-year group approached the ceiling, might be taken as supporting the notion that the 4-7 year transition represents a definite stage in perceptual and cognitive growth, corresponding to Piaget's stage of Intuitive Thought.

AUDITORY COGNITION.

That some items were more easily recognized than others was claimed to be attributable to frequency of prior stimulation, vividness and intensity of the acoustic configuration, incentive conditions, degree of distortion in reproduction, and subjects' ability to reason.

The various sex differences seem to reveal the operation of a differential set or orientation among the boys, who perceived the stimuli in line with masculine interests.

The social-context responses are taken as indices of the child's social perception. Auditory Cognition seems to be inseparable from an explicit or implicit awareness of the socio-cultrual context of a situation.

AUDITORY EMPATHY.

The overall ability to recognize Happy and Cross emotions more readily than Frightened and Sad is attributed to the greater histrionic quality of the latter two and to their being far less frequently encountered than the former.

AUDITORY PROJECTION.

The misperceptions occurring in the previous two tests could be considered as examples of inability to decentre, in Piaget's sense. There was evidence that this inability was greater among the 4-5 year-olds than among the 6-7 year-olds, especially when, after making an incorrect verbal identification, they were asked to choose the correct picture. Another phenomenon contributing to distortions was that of perseveration, to which the younger, and duller, children were particularly predisposed.

The remarkable fact to emerge from the comparison between the auditory and visual techniques was the zero correlation with respect to the emotive-conative content of the stories. It seems that a general trans-modality trait of projectivity does not exist among children.

OVERALL FINDINGS.

The most significant finding is considered to be the fairly high mutual overlap between Auditory Cognition, Auditory Empathy and Recognition Vocabulary. There seems to be a common factor of cognitive functioning which involves (i) the ability to perceive specific acoustic patterns and configurations, (ii) the ability to comprehend the meanings of signs and symbolsm and (iii) the apprehension of socio-cultural contexts and situations.

THEORETICAL IMPLICATIONS.

The overall findings bear out Gesell's (1947) dictum that "hearing is a social as well as an intellectual sense" and Strauss and Kephart's (1955)statement (derived from Piaget) that the perceptual and cognitive development of the child go hand-in-hand with an increase in the socio-cultaral content of his language. The findings throw into relief the socio-cultural significance of non-linguistic auditory signs and symbols. Since language is composed

of auditory patterns of configuration, known as phonemes (Goldstein, 1948), non-linguistic auditory configurations may be said to have the characteristics of a quasi-language. In fact, Sapir's (1921) definition of language as the communication of ideas, emotions and desires by auditory symbols fits such a notion in every respect. It would seem that the long-neglected study of the development of auditory perception is essential to an understanding of psycholinguisticss, including, as it does, the interplay of perceptual, symbolic and socio-cultural processes.

PRACTICAL APPLICATIONS.

Tests of auditory perception might have manifold applications in the fields of developmental psychology, personality study, the agnosias, the aphasias, and scholastic disabilities:

The clear developmental trends discovered make such tests most suitable in the assessment of perceptual, cognitive and social development. Likewise, they could be used as instruments in personality research, in which values, sex-interests and other orientations could be explored. A further application is the possible development of an auditory analogue of the Bender-Gestalt test of visual configurations and of the Strauss-Werner (1942) test of perseveration.

Finally, an important application that awaits attention is an experimental investigation of auditory agnosias and receptive aphasias, about which we have, at present, only clinical evidence. The results might have diverse beneficial repercussions, not the least being the early detection of certain potential scholastic disabilities, especially in the language arts.

APPENDIX A

DESCRIPTION OF AUDITORY COGNITION STIMULI

Except where otherwise indicated, all sounds were taken from special commercial recordings and the descriptions quoted are those given by the recording company.

CPa Aeroplane (Practice Stimulus)
"Multi-engine piston aircraft passes overhead". (20 secs.)

Cpb Bubbles (Practice Stimulus)
Air-bubbles breaking through water. (15 secs)

C1 Motor Car Starting
"Starter turns over twice, car starts, revs up, pulls away" (20 secs.)

C2 Telephone Ringing
Self-recorded. Standard automatic double-ring. (15 secs.)

C3 Sawing Wood
One-man saw used on heavy beam. (15 secs.)

C4 School Bell
"School bell or town-crier bell, recorded outdoors". (15 secs.)

c5 Reveille Bugle
"Reveille bugle call of the U.S. Armed Forces". (20 secs.)

C6 Cock Crowing
"Rooster crows three times" (4 secs.)

C7 Bath Sequence
Self-recorded. Bath being run (8 secs.), then sounds of splashing (4 secs.), then sounds of lathering and washing (5 secs.)

C8 Fire Engine
"Fire-engine passes with bell clanging". Gradual approach, then fade-out. (21 secs.)

C9 Pouring Water
"Water being poured into glass, microphone very close" (5 secs.)

APPENDIX A (Contd.)

C10 Typewriter

"Standard (i.e. non-electric) typewriter, moderate speed" (20 secs.)

C11 Clock Ticking then Alarm

Loud, slow ticking (10 secs.), then shrill alarm (5 secs.)

C12 Machine Guns

"Machine guns and mixed rifle fire, distant perspective" (13 secs.)

APPENDIX B

AUDITORY COGNITION ILLUSTRATIONS

The following sets of illustrations formed the multiple-choice pictorial stimuli corresponding to each Auditory Cognition stimulus. The item representing a correct response is underlined in each case. Two examples of these illustrations follow the listed items.

C1: Locomotive, Motor Van, Concrete Mixer, Sewing Machine, Alsatian Barking, Tractor.

C2: Alarm Clock, Horse and Cart, Telephone, Whistle, Clock, Typewriter, Birds Chirruping, Fire Engine, Bicycle Bell, Hand-bell.

C3: Lawnmower, Dog Barking, Sawing Wood, aeroplane, Brushing Teeth, Grating Carrot, Cutting Vegetable, Donkey.

C4: Hand-bell, Keys, Bicycle Bell, Church-bell, parrot, Piano, Fire Engine, Telephone

C5: Parrot, Monkey, Ambulance, Clarinet, Fire Engine, Cuckoo Clock, Bugle.

C6: Hen clucking, Whistle, Train, Car Skidding, Dog Barking, Ducks Quacking, Ambulance, Bugle, Rooster Crowing.

C7: Boy Swimming, Girl Bathing, Kitten Lapping Milk, Country Stream, Toilet, Bonfire, Pouring Water into Jug, Fish Swimming, Girl Giving Dog a Bath, Boy at Washbasin.

C8: Vacuum Cleaner, Telephone, Cat Howling, Ambulance, Fire Engine, Church-bell, Trumpets, Electric Train.

C9: Pouring Milk into Glass, Snake, Violin, Lighted Match, Motorboat, Toilet, Cat Hissing, Tap Running.

C10: Cash Register, Scissors, Typewriter, Telephone, Sewing Machine, Clock, Horse and Cart, Rattle, Nail being Hammered, Raindrops on Umbrella.

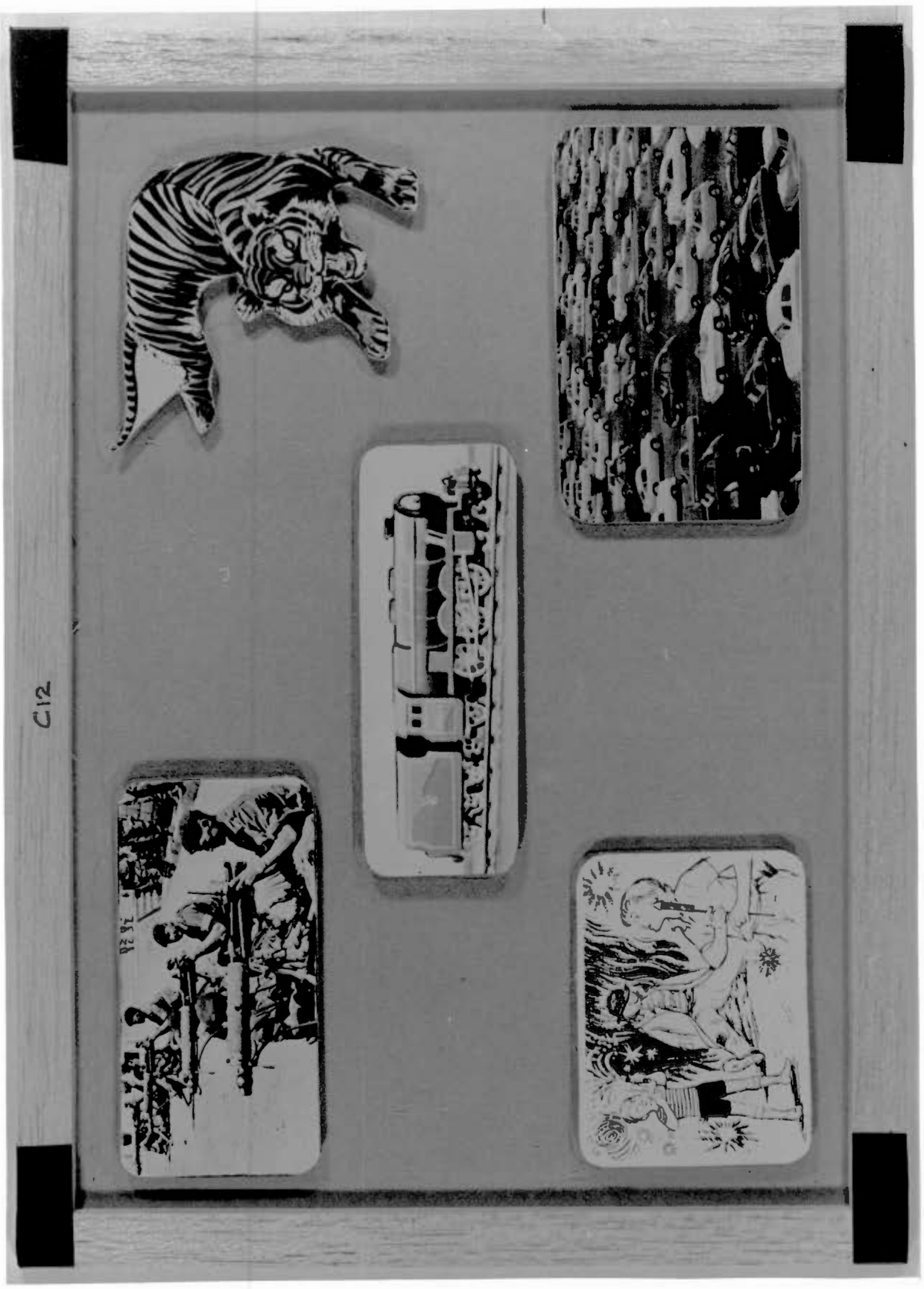
APPENDIX B (Contd.)

C11: Railway Coach, Telephone being Dialled, Telephone Ringing, Alarm Clock, Horse and Cart, Typewriter, Raindrops on Window-pane, Sewing Machine.

C12: Tiger Growling, Machine Guns, Locomotive, Fireworks, Motor Cars

APPENDIX B (Contd.)

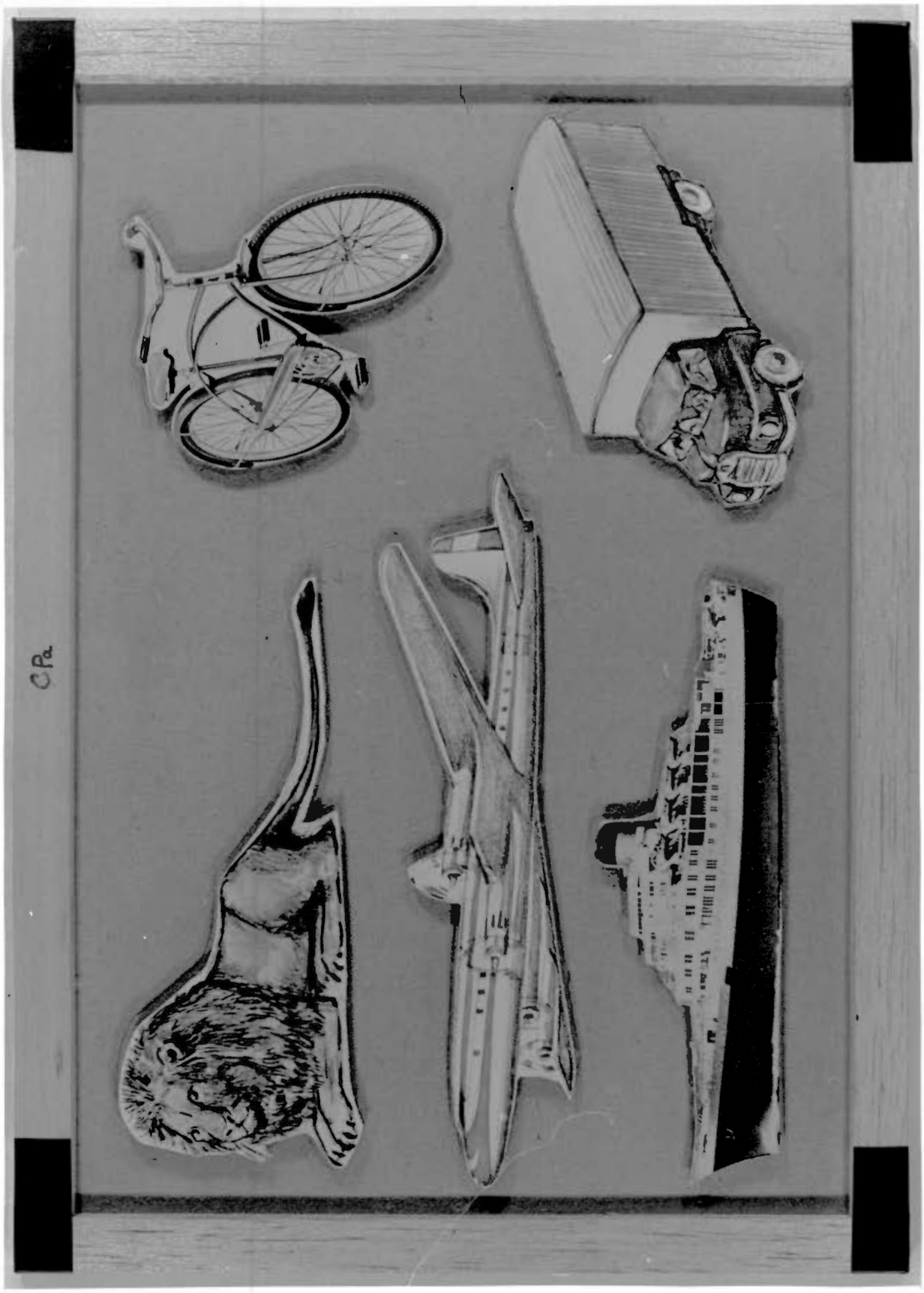
EXAMPLES OF AUDITORY COGNITION ILLUSTRATIONS



Set of illustrations (in tray) used for item C12, Machine Guns.

APPENDIX B (Contd.)

EXAMPLES OF AUDITORY COGNITION ILLUSTRATIONS



Set of illustrations (in tray) used for item CPa, Aeroplane.

APPENDIX C

DESCRIPTION OF AUDITORY EMPATHY STIMULI

Except for E3 and E4, Woman Singing, all items were self-recorded.

E1 Baby Crying (Cross)

A seven-month infant was deliberately provoked by her mother. When she had just begun to suck at her bottle, it was removed and held out of reach in front of her.

E2 Baby Laughing (Happy)

The same child was held aloft and tossed several times, an activity which she showed every sign of enjoying.

E3 Woman Singing (Happy)

An extract from a recording by the folk-singer, Martha Schlamme, singing an Austrian nursery song, "Die Vogelhochzeit" (The Birds' Wedding).

E4 Woman Singing (Sad)

From a dirge in Yiddish, by the same artist, "Joshua Departs".

For the remaining items, two drama students were required to read brief passages transliterated into gibberish.

E5 & E10 Sad

Original passage: "So my child is no more. My poor, tiny baby. never again will I hold you in my arms. Never again will I hear your voice. You are gone forever, and life is like an empty desert."
Direction: Indicate renunciation rather than hysterical grief.
Gibberish passage: "So hy prile is lo four. Dy moor, cony daly. Diver amond will I fend-loo in gy sarn. Diver amond will I thaw raw deeve. You-ray bawn endiver, and mite is type an orten ganner."

E8 & E11 Cross

This is a passage from Bernard Shaw's Pygmalion. Eliza Doolittle "snatches up Higgins' slippers, and hurls them at him one after the other with all her force."
Original Passage: "There are your slippers! And there! Take your slippers; and may you never have a day's luck with them! I've won your bet for you, haven't I? That's enough for you. I'd like to smash your face, you selfish brute!"

APPENDIX C (Contd.)

Gibberish passage: "Shore are more flenders! And floor! Gran ter flenders; and lep-tee danda have a fee's tarn with hem! I've pen dore lat for moo, dallen't I? Pant's a luff for loo. I'd bann to batch-err bace, sor glander prett!"

E6 & E9 Happy

Original Passage: "Hullo, everybody! Guess what! I've got the most wonderful story for you! It's the loveliest, funniest thing that's happened for years and years; I just can't wait to tell you."

Direction: Indicate someone who is bubbling over with gaiety and mirth.

Gibberish passage: "Sunno, igliwonny! Pless mott! I've lester boze dandernel glary sor-doo! It's the fenderest, molliest thawl that's sellered for lores and fares; I cass paint loot to pret-noo."

E7 & E12 Frightened

Original Passage: "Who...who's there? Oh God! What do you want? I...I've got no money. Very little. Don't shoot. You can have anything. Please. Put that thing down. Oh God!"

Direction: Speak in short, gasping phrases.

Gibberish Passage: "Hee...hee's mare? Ay Nod! Mott do roo pent? I...I've let no lerry. Over mattle. Pront loot. You can sayt dillylog. Floaze. Pat sett ling rong. Ay Nod!"

APPENDIX D

EXAMPLE OF AUDITORY EMPATHY ILLUSTRATIONS

Set of illustrations (in tray) for items E9 to E12, Man Speaking

APPENDIX E

PARENTS OPINION INVENTORY

The inventory consisted of twenty statements each of which had to be endorsed Strongly Agree, Mildly Agree, Uncertain, Mildly Disagree or Strongly Disagree, scored 5, 4, 3, 2,1 respectively. Ten statements referred to the Warmth-Objectivity dimension, and ten to the Inconsistency-Rigidity dimension. In order to counteract a possible affirmative response-set, five statements in each section were positively worded, and five negatively worded, as follows:-

I Warmth-Objectivity

(a) The higher the score the greater the warmth

6. The soundness of a child's character and personality depends only on one thing, unqualified love and tenderness in the home.

3. What sets us apart from the animal kingdom even more than our superior brain-power is our ability, from infancy onwards, to cry and to laugh.

8. When misfortune strikes the home it is best to be completely frank about it with one's children.

9. It would be a good thing if parents would learn to partake as fully as possible in their children's own joys and sorrows instead of looking at everything from an adult point of view.

12. The young child has a strong need to be frequently fondled and petted by its parents.

(b) The higher the score the greater the objectivity

1. It is a mistake for parents to reveal their strong feelings - pleasant or unpleasant - in the presence of young children.

7. One of the first requirements of good parenthood is the ability to apply, without fuss, established procedures of child rearing.

11. The hallmark of a well-adjusted young child is his ability to think clearly and act calmly under all circumstances.

14. Emotional self-control is probably the most important quality which a young child should acquire.

15. Fortunate is the child whose parents treat it with calm detachment and objectivity.

II Inconsistency-Rigidity

(a) The higher the score the greater the inconsistency

10. A child is entitled to change his mind just as much as an adult is.

APPENDIX E (Contd.)

4. In the long run it is to the benefit of children if they realise that their parents are just as human and inconsistent as themselves.
5. Good parents learn to put up with a considerable amount of naughtiness from their children.
18. The kind of parents who always stick firmly to their principles don't always succeed with their children.
19. Parents should often give way to a child who has a "will of its own."

(b) The higher the score the greater the rigidity

2. The personality of a child will reach proper development only if every good action of his is rewarded and every naughty one punished.
13. A happy child is one that knows exactly where he stands with his parents.
16. Parents with changeable moods can have an extremely harmful effect on their children.
17. Nothing gives children a sense of security as much as strict routine and punctuality in the home.
20. Once a child has been warned he should never be allowed to get away with any naughtiness at all.

These items were presented in random order as shown in the final inventory overleaf.

APPENDIX E (Contd.)

Emotional self control is probably the most important quality which a young d should acquire.

ongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

Fortunate is the child whose parents treat it with calm detachment and objectivity.

ongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

Parents with changeable moods can have an extremely harmful effect on their dren.

ongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

Nothing gives children a sense of security as much as strict routine and tuality in the home.

gly agree Mildly agree Uncertain Mildly disagree Strongly disagree

The kind of parents who always stick firmly to their principles don't always eed with their children.

ongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

Parents should often give way to a child who has a'will of its own'.

ongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

Once a child has been warned he should never be allowed to get away with any ughtiness at all.

rongly agree Mildly agree Uncertain Mildly disagree Strongly disagree

..... Husband's occupation.....

APPENDIX F

ADMINISTRATION OF AUDITORY STIMULI

This is a magic box. Here is a button. When I tell you to press this magic button you will hear all kinds of sounds and noises coming out of the magic box. Would you like to hear an aeroplane? Press the magic button and you will hear an aeroplane flying high in the sky. (Play CPa item. After a few seconds present CPa illustrations) Now here are some pictures. Which is the right picture? Which picture is making the sound? Pick it up and stick it on here. (Remove CPa illustrations).

Now press the magic button again. (Play CPb item) What can you hear? What sound is that? (If child fails to respond or makes incorrect response, replay CPb item and simultaneously present CPb illustrations) Listen carefully to the sound again, and look at these pictures. Which is the right picture? Which picture is making the sound? (If child fails to respond or makes incorrect response replay CPb) Listen again. Doesn't it sound like water bubbling down a drain? Look. Here is a picture showing all the bubbles. Let's stick it on here. (Remove CPb illustrations).

Now I'm going to see if you can tell me what the next sound is all by yourself. Press the magic button again and tell me what you can hear. (Play C1 item) (If the child identifies the object without placing it in a social context, e.g. "car" instead of "a man is trying to start his car", say) Tell me more about this car. What is happening? Who is there? Etc. (If child identifies the object, whether or not he places it in its correct social context, present C1 illustrations without replaying C1, and say) Which is the right picture? Which picture made that sound? (If child fails to respond to C1 or makes incorrect response, replay C1, simultaneously present C1 illustrations and say) Listen again carefully, and look at these pictures. Which is the right picture? Which picture is making that sound?

C2 to C12: As for C1, but if child identifies the items without placing them in a social context, make the following enquiries in each case:-

C2 Tell me more about it. Who is making it ring? Why?

C3 Tell etc. Who is doing it? Why is he doing it?

C4 Tell etc. Who is doing it? Why?

C5 Tell etc. Who is doing it? Why?

APPENDIX F (Contd.)

C6 Why is the cock crowing? What time do you think it is?
C7 Tell etc. What is happening? Who is there?
C8 Tell etc. What is happening? What are they going to do?
C9 Tell etc. What is happening? Who is doing it? Why?
C10 Tell etc. What is happening? Who is doing it? What for?
C11 Tell etc. What time do you think it is? Who is there?
C12 Tell etc. Who is doing it? Why?

E1 to E12: Same as above, but enquiry as follows:-
E1, E2: Is the baby frightened or sad or cross or happy? Now let's play a guessing game. You must guess why the baby is...
Illustrations: Which is the right baby? Which baby was that? Point to it.
E3 to E8: Is the lady cross or happy or sad or frightened? Guess why the lady is...
Illustrations: Which is the right lady? Which lady is like that? Point to it.
E9 to E12: Same as E3 to E8, mutatis mutandis.
P1 to P7: This time when I tell you to press the button, you will hear something happening somewhere. Listen carefully and then tell me what is happening. (Present item and wait for story. If response is inadequate, say) And then? And then?

APPENDIX G

ANALYSIS BY AGE AND SEX

OF VERBAL IDENTIFICATIONS

IN RESPONSE TO AUDITORY COGNITION STIMULI (N=96)

ITEM C1

CAR STARTING

AGE	DON'T KNOW		GUITAR		FIRE ENGINE		CAR LORRY		STEAM ENGINE		PHONE		SPEED BOAT		AERO-PLANE		CRANE		LION		COW		FISH		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	5	1	1				4	5	2						1					1	1				14	7
FIVE	2	3			1		7	9	3	1	1		1				1							1	16	14
SIX							16	6		1															16	7
SEVEN		2					14	6																	14	8
TOTAL	7	6	1	-	1	-	41	26	5	2	1	-	1	-	1	-	1	-	-	1	1	-	-	1	60	36

ITEM C2

TELEPHONE RINGING

AGE	DON'T KNOW		PHONE		DOOR BELL		BELL UNSPEC.		CHURCH BELL		TRAIN		WATCH		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		7	4	2	2	2	1	1		1				14	7
FIVE			15	11		2	1	1							16	14
SIX			12	6	3	1							1		16	7
SEVEN			12	7	2	1									14	8
TOTAL	1	-	46	28	7	6	3	2	1	-	1	-	1	-	60	36

ITEM C3
SAWING
WOOD

AGE	DON'T KNOW		SAW		TRAIN		CAR		MOTOR BIKE		PUMPING WATER		SWEEPING		SCRAP-ING		PULLER (?)		DOG		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	3	1	6	2	4	2		1	1											1	14	7
FIVE		1	9	7	5	4								1		1	1		1		16	14
SIX			7	6	9							1									16	7
SEVEN		1	7	6	7	1															14	8
TOTALS	3	3	29	21	25	7	-	1	1	-	-	1	-	1	-	1	1	-	1	1	60	36

ITEM C4
SCHOOL
BELL

AGE	DON'T KNOW		SCHOOL BELL		CHURCH BELL		TABLE BELL		BELL UNSPEC.		TRAIN		FIRE ENGINE		PHONE		ICE CR. BELL		MISC. BELLS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1	1			3		1	3	4	2	1		2			1			2		14	7
FIVE	2		3		6	5	2			5			3					2		2	16	14
SIX	1	1	4	1	4	4	1				2		1		1					1	16	7
SEVEN	1		2	3	6	5	1		1				1				1		1		14	8
TOTALS	5	2	9	4	19	14	5	3	5	7	3	-	7	-	1	1	1	2	3	3	60	36

ITEM C5
BUGLE
REVEILLE

AGE	DON'T KNOW		TRUMPET BUGLE		BAND		INSTRUM UNSPEC		GUITAR BANJO		DRUM		PIANO		CHURCH MUSIC		BAG-PIPES		WHISTLE		MISC. MUSIC		TOTALS	
~~FOUR~~	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	2	2	3	1	5	1	1		1		1		1									3	14	7
FIVE	1	3	9	4	2	2	2		1			2				1				2	1		16	14
SIX	1	2	10	5	4												1						16	7
SEVEN			11	6	2			2	1														14	8
TOTALS	4	7	33	16	12	3	3	2	3	-	1	2	1	-	-	1	1	-	-	2	1	3	60	36

ITEM C6
ROOSTER
CROWING

AGE	DON'T KNOW		COCK		HEN FOWL		BIRD UNSPEC		PARROT		TURKEY		CROW		CUCKOO		CAT		AERO-PLANE		TRAIN		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	2	1	5	2	3	2	1	1		1							1		1		1		14	7
FIVE	2	3	6	8	4	1	2	1	1				1					1					16	14
SIX	1		10	2	3	4		1	1				1										16	7
SEVEN			7	3	6	3					1			1		1							14	8
TOTALS	5	4	28	15	16	10	3	3	2	1	1	-	2	1	-	1	1	1	1	-	1	-	60	36

ITEM C7
BATH
SEQUENCE

AGE	DON'T KNOW		WASHING		WATER RUNNING		BUBBLES		WATER UNSPEC		POURING WATER		LAWN MOWER		TRAIN		FISH FROG		FRYING FAT		BOAT		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1	1			1	1	7	2	2	1							3	1				1	14	7
FIVE	3	2	1		6	3	2	1	1	3	1	1		1	1	1	1	2					16	14
SIX			2	2	4	2	2				1	2	1				4	1	2				16	7
SEVEN		1	4		6	3	1		1	2							1	2			1		14	8
TOTALS	4	4	7	2	17	9	12	3	4	6	2	3	1	1	1	1	9	6	2	-	1	1	60	36

ITEM C8
FIRE
ENGINE

AGE	DON'T KNOW		FIRE ENGINE		AMBULANCE		ELECTRIC TRAIN		CHURCH BELLS		BELL UNSPEC		STEAM ENGINE		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			11	4		2	1	1			1		1		14	7
FIVE		1	12	8	2	4	1	1			1				16	14
SIX			11	6	2	1	2		1						16	7
SEVEN			12	6	2	1				1					14	8
TOTALS	-	1	46	24	6	8	4	2	1	1	2	-	1	-	60	36

ITEM C9
POURING
WATER
INTO
GLASS

AGE	DON'T KNOW		POURING WATER		BUBBLES		WASHING		TRAIN		SWIMMING		WATER UNSPEC		ONOMATO-POEIAC		TAP RUNNING		RAIN		WASH. MACH.		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	2	1	1		6	2			1		1	3	1		1		1	1					14	7
FIVE	2	2	3	1	6			1		2		2	1	3	2		1	2		1	1		16	14
SIX	3	2			4	2	3				5	1		1			1	1					16	7
SEVEN	3	5	2		3		1				2		1	1			2	2					14	8
TOTAIS	10	10	6	1	19	4	4	1	1	2	8	6	3	5	3	-	5	6	-	1	1	-	60	36

ITEM C10
TYPE-
WRITER

AGE	DON'T KNOW		TYPE-WRITER		HORSE TROTTING		TRAIN		PHONE		WATER		DRUMS		MISC. VEHICLES		MACH. GUN		MISCEL.		ADD. MACH.		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	8	3		2		1	2	1	1		1		1						1				14	7
FIVE	2	9	3	4	1		4	1			1		1		2		1				1		16	14
SIX	2	2	4	3			4	1			1				2		1		1		1	1	16	7
SEVEN	2	1	8	4	1			3					1		2								14	8
TOTAIS	14	15	15	13	2	1	10	6	1	-	3	-	3	-	6	-	2	-	2	-	2	1	60	36

ITEM C11
ALARM
CLOCK

AGE	DON'T KNOW		ALARM CLOCK		CLOCK		BELL		TRAIN		FIRE ENGINE		HORSE TROTTING		HAMMER		PHONE		RAIN		DOOR BELL		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	5	1	3	2				1	2	1	3			1	1					1			14	7
FIVE	2	3	2	1	1	2	2	2	2	3	1			2	2	1	4						16	14
SIX	2	2	6				1		1				3	2	1		1	2		1	1		16	7
SEVEN	2	2	4	3	2	1			2				3	2			1						14	8
TOTALS	11	8	15	6	3	3	3	3	7	4	4	-	6	7	4	1	6	2	-	2	1	-	60	36

ITEM C12
MACHINE
GUNS

AGE	DON'T KNOW		SHOOT-ING		TRAIN		MISC. VEHICLES		THUNDER		FIRE		BOMBS		DRUMS		BOWS & ARROWS		RECORDS		MISC.		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	4	2	3	2	3	2	2				1										1	1	14	7
FIVE	7	4	7	3		1	1	3		2	1									1			16	14
SIX	1	1	10	3	2	1		1	1			1	1				1						16	7
SEVEN	1	4	12	4	1																		14	8
TOTALS	13	11	32	12	6	4	3	4	1	2	2	1	1	-	-	-	1	-	-	1	1	1	60	36

APPENDIX H

ANALYSIS BY AGE AND SEX

OF PICTURE-MATCHING IDENTIFICATIONS

IN RESPONSE TO AUDITORY COGNITION STIMULI

ITEMC1 CAR STARTING

AGE	DON'T KNOW		LOCO-MOTIVE		MOTOR CAR		CONCR. MIXER		SEWING MACH.		DOG		TRACTOR		AERO-PLANE		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			3		5	6					3		2	1	1		14	7
FIVE	1		4	1	7	10	1	1				1	2	1	1		16	14
SIX					16	6		1									16	7
SEVEN				1	14	7											14	8
TOTALS	1	-	7	2	42	29	1	2	-	-	3	1	4	2	2	-	60	36

ITEM C2 TELEPHONE RINGING

AGE	DON'T KNOW		ALARM CLOCK		HORSE & CART		PHONE		WHISTLE		CLOCK		TYPE-WRITER		BIRDS		FIRE ENGINE		CYCLE BELL		SCHOOL BELL		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR							10	5	1								1	1	1		1	1	14	7
FIVE							16	12												1		1	16	14
SIX							14	6											1	1	1		16	7
SEVEN							13	8									1						14	8
TOTALS	-	-	-	-	-	-	53	31	1	-	-	-	-	-	-	-	2	1	2	2	2	2	60	36

ITEM C3 SAWING WOOD

AGE	DON'T KNOW		LAWN-MOWER		DOG		SAWING LOG		AERO-PLANE		BRUSHG. TEETH		GRATING CARROT		CUTTING VEG.		DONKEY		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		1	1		1	3	1			1		3	1	4	3			14	7
FIVE	1	1		2			7	6		1		1	3	1	4	2	1		16	14
SIX			2				10	4					2		2	3			16	7
SEVEN			1		2		7	6					2	1	2	1			14	8
TOTALS	2	1	4	3	2	1	27	17	-	1	1	1	10	3	12	9	2	-	60	36

ITEM C 4 SCHOOL BELL

AGE	DON'T KNOW		SCHOOL BELL		KEYS		CYCLE BELL		CHURCH BELL		PARROT		PIANO		FIRE ENGINE		PHONE		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			9	4			2	2	1	1					1		1		14	7
FIVE		1	11	9			1	1	2	3							2		16	14
SIX			6	5			2	1	7	1			1						16	7
SEVEN			12	7			1						1	1					14	8
TOTALS	-	1	38	25	-	-	6	4	10	5	-	-	2	1	1	-	3	-	60	36

ITEM C5
BUGLE
REVEILLE

AGE	CLARINET		FIRE ENGINE		CUCKOO CLOCK		BUGLE		TOTALS	
	M	F	M	F	M	F	M	F	M	F
FOUR		1	1			1	13	5	14	7
FIVE	2					1	14	13	16	14
SIX	2	1					14	6	16	7
SEVEN		1					14	7	14	8
TOTALS	4	3	1	-	-	2	55	31	60	36

ITEM C6
COCK
CROWING

AGE	HEN		TRAIN		DOG		DUCKS		COCK		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	3		1		1			1	9	6	14	7
FIVE	7	5						1	9	8	16	14
SIX	5	3						1	11	3	16	7
SEVEN	4	1							10	7	14	8
TOTALS	19	9	1	-	1	-	-	3	39	24	60	36

ITEM C7
BATH
SEQUENCE

AGE	DON'T KNOW		WASH BASIN		BATH TUB		CAT		STREAM		TOILET		BONFIRE		JUG		FISH		DOG BATHED		SWIMMING		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR							1			1					3	1	1	3	7	1	2	1	14	7
FIVE	1		3	1	1	2			3	1							3	1	4	7	1	2	16	14
SIX		1		2	2	2			1								6	1	4	1	4	1	16	7
SEVEN			2	1	2				1	1		1	1		1		1	1	2		3	4	14	8
TOTALS	1	1	5	4	5	3	1	-	5	3	-	1	1	-	4	1	11	6	17	9	10	8	60	36

ITEM C8
FIRE
ENGINE

AGE	VACUUM CLEANER		AMBU-LANCE		FIRE ENGINE		CHURCH BELL		TRUMPETS		ELECTRIC TRAIN		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1				8	1	1	1	1	2	3	3	14	7
FIVE	1			4	12	7	1	2			2	1	16	14
SIX			1	1	13	6	1				1		16	7
SEVEN					13	8					1		14	8
TOTALS	2	-	1	5	46	22	3	3	1	2	7	4	60	36

ITEM C9
POURING WATER

AGE	DON'T KNOW		POURING MILK		SNAKE		VIOLIN		MATCH		BOAT		TOILET		CAT		TAP		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			1		3						4	4	1	1	1		4	2	14	7
FIVE	1		6	3		3			1		7	3					1	5	16	14
SIX			3	4	1						6	1					6	2	16	7
SEVEN			8	2				1			3	2		1			3	2	14	8
TOTALS	1	-	18	9	4	3	-	1	1	-	20	10	1	2	1	-	14	11	60	36

ITEM C10
TYPEWRITER

AGE	DON'T KNOW		CASH REGISTER		TYPE-WRITER		PHONE		SEWING MACH.		CLOCK		HORSE & CART		RATTLE		HAMMER		RAIN		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			8	3	1	1			2	1	2	1	1					1			14	7
FIVE		1	6	6	2	3			3	2		1		1	2		1		2		16	14
SIX			5	4	6	2			2	1			2		1						16	7
SEVEN			1	1	11	5		1	1	1							1				14	8
TOTALS		-	1	20	14	20	11	-	1	8	5	2	2	3	1	3	-	2	1	2	-	60	36

ITEM C11
ALARM
CLOCK

AGE	DON'T KNOW		RAIL COACH		DIALLG. PHONE		PHONE		ALARM CLOCK		HORSE & CART		TYPE-WRITER		RAIN		SEWING MACH.		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		3	1	1			2	6	3	2			1	1				14	7
FIVE	2			2	1	3	1	4	10	4					1	1	1		16	14
SIX			2		2	3	3	1	8	3	1								16	7
SEVEN					1				12	8	1								14	8
TOTALS	3	-	5	3	5	6	4	7	36	18	4	-	-	1	2	1	1	-	60	36

ITEM C12
MACHINE
GUNS

AGE	DON'T KNOW		TIGER		GUNS		TRAIN		FIRE WORKS		CARS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	2		1	3	8	2	3	1		1			14	7
FIVE		1		3	11	7	5	2				1	16	14
SIX			1	2	13	4	1	1	1				16	7
SEVEN					14	5		1		1		1	14	8
TOTALS	2	1	2	8	46	18	9	5	1	2	-	2	60	36

APPENDIX J

ANALYSIS BY AGE AND SEX
OF TYPICAL EXAMPLES OF SOCIAL CONTEXT RESPONSES
TO AUDITORY COGNITION STIMULI

ITEM C1 - CAR STARTING

FOUR YEARS - MALE

§ Trying to start - the people
§ Starting up its engine - a man
§ Starting up - a man

FOUR YEARS - FEMALE

§ It's driving - a man
§ He's driving

FIVE YEARS - MALE

§ Starting up - the man
§ Trying to start the car - a man
§ (I don't know in real writing) !

FIVE YEARS - FEMALE

§ Car going - lady or man

SIX YEARS - MALE

§ He's making the engine go
§ Starting its engine - the driver

SIX YEARS - FEMALE

§ A man letting the car go
§ Starting up - the man who drives

ITEM C2 - TELEPHONE RINGING

FOUR YEARS -MALE

§ Somebody wants to talk to somebody
§ Someone at it
§ Someone wants to tell someone something

FOUR YEARS - FEMALE

§ Someone wants to phone
§ Somebody wants a other one
§ Nobody's answering

FIVE YEARS - MALE

§ For the people to come and answer
§ No-ne is answering it
§ A man is calling another man

FIVE YEARS - FEMALE

§ For the mommy to answer it
§ Somebody must pick it up
§ Somebody wants to phone

SIX YEARS - MALE

§ Someone's phoning
§ Somebody wants to talk to...
§ Man's phoning another man

SIX YEARS - FEMALE

§ People wants to ask something
§ Lady's ringing somebody
§ Somebody's phoning

APPENDIX J (CONTD.)

ITEM C3 - SAWING WOOD

FOUR YEARS - MALE

§ A man cutting a piece of wood

§ A man - to make something

FOUR YEARS - FEMALE

§ A man - to make a braai

§ A man - to make something

FIVE YEARS - MALE

§ A man swording some wood

§ A man sawing down a tree

§ A man wants to make a fire

§ A man cutting wood with a sword

FIVE YEARS - FEMALE

§ A daddy sawing a tree

§ A man sawing up wood

SIX YEARS - MALE

§ A man wants to have wood for the fire

§ A man with a sword cutting a log

§ A man wants to build something

SIX YEARS - FEMALE

§ A man saw-wooding to make something

§ A man wants to saw off a piece of wood

§ A man swording a tree down

SEVEN YEARS - MALE

§ A carpenter sawing wood

SEVEN YEARS - FEMALE

§ A man sawing wood to make a table

ITEM C4 - SCHOOL BELL

FOUR YEARS - MALE

§ (Tinging for collect the food)

§ (Father Christmas ringing his bells as he's going along)

FOUR YEARS - FEMALE

§ (Dinner bell calling you for dinner)

§ (Somebody's ringing the bell for lunch)

FIVE YEARS - MALE

§ School bell for all the children to come in

§Ringing because they're late for school

FIVE YEARS - FEMALE

§ (Somebody wants to get in the door)

§ (A man goes tingaling - ice cream)

SIX YEARS - MALE

§ A bell at school because its playtime

SIX YEARS - FEMALE

§ School bell - time for me to go in

SEVEN YEARS - MALE

§ School bell to tell the children to come in

SEVEN YEARS - FEMALE

§ School bell - for the children to line up

APPENDIX J (CONTD.)

ITEM C5 - BUGLE REVEILLE

FOUR YEARS - MALE

§ The army men's music

§ Soldiers blowing a trumpet

§ Band going along the street

FOUR YEARS - FEMALE

§ A soldier playing trumpets

FIVE YEARS - MALE

§ Cadets playing the bugle

§ The soldiers at school - trumpet

§ A Roman playing a kind of mouth-organ to get all the other Romans

FIVE YEARS - FEMALE

§ A trumpet - a soldier

§ A trumpet - a man is marching

§(Soldier playing the drum)

SIX YEARS - MALE

§ A Scotty playing a trumpet

§ Soldier's music

§ Bishops' band

SIX YEARS - FEMALE

§ Trumpet - a bandman

§ Bugle - the bandboys

§ Trumpet - a schoolboy

SEVEN YEARS MALE

§ Trumpet - the guards

SEVEN YEARS - FEMALE

§ The big boys at school

ITEM C6 - COCK CROWING

FOUR YEARS - MALE

§ Cocks hooting - it's eight o'clock in the morning

§ Chicken making a noise - it's morning

FOUR YEARS "FEMALE

§ Cockledoodledoo - cocking to wake everyone up

§(A cock - he laid an egg)

FIVE YEARS - MALE

§ Cock crowing because morning has come

§ Cockledoodledo doing its noise - after the morning

FIVE YEARS - FEMALE

§(Cockledoodledo - laying an egg)

§ A cock waking people up

SIX YEARS - MALE

§ (Squalling for its chickens- to keep them warm)

SIX YEARS - FEMALE

§ Hens or cocks crowing to say good morning to the sun

SEVEN YEARS - MALE

§ Rooster crowing - calling the people to wake up

SEVEN YEARS - FEMALE

§ A cock - because its the morning

APPENDIX J (CONTD.)

ITEM C7 - BATH SEQUENCE

FOUR YEARS - MALE

§ (Fishes blowing out some water)

FOUR YEARS - FEMALE

§ (Dogs drinking the water)

FIVE YEARS - MALE

§ (Someone walking through the water)

§ A boy washing in a basin

FIVE YEARS - FEMALE

§ Somebody's washing their hand

§ (People sweeping the water)

SIX YEARS - MALE

§ He's scrubbing his feet at the basin

§ (Man swimming in the water)

§ Lady washing dishes

SIX YEARS - FEMALE

§ (Switching on the tap to water the garden)

§ They're washing their hands

SEVEN YEARS - MALE

§ Somebody washing clothes

§ Somebody's bathing themselves

SEVEN YEARS - FEMALE

§ The basin's getting too full

§ (Somebody's drinking)

ITEM C8 - FIRE ENGINE

FOUR YEARS - MALE

§ Going to squirt out the fire

§ Making a noise with the bells - to hit the fire out

§ Going to a fire because they don't want it to burn up

FOUR YEARS - FEMALE

§ (Ringing a bell because the people wants to watch them)

§ -

FIVE YEARS - MALE

§ Going fast to a fire

§ To blow the fire out

FIVE YEARS - FEMALE

§ (Ambulance putting on the silence)

§ Going to see if there's a fire (sirens)

SIX YEARS - MALE

§ Going to kill the fire

SIX YEARS - FEMALE

§ In a hurry because a house is on fire

SEVEN YEARS - MALE

§ Ringing the bell to tell the cars that it's coming - to a fire

§ Rushing out to a fire

SEVEN YEARS - FEMALE

§ Because a house is on fire

§ To put water on the house

APPENDIX J (Contd.)

ITEM C9 - POURING WATER

FOUR YEARS - MALE

§ (Making a wee-wee)

FIVE YEARS - MALE

§ A man pouring water

SIX YEARS - MALE

§ (She's washing the dog)

§ (A man washing his hands)

§ (Somebody swimming)

§ (Somebody's throwing water)

SIX YEARS - FEMALE

§ They're letting the water go out from the tap

ITEM C10 - TYPEWRITER

FOUR YEARS - FEMALE

§ You press the thing to make writing

§ A thing what makes writing on paper

FIVE YEARS - MALE

§ Typewriter - a woman

§ (You press the button - it's your accounts)

§ Someone is typing letters

FIVE YEARS - FEMALE

§ A person typing a letter

§ A person typing a letter

§ Somebody typewriting - to write a letter to somebody

SIX YEARS - MALE

§ A thing what you go like that - a lady in a office

SIX YEARS - FEMALE

§ A typist typing a letter

SEVEN YEARS - MALE

§ Press knobs on one of those things and comes a letter

§ Someone at a typewriter making signals

SEVEN YEARS - FEMALE

§ A person in the office typing

§ Typewriter - a girl in work

APPENDIX J (Contd.)

ITEM C11 - ALARM CLOCK

FOUR YEARS - MALE

§ Clock ringing to tell the time

§ Clock ticking - to tell the people to wake up

FOUR YEARS - FEMALE

§ Clock ringing to tell you its nearly time to wake up

§ In the night time my mummy's clock rings to wake up you and go to the lav and do a wee

FIVE YEARS - MALE

§ Clock rings a bell - then it wakes you up

FIVE YEARS - FEMALE

§ Clock ringing to wake the people

SIX YEARS - MALE

§ Clock ringing because the person must take the cake out

§ Its telling you its time to get out of bed

ITEM C12 - MACHINE GUNS

FOUR YEARS - MALE

§ Guns are shooting - army men

§ Shooting - all the cowies

FOUR YEARS - FEMALE

§ Shooting - wants to kill

§ Aeroplane going in the war - getting fired down

FIVE YEARS - MALE

§ People in the war - shooting at each other

§ Machine guns - army man

FIVE YEARS - FEMALE

§ A person shooting because he wants to kill

§ -

SIX YEARS - MALE

§ A man shooting in the war

§ Cowboys shooting at the enemy

§ (Red Indians shooting arrows)

§ Soldiers want to kill the enemies

SIX YEARS - FEMALE

§ Cowboys shooting

§ Robbers or policemen shooting

§ -

SEVEN YEARS - MALE

§ People firing because there's a war

§ Soldiers fighting

SEVEN YEARS - FEMALE

§ A man wants to kill

§ Somebody shooting

APPENDIX K

ANALYSIS BY AGE AND SEX
OF VERBAL IDENTIFICATIONS
IN RESPONSE TO AUDITORY EMPATHY STIMULI

ITEM E1 - BABY CRYING (CROSS)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	3	1		1	4	2	2	1	2	1	11	6
FIVE	2	1			7	7	6	6		1	11	6
SIX	1				5	2	9	2	1	3	16	7
SEVEN		1			8	3	1	2	5	1	14	7
TOTALS	6	3	-	1	24	14	18	11	8	6	57	34

ITEM E2 - BABY LAUGHING (HAPPY)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	4	1	1	2	2	1	2	1	2	1	11	6
FIVE	2	2	7	6	1	2	5	2	1	2	16	14
SIX	1		9	6	3		2	1	1		16	7
SEVEN	1	1	9	3	3			3	1		14	7
TOTALS	8	4	26	17	9	3	9	7	5	3	57	34

ITEM E3 - WOMAN SINGING (HAPPY)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	2	1	5	3			3		1		11	6
FIVE	1	1	14	13	1						16	14
SIX			15	7					1		16	7
SEVEN			14	17							14	7
TOTALS	3	2	48	30	1	-	3	-	2	2	57	34

APPENDIX K (CONTD.)

ITEM E4 - WOMAN SINGING (SAD)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1	1	4	4	1	1	1		4		11	6
FIVE		1	10	8	3	4	1		2	1	16	14
SIX			10	2	6	5					16	7
SEVEN		1	4	3	10	2				1	14	7
TOTALS	1	3	28	17	20	12	2	-	6	2	57	34

ITEM E5 - WOMAN SPEAKING (SAD)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR		1	4	2		1	3		4	2	11	6
FIVE	1	1	6	7	7	2	2	3		1	16	14
SIX	2		5		2	5	4	1	3	1	14	7
SEVEN		1		1	7	2	6	3	1		14	7
TOTALS	3	3	15	10	16	10	15	7	8	4	57	34

ITEM E6 - WOMAN SPEAKING (HAPPY)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			7	3	1		2	1	1	2	11	6
FIVE		2	13	9	2				1	3	16	14
SIX			12	6	2	1			2		16	7
SEVEN			13	7			1				14	7
TOTALS	-	2	45	25	5	1	3	1	4	5	57	34

APPENDIX K (CONTD.)

ITEM E7 - WOMAN SPEAKING (FRIGHTENED)

AGE	DON'T KNOW		HAPPY		S A D		FRIGHTENED		CROSS		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			2	3	5	2	1	3	1		11	6
FIVE			2	1	9	10	3	2	2	1	16	14
SIX			1		3	4	11	3	1		16	7
SEVEN			[illegible]		[illegible]7	3	[illegible]7	4	[illegible]		14	7
TOTALS			5	4	24	19	24	10	4	1	57	34

ITEM E8 - WOMAN SPEAKING (CROSS)

AGE	DON'T KNOW		HAPPY		S A D		CROSS		FRIGHTENED		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		2		2		5	6	1		11	6
FIVE		2	2	3		2	13	6	1	1	16	14
SIX			1		2	1	11	6	2		16	7
SEVEN							14	7			14	7
TOTALS	1	2	5	3	4	3	43	25	4	1	57	34

ITEM E9 - MAN SPEAKING (HAPPY)

AGE	DON'T KNOW		HAPPY		S A D		CROSS		FRIGHTENED		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		7	3			3	3			11	6
FIVE		2	12	9		1	2	2	2		16	14
SIX			13	4	1	1	1	2	1		16	7
SEVEN	1		12	7					1		14	7
TOTALS	2	2	44	23	1	2	6	7	4	-	57	34

APPENDIX K (CONTD.)

ITEM E10 - MAN SPEAKING (SAD)

AGE	DON'T KNOW		HAPPY		S A D		CROSS		FRIGHTENED		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		3	2	2	1	5			3	11	6
FIVE	1		4	6	9	4	2	3		1	16	14
SIX			2	1	9	4	2	2	3		16	7
SEVEN			1	1	9	3	2		2	3	14	7
TOTALS	2	-	10	10	29	12	11	5	5	7	57	34

ITEM E11 - MAN SPEAKING (CROSS)

AGE	DON'T KNOW		HAPPY		S A D		CROSS		FRIGHTENED		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1	1	4	1	2	1	4	2		1	11	6
FIVE		1	2	2	1	1	13	10			16	14
SIX					2		12	7	2		16	7
SEVEN				1			14	6			14	7
TOTALS	1	2	6	4	5	2	43	25	2	1	57	34

ITEM E12 - MAN SPEAKING (FRIGHTENED)

AGE	DON'T KNOW		HAPPY		S A D		CROSS		FRIGHTENED		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	3		2	2	2	1	3	1	1	2	11	6
FIVE		1	5	2	2	5	4	5	5	1	16	14
SIX					6	2	4	1	6	4	16	7
SEVEN					2		1	1	11	6	14	7
TOTALS	3	1	7	4	12	8	12	8	23	13	57	34

APPENDIX L

ANALYSIS BY AGE AND SEX OF PICTURE-MATCHING IDENTIFICATIONS IN RESPONSE TO AUDITORY EMPATHY STIMULI

ITEM E1 - BABY CRYING

AGE	DON'T KNOW		SNIVELLING		SMILING		LAUGHING		NEUTRAL		CRYING		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1									1	10	5	11	6
FIVE	1		3	1			1			1	11	12	16	14
SIX							1	1			13	6	14	7
SEVEN							1	1			15	7	16	7
TOTALS	2	-	3	1	-	-	3	2	-	2	49	30	57	34

ITEM E2 - BABY LAUGHING

AGE	DON'T KNOW		SNIVELLING		SMILING		LAUGHING		NEUTRAL		CRYING		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1		2	1			5	3	1	1	2	1	11	6
FIVE			1	1	1	2	9	9			5	2	16	14
SIX			4	1			11	6	1				16	7
SEVEN				1			13	5			1	1	14	7
TOTALS	1	-	7	4	1	2	38	23	2	1	8	4	57	34

ITEM E5 - WOMAN SPEAKING (SAD)

AGE	DON'T KNOW		NEUTRAL		S A D		CROSS		FRIGHTENED		HAPPY		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR		1	2			1	2		3	2	4	3	11	6
FIVE		1	1		5	2	2	2	4	4	4	5	16	14
SIX					6	3	3	2	7	2			16	7
SEVEN			1		6	7	2		5				14	7
TOTALS	-	1	4	-	17	3	9	4	19	8	8	8	57	34

APPENDIX L (CONTD.)

ITEM E6 - WOMAN SPEAKING (HAPPY)

AGE	DON'T KNOW		NEUTRAL		S A D		CROSS		FRIGHTENED		HAPPY		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR					2	3	2		1	2	6	1	11	6
FIVE		2		4	2	1	1		1	2	12	5	16	14
SIX							2		2	2	12	5	16	7
SEVEN					1		1		1	1	11	6	14	7
TOTALS	-	2	-	4	5	4	6	-	5	7	41	17	57	34

ITEM E7 - WOMAN SPEAKING (FRIGHTENED)

AGE	DON'T KNOW		NEUTRAL		S A D		CROSS		FRIGHTENED		HAPPY		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			1	1	4	1	1		5	3		1	11	6
FIVE			1		6	5	3	2	4	6	2	1	16	14
SIX				1	6	4	5	1	5	1			16	7
SEVEN					5	3	1	2	8	2			14	7
TOTALS	-	-	2	2	21	13	10	5	22	12	2	2	57	34

ITEM E8 - WOMAN SPEAKING (CROSS)

AGE	DON'T KNOW		NEUTRAL		S A D		CROSS		FRIGHTENED		HAPPY		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR	1			1	1	1	1	3	5	1	3		11	6
FIVE			2	2	2		4	7	6	4	2	1	16	14
SIX			1	2	3		7	2	3	3	2		16	7
SEVEN			2		1	1	5	4	6	2			14	7
TOTALS	1	-	5	5	7	2	17	16	20	10	7	1	57	34

APPENDIX L (CONTD.)

ITEM E9 - MAN SPEAKING (HAPPY)

AGE	DON'T KNOW		HAPPY		CROSS		NEUTRAL		FRIGHTENED		S A D		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			4		2	2	1	1	2	2	2	1	11	6
FIVE			5	6	4	2	1	1	4	5	2		16	14
SIX			8	2	3	3		1	4	1	1		16	7
SEVEN			11	6					3			1	14	7
TOTALS			28	14	9	7	2	3	13	8	5	2	57	34

ITEM E10 - MAN SPEAKING (SAD)

AGE	DON'T KNOW		HAPPY		CROSS		NEUTRAL		FRIGHTENED		S A D		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			1	1	5	2	1	1	1	1	3	1	11	6
FIVE	1		2	1	5	8	1		3	5	4		16	14
SIX			2	1	7	3		1	4		3	2	16	7
SEVEN					6	3			4	1	4	3	14	7
TOTALS	1	-	5	3	23	16	2	2	12	7	14	6	57	34

ITEM E11 - MAN SPEAKING (CROSS)

AGE	DON'T KNOW		HAPPY		CROSS		NEUTRAL		FRIGHTENED		S A D		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			3	1	5	2	2	1	1	1		1	11	6
FIVE			1	1	4	6	1	1	8	2	2	4	16	14
SIX					7	5	1		7	1	1	1	16	7
SEVEN					11	4	1		2	2		1	14	7
TOTALS	-	-	4	2	27	17	5	2	18	6	3	7	57	34

ITEM E12 - MAN SPEAKING (FRIGHTENED)

AGE	DON'T KNOW		HAPPY		CROSS		NEUTRAL		FRIGHTENED		S A D		TOTALS	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
FOUR			1	2	4	1	3		1	2	2	1	11	6
FIVE	1	1	2	2	3	2	2	2	4	4	4	3	16	14
SIX			1	1	3		2		5	3	5	3	16	7
SEVEN					1	1	2	2	8	2	3	2	14	7
TOTALS	1	1	4	5	11	4	9	4	18	11	14	9	57	34

APPENDIX M

ANALYSIS BY AGE AND SEX OF CAUSES TYPICALLY ASCRIBED TO EMOTIONAL CONTENT OF AUDITORY EMPATHY STIMULI

ITEM E1 - BABY CRYING (CROSS)

FOUR YEARS - MALE

§ Sad - because he made a wee in his brooks

FOUR YEARS - FEMALE

§ Sad - because somebody took away something of its

FIVE YEARS - MALE

§ Sad - because somebody hurt her

§ Scared - because her mother's gone out

§ Frightened - because they're teasing it

FIVE YEARS - FEMALE

§ Frightened - something's making a noise

§ Frightened - because she's only small

§ Sad - because she can't get her own way

SIX YEARS - MALE

§ Sad - because his mother wasn't with him

§ Frightened - because someone's coming in

§ Frightened - because her mother's going to hit her

SIX YEARS - FEMALE

§ Cross - she hurt herself or she did something naughty

ITEM E2 - BABY LAUGHING (HAPPY)

FOUR YEARS - MALE

§ Cross - because he also made a wee in his brooks

FOUR YEARS - FEMALE

§ Happy - because something's funny

FIVE YEARS - MALE

§ Happy - because her mother's home

FIVE YEARS - FEMALE

§ Happy - because she can get her own way

SIX YEARS - MALE

§ Happy - because its brother is playing with it

§ Happy - because her mother's bought her something

SIX YEARS - FEMALE

§ Happy - because something's ticklish

§ Happy - because its mother will give it a bottle

APPENDIX M (CONTD.)

ITEM E3 - WOMAN SINGING (HAPPY)

FOUR YEARS - MALE

§ Happy - because she's singing a song

FOUR YEARS - FEMALE

§ Happy - because she's singing a happy song

FIVE YEARS - MALE

§ Happy - because she's playing the piano and singing

FIVE YEARS - FEMALE

§ Happy - Afrikaans lady singing

ITEM E4 - WOMAN SINGING (SAD)

FOUR YEARS - MALE

§ Cross - because somebody took a thing away

FIVE YEARS - MALE

§ Happy - because she's got a piano

FIVE YEARS - FEMALE

§ Sad - because the piano is soft

ITEM E5 - WOMAN SPEAKING (SAD)

FOUR YEARS - MALE

§ Cross - because her children are naughty, that's why

§ Frightened - because there's something going to harm her

FOUR YEARS - FEMALE

§ Cross - because something's wrong

§ Cross - my mummy's whispering

FIVE YEARS - MALE

§ Frightened - because someone's bullying her

§ Sad - saying prayers to God

FIVE YEARS - FEMALE

§ Happy - because she's in church

SIX YEARS - MALE

§ Happy - because she's at home singing (perseveration)

§ Sad - one of her children are dead

§ Frightened - thinks her baby son's going to be killed

§ Frightened - because there's a man come in to murder her

§ Happy - saying her prayers

§ Sad - because she's got nobody to talk to

SIX YEARS - FEMALE

§ Sad - its a story and she saw something sad

§ Sad - because she's saying sad things

§ Cross - because a child's been naughty

APPENDIX M (CONTD.)

ITEM E6 - WOMAN SPEAKING(HAPPY)

FOUR YEARS - MALE

§ Cross - because her children are naughty

§ Happy - saying her prayers

FOUR YEARS - FEMALE

§ Happy - because she's whispering

§ Happy - because she's got friends to tea

SIX YEARS - MALE

§ Happy - God made her happy

§ Happy - because she's got a baby

SIX YEARS - FEMALE

§ Happy - because she's saying nice things

§ Happy - because her child's done something good

SEVEN YEARS - MALE

§ Happy - because she's got somebody to talk to

SEVEN YEARS - FEMALE

§ Happy - its the wireless, the children's programme

ITEM E7 - WOMAN SPEAKING (FRIGHTENED)

FOUR YEARS - MALE

§ Sad - because her children are naughty

FOUR YEARS - FEMALE

§ Happy - because she's talking

FIVE YEARS - MALE

§ Scared - because she's all by herself

§ Cross - because she's crying

FIVE YEARS - FEMALE

§ Sad - because she's crying

SIX YEARS - MALE

§ Sad - because somebody's gone mad

§ Frightened - because somebody's coming

SIX YEARS - FEMALE

§ Frightened - because something's gone wrong

§ Frightened - because something's going to happen

SEVEN YEARS - MALE

§ Sad - because somebody's going to kill her

§ Frightened - because she thinks somebody's going to shoot her

APPENDIX M (CONTD.)

ITEM E8 - WOMAN SPEAKING (CROSS)

FOUR YEARS - MALE

§ Cross - because her children are still naughty: they kick

FIVE YEARS - MALE

§ Cross - because someone is fighting with her

SIX YEARS - MALE

§ Cross - because another man's naughty

§ Angry - a little child was naughty

§ Cross - because someone's messing in the floor

SIX YEARS - FEMALE

§ Cross - because she's cross with her children

SEVEN YEARS - FEMALE

§ Cross - having an argument with another woman

ITEM E9 - MAN SPEAKING (HAPPY)

FOUR YEARS - MALE

§ Cross - because he came from work too late

FOUR YEARS - FEMALE

§ Cross - a daddy

FIVE YEARS - MALE

§ Happy - because someone was with him

§ That's a daddy and he's happy because he came inside

FIVE YEARS - FEMALE

§ Happy - because he's in church

SIX YEARS - MALE

§ Happy - something's happened nice, Christmas is coming near

§ Happy - because he's going to get something, a motor-car

SEVEN YEARS - MALE

§ Happy - because he's got somebody to talk to

APPENDIX M (CONTD.)

ITEM E10 - MAN SPEAKING (SAD)

FOUR YEARS - MALE

§ Cross - because somebody hit him

FIVE YEARS - MALE

§ Happy - because he's gone to shul (synagogue)

FIVE YEARS - FEMALE

§ Happy - because he's in church

SIX YEARS - MALE

§ Sad - his wife or child is dead

SIX YEARS - FEMALE

§ Sad - because its a cold day

ITEM E11 - MAN SPEAKING (CROSS)

FOUR YEARS - MALE

§ Sad - because he came home late from work

FIVE YEARS - MALE

§ Sad - because his children are naughty

SIX YEARS - MALE

Cross - taling to some other man who stole something from him

SIX YEARS - FEMALE

§ Cross - because one of the children made him cross

ITEM E12 - MAN SPEAKING (FRIGHTENED)

FOUR YEARS - MALE

§ Frightened - because there's a dragon

FIVE YEARS - MALE

§ Cross - because his children are naughty

SIX YEARS - MALE

§ Cross - he doesn't want anyone near him

§ Sad - because he's killed somebody

§ Frightened - worried that some enemies are going to attack

§ Frightened - because somebody's going to shoot him

SIX YEARS - FEMALE

§ Sad - because a person made him sad

APPENDIX N

ANALYSIS BY AGE AND SEX
OF TYPICAL RESPONSES
TO AUDITORY PROJECTION STIMULI

ITEM P1 - "WHO'S THERE?"

FOUR YEARS - MALE

§ Dog - man got knocked over - police and traffic-cop is going to come along

§ Dog barking

§ Dog - the man did sing also

FOUR YEARS - FEMALE

§ Dog barking - they locked the dog up in a kennel

§ Dog's barking and he's opening the door for the dog and now he shut the door - who's there - whisper

FIVE YEARS - MALE

§ Dog was barking and they telling secrets

§ The dog was barking - then someone came in and the dog had to bark to frighten him away - then the man talked

§ It's a dog - a dog was going inside - daddy got frightened

FIVE YEARS - FEMALE

§ Dog - a man talking

§ Dog barking - knocking at the door

§ Dog barking - door opening - let the dog out

§ A dog - the dog was scratching on the door - the man said who's there

SIX YEARS - MALE

§ Dog was barking - and the man came and opened the door - and he was cross

§ Dog barking at the door and the man said who's there

§ A dog barking because a lady's coming in - no, a man

SIX YEARS - FEMALE

§ A dog - something fell - then someone was getting cross

§ Dog's barking at someone - they teasing the dog

§ Dog's barking, the dog got killed - he said who's there

SEVEN YEARS - MALE

§ Dog's barking at a burglar - the burglar broke in

§ A dog's barking - a horse was going out of his stable - a man said who's there

§ Dog's barking at a stranger - a man has done something to a house

SEVEN YEARS - FEMALE

§ Dog's barking - and a man opened the window and said who's there

§ Dog barking - man came inside - asked who was there

§ Dog barking - man saying who's there - and then the dog came in

APPENDIX N (CONTD.)

ITEM P2 - "PLAYGROUND"

FOUR YEARS - MALE

§ They running away from the dog - they can't catch up with the train (perseveration)

§ People shouting - baby's crying

FOUR YEARS - FEMALE

§ People at church

§ They're all cheering - bell - still children - somebody crying

FIVE YEARS MALE

§ It's boys playing and they're talking and then the bell rang and then someone was crying

§ They're shouting - they're running to church - he's crying - he came late for school

FIVE YEARS - FEMALE

§ Concert - shouting - they must be quiet - crying

§ Laughing and singing because its Christmas - softly cried

SIX YEARS - MALE

§ Party - shouting because they want some cake - she's crying

§ Lots of people and they're making a noise - a girl was left behind and then she was crying

§ Children are playing in the playground - a girl was crying

SIX YEARS - FEMALE

§ Happy - something's got wrong - they're having a fight - crying

§ There's a fire somewhere and they're laughing at it

§ All the children are happy and the bell's ringing - a mother crying

§ The children was playing in Christmas - then somebody was crying

SEVEN YEARS - MALE

§ They're playing soccer and somebody got hurt - he's crying

§ They were all happy at the beginning and at the end they were all sad

§ Somebody got lost in the rugby match and they all were shouting and a man rang the bell to tell them to stop shouting

SEVEN YEARS - FEMALE

§ They're fighting - children are fighting and the man's getting cross - somebody's crying

§ Little girl hurt herself and she's crying

§ A lot of people laughing because they're ringing the Christmas bells - one was crying

APPENDIX N (CONTD.)

ITEM P3 - "PRETEND WE'RE NOT HERE"

FOUR YEARS - MALE

§ Someone knocking at the door - he started to cry because they locked his hand in the door

§ Knock at the door - pretend that naughty

FOUR YEARS - FEMALE

§ Somebody knocking on the door - somebody laughing - he whispered pretend we aren't here

§ Knocking at the door - then laughing - then whispering

FIVE YEARS - MALE

§ Somebody knocking at the door - man said pretend we're not here then the girl laughed

§ Someone's knocking at the door and then someone was laughing

FIVE YEARS - FEMALE

§ Somebody knocking at the door - wants to be naughty - laughing

§ Knocking on the door or banging with the hammer - the man said let's pretend we're not here when the lady was knocking on the door

SIX YEARS - MALE

§ Somebody knocking at the door - he said we're not here and the little girl laughed

§ Someone was knocking at the door and the man said to the boy pretend we're not here and the boy laughed

SIX YEARS - FEMALE

§ She was laughing - somebody knocked at the door - he said pretend we naughty - she laughed

§ Someone knocking at the door - the children were naughty

SEVEN YEARS - MALE

§ Somebody was knocking on the door - he wanted to steal some things - and then the girl inside started to laugh

§ Someone's knocking and there's no answer - there's a girl knocking and a man came up to her and said pretend we're not here (embarrassed)

SEVEN YEARS - FEMALE

§ Somebody's knocking at the door - they say let's be Naughty

§ Somebody knocking at the door - he's saying pretend we're naughty and the one was laughing

§ They're knocking on the door - they're naughty

APPENDIX N (CONTD.)

ITEM P4 - "WHO DID THIS?"

FOUR YEARS - MALE

§ They're shouting and he wants them to be quiet and the daddy came along and gave one of them a smack

§ There the children are playing and they were talking and then the schoolmaster talked to the boy that was naughty - he had to...

FOUR YEARS - FEMALE

§ Cheering again - they're saying be quiet everyone and now laughing

§ Concert - the man was cross - gave her a hiding

FIVE YEARS - MALE

§ Everyone was laughing and the man said stop and the boy started to giggle

FIVE YEARS - FEMALE

§ Somebody knocked over something and the father's cross

SIX YEARS - MALE

§ The principal or a teacher said who did this to something that was broken

SIX YEARS - FEMALE

§ A man was cross - some other children done something what they shouldn't of done

§ He was telling them to be quiet - something got broken

SEVEN YEARS - MALE

§ They were playing soccer and making a noise and the boss said keep quiet

§ Children were at a party and the man said who did this and someone laughed

SEVEN YEARS - FEMALE

§ They're fighting - now their Daddy's cross with them

§ Somebody did something naughty, a little boy

APPENDIX N (CONTD.)

ITEM P5 - "WHY CAN'T I?"

FOUR YEARS - MALE

§ She wouldn't let him sit on the chair because he was naughty - he sat on the chair and the lady pushed him off

FOUR YEARS - FEMALE

§ Please can I - no - why can't I-you know why

FIVE YEARS - MALE

§ The boy was sad - the mother talked to say the boy couldn't go outside because it was wet

§ The man said can I and the girl said no you can't

FIVE YEARS - FEMALE

§ A lady telling a man that he mustn't do it

§ He wants to go and play with a friend and his mother says he can't

SIX YEARS - MALE

§ He wants something to eat

§ A little boy was asking for sweets before supper or breakfast or lunch

§ He asked the lady please may I have some bread but the lady said no, you know why

SIX YEARS - FEMALE

§ The child wanted to go somewhere and they said no

§ He's asking his mother something and his mother said no

SEVEN YEARS - MALE

§ He wants to go and play and his mother says no

§ Someone wants to go and see the pigs and the mother said that they can't

§ A man and a woman were talking about the child - she got a hiding

§ A man must be sick and he must have something when he wants it and the lady said no, you know you mustn't

SEVEN YEARS - FEMALE

§ A little girl was doing something and her mother said she mustn't and then she said why and then the mother said you know why

§ Little boy was asking his mother something and the mother said no he can't have it

§ Because he was naughty

APPENDIX N (CONTD.)

ITEM P6 - "I CAN'T DO IT"

FOUR YEARS - MALE

§ They said they can't do up the mess - they're going to get a smack

§ The lady said she can't do it - the man wouldn't let her sit on the chair - he's going to push her off

FOUR YEARS - FEMALE

§ And what's the matter with you - I can't do it - come here

FIVE YEARS - MALE

§ Little girl said I can't do it and the father said come here

§ The father talked and the girl was outside and she couldn't open the door

FIVE YEARS - FEMALE

§ Wants her to go to the hospital

§ The father wants her to do something and she says she can't do it

SIX YEARS - MALE

§ The little girl had to come up to her father

§ A lady couldn't open the cupboard because it was stiff

SIX YEARS - FEMALE

§ The daddy wants to give the little girl a hiding because she was naughty

§ A little girl was crying

SEVEN YEARS - MALE

§ Someone's threatening someone

§ The father told her to glue it together and the child said I can't do it - then she got another hiding

§ Schoolteacher is telling a little girl to do her sums and she says I can't do it and he says come here

SEVEN YEARS - FEMALE

§ Somebody can't do their schoolwork

§ A little girl couldn't do something - then the man said come here

APPENDIX N (CONTD.)

ITEM P7 - "SHOULD WE?"

FOUR YEARS - MALE

§ They said oh wait - they're going to hide themselves before their daddy comes along because they don't want to get a smack

§ The lady got frightened (perseveration)

FOUR YEARS - FEMALE

§ She said oh wait come on

FIVE YEARS - MALE

§ The father talked and he said no wait

FIVE YEARS - FEMALE

§ He wants them to hide

SIX YEARS - MALE

§ They want to go and play

§ Should we trick somebody?

SIX YEARS - FEMALE

§ Someone said she must go - her friend said she must go

§ They were playing hiding-go-seek and the boy was block himself - that's why he was whispering

SEVEN YEARS - MALE

§ Her father said oh come on you must do it (perseveration?)

§ The man was whispering to the other robber he said come here - don't waste your time

SEVEN YEARS - FEMALE

§ He didn't know what to do - a naughty man

§ Going to do something

§ Playing something

APPENDIX P

SCORING-SYSTEM FOR VERBAL AND PICTURE-MATCHING RESPONSES TO AUDITORY COGNITION STIMULI

C1 - CAR STARTING

2 points: car, motor-car, van, lorry, car starting, car "turning its keys", car going, car reversing, car revving up

1 point: tractor, speed-boat

0 points: onomatopoeiac descriptions, animals, steam-engine, concrete-mixer, sewing machine, fire-engine, aeroplane, crane

C2 - TELEPHONE RINGING

2 points: telephone, phone

1 point: door-bell, bicycle bell

0 points: church-bell, hand-bell, alarm clock, fire-engine bell, bell (unspecified), whistle, typewriter, birds, animals, horse-and-cart

C3 - SAWING WOOD

2 points: sawing, saw, saw-wooding, swording wood

1 point: grating carrot, cutting vegetable

0 points: steam-engine, lawnmower, sweeping, pumping water, motor-bike, brushing teeth, aeroplane, donkey

APPENDIX P (CONTD.)

C4 - SCHOOL BELL

2 points: large hand-bell, school bell, bell that you hold (described)

1 point: church bell, dinner bell, ice-cream bell, tea bell, bell (unspecified)

0 points: bicycle bell, doorbell, telephone, sleigh bells, fire engine, clock, keys, piano, bird, animal

C5 - BUGLE REVEILLE

2 points: bugle, cornet, horn, trumpet

1 point: other wind instrument, e.g. clarinet, bag-pipes, "blowing a...", kind of mouth organ; soldier's music, the band, the army men, the marching boys

0 points: stringed or percussion instrument, e.g. guitar, banjo, drum; concert, radio, singing, music, cuckoo-clock, ambulance, bird or animal

C6 - ROOSTER CROWING

2 points: cock crowing, cock, crowing (even if attributed to fowl, hen or chicken), cockledoodledoo

1 point: clucking or cackling (attributed to fowl, hen or chicken), crow, cocket, kippen

0 points: duck, parrot, turkey, cuckoo-bird, peacock, bird (unspecified), whistle, train, car skidding, dog barking, ambulance, bugle, aeroplane, cat

APPENDIX P (CONTD.)

C7 - BATH SEQUENCE

2 points: someone having a bath, someone washing themselves, washing clothes, tap running then water splashing then rubbing or washing

1 point: water running, water splashing, washing the didhes, throwing water, people sweeping the water, giving the dog a bath, boy swimming, walking through the water

0 points: water bubbling, pouring water, river or stream, boat going through the water, fish swimming, raining, kitten lapping milk, toilet, water (unspecified), something frying, fire, mincer, lawnmower

C8 - FIRE ENGINE

2 points: fire-engine, fire brigade

1 point: ambulance, electric train

0 points: vacuum cleaner, telephone, cat, bell (unspecified), trumpet, steam-engine

C9 - POURING WATER

2 points: pouring water (into glass or other receptacle), "glass of water", poring

1 point: tap running, water running out (of drain, etc.), doing a wee-wee

0 points: water bubbling, boy swimming, dog having a bath, river or stream, waterfall, water dripping, water splashing, fish swimming, washing machine, toilet (flushing), raining, surf, water (unspecified), snake, violin, lighted match, motor boat, cat, mincer, soap, glass breaking

APPENDIX P (CONTD.)

C10 - TYPEWRITER

2 points: typewriter, any attempted description of typing, e.g. "you press the thing to make writing", a typer

1 point: adding machine, what you do your accounts with, cash register

0 points: drums, door-knocks, lorry trying to start, boat, car, gun, cutting paper, telephone, clock, train, sewing machine, horse-and-cart, rattle, hammering, raining

C11 - CLOCK TICKING THEN ALARM

2 points: alarm clock, clock-alarm, bell-clock, the clock is ringing

1 point: clock (no mention of alarm)

0 points: beetle (tok-tokkie), horse (clip-clop), horse-and-cart, hammering, train, bells, cutting the grass, chopping, dialling (telephone), telephone ringing, typewriter, raining, sewing machine

C12 - MACHINE GUNS

2 points: machine gunners, guns, rifles, shooting, war, battle, bullets, cannons, a gun, firing

1 point: fireworks, explosions, bombs, thunder

0 points: a fire, Red Indians shooting arrows, racing cars, motor-cars, steam-engine, records, animals

APPENDIX Q

COMPLETE TABLE OF INTERCORRELATIONS BETWEEN AUDITORY SCORES, INTELLIGENCE SCORES, AND CHRONOLOGICAL AGE (N=90)

	AUD. COGN. VERB.	AUD. COGN. PICT.	AUD. COGN. COMB.	PMA VOCAB.	PMA AUD. DISCR.	PMA VERB. MEAN.	PMA PERC. SPEED	PMA V-P M.A.	CHRON. AGE
AUD.				498				544	479
COGN.				325				333	
VERB.				(416)					
AUD.				608					505
COGN.				463					
PICT.				(674)					
AUD.				633	171	560	508	602	586
COGN.				466	-127	300	197	332	
COMB.				(595)	n.s.		n.s.		
AUD.	640			510				680	586
EMP.	505			297					
VERB.	(668)			(355)					
AUD.		478		493					476
EMP.		314		320					
PICT.		(554)		(446)					
AUD.			600	531	310	586	604	635	641
EMP.			361	289	032	302	312	341	
COMB.			(471)	(340)	n.s.				
AUD.				454				568	555
PERC.				223				302	
VERB.				(258)	(5%)				
AUD.				597					623
PERC.				397					
PICT.				(511)					
AUD.				793	287	656	660	718	708
PERC.				693	-049	378	360	442	
COMB.				(802)	n.s.				
CHRON. AGE.	586	476	641	536	449	635	663	698	

Note: First coefficient in each cell represents the overall, uncorrected correlation.
Underlined coefficient represents correlation when chronological age is partialled out
Coefficient in parentheses represents partial correlation when corrected for attenuation.
All correls. sign. at 1% or better except where otherwise indic.

BIBLIOGRAPHY

ABRAMOVITZ, A. (1961)
"The auditory perception of emotion." Unpublished Undergraduate Studies in Perception. Johannesburg, University of the Witwatersrand.

ABRAMSON, L.S. (1963)
"A comparison of an auditory and a visual projective technique," J. Proj. Techn., 27, 3-11.

ALLPORT, F.H. (1955)
Theories of Perception and the Concept of Structure. New York, Wiley.

ALLPORT, G.W. (1954)
The Nature of Prejudice. Cambridge, Mass., Addison-Wesley

ANDREANU, F. & O. DENTICE (1951)
"Possibilita di un nuovo metodo proettivo accustico." Arch. Psicol. Neurol. Psichiat., 12, 437-447.

BALL, T. & L. BERNARDONI (1953)
"The application of an auditory apperception test to clinical diagnosis." J. Clin. Psychol., 9, 54-58.

BEATTY, R.T. (1932)
Hearing in Man and Animals. London, Bell.

BRAVERMAN, S. & H. CHEVIGNY (1955)
The Braverman-Chevigny Auditory Projective Test. New York, American Foundation for the Blind.

BRIGGS, G. & H. WILMER (1956)
"Projective sound testing of emotionally ill patients." U.S. Armed Forces Med. J., 7, 64-70.

BRUNER, J.S. & R. TAGIURI (1954)
"The perception of people." In Handbook of Social Psychology, ed. G. Lindzey. Ch. 17. Cambridge, Mass., Addison-Wesley.

BÜHLER, C. (1930)
The First Year of Life. New York, Day.

CAPLAN, N. (1952)
"Construction and Validation of an audio-projection test." Psi Chi Newsletter, Oct., 12.

DAVIDS, A. & H.A. MURRAY (1955)
"A preliminary appraisal of an auditory projective technique for studying personality and cognition." Amer. J. Orthopsychiatr., 25, 543-554.

DUSENBURG, P. & F.H. KNOWRER (1939)
"Experimental studies of the symbolism of action and voice." J. Soc. Psychol., 14, 369-372.

ENGLISH, H.B. & A.C. ENGLISH (1958)
A Comprehensive Dictionary of Psychological and Psychoanalytical Terms. New York, Longmans, Green & Co.

EWING, I.R. & A.W.G. EWING (1944)
"The ascertainment of deafness in infancy and childhood." J. Laryng. & Otol., 59, 309.

FAIRBANKS, G. & HOAGLIN, L. (1941)
"An experimental study of the durational characteristics of the voice during expression of emotion." Speech Monogr., 8, 85-90.

FAIRBANKS, G. & D. PRONOVOST (1938)
"An experimental study of the pitch characteristics of the voice during expression of emotions." Speech Monogr., 6, 87-104.

GATES, G.S. (1923)
"An experimental study of the growth of social perception." J. Educ. Psychol., 14, 449-462.

GATES, G.S. (1927)
"The role of the auditory element in the interpretation of emotion." Psychol. Bull., 24, 175.

GESELL, A. (1952)
The First Five Years of Life. London, Methuen.

GESELL, A. & AMATRUDA, C. (1947)
Developmental Diagnosis. New York, Hoeber.

GLIDEWELL, J.C. ed. (1961)
Parental Attitudes and Child Behaviour. Springfield, Ill., Thomas.

GOLDSTEIN, K. (1948)
Language and language disturbances. New York, Grune & Stratton.

HUNT, T. (1928)
"The measurement of social intelligence." J. Appl. Psychol., 12, 317-334.

HUSNI, M.A. (1952)
"The auditory perceptions and projections of blind children." Unpublished Master's Thesis, Stanford University School of Education.

LEAL, A. & P. PASCUAL (1952)
"El test musical psicodiagnosis de 'Mario Newton Filho' y su applicacion en nuestro media escolar." Rev. Psicol. Pedag. Ap. Valencia, 3, 133-136.

LÖWEFELD, B. (1927)
"Systematisches Studien der Reaktionen der Sänglinge auf Klange und Gerausche," Zeitschr. f. Psychol., 104, 62-96.

McNEMAR, Q. (1959)
Psychological Statistics. New York, Wiley.

MURPHY, G., L.B. MURPHY & T.M. NEWCOMB (1937)
Experimental Social Psychology. New York, Harper.

MURRAY, H.A. (1938)
Explorations in Personality. New York, Oxford University Press.

MYKLEBUST, H.R. (1954)
Auditory Disorders in Children. New York, Grune & Stratton.

PALACIOS, M.A. (1959)
"Clinical use of the Sound Test with blind adults." Unpublished Ph. D. Dissertation, Purdue University, Psychology Department.

PIAGET, J. (1950)
The Psychology of Intelligence. New York, Harcourt Brace.

PIAGET, J. (1953)
The Origin of Intelligence in the Child. London, Routledge & Kegan Paul.

PIAGET, J. (1955)
The Child's Construction of Reality. London, Routledge & Kegan Paul.

SAPIR, E. (1921)
Language. New York, Harcourt Brace.

SHAKOW, D. & S. ROSENZWEIG (1940)
"The use of the tautophone as an auditory apperception test for the study of personality." Char. Personal., 8, 216.

SHERMAN, M. (1927)
"The ability of observers to judge the emotional characteristics of the crying of infants." J. Comp. Psychol., 7, 335-351.

STAGNER, R. & T.F. KARWOSKI (1952)
Psychology. New York, McGraw.

STONE, D.R. (1950)
"A recorded auditory perception test as a new projective technique." J. Psychol., 29, 349-353.

STRAUSS, A.A. (1945)
"Aphasia in children." American J. Phys. Med., 33, 93-99.

STRAUSS, A.A. & N.C. KEPHART (1956)
Psychopathology and Education of the Brain-injured Child. Vol. 2. Progress in Theory and Clinic. New York, Grune & Stratton.

STRAUSS, A.A. & WERNER, H. (1942)
"Experimental analysis of the clinical symptom 'perseveration' in mentally retarded children. Am. J. Ment. Def., 47, 185-187

THURSTONE, L.L. & T.G. THURSTONE (1953)
Examiner Manual and Technical Supplement for the SRA Primary Mental Abilities for Ages 5 to 7. Chicago, Science Research Associates, Inc.

UTLEY, J. (1950)
What's its Name? A Guide to Speech and Hearing Development. Urbana, University of Illinois Press.

WIIMER, H. & M. HUSNI (1953)
"Use of sounds in a projective test." J. Consult. Psychol., 5, 377-383.

WILSON, P. (1957)
The Gramophone Handbook. London, Methuen.

WOODWORTH, R.S. & H. SCHLOSBERG (1955)
Experimental Psychology. London, Methuen.