DOCUMENT RESUME

ED 316 977 EC 230 033

AUTHOR	Vestberg, Palle; Johnson, Robert C., Ed.
TITLE	Beyond Stereotypes: Perspectives on the Personality Characteristics of Deaf People. Working Paper 89-2.
INSTITUTION	Gallaudet Research Inst., Washington, DC.
PUB DATE	Feb 89
NOTE	35p.; A product of Graduate Studies and Research.
AVAILABLE FROM	Scientific Communications Program, Gallaudet Research Institute, 800 Florida Ave., N.E., Washington, DC 20002 ($2.50, quantity discount available).
PUB TYPE	Information Analyses (070) -- Viewpoints (120)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Adolescents; Adults; *Child Development; Child Rearing; Children; Cognitive Development; *Deafness; Emotional Development; Experimenter Characteristics; Infants; Intervention; *Personality Development; Research Problems; *Sensory Integration; Social Development; Trend Analysis
IDENTIFIERS	*Disabled Parents

ABSTRACT

The paper reviews research trends and findings on the development of personality in deaf individuals. The first section, "Adolescent and Adult Deaf Personalities," focuses on studies in the psychological literature that tend to promulgate stereotypical views of deaf people by reflecting researcher bias rather than researcher findings. The second section, "Personality Development in Deaf Children," examines in depth the consistent finding that deaf children who grow up in deaf families generally have better social, emotional, and cognitive development than do deaf children from hearing families. In the final section, "Implications for Parents of Deaf Children," a planned intervention called a "Sensory Integration Program for Deaf Infants" is recommended. Hearing parents of deaf children are encouraged to learn from deaf parents their ways of touching, communicating, and playing with young deaf children. Contains 85 references. (DB)

Beyond Stereotypes: Perspectives on the Personality Characteristics of Deaf People

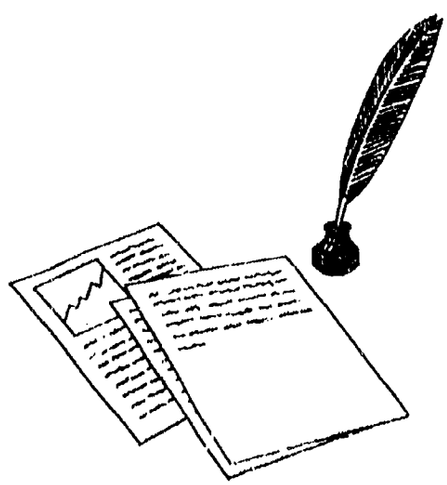
By

Palle Vestberg

1987-88 International Visiting Scholar
Graduate Studies and Research
Gallaudet University

Edited by

Robert C. Johnson
Gallaudet Research Institute



Gallaudet Research Institute Working Paper 89-2
Gallaudet University, Washington, D.C.

Beyond Stereotypes: Perspectives on the Personality Characteristics of Deaf People

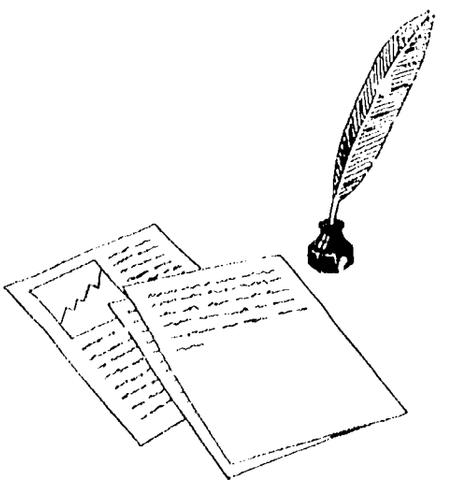
By

Palle Vestberg

1987-88 International Visiting Scholar
Graduate Studies and Research
Gallaudet University

Edited by

Robert C. Johnson
Gallaudet Research Institute



Gallaudet Research Institute Working Paper 89-2
Gallaudet University, Washington, D.C.

The Gallaudet Research Institute is pleased to disseminate the information and perspectives contained in its Working Paper series. The opinions expressed here are those of the author and do not necessarily reflect the views of the Gallaudet Research Institute or of Gallaudet University.

Persons interested in obtaining additional copies of this document or of the Gallaudet Research Institute periodical Research at Gallaudet, *may write to:*

Scientific Communications Program
Gallaudet Research Institute
Gallaudet University
800 Florida Avenue, N.E.
Washington, D.C. 20002

To recover costs for printing and postage, the Gallaudet Research Institute requests prepayment at the following rates:

1-49 copies: $2.50 per copy
50-99 copies: $2.00 per copy
100 or more: $1.50 per copy

Contents

Preface

After having been involved in deaf education for 25 years as a teacher, psychologist, and superintendent of the Royal School for the Deaf in Copenhagen, Denmark, I was given the opportunity for a sabbatical year. I decided to concentrate my attention on one of the problems that has puzzled me throughout the years.

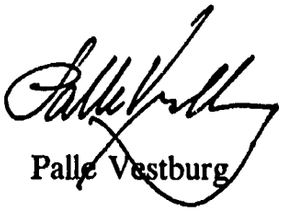
I had always wondered what impact deafness itself inevitably has on the development of an individual's personality and what personality characteristics result merely from the way hearing impaired individuals are typically treated at home and in school.

Aware that most of the studies on this subject have been conducted in the United States and that Gallaudet University is currently engaged in extensive studies of the development of deaf infants, I knew that the best way for me to undertake such a study myself would be to go to Gallaudet.

Fortunately, the Danish Fulbright Commission supported the idea by providing me with a Senior Fellowship, and Dr. Michael A. Karchmer, Dr. Kathryn P. Meadow-Orlans, and the Gallaudet Research Institute provided facilities for me to conduct my study in Washington, D.C.

In presenting this report I feel indebted to many people in Denmark and the U.S. who helped make this research possible and who--in different ways--have contributed to enriching my experiences and thinking during this period; I thank each one of you for your time and effort.

The most eventful experience in this year, however, was the week in March, 1988, when the revolution occurred at Gallaudet University--when the students showed the world the strength and spirit of the deaf mind. Therefore, I dedicate this manuscript to the students of Gallaudet!



Palle Vestburg

Washington, D.C.
June 28, 1988

Introduction

This paper includes a review of a number of studies of deaf adults and deaf children that were conducted during the last half century. The first section, "Adolescent and Adult Deaf Personalities," focuses on a wide array of studies in the psychological literature on deaf people, some of them conducted as recently as in the 1980s, that tend to promulgate stereotypical views of deaf people, most of which, in my opinion, are products of researcher bias rather than of researcher findings. In fact, this section and the one following it demonstrate how commitment to one or another educational or communication philosophy tends to blind many psychological researchers to certain implications of their own discoveries.

The second section, "Personality Development in Deaf Children," pursues in more depth the thread of one consistent but often overlooked or ignored finding of numerous studies of the social, emotional, and cognitive development of deaf children, as well as of their academic achievement. Th' finding--often a surprise to hearing researchers--is that deaf children who grow up in deaf fa .s generally do better in all of these areas than do deaf children from hearing families. Continuing disagreement about the significance of that thought-provoking fact suggests that closer studies of this general finding are needed. Nevertheless, it seems to me possible to say, even at this time, that this finding stands as the central challenge to those who insist on clinging to false, negative stereotypes about deaf people's personalities and capabilities. Rearchers may increasingly need to turn their attention toward the interactions of deaf adults and their deaf children as they strive to learn what can and should be done to help deaf children of hearing parents more fully realize their potential.

In the final sectior of this paper, "Implications for Parents of Deaf Children," I will venture to recommend what I call a "Sensory Integration Program for Deaf Infants." In the course of my description of this program, I will also suggest a little of what hearing parents of deaf children may need to learn from deaf parents' ways of touching, communicating, and playing with their young deaf children.

Adolescent and Adult Deaf Personalities

Early in the twentieth century, shortly after the young profession of psychology developed its first instruments for measuring intelligence, it was discovered that if nonverbal tests and nonverbal instructions were given to randomly selected groups of hearing impaired subjects, no substantial differences could be found between the native intelligence of these groups and similarly selected groups of hearing persons.

As will be demonstrated by the following review of literature, however, conclusions about the emotional and social development of deaf people have been somewhat more complex and controversial.

Early Studies

One of the first comprehensive reviews of research in this area was conducted by Heider and Heider (1941), who noted considerable disagreement among researchers concerning the "adjustment" of adult deaf people. Even when they omitted studies that had obviously used unreliable tests and measurements, Heider and Heider found contradictory results, some of which they attributed to researchers' use with deaf people of measures (questionnaires) constructed for hearing people.

Attempting to formulate a more reliable approach, Heider and Heider developed a series of open, informal questions that were presented to 82 deaf graduates and former students of five schools for the deaf. Their analysis of the results not only showed broad variations in terms of problems, tensions, and limitations experienced by the subjects, but also showed considerable variety in the ways these subjects coped, fought, tackled, or avoided these difficulties. The authors found that "one of the most significant aspects of the picture is the fact that, to a large extent, the deaf blame their difficulties more on the attitudes of the hearing than on the sense defect itself" (p. 130).

Employed by Clarke School for the Deaf, which then used a purely oral approach to communication and teaching, the authors did not personally comment on sign language issues, but the subjects' comments on this topic were implicitly indicated in the report. For instance, a majority of the subjects (18 out of 32) said they preferred to avoid social interaction with other deaf people. This fact may reflect the degree to which deaf persons at that time had internalized the values, attitudes, and prejudices of hearing people who (in the tradition of Alexander Graham Bell) had warned deaf people for decades of the "dangers" of communicating too much in sign language with other deaf people. The contemporary reader may regret that Heider and Heider did not themselves comment on this issue, but the authors did, at least, state in their conclusion that

> If the behavior of the deaf is found to differ from that of the hearing, a closer study will show that in many cases it is normal behavior in an abnormal situation rather than abnormal and maladjusted behavior (p. 130).

The "abnormal situation" was treatment and testing of hearing impaired individuals by the same methods used to treat and test hearing individuals.

In Adjustment to Physical Handicap and Illness: A Survey of the Social Psychology of Physique and Disability, Barker (1953), in collaboration with Wright, Meyerson, and Gonick, extensively reviewed the literature dealing with different aspects of personality among deaf people. Lee

Meyerson (1955), himself deaf, in his explanations of the research results, pointed out that some of the implicit assumptions in the tests and instruments used were, in his opinion, not true for deaf persons. He questioned many of the procedures used and pointed to factors in every deaf person's experience that might explain some of the apparent psychological differences found between deaf and hearing people: (a) deaf children's experiential and social deprivation, (b) their institutionalization (a total of 75% of the deaf school children were educated in residential schools in 1953), and (c) the exclusively oral methods of instruction used in those schools.

From Meyerson's description it is clear that a very mechanical method of teaching speech and language was typical for this period, which can also be characterized by its very strong prejudice against the formal use of any manual form of communication. Although he personally believed that fingerspelling should at least be tried in schools, he commented that "in the present climate of opinion ... it is unlikely that the effects of enlarging the child's experiential world by this means will be tested" (p. 147).

Meyerson used concepts like "life space" and "dynamic field" from Lewin's Principles of Topological Psychology (1936) to explain the apparent effects on deaf people's personalities of the deaf experience of those days. He described the social deprivation of the preschool deaf child as follows:

> He may simply be an isolated and rejected individual without group support. For years he may be the recipient of ambivalent and hostile attitudes... Unlike members of religious or racial minority groups, which have a high degree of continuity and tend to encourage group pride and group belongingness, he actually has no group with which he can identify. He has no group support to sustain his courage and reinforce his claim of equal worthiness (p. 158).

Myerson added that "in many schools for the deaf [a deaf child] and his classmates are evaluated in terms of the degree to which they meet hearing standards. There may be no deaf teachers to serve as models for an ego-ideal" (p. 158). Only when they finally left school, Meyerson said, did deaf students gain the opportunity to choose their own adjustment pattern.

> Then, however, they encounter additional problems. Unlike the Negro, who often is discriminated against from childhood and may learn to cope with it, the disabled child frequently lives in an outwardly protective and sentimental environment. Many of us have different attitudes toward sweet and "helpless" handicapped children than towards the grosser disabled adult... It is not until post-school experience that the deaf child encounters the full force of the hostility and discrimination that is directed against his group. From the standpoint of mental hygiene, fewer problems might arise if deaf and other kinds of physically disabled children were actually members of a psychological minority group from birth (p. 158).

Meyerson concluded that available data on the adjustment difficulties of deaf adults "reflect to a far greater degree our ignorance of how to rear children with impaired hearing than they reflect any inherent characteristics of the deaf" (p. 139).

Levine (1956) selected from an oral residential school 31 psychologically "normal" (meaning that at least 3 of 4 raters plus school records agreed to this label) deaf female adolescents of hearing parents. She compared their performance on the Rorschach test to that of a control group of 100 hearing 16-year-olds from Wechsler's standardization population with a matching full scale IQ score (which meant that the deaf group had significantly higher performance IQ scores, and significantly lower verbal IQ scores than the hearing group).

Levine summarized the results as follows:

> The personality patterns of the deaf subjects were found to be characterized by (1) pronounced underdevelopment in conceptual forms of mental activity; (2) emotional underdevelopment; (3) a substantial lag in understanding the dynamics of interpersonal relationships as well as the world about; (4) a highly egocentric life perspective; (5) a markedly constricted life area; and (6) a rigid adherence to the book-of-etiquette code rather than inner sensibility as standards for behaving and even for feeling (p. 146).

Confronted with the contradiction between the opinions of teachers that these were well-adjusted girls and the bleak test results, Levine concluded,

> If this configuration were found in a hearing subject reared in an average environment, it would represent maladjustment. But the deaf subjects of this study have been purposely selected for normalcy. Their configuration must, therefore, demonstrate how normal psychological potentials manage to effect an adjustment to the highly abnormal environment that deafness creates (p. 147).

Levine did not consider the results an artifact of the instrument used. On the contrary, she found support in other Rorschach studies that showed much the same picture, and she, in contrast to Meyerson, held that these "normal" deaf adolescent girls were victims of a "protected greenhouse existence" in their schools.

> Within the school, their patterns of thinking, feeling, and reasoning are under few if any strains or pressures, for they are well understood, their responsibilities are few, important decisions are generally made for them, and they are at ease (p. 147).

Levine seems to have believed that the test results showed these girls' true lack of adjustment to the world at large, a deficiency that would become apparent "when the time comes for making more demanding life adjustments and for managing more complex life situations" (p. 148). Nevertheless, by regarding the psychological difficulties experienced by deaf people as largely an effect of their long, early institutionalization, rather than of the deafness itself, Levine agreed in an important way with Meyerson. Both seem to have thought that deaf people's apparent lack of adjustment could be changed if certain aspects of the institutions in which they spent their youths were changed.

Levine (1956) stated that "the personality development of a given deaf person is far more intimately and intricately related to his language development than seems to be recognized" (p. 162). Meyerson concurred with that view but, unlike Levine, speculated that part of the problem might be the omission of any aspect of sign language from use in schools for the deaf. Levine knew of the existence of sign language and alternatives to oral teaching and communication, but she did not comment at all on this issue in relation to testing and personality functioning and seemed to overlook entirely the important, positive role sign language might play in deaf people's lives when she stated that

> the outcome of the whole complex story of a deaf child's development hinges upon the pace with which language will succeed in bringing meaning to his life and his world. All aids must be provided towards this end; every effort must be made to keep the way clear of obstacles right from the start (p. 163-164).

There is reason to assume that sign language, in Levine's mind, was regarded as an "obstacle" to language acquisition, rather than a language in its own right. In those days, in fact, sign language was considered by most hearing authorities to detract from or block the attainment of oral skills. In a much later paper, Levine stated that American Sign Language (ASL), as it by then was called, was not a "verbal" language at all. She said that in her opinion, the sign language of the deaf was no more linguistic in content than the facial expressions and intonations all people use as nonverbal means of expression (Levine, 1976, p. 265).

Myklebust (1964) studied deaf college students using the Minnesota Multiphasic Personality Inventory and found that "The results indicated a relationship between this sensory deprivation and emotional adjustment" (p. 156); he summarized his results by saying, "A characteristic profile did emerge ... similar to the profile found in psychosis" (p. 157). As the high score on schizophrenia, however, was balanced by a low score on social introversion, he felt compelled to conclude that "deafness, particularly when profound from early life, imposes a characteristic restriction on personality, but does not cause mental illness" (p. 158). The last statement was later underscored by Altshuler (1974), who, after describing the traditional developmental milieu surrounding the deaf child, said that

> it is nothing short of miraculous that the majority of deaf children develop to be normal neurotics like the rest of us. Clinical studies of adult psychiatric patients indicate that ... the major forms of psychotic illness are no more frequent for the deaf than for the hearing (p. 370-371).

Some psychiatrists (e.g., Basilier, 1973; Rainer & Altshuler, 1967; Remvig, 1969) asserted that although, when compared with the percentage of deaf people in the population at large, a higher percentage of deaf individuals could be found in some mental hospitals, a closer examination of particular cases showed that many of the deaf patients did not fit well into traditional diagnostic frameworks. Rather than question the institutionalization of these deaf patients, however, a few of these psychiatrists attempted to formulate special diagnostic labels for deaf people in mental hospitals. Basilier (1964) in Norway, for instance, invented the diagnostic label, surdophrenia (i.e., deaf mind), thus satisfying the administrative need for a diagnosis to justify the continued provision of hospital services to these patients.

Some rehabilitation workers with a knowledge of adult deaf persons questioned these psychiatrists' negative findings. Donoghue (1968), in a review of research entitled The Deaf Personality, pointed to internal contradictions within some of the studies and contrasted the assertion that there is a link between deafness and maladjustment with a diametrically opposed perspective articulated by Best (1943), who "described the deaf as an exceptionally optimistic and cheerful group. Practically all the material acquisitions of our society are in their possession, and they do not, according to him, lack for normal cultural interests" (Donoghue, p. 40). Donoghue went on to ask rhetorically,

> How does one account for such divergent phenomena which on the one hand indicate emotional adjustment seriously deviates from accepted norms, while on the other hand social adjustment, when measured in material and cultural acquisitions, appears to be normal? (p. 41).

The answer could be that many of the researchers who have reached negative conclusions about deaf people were unconsciously seeking confirmation of their own prejudices in their studies, an all-too-frequent phenomenon that has been termed the Rosenthal Effect (1966). An illustration of the prejudicial nature of many researchers' conclusions about deaf people was provided by Joseph

Church (1951) when he compiled a list of assumptions drawn from the literature, many of which are contradictory and few of which are convincingly supported by the researchers' data. According to that literature, Church said, deaf people are:

- egocentric,
- intolerant,
- irresponsible,
- socially withdrawn,
- dependent,
- lacking in understanding,
- hypersensitive,
- less suspicious than hearing people,
- fearful,
- deficient in sympathy,
- unable to express themselves,
- pugnacious,
- apathetic and listless,
- subject to uncontrolled motor outbursts,
- easily discouraged,
- easily fatigued,
- rigid in their adjustment to life,
- introverted,
- socially retarded,
- inclined to think in class concepts,
- more pragmatic and less imaginative than hearing people,
- conceited and lacking powers of self criticism,
- deficient in reasoning ability,
- unconcerned about their lack of hearing,
- unconsciously wishing they could hear,
- preoccupied with power aspirations,
- in danger of maladjustment to the degree that they lack hearing,
- likely to become better adjusted with the passage of time, and
- likely to become more poorly adjusted with the passage of time.

Contemporary Studies

During the last 20 years, fewer studies of deaf people's personalities than one might wish have seriously brought into question the assumptions reported in the earlier work described above. More deaf researchers have come to the field, new psychological instruments have been used, translations of many written instruments into American Sign Language is nearing completion, and special norms for deaf persons are being calculated (Brauer, 1987).

More specific areas of personality function have been investigated and better defined groups have been studied. For example, Bolt (1973) studied personality differences as measured by the California Test of Personality in groups of deaf persons with oral backgrounds and compared the results to similar personality measures of deaf persons with total communication backgrounds. She

did not find any significant differences, however. Lytle (1987) compared female deaf college students whose parents were hearing with those whose parents were deaf. She found that the "psychosocial development of [deaf] women with deaf parents was superior to that of the [deaf] women with hearing parents." Although statistical differences between these two groups were indeed found, the differences within the groups were more prominent. Lytle commented that

> One of the strongest messages to be learned from these interviews lies in the variation among the sample, not only from deaf women of hearing parents, but of deaf women of deaf parents. These women were very diverse and resist classification into some neat tidy bundle (p. 136).

Sainsbury (1986), in her report on the results of interviewing 175 deaf adults living in England, also demonstrated the extreme diversity of the deaf population.

Stereotypical views of deaf people, however, are still alive. They can, for example, be found in a book aimed at clinical assessment and intervention with "sensorially disabled" persons. Evans (1987), in summarizing the characteristics of deaf people, says that there is no such thing as a typical "deaf personality" among deaf children. He does seem to believe, however, that many of the negative images of adult deaf people set forth in previous literature are accurate. Evans does not regard these negative characteristics as innate but as consequences of "deprivation of early interaction."

> The negative characteristics listed previously (egocentricity, immaturity, and the rest) are felt by this author to be secondary to the lack of optimal, early reciprocal parent/child relationships, which interferes with the attachment, bonding and/or separation/individuation phases of development. Without satisfying reciprocal language or communication, a poor self concept often results (p. 174).

How do deaf people themselves view the concept of "deaf personality?" Of course, every person would answer differently, and some studies have tried to investigate adult deaf people's self-images, but I have chosen to examine more deeply one extended answer to this question, an answer that I have found illuminating, although it may not be fair to consider it fully representative.

Leo M. Jacobs, in A Deaf Adult Speaks Out, originally published in 1974 and printed again in 1982, began by saying that deaf adults cannot be stereotyped, and yet he did so himself when he said "the average adults are ... limited to the more earthy and concrete forms of humor ... the deaf adult cannot begin to comprehend the more abstract concepts" (p. 83). Jacobs went on as follows:

> The underachieving deaf adult has very shallow ideas of what constitutes the pleasures of life ... this deaf person is easily satisfied with common surface pleasures ... culture, as it is commonly conceived, is foreign to the shortchanged deaf adult ... The average deaf adult, even at college level, is approximately two years behind the current trends in styles, modes, fads and philosophy ... The average deaf adult is often considerably less mature in certain respects than his/her counterpart in the hearing world (p. 84).
>
> The deaf adult has extremely short-range goals; he/she is much more interested in immediate wants and needs than in any possible benefits in the future ... The deaf adult is also slow in

developing an understanding of responsibilities and privileges ... Socially immature, the deaf person frequently commits blunders, which try the hearing public's tolerance toward him/her (p. 85)[1].

Jacobs did not see these characteristics as constitutionally determined, but explained the development of such traits as understandable in light of the treatment the deaf individual is subjected to from his hearing parents and his teachers at school, and from his lack of competence in the English language. He noted, "The cost of unclear communication is appalling to the deaf child's emotional make-up, leading to deviant behavior and adjustment problems"(p. 83). He also observed that one difference between being reared by deaf parents and being reared by hearing parents is seen in adult deaf people's reactions to hearing people. Deaf people with hearing parents, Jacobs said, were much more prone to feelings of inferiority: "Deaf persons with hearing parents seem to expect, and accept better, the superior attitude of hearing persons" (p. 80).

It is important to note that Jacobs' book was written originally in 1974 and thus reflected much of what happened to him earlier, during the enthusiastic oral/aural period of the 1950s and 1960s, when even outstanding deaf individuals like Jacobs saw the personality profile of deaf people from the hearing majority's point of view. It is little wonder, when we consider that prominent deaf people themselves sometimes promulgate negative views concerning deaf adults, that many teachers and parents of deaf children, social workers, psychiatrists, and psychologists have felt justified in regarding deaf people as having "substandard" personality characteristics.

Luckily, other attitudes existed and were expressed. Delgado (1982), for example, in a critical review of studies in the development of the so-called "social maturity" of the deaf, wrote, "The development rates and milestones established for hearing children do not necessarily provide a good fit for deaf children" (p. 358). Levine (1981), in a review of personality tests used in studies of deaf persons, acknowledged,

> It is time to look beyond the test-elicited stereotype of 'the' deaf personality, derived, it must be pointed out, largely from studies of deaf schoolagers and clinical cases, and to balance the picture with studies of the real-life coping mechanisms and survival strategies of deaf adults (p. 200).

Also, Lane (1988), in a review of much of the psychological research literature, recently questioned the relevance of the entire concept of "a psychology of the deaf." He argued that no psychological studies to date have convincingly attributed any of the psychological disorders experienced by deaf people to deafness itself.

Conclusion and Suggestions

Although sign language research has changed the earlier negative perception of deaf people's communicative sophistication and may have helped many deaf people develop a more positive self-image (e.g., Kannapell, 1980), I have found few studies of deaf adults that demonstrate similar strides toward equality within the realm of personality.

---

[1] I cannot help saying that in my mind this comprehensive stereotypical description might as well express a social class stereotype, or reflect what a European might think of an average American. So it tells more about the person using the stereotype than about the intended subject.

Many professionals and the deaf themselves do stress the differences between deaf individuals; a few recent studies have documented this, but many studies still leave the reader with a negative perception of deaf people in general. Many continue to see deafness as a condition subtracting from rather than challenging a person's abilities.

I would like to recommend, as a corrective to the lingering effects of the previously-described negative stereotypes, a different, considerably more positive perspective. Perhaps we should endeavor to see deafness as a personality variable in its own right, a potentially positive trait making its own unique contribution to an individual's character, something that hearing people, in fact, are deprived of or excluded from. Such a perspective might serve as a useful antidote to the common view of deafness as an obstacle to the development of personal identities modeled upon those of hearing people.

Factor-analytical studies of variables influencing various aspects of the lives of people with impaired hearing could be conducted using deafness as one factor. Deafness viewed as a personality trait rather than as a defect will no doubt be found to vary, as other traits do, in quality and quantity; its contribution to an individual's general character will no doubt be found to vary from one person to another, from one time to another, and from one situation to another.

In many factor-analytic studies of deaf people, the deafness-related variables used have been limited to audiometric measures, the cause of deafness, the age at which the hearing loss occurred or was diagnosed, and the type of school program in which the selected deaf subjects are or have been enrolled. But other parameters clearly need to be entered into factor-analytical studies of deaf people before the results can tell us what we need to know about these people's lives. The age at which sign language acquisition started and the quality and intensity of the sign language milieu would be important factors. Also, specific abilities and skills needed for sign language acquisition--speed, capacity, and memory for visual-motor representation, symbolization, sequencing and spatialization--would be valuable characteristics to include in a study. Unfortunately, however, I have not yet been able to find any factor-analytic study that includes all of these important characteristics of deaf people.

In general, after reviewing a large number of studies conducted over the years concerning adult deaf people's personalities, I was struck by how many of those studies convincingly attributed the difficulties experienced by deaf adults to limitations imposed on these individuals when they were children. I consequently decided to turn my attention to a review of studies focused on the social-emotional development of deaf children in search of critical variables affecting the formation of adult deaf people's personalities.

Personality Development in Deaf Children

Early Studies

As I have already suggested, results from a number of independent studies conducted in the 1930s, 40s, and 50s indicated that having deaf family members seemed to be an important factor in satisfactory personality development among deaf children, but none of the investigators during that period seem to have appreciated the profound implications of this fact.

One early study of the personal and social adjustment of deaf children was done by Lily Brunschwig (1936). Using a slightly modified form of the Rogers Test of Personality Adjustment with 159 pupils of public residential schools for the deaf and comparing the results with those similarly gathered from 243 hearing public school children, she found no statistically significant differences except in the extent of "daydreaming" among the boys.

These results did not correspond with Brunschwig's experience and expectations. She concluded that because the instrument used did not adequately differentiate between the groups tested, an instrument more sensible to the special problems of deaf people had to be constructed. When she then proceeded to develop such an instrument herself, she established as one of her criteria of validity that the test be able to distinguish "between children described by their teachers as problem cases and others regarded as well adjusted" (p. 77).

The resulting "Personality Inventory for Deaf Children, Form III" fulfilled this and other criteria and was then used in a study of 182 deaf and 348 hearing children in grades 5 to 8. The results showed that

> In most items the amount of overlap between the deaf and the hearing was marked. The deaf on average consistently obtained lower adjustment scores than the hearing. Differences between them were largest for both sexes in Social Adjustment, smallest for boys in School Adjustment and for girls in Home Adjustment (p. 125).

Brunschwig begins her final discussion of these results by commenting that the "overlapping in the range of scores of the deaf and the hearing on the Personality Inventory might be taken as an indication that the deaf in this respect are not a group apart" (p. 136). She concedes, in other words, that even her own carefully developed inventory revealed large areas of commonality between the deaf and hearing subjects. Nevertheless, pointing to her consistent finding that the deaf subjects appeared to be less well adjusted in every area than the hearing subjects, she speculates that

> There is a possibility that the inventory responses of the deaf might have been influenced by their different living conditions, their peculiar form of bilingualism[2], and characteristic language retardation with its various concomitants. But the extent to which these or other factors played a part remains unknown (p. 135).

---

[2]This term, as used here in 1936 when sign languages were not generally accepted as true languages, probably had a connotation closer to that conveyed now by the term "semilingualism," as used by linguists to suggest a deaf person's weak grounding in either a signed or a spoken language. It is impossible to know, however, the extent to which Brunschwig's subjects in this particular study were or were not competent users of sign language.

A partial answer to these speculations, however, was in fact found in another extensive study Brunschwig conducted with Rudolf Pintner (Pintner & Brunschwig, 1936) involving 1,263 deaf pupils. The study showed that the poorest adjustment occurred when there were no other deaf people in the family, that adjustment was best when there were deaf adults, and intermediate when there were deaf siblings and hearing parents. Brunschwig offers the following explanation of these results:

> It may be that the deaf child in a 'deaf' home is better understood during his preschool life. He is not handicapped by the absolute misunderstanding or by the misdirected sympathy which may be the lot of the deaf child in a home made up entirely of hearing individuals who have never had the experience of living with deaf individuals (p. 385).

The investigators did not directly comment on what today would be considered a matter of paramount importance: the method of communication used in homes with deaf parents and siblings. They did, however, attempt to correlate their adjustment data with data on the predominant methods of communication used at the deaf children's schools: manual, oral, or manual and oral combined. The results showed that on two of the four measures of adjustment the orally instructed pupils obtained higher mean scores than pupils taught manually or by the combined method, and on the two other measures the pupils taught by the combined method exceeded the other groups. However, the authors also stated, "Further analysis suggested that differences in adjustment among these groups might be due to the initial selection of subjects for such classes rather than to the influence of a specific method of instruction" (p. 387). In other words, better adjusted students may, for one reason or another, have been placed more frequently in oral classes than students with poorer adjustment.

O'Connor and Simon (1942), using Brunschwig's Personality Inventory on another large group of deaf subjects, also found that having deaf relatives significantly contributed to better social adjustment. Interestingly, however, the most obvious interpretation of these findings--that early exposure to and use of sign language communication might benefit personality development and social adjustment--did not seem to occur to any of these researchers.

Church (1951), who in his masters dissertation presented the catalog of prejudicial assumptions about deaf people cited earlier, conducted his own study of nine deaf pupils
from Clarke School for the Deaf and obtained personality profiles that contradicted the negative stereotypes conveyed in that list. One of the pupils, Alan, "is the child of deaf parents and has a deaf sister, but [my underline] is relatively well adjusted, thanks probably to his parents' own good adjustment" (p. 117). The "but" indicates that the finding somehow surprised Church, who carried out his research in an ideologically oral/aural milieu. Church apparently had his own underlying negative assumptions about the benefits on deaf children of contact with deaf adults. He may even have based his assumption that Alan's parents were "well adjusted" on the fact that they had wisely sent their deaf children to a private oral school, although Church did not explicitly say so.

Church presented a very optimistic view of deaf youngsters' capacities, and in his concluding chapter he put forward some suggestions about how to improve school environments and give deaf pupils a solid knowledge of the world and the "symbolic means with which to order and manipulate [their] scheme of orientation" (p. 136). As with so many other researchers from that period, however, Church overlooked--or failed to mention--the possibility that signing or fingerspelling might constitute at least part of the "symbolic means" deaf children need to "order and manipulate" their experience. He did, however, suggest that more attention to visual means of conveying information should be used in schools and recommended that a more extensive use of "pictures" might be helpful.

Contemporary Studies

From the 1960s to the present, studies of the developmental psychology of deaf children progressed in a slow, often halting manner from those that adhered to some of the negative stereotypes already discussed toward a less prejudiced, more open-minded, and to my mind more genuinely scientific form of inquiry.

Lewis (1968), in his Language and Personality in Deaf Children summarized research and opinion in the area of what he called "evidence of orectic impairment" in deaf children:

> In their personal development the children are found to be immature in self-awareness; to be what some observers term egocentric, others introverted; and even to have a distorted image of themselves. Frequently allied with this is a certain lack of self-confidence and initiative. They have a tendency to keep to the familiar, to perseverate, to adhere to fixed rules of behavior, to be 'rigid' rather than flexible, to be stubborn (p. 69).

Lewis' hypothesis was that this immature personality development is related to deaf children's "language retardation." He did not even mention the possibility in this book that sign language might be a language in its own right, but set out to determine the relationship between "language and personality," by which he meant spoken language and personality. After having studied more than 700 deaf children he concluded that "the commonly stated hypothesis--that linguistic development, in extent and kind, is also likely to be influential--is given some confirmation from the inferences it is reasonable to make from our data" (p. 177). This very modest conclusion only partially disguises the fact that the study simply failed to show the strong association between (English) language proficiency and personality development that Lewis and several others with him believed he would find.

In my opinion, Lewis failed to see that although the influence might not be direct, personality might still be indirectly influenced by any factors that limit deaf individuals' possibilities for having social and personal experiences. Also, by considering only the deaf child's communication with the hearing world, and overlooking the deaf child's communications and experiences with the deaf world, Lewis missed the most important truth revealed by his results: Despite the fact that these children were severely limited in their ability to interact with hearing people, their personalities developed in much the same way hearing children's do, primarily, no doubt, because many of their personal interactions were conducted in unimpaired sign language.

Now, to be fair to Lewis, he did not compare the deaf children to hearing children. He compared within the group of deaf children those with different commands of "language" (English), analyzed these results, and concluded, "We are justified in saying that there are 'positive' relationships between extreme levels of personal and ethical development, as rated by the schools, and achievements in our language [English] measures" (p. 174). Only five years before he completed his studies in deafness, however, Lewis (1963) wrote,

> The importance of language is so great in personal and social development that its recognition has led to an apparently paradoxical effect on the practice of many teachers of the deaf. While maintaining and even emphasizing that for a child's future as a member of society, he must speak and lip-read the mother tongue as far as this is possible for him, they nevertheless are deeply committed to the practice of teaching and encouraging the deaf children to use manual sign-language for immediate everyday intercourse with their schoolfellows. Only this way, the teachers believe, can the children be helped to overcome the disabilities of personal and ethical development which the impairment of language will impose upon them (p. 159).

As the history of science clearly shows, most new knowledge results from the unflinching exploration of apparent paradoxes such as the one Lewis stumbled upon when he discovered that personality development among deaf children was not nearly so strongly associated with English language proficiency as he originally assumed it would be. Unfortunately, Lewis chose merely to soften his earlier assertions rather than pursue the implications of his own unexpected findings.

If special, negative, "deaf" personality characteristics really developed strictly as a result of the lack of hearing, it could reasonably be assumed that they would be especially apparent in deaf children of deaf parents. But time after time the opposite has been and continues to be found. Meadow, for instance, in a study designed to test the role of early manual communication (1968a), using 31 matched-pairs of deaf children with deaf and hearing parents found the deaf children of deaf parents statistically superior, and "in the area of social functioning, differences favoring children with deaf parents were particularly impressive in areas of behavior which have been cited as 'characteristic' of deaf individuals" (p. 39). Meadow also showed that "deaf children with deaf parents demonstrate a more positive self-image than deaf children with hearing parents" (1969, p. 434).

In the 1970s, as the philosophy of total communication became more acceptable, investigators seemed to become more aware of some of the difficulties and controversies inherent in the deafness-related research situation as well as in hearing society's desire to "rehabilitate" persons with a hearing loss. In a theoretical treatise (based on clinical evidence) called "Personality Differences in the Perceptually Handicapped," Lesser and Easser (1972) pointed out some of the difficulties confronting the researcher in this field that might bias his "working model."

> It is almost impossible for the investigator in a field in which a major faculty such as hearing has been eliminated or severely impaired to place himself in the shoes of the developing infant and child ... such a child will in fact be a different organism from the child with no such impairment; he will be subjected to gross differences in mothering; in being confined to living within the shell of an incomplete perceptual environment (p. 459).

Greenberg and Marvin (1979) intended to examine the levels of communicative competence and mode of communication (speech and sign versus speech alone) on the developmental phase and quality of the attachment relationship of 28 deaf three- to five-year-old children to their mothers. When they did not find any significant difference between the total communication dyads and the pure oral groups in reciprocal understanding, they subdivided the sample into high and low communication dyads regardless of communication method used. They then found that "within this sample of deaf children, level of communication, not age, was associated with qualitatively different patterns of attachment" (p. 277).

Greenberg and Marvin did not compare the patterns of attachment in dyads of deaf infants and deaf mothers who used American Sign Language with those of deaf infants whose hearing mothers used English-based signs combined with speech (simultaneous communication). They concluded, however, that because earlier studies had pointed to apparent advantages for deaf children in deaf families, more observational studies of the social development of young deaf children with deaf parents would be necessary. Such studies, they suggested, would enable researchers "to distinguish the effect of early sign language input from the more global effects of growing up in a deaf family" (p. 278).

Meadow (1980), in a review of studies of the social and psychological development in deaf children between 1936 and 1978, including 18 studies of social maturity, eight of social interaction, eight of self-concept, and 12 of personality characteristics of deaf children, said that "in spite of

consistencies in findings of personality studies, it would be a mistake to conclude, that there is a single 'deaf personality type.' There is much diversity among deaf people ... related to [their] education, communication and experience" (p. 97). That caveat aside, Meadow went on to list the personality characteristics most consistently associated with deaf people in those studies: rigidity, egocentricity, absence of inner controls, impulsiveness, and suggestibility. She added that "social immaturity" was consistently found among deaf children as a group, although deaf children of deaf parents were found to be relatively more mature than deaf children of hearing parents.

Explaining these findings, Meadow, like many other researchers, pointed to the delayed language acquisition and limited opportunities for social interaction experienced by most deaf children, but she placed particular emphasis on the importance of interactions between these children and their parents.

> The didactic and intrusive nature of the mothers' interactions with their deaf children may be induced by a realistic assessment of reduced coping ability in the child. These interaction patterns may then lead to exacerbated dependence and even more retarded social maturity in the deaf child (p. 96).

The assumption that early interaction patterns are of great importance in the development of deaf people's personalities underlies the extensive research still being pursued by Meadow (now Meadow-Orlans) and many other researchers within the Gallaudet Research Institute's "Parent Infant Interaction Program."

A study by Meadow, Greenberg, Erting, and Carmichael (1981) compared the social and linguistic interaction in four different dyads: (1) hearing mothers using speech in their communication with their five-year-old deaf children, (2) hearing mothers using speech and sign communication simultaneously with their five-year-old deaf children, (3) deaf mothers using a variety of communicative means with four-year-old deaf children, and (4) hearing mothers with five-year-old hearing children. Videotaped interactions were transcribed, coded, and analyzed in terms of interaction and functional communication. The authors then concluded that "The most striking and consistent pattern that emerges from the data ... [is] ... the similarities in social and linguistic interaction of the deaf child/deaf mother dyads and the hearing child/hearing mother dyads" (p. 465).

A Swedish researcher, Kerstin Norden (1981), in reporting on a longitudinal study of learning processes and personality development of 23 young deaf children, some of whom had parents who used signs in their communication with the infants when the infants were as young as six months, recognized that "with deaf children the greatest threat to a healthy personality development, including language competence, is the way they are treated in our attempts to adapt them to their hearing environments" (p. 404).

In a study of 17 one- to five-year-old deaf children from families in which both parents were deaf, Meadow, Greenberg, and Erting (1983) analyzed the children's reaction to a separation period of three minutes and the following reunion with the mother, an exercise
intended to show the development of children's attachment to their mothers. "Analysis of their behavior indicated that they are comparable to children with normal hearing who have participated in research projects in the past," the authors concluded (p. 23).

Schlesinger and Acree (1984) in a longitudinal study of 39 deaf children from the toddler stage of development in 1969 through adolescence in 1981 found "enormous diversity of the group, on all dimensions" (p. 52). In the conclusion of their report on this study, the authors suggested that

"contemporary variations in performance among our deaf adolescents might be partly traceable to differences in opportunities for dialogue [i.e., effective communication] in the early years" (p. 56). Moores (1987) confirmed this when he summarized seven studies conducted between 1964 and 1975 comparing deaf children of deaf parents with deaf children of hearing parents. He suggested that such studies have shown "evidence indicating the superiority of deaf children of deaf parents in language functioning, academic achievement, and psychosocial adjustment" (p. 205).

Deaf Infancy Studies

The consistent finding over many decades that deaf children with deaf parents tend to outperform deaf children of hearing parents in both academic and psychosocial dimensions led to a number of studies beginning in the 1980s that attempted to examine in greater detail the nature of the interactions of deaf infants and deaf parents.

> Maestas y Moores (1980) reported a preliminary analysis of deaf mothers' interaction with seven deaf and hearing infants in the first year of life. She found that these parent-infant interactions proceed in a relaxed manner and ... parents and infants alike have an extensive repertoire of communicative acts. Infants initiate meaningful responses and dialogue from their parents and can respond to the communicative acts of their parents (p. 12).

Another study of the early linguistic environment provided deaf infants by their mothers was done by Moores and Maestas y Moores (1982) and involved three deaf mothers, each of whom had a deaf infant at least six months old. They found that "the results of the research suggest that profoundly deaf mothers utilize the same pragmatic functions in their communication with infants from one to six months as hearing mothers."

The language aspect has been very prominent in the few existing studies of deaf parents' interaction with their infants, as reported by Erting, Prezioso, and Hynes (in press), who mention only five studies in this area, including their own. In Denmark, to the best of my knowledge, only one study of one hearing impaired infant with two hearing impaired parents has been carried out (Damholt & Nielsen, 1982). Generally these studies have confirmed, but added little to, the interactional aspects described by Maestas y Moores.

Detailed analysis of face-to-face interaction of hearing impaired one-year-olds with their hearing mothers (Day, Gutfreund, & Bodner-Johnson, 1987) has indicated that hearing mothers of hearing impaired infants are more initiating or directive and less responsive in their communication than mothers of hearing infants. The impact of such behavior on the development of communication, language, and social-emotional development in hearing impaired children has been under investigation for several years in the Gallaudet Research Institute's Parent-Infant Interaction Program. Meadow-Orlans and her colleagues in the program have indicated (1978a) that they are pursuing this line of research because they realize the "significant effects on social-emotional, linguistic, and cognitive-perceptual development resulting from experiences during infancy, particularly those involving interactions of infants with primary caregivers" (p. 18).

In one research project now underway, Meadow-Orlans, Erting, Day, and MacTurk (1987b) are studying the impact of deafness on the interactions of deaf infants and their normally-hearing mothers. They are tracing through the first year of life the child's development of (1) social interaction and communication, (2) mastery motivation in exploratory behavior, and (3) ability to cope with stress. The study will shed light on the effects of hearing impairment on an infants' social-emotional development in the circumstances most often experienced by deaf children: those

in which the parents, unlike the infant, can hear. Data gathered in this study will be compared, at some point, with similarly gathered data on the interactions of deaf infants with deaf parents.

It would be fascinating to see what could be learned if the deaf infants now being studied in the Parent-Infant Interaction Program could be followed and tested periodically throughout childhood and into adulthood. I believe that important knowledge could be gained if the present infancy studies could be developed into longitudinal studies revealing the long-range effects on deaf people's social-emotional, linguistic, and academic development of various patterns of interaction experienced in infancy with either hearing or deaf parents.

Conclusion and Suggestions

Although some researchers studying deaf children's social-emotional development indeed appear to have found indications of adverse personality development in deaf as opposed to hearing children, other studies fail to reveal such differences. Even those studies in which statistically significant personality differences were found also generally revealed larger variations within the deaf population than between the deaf and hearing groups. More importantly, negative personality outcomes were certainly not found to be inevitable among deaf children, as has been demonstrated in many studies in which indications of positive personality development were found with great frequency among deaf children reared in deaf families.

Many studies reveal not only superior personality characteristics among deaf children reared in deaf families, but superior academic achievements as well (two goals curiously regarded by Schlesinger and Acree [1984] as "incompatible"). The intelligence scores of deaf students of deaf parents, as demonstrated in a study by Karchmer, Trybus, and Paquin (1978), were found to be superior to those of deaf students of hearing parents. Even the critical remarks of Conrad and Weiskrantz (1981) regarding some of the methodological difficulties inherent in such comparisons (e.g., controlling for the intelligence of the parents), leaves the results intact and thought-provoking.

In spite of the fact that deaf families have generally been considered to be disadvantaged in most respects, they seem to be highly successful in the upbringing of deaf children. There are probably several reasons for this outcome that we do not know enough about, although the superior ability of deaf parents to communicate with their children in a visually accessible language, thus capitalizing on deaf children's optimal period for early language acquisition, undoubtedly plays an enormous role. Continued investment in longitudinal studies of deaf caretakers' interactions with deaf children from early infancy will no doubt teach us other beneficial aspects of deaf parents' interactions with their deaf infants that have not yet been revealed by research.

Implications for Parents of Deaf Children

In this section, I intend to discuss some of the conclusions I have drawn concerning optimal conditions for the development of deaf infants and children. These conclusions are based on my reflections concerning the literature I have read, my own direct observations of deaf and hearing adults interacting with their children, and the many discussions I have had with researchers now involved in pioneering studies of parent-infant interaction.

It is my feeling that the previously described studies, in sum, suggest that deaf parents are so successful at facilitating deaf children's linguistic, intellectual, and personality development that hearing parents of deaf children cannot afford to ignore the positive lessons deaf adults can potentially teach. Research aimed at identifying the essential beneficial components of the interactions of deaf parents and deaf children is now being intensively pursued at Gallaudet University. I wish more results were currently available than is the case, because I wish that this document could include more information on this topic than currently is available. Nevertheless, I will attempt to suggest here a little of what may in time be more clearly understood about deaf children's early interactional needs.

I know of no better way to emphasize the importance of the ongoing search for optimal ways parents might interact with their deaf infants and preschool-aged children than to mention here some recent findings concerning the development of the central nervous system. The discovery that the number of cells in the human brain rapidly increases for up to two years after birth, then begins to level off (Dobbing & Sands, 1973)--a view in disagreement with the previously widespread belief that human brain development was virtually complete by the fifth postnatal month--has suggested to many scientists that mental stimulation or deprivation during the first two years of a person's life can significantly affect brain development and consequently a person's later ability to learn and adapt. These neurophysiological findings underlie much of the current research interest in parent/infant interaction.

Hirsch and Tieman (1987) in a survey of studies on the development and experience-dependent changes in the visual cortex of cats, conclude

> If these developmental principles can be applied to primates, the implications for human development are apparent; limitations in early environment may bias the young child's behavior even if these limitations are subsequently removed. Critical period studies show that a long shadow can be cast by an impoverished early environment (p. 70).

Interesting findings are also being reported in the field of developmental psychobiology. Some reports (Greenough, 1988b, Greenough et al.,1987) indicate that the number of synapses per neuron found in the visual cortex of young animals is directly correleted with the "richness" of the experiences of the animals and that increased vascular capacity is found in the brain tissue of animals raised in "complex stimulating environments," as compared to the lesser vascular capacity of brain tissue among animals raised in deprived environments.

Of course, new knowledge of this kind invites us to think of its possible implications for deaf children. If early experiences vitally affect the formation of basic neuronal structures and the development of stable reaction patterns, do the "complex stimulating environments" deaf parents tend to create for their deaf children actually strengthen the neurobiological foundations of their

children's later development? If so, then even more may be at stake in issues related to early identification and early intervention than previously has been supposed.

In what follows, I will attempt to suggest a positive approach that might be taken by hearing (as well as deaf) parents of deaf children who wish to create a stimulating environment for their deaf children and avoid the damage that could potentially result from early sensory deprivation.

A Sensory Integration Program for Deaf Infants

Normal hearing functions twenty-four hours a day, through walls, round corners, over long distances, and in darkness. Also, hearing directs (in combination with vision) the child's motor coordination and guides his or her attention and awareness, bringing things and events into focus. A hearing impairment may therefore also bring along a decrease in the stimulation of the other senses unless special care is taken. This calls for a planned intervention directed toward both the use of residual hearing and toward the use of other sensory paths, that is, an increase in stimulation of the other senses in order to compensate for the lowered level of sensory-motor integration.

How can a rich and healthy sensory nutrition for hearing impaired infants be planned to (1) optimize use of residual hearing, (2) substitute the inevitable losses with information from other senses, and (3) increase stimulation of other senses in order to maximize their complementary contribution to the sensory processing of information?

In most cases of hearing impairment some degree of residual hearing is usually present. Early hearing aid fitting will be important for the development of whatever hearing capacity, auditory awareness, and eventually auditory discrimination might exist.

Lowered thresholds of auditory perception are usually measured by pure tones just above the individual's threshold, and the auditory discrimination is measured by the percentage of words correctly identified. Both of these measures are difficult to obtain in small children and impossible to obtain in infants, so other ways of getting information regarding the function of the auditory system must be used. Unfortunately, results from other procedures only indicate auditory capacity in gross terms.

Early hearing aid selection and fitting must therefore be based on sparse and unprecise information with frequent reevaluation, which accentuates the need for supplementary means of securing optimum sensory stimulation and development.

Vision, touch, sound, and movement can be used simultaneously in many different ways. Sound amplification, depending on degree of hearing loss and in cases of total deafness, vibratory devices, will sometimes be helpful. Auditory stimulation as proposed by Wedenberg (1954)--talking loudly a few centimeters away the child's ear--is enjoyed by many hard of hearing children sitting on the laps of their mothers, simultaneously feeling
through close body contact her movements, breathing, and the vibration of her voice (Rohde, 1980).

Body contact and joint rhythmic movement by mother and infant (e.g., as in baby-rhythmics, and rocking, swinging, singing, and dancing) are activities that will promote sensory integration; baby-massage will stimulate proprioception and the tactile system.

Touch, vibration, and vision can be used to attract and direct attention, and varied and interesting expressive means such as mimicry can be used to arouse and increase curiosity, ensure awareness, and keep attention.

Sign language, as used spontaneously by deaf parents, incorporates many of the mentioned features, and has been shown to be the most efficient way of compensating for the loss of hearing and helping the individual to function to his fullest potential in spite of even severe sensory-neural hearing impairment. The use of signs by hearing parents also benefits the deaf child's development, as shown, for example, by Schlesinger and Meadow (1972). Hearing parents, however, should make an effort to meet and observe deaf adults as soon as possible and strive to incorporate into their own signing as much as they can of deaf people's natural use of signing.

So that such activities can be sensorially as well as mentally healthy, they should not be carried out as a routine program of stimulation or a kind of scheduled training, but used as integrated means in every suitable situation to intensify ordinary daily interaction and communication--while bathing, playing, participating in sports, getting around, shopping, cleaning, cooking, eating, and relaxing. Sensory stimulation is not an end in itself, but should be part of the interaction, an ingredient in two-way communication with age-appropriate social and emotional feedbacks, rewards, and goals.

I assume sensory organization is an individual characteristic, so no general prescriptions can be applied to all cases. The child's unique sensory capacities determine the possibilities and the limitations, and the organization of these capacities determine which processes are functioning best. Therefore it will be important to notice how the infant reacts to different approaches in order to adapt the dialogue to fit the purpose of the interaction. It may be even more important to notice the contributions to the dialogue coming from the child in both the ways and means he uses to express himself and in the content, the meaning, and the intention of his responses to the caretaker. Such observations may give clues also to his specific experiential needs and to the most effective sensory pathways.

As we are unable to interview an infant about his preferences, we will have to infer this on the basis of his responses to what he is offered, and as he seems to accept and put up with much of what he is provided with, the most important cue for us will often be his rejections, his defenses, his "no's".

Close observation of the interaction between infant and mother will reveal how they establish mutually satisfying interactions. Analysis of the infant's sensory-defensive reactions will show what kind of experiences he welcomes most, what sensory pathways he prefers; it will show when he is open, receptive and ready for the mother's response or initiative. Also the mother's preferred ways of expressing herself and of receiving information will be important to observe in order to encourage her to provide the sensory stimulation and the emotional interaction her baby needs and to respond to his requests. Such observations will provide the professional with information on possible needs for guidance and eventually teach the mother more appropriate interaction and communication skills.

None of these issues and suggestions for hearing impaired infants are new to professionals in the field of deafness (although the combination and the theoretical linking of perception, experience, and socio-emotional development may be). Many of them may, however, be new to the parents, daycare institutions, and babysitters who are most likely to play key roles in caring for a new generation of deaf children.

In light of all of the above, I find it somewhat alarming to consider that many parents overlook the absence of hearing in their babies for months and even years. Why? One of the reasons could be that the mutual need of mother and infant to share experiences reinforces the development of an interaction pattern that offers some immediate gratification, but which forces the infant to survive on a meager sensory diet at a very important time for the development of the infant's sensorineural organization. Although hearing may not seem to play such an important role in the child's development during this period, we know that it does. A hearing infant in a hearing family will develop auditory discrimination skills during the first months of life that will allow him or her later to acquire within a very short time the phonemes of the mother tongue. Similarly, a deaf child in a deaf family will develop some of the visual discriminative skills that will allow that child later to acquire within a very short period basic elements of the native sign language.

Even more important and fundamental, however, is the reinforcement of sensory-motor interaction patterns that give the children a sense of place in their environment and help them know what things or people are within or beyond their grasp. It is through early interactional experiences that children begin to build "working models" in their minds of what the world and the people in it are like, and of what is or is not possible. Parents not only give their children a model of language, in other words, but also of the nature of human beings in general and of the whole world.

To the extent that this proposed "Sensory Integration Program can increase deaf infants' possibilities for having complex sensory experiences, it will increase infants' capacity for development in all areas and their ability to gain access to the full range of possible experiences.

Overcoming Obstacles to Early Intervention

For many years in the field of deafness, parental guidance has been seen as one of the main avenues available to professionals wishing to intervene early and have a positive effect on parents' interactions with their deaf children. As is implied by my suggestions above concerning the sensory and experiential enrichment needed by deaf infants for optimal development and realization of potential, the importance of wisely informed early intervention is paramount. Until now, however, most programs for early intervention with deaf children have run into difficulties. It is critical that these problems be faced and resolved because improvements in the timing and content of intervention will have to be key components of any far-reaching effort to realize the optimal development of deaf infants' early sensory organization.

One of the greatest obstacles to early intervention is finding the deaf child. Even the best programs for identifying hearing impaired children and providing guidance services to their parents are not very successful in finding the babies within their first year of life.

According to Freeman, Carbin, and Roese (1981), studies from Canada and the U.S. show that the mean age of the child, when parents begin to suspect a hearing problem, is 13 months. Another problem is that an unnecessarily long time tends to pass after parents' suspicions first arise, before identification and diagnosis by professionals occurs and planned intervention can begin. In Denmark about half of the infants do not reach a special program for hearing impaired children until after the children's second birthday, according to statistical information from Bornekliniken, Copenhagen (Furth, 1978, p. 148).

Meadow-Orlans (1987) has pointed out that although several methods of audiometric testing of infants have been developed, and research has demonstrated the reliability of newborn screening, none of these methods is used extensively as a standard procedure.

The overwhelming majority of infants with a hearing impairment could at least be identified as children "at risk" within the first week of life. These children could be tracked until more advanced audiometric measures can be used to check for possible hearing loss or determine the exact audiogram. In spite of the risk of unnecessarily worrying some parents of normally hearing infants for a period, the importance of identifying deaf children as early as the neonatal period would more than justify such a program.

Whereas the fitting of a hearing aid will take some time until an exact diagnosis is obtained, an audiogram specified, and an earmold made, the use of sensory integration can start immediately after a problem of auditory deficiency is suspected. This approach cannot in any way harm a child who is later found to have normal hearing.

Once the hearing loss is suspected and confirmed another set of problems arises. Learning about the deafness will throw the infant's family into a turmoil of different feelings and emotional problems. Meadow (1968b) outlined some of the phases the parents will have to go through in learning about their child's deafness, and more recently Kenneth L. Moses (1985) described some of the same issues in a chapter entitled "Infant Deafness and Parental Grief: Psychosocial Early Intervention."

An illustration of the emotional impact on parents who learn their child has a hearing handicap can be found in parents' reports many years later. Choices in Deafness (Sue Schwartz, Ed., 1987) is a book that describes the individual experiences of twelve parents of deaf adolescents, and it is intended to help parents choose among the existing communication strategies. The twelve parents, whose children are now adults, tell about their emotional reactions to their child's deafness when they first learned about it.[3] These parents must have felt reasonably successful in dealing with the challenge because they agreed to contribute to a book giving advice to new parents in the same situation.

Emotional stress may mobilize the parent's resources to cope with the situation, but it may also cause the parent's ego defenses to work and eventually interfere with or even block their ability to deal with their own feelings and with the baby. In light of this potential threat to the interaction between the parents and the infant, it will be important to provide the parents with techniques that will give them an immediate experience of success and gratification in their interactions, an approach that will also cause rewarding reactions from the baby.

---

[3]Some of the words used by the parents to describe their emotional experiences are: "hysterical ...angry... Why am I being punished?... many years of guilt ... one big emotional jumble of pain, anguish, and frustration" (parent #1). "frustrating and frightening" (parent #2). "denial... guilt, anger... depression... tremendous grief" (parent #3). "anxiety... frustration... painful discovery... pity, hopelessness and guilty" (parent #4). "frustration... tension" (parent #5). "We fought back tears... we felt sick and scared... those first years were hard on the whole family" (parent #6) "crying frantically" (parent #7). "our fears were confirmed yet it was still a shock for us" (parent #8). "sorrow for the loss of all our dreams" (parent #9). "more and more concerned" (parent #10). "Tests confirmed our worst fears... we felt sorry that such a little girl had to wear those ugly things... we felt embarrassed for her in public... upset... more than I could handle... I was going to have a nervous breakdown" (parent #12).

Professional guidance in combination with instruction in sensory-motor interactions, and awareness and use of effective pre-language elements in communicating with an infant could lead to minimizing instead of increasing the stress on the parent.

A special difficulty for the parents may be the disagreement and controversy among professionals as to the approach to be used and recommended to parents for communicating with their deaf infants. In spite of 200 years of experience and 50 years of research in deaf education, even the most fundamental means of interaction, the communication mode, continues to be debated among experts. Some parents will be advised to rely purely on amplification of sound combined with the development of lipreading skills; others will be advised to supplement speech with one of several artificially devised manual codes of spoken language (this technique, called "simultaneous communication," is commonly used in "total communication" settings); and still others will be encouraged to learn and use as much as possible of the natural sign language used by deaf parents with their infants.

Most parents are exposed to more than one professional opinion, so they usually must "solve" the communication controversy, as it applies to their own child, by making a painful decision. The obvious importance of this decision makes it all the more agonizing for parents, who must sort out the conflicting claims of various "experts" while, at the same time, experiencing an acute emotional crisis as they adjust to the fact that something is incurably "different" about their infant.

My hope is that a program founded on a comprehensive view of sensory integration might be generally agreed on, supported, and even encouraged by professionals who have different opinions on many details of recommendable or ideal approaches. If such an agreement could occur, parents would be spared the current situation in which they are dragged into controversial issues at a time when they are struggling to overcome some of their own negative feelings, accept their child's deafness, and learn about the likely consequences of deafness on their infant.

Early detection and a sensitive approach to individual sensory needs will not solve all problems, but it will provide a basis for establishing fundamentally satisfying relations in a family with a deaf member, so that other problems can be dealt with.

In addition to hearing parents' emotional reactions to the loss of a perfect child, optimal interactions between hearing parents and their deaf children may also be hindered by the parents' own stereotypical attitudes about deafness and about deaf people. As we have seen in this paper, parents' expectations concerning their deaf child's potential abilities will not necessarily be heightened by much of the literature they may find on the subject, because the conclusions of many researchers have also, regrettably, been tainted by prejudice. It is my view that parents of deaf children must work to rid themselves of stereotypical notions about the capabilities and potential of deaf people in order to maintain a vitally needed positive attitude toward their deaf child. Some studies concerning the effects of stereotypes on the perception of infants' characteristics have demonstrated, for example, that the label prematurity has a stronger impact on parents' attitude toward their infant than does the infant's gender (Booth, 1988). The labels deaf and hearing impaired also may have a decided impact on parents' attitudes, and may negatively influence the interaction between parents and their deaf infant, eventually setting into motion a self-fulfilling prophesy.

The demands in terms of time used to visit institutions, to get counseling, to attend to the special needs of the deaf infant, to meet expenses, or to find ways to offset the effects of reduced job hours may all impose stress on family life and therefore on the interactions between the infant and his or her primary caretakers. In addition, the primary caretaker--usually the mother--may

have to carry the burden of a frustrated husband and upset grandparents and, of course, the advice of well-meaning but often ill-informed friends and neighbors.

Fortunately, however, not everything works out in a negative direction. Usually counselors are helpful and supportive. Employing sufficient numbers of deaf counselors, incidentally, would in itself communicate to hearing parents a very important message: that there is a future for their deaf child. Providing families with techniques that genuinely improve interactions between deaf infants and their caretakers will no doubt lead to both immediate and long-term rewards for all involved. Infants' positive responses to caretakers' efforts will undoubtedly result in more satisfying relationships that will reward the caretakers and, hence, sustain the ongoing hard work involved in developing effective interactive and communicative skills. Ongoing studies of deaf mothers' interaction with their infants will no doubt further increase our knowledge of how to provide optimal situations for mother and child.

Hearing parents with deaf infants could learn so much of great value from deaf adults that more ways need to be developed for these parents not only to meet deaf adults but also to benefit in lasting ways--as their children no doubt will--from the support of the deaf community. The establishment of quality deaf infant daycare facilities with sufficient numbers of deaf daycare providers would be one way such support could be provided, improving the economic as well as the social situation of families with deaf infants.

I regret to say that much, if not most, of what needs to be done to ensure the optimal development of deaf children is not being done today. So let's hurry! Deaf infants can't wait!

References

Altshuler, K.Z. (1974). The social and psychological development of the deaf child: Problems, their treatment and prevention. American Annals of the Deaf, 365-376.

Ayres, A.J. (1974). Sensory integration and learning disorders (third printing). Los Angeles: Western Psychological Services.

Ayres, A.J. (1979). Sensory integration and the child. Los Angeles: Western Psychological Services.

Barker, R.G., Wright, B.A, Meyerson, L., & Gonick, M.R. (1953). Adjustment to physical handicap and illness: A survey of the social psychology of physique and disability. New York: Social Science Research Council.

Basilier, T. (1964). Surdophrenia. Acta Psychiatricia Scandinavica Supplementum, 40, 362-374.

Basilier, T. (1973). Hoerselstap og Egentlig Doevhet i Socialpsykiatrisk Perspektiv. Oslo: Universitetsforlaget.

Belmont, J.M., Karchmer, M.A., & Bourg, J.W. (1983). Structural influences on deaf and hearing children's recall of temporal/spatial incongruent letter strings. Journal of Educational Psychology, 3, 259-274.

Blair, F.X. (1957). A study of the visual memory of deaf and hearing children. American Annals of the Deaf, 102, 254-263.

Bolt, J.E. (1973). Personality Differences Between Oral and Total Communication Deaf Subjects as Measured by the California Test of Personality. Masters thesis.

Booth, C.L. (1988). Parental belief about infants: A model relating parental stereotyping to parent infant interaction. Paper presented at the International Conference on Infant Studies, Washington, DC.

Brauer, B.A. (1987). Personality profile of deaf college students using the ASL-version of the MMPI. In R.J. Trybus & M.A. Karchmer (Eds.), A Tradition of Discovery The 1986/87 Annual Report of the Gallaudet Research Institute. Graduate Studies and Research, Gallaudet University, Washington, DC.

Brunschwig, L. (1936). A study of some personality aspects of deaf children. Bureau of Publications, Teachers College, Columbia University, New York.

Church, J. (1951). Deafness, Language, and Personality. Masters thesis, Cornell University.

Conrad, R. (1970). Short term memory processes in the deaf. British Journal of Psychology, 61(2).

Conrad, R. & Weiskrantz, B.C. (1981). On the cognitive abilities of deaf children with deaf parents. American Annals of the Deaf, 126(9), 995-1003.

Damholt, H. & Nielsen, C.L. (1982). Samtale med et Spaedbarn - Rytmisk Samspil. Doctoral dissertation, University of Copenhagen, Denmark.

Day, P.S., Gutfreund, M., & Bodner-Johnson, B. (1987). Face-to-Face Interaction Between Hearing Mothers and Hearing-Impaired Infants. Unpublished paper. Information presented at the Conference of the Division of Early Childhood, Council for Exceptional Children, Denver, and the Convention of the American Speech, Language, and Hearing Association, New Orleans.

Delgado, G.L. (1982). Beyond the norm - Social maturity and deafness. American Annals of the Deaf, 127(3), 356-360.

Dobbing, J. & Sands, J. (1973). The quantitative growth and development of the human brain. Archives of Diseases of Childhood, 48, 757-767.

Donoghue, R.J. (1968). The deaf personality - A study in contrasts. Journal of Rehabilitation of the Deaf, 2, 37-52.

Erting, C.J., Prezioso, C., & Hynes, M.O. (in press). Mother signs in baby talk. In F. Karlsson & W. Edmonson (Eds.), Proceedings of the Fourth International Symposium on Sign Language Research. London: Multilingual Matters.

Evans, J.W. (1987). Mental health treatment of hearing impaired adolescents and adults. In B. Heller, L. Flohr, & L.S. Zegans (Eds.), Psychosocial Interventions with Sensorially Disabled Persons. Orlando, FL: Grune & Stratton.

Farrugia, D. & Austin, G.F. (1980). A study of social-emotional adjustment of hearing impaired students in different educational settings. American Annals of the Deaf, 535-541.

Federal Register. (1977). Education of handicapped children, Implementation of Part B of the Education of the Handicapped Act, Part II, U.S. Department of Health, Education and Welfare, Office of Education, Washington, DC.

Freeman, R.D., Carbin, C.F., & Boese, R.J. (1981). Can't your child hear - A guide for those who care about deaf children. Austin, TX: PRO-ED.

Furth, H.G. (1978). Dove Borns Indlaering og Udvikling. Copenhagen, Denmark: Munksgaard.

Greenberg, M.T. (1980). Hearing families with deaf children: Stress and functioning as related to communication method. American Annals of the Deaf, 1063-1071.

Greenberg, M.T. & Marvin, R.S. (1979). Patterns of attachment in profound deaf preschool children. Merrill-Palmer Quarterly, 25, 265-279.

Greenough, W.T. (1988a). Continuities and discontinuities in development: A neurobiological view. Paper presented at the International Conference on Infant Studies, Washington, DC.

Greenough, W.T. (1988b). Personal communication.

Greenough, W.T., Black, & Wallace, C.S. (1987). Experience and brain development. Child Development, 58, 539-559.

Greenspan, S.I. & Porges, S.W. (1984). Psychopathology in infancy and early childhood: Clinical perspectives on the organization of sensory and affective-thematic experience. Child Development, 55, 49-70.

Gregg, T.A. (1985). A Study of the Personality Development of Prelingually Deaf School Children. Doctoral dissertation, University of Texas, Austin.

Heider, F. & Heider, G.M. (1941). The adjustment of the adult deaf. Studies in the Psychology of the Deaf, No. 2. Psychological Monographs, 53.

Hirsch, H.V.B. & Tieman, S.B. Perceptual development and experience-dependent changes in cat visual cortex. In M.H. Bornstein (Ed.), Sensitive periods in development: interdisciplinary perspectives. Hillsdale, NJ: Lawrence Earlbaum.

Jacobs, L.M. (1974). A deaf adult speaks out. Washington, DC: Gallaudet College.

Kannapell, B. (1980). Personal awareness and advocacy in the deaf community. In C. Baker & R. Battison (Eds.), Sign language and the deaf community. Silver Spring, MD: National Association of the Deaf.

Karchmer, M.A., Trybus, R.J., & Paquin, M.M. (1978). Early manual communication, parental hearing status and the academical achievements of deaf students. Unpublished paper. American Education Research Association, Toronto, Canada.

Kolata, G. (1984). New neurons form in adulthood. Science, 224, 1325-1326.

Lane, H. (1988). Is there a psychology of the deaf? Paper given at Gallaudet University, March 7, 1988.

Lesser, S.R. & Easser, R. (1972). Personality differences in the perceptually handicapped. Journal of American Academy of Child Psychiatry, 11, 458-466.

Levine, E.S. (1956). Youth in a soundless world. New York, NY: University Press.

Levine, E.S. (1976). Psychocultural determinants in personality development. Volta Review, 258-267.

Levine, E.S. (1981). The ecology of early deafness: Guides to fashioning environments and psychological assessments. New York: Columbia University Press.

Lewin, K. (1936). Principles of topological psychology. New York: McGraw Hill.

Lewis, M.M. (1963). Language, thought, and personality in infancy and childhood. New York: Basic Books.

Lewis, M.M. (1968). Language and personality in deaf children. National Foundation for Educational Research in England and Waics, the Mere, Upton park, Slough, Bucks, London.

Lieth, L. von der (1977). Nogle overvejelser over de sociale situationer den enkelte doeve befinder sig i paa tidspunkter af sit liv. In Doev i Dag. Danske Doeves Landsforbund. Copenhagen, Denmark.

Lourie, R.S. (1988). Personal communication.

Lytle, L.R. (1987). Identity formation and developmental antecedents in deaf college women. Doctoral dissertation, The Catholic University of America, Washington DC.

Madill, H.M. & Gironella, O.C. (1982). Occupational therapy services for hearing-impaired children. Sensory Integration: Special Interest Section Newsletter, 5(4), 187-189.

Meadow, K.P. (1968a). Early manual communication in relation to the deaf child's intellectual, social, and communicative functioning. American Annals of the Deaf, 113, 29-41.

Meadow, K.P. (1968b). Parental response to medical ambiguities of congenital deafness. Journal of Health and Social Behavior, 9(4), 299-309.

Meadow, K.P. (1969). Self-image, family climate, and deafness. Social Forces, 47, 428-438.

Meadow, K.P. (1980). Deafness and child development. Berkeley, CA: University of California Press.

Meadow, K.P. & Dyssegaard, B. (1983). Teachers' ratings of deaf children: An American-Danish comparison. American Annals of the Deaf, 128, 900-908.

Meadow, K.P., Greenberg, M.T., Erting, C., & Carmichael, H. (1981). Interaction of deaf mothers and deaf preschool children: Comparisons with three other groups of deaf and hearing dyads. American Annals of the Deaf, 126(4).

Meadow, K.P., Greenberg, M., & Erting, C. (1983). Attachment behavior of deaf children with deaf parents. Journal of the American Academy of Child Psychiatry, 22(1), 23-28.

Meadow, K.P., Karchmer, M.A., Petersen, L.M. & Rudner, L. (1980). Meadow/Kendall Social-Emotional Assessment Inventory for Deaf Students Manual. Washington, DC: Gallaudet College.

Meadow-Orlans, K.P. (1987). An analysis of the effectiveness of early intervention programs for hearing-impaired children. In M.J. Guralnick & F.C. Bennett (Eds.), The effectiveness of early intervention for at-risk and handicapped children. New York: Academic Press.

Meadow-Orlans, K.P., Erting, C.J., MacTurk, R.H., Day, P.S., Prezzioso, C.T., Tetu, L., & O'Grady, M. (1987a). Parent-infant interaction. In R.J. Trybus & M.A. Karchmer (Eds.), A Tradition of Discovery: The 1986/87 Annual Report of the Gallaudet Research Institute. Graduate Studies and Research, Gallaudet University, Washington DC.

Meadow-Orlans, K.P., Erting, C.J., MacTurk, R.H., & Day, P.S. (1987b). Unpublished grant application.

Meyerson, L. (1955). A psychology of impaired hearing. In W.M. Cruickshank (Ed.), Psychology of Exceptional Children and Youth. Englewood Cliffs, NJ: Prentice Hall.

Moores, D.F. (1987). Educating the deaf: Psychology, principles, and practices (third edition). Boston, MA: Houghton Mifflin.

Moores J.M. (1980). Early linguistic environment: Interactions of deaf parents with their infants. Sign Language Studies, 26, 1-13.

Moores, J.M. & Moores, D.F. (1982). Interaction of deaf parents with children in the first months of life. In Proceedings of the International Congress on Education of the Deaf 1980 Volume I. Hamburg: Julius Groos.

Moses, K.L. (1985). Infant deafness and parental grief: Psychosocial early intervention. In F. Powell et al. (Eds.), Education of the Hearing Impaired Child. San Diego, CA: College-Hill Press.

Myklebust, H.R. (1964). The psychology of deafness (second edition). New York: Grune & Stratton.

Myklebust, H.R. & Brutten, M. (1953). A study of the visual perception of deaf children. Acta Otolaryngologica Supplementum 105. Lund, Sweden.

Norden, K. (1981). Learning processes and personality development in deaf children. American Annals of the Deaf, 126(4), 404-410.

O'Connor, C.D. & Simon, E. (1942). A preliminary survey into problems of adjustment among pupils of the Lexington School for the Deaf. American Annals of the Deaf, 224-240.

Pintner, R. & Brunschwig, L. (1936). Some personality adjustments of deaf children in relation to two different factors. Journal of Genetic Psychology, 49, 377-388.

Rainer, J.D. & Altshuler, K.Z. (1967). Psychiatry and the deaf. Washington DC: U.S. Department of Health, Education and Welfare.

Ratner, V.L. (1985). Spatial-Relationship deficits in deaf children: The effects of communication and classroom performance. American Annals of the Deaf, 130(3), 250-254.

Remvig, J. (1969). Three clinical studies of deaf mutism and psychiatry. Copenhagen: Munksgaard.

Robinson, C. & Riggio, M. (1975). Jean Ayres' sensory integrative approach. Unpublished manuscript reprinted by South Central Regional Center for Services to Deaf-Blind Children, Dallas, Texas.

Rohde, I. (1980). Auditory training by the ear. In L. Marckmann (Ed.), Auditory Training of Hearing Impaired Pre-school Children. Stockholm: Scandinavian Audiology, Suppl. 10.

Rosenthal, R. (1966). Experimenter effects in behavioral research. New York: Appleton-Century-Crofts.

Sainsbury, S. & Lloyd-Evans, P. (1986). Deaf worlds: A study of the integration, segregation and disability. London: Huchinson.

Schlesinger, H.S. & Acree, M.C. (1984). The antecedents of achievement and adjustment: A longitudinal study of deaf children. In G.B. Anderson & D. Watson (Eds.), The Habilitation and Rehabilitation of Deaf Adolescents. The National Academy, Gallaudet College, Washington DC.

Schlesinger, H.S. & Meadow, K.P. (1972). Sound and sign: Childhood deafness and mental health. Berkeley, CA: University of California Press.

Schwartz, S. (Ed.) (1987). Choices in deafness: A parents guide. Kensington, MD: Woodbine House.

Sterritt, G.M., Camp, B.W., & Lipman, B.S. (1966). Effects of early auditory deprivation upon auditory and visual information processing. Perceptual and Motor Skills, 23, 123-130.

Trybus, R.J. (1971). Time Estimation in Oral Deaf Adolescents. Unpublished doctoral dissertation, St. Louis University. St. Louis, MO.

Wedenberg, E. (1954). Auditory training of severely hard of hearing preschool children. Acta Otolaryngologica Supplementum 110.