In the present chapter, a summary is made of the available literature on Gesture, Hearing Impairment and Sign Language leading to the conceptual framework of the study.

SECTION A

Gesture

The hand-wave is a primary gesture, because it has no other existence or function. It is a piece of communication from start to finish. The sneeze, by contrast, is a secondary, or Incidental Gesture. Its primary function is mechanical and is concerned with the sneezer’s personal breathing problem. In its secondary role, however it cannot help but transmit a message to his companion warning that he may have caught a cold.

Morris (1984) classified Gestures into 14 types. They are
i. Incidental gestures
ii. Expressive gestures
iii. Mimic Gestures
iv. Schematic gestures
v. Symbolic gestures
vi. Technical gestures
vii. Coded gestures
viii. Gesture variants
ix. Multi message gestures
x. Gesture alternatives
xi. Hybrid gestures
xii. Compound gestures
xiii. Relic gestures
xiv. Regional signals
Incidental gestures - Mechanical actions with secondary messages

Many of our actions are basically non-social, having to do with problems of personal body care, body comfort and body transportation; we clean and groom ourselves with a variety of scratchings, rubbings and wipings, we cough, yawn and stretch our limbs; we eat and drink; we prop ourselves up in restful postures, folding our arms and crossing our legs; we sit, stand, squat and recline, in a whole range of different positions, we crawl, we walk and run in varying gaits and styles. But although we do these things for our own benefit, we are not always unaccompanied when we do them. Our companions learn a great deal about us from these 'personal' actions – not merely that we are scratching because we itch or that we are running because we are late, but also, from the way we do them what kind of personalities we possess and what mood we are in at the time.

Sometimes the mood-signal transmitted in this way is one that we would rather conceal, if we stopped to think about it. Occasionally we do become self-consciously aware of the 'mood broadcasts' and 'personality displays' we are making and we may try to check ourselves. But often we do not, and the message goes out loud and clear.

Many of our Incidental Gestures provide mood information of a kind that neither we nor our companions become consciously alerted to. It is as if there is an underground communication system operating just below the surface of our social encounters. We perform an act and it is observed. Its meaning is read, but not read out loud. We 'feel' the mood, rather than analyse it. Occasionally an action of this type becomes so characteristic of a
particular situation that we do eventually identify it – as when we say of a
difficult problem: ‘That will make him scratch his head’, indicating that we do
understand the link that exists between puzzlement and the Incidental
Gesture of head-scratching. But frequently this type of link operates below
the conscious level, or is missed altogether. Where the links are clearer, we
can of course, manipulate the situation and use our Incidental Gestures in a
contrived way.

Expressive gestures - Biological gestures of the kind we share with other animals

Primary Gestures fall into six main categories. Five of these are
unique to man, and depend on his complex, highly evolved brain. The
exception is the category and is called Expressive Gestures. These are
gestures of the type which all men every where, share with one another, and
which other animals also perform. They include the important signals of
Facial Expressions, so crucial to daily human interactions.

All primates are facially expressive and among the higher species the
facial muscles become increasingly elaborate, making possible the
performance of whole range of subtly varying facial signals. In man this
trend reaches its peak, and it is true to say that the bulk of non-verbal
signaling is transmitted by human face. Human hands are also important,
having been freed from their ancient locomotion duties, and are capable,
with their Manual Gesticulations, of transmitting many small mood
changes by shifts in their postures and movements, especially during
conversational encounters.
In origin, our Expressive Gestures are closely related to our Incidental Gestures, because their roots also lie in primarily non-communicative actions. The clenched fist of the gesticulator owes its origin to an intention movement of hitting an opponent, just as the frown on the face of a worried man can be traced back to an ancient eye-protective movement of an animal anticipating physical attack.

Despite their worldwide distribution, Expressive Gestures are nevertheless subject to considerable cultural influences. Even though we all have an evolved set of smiling muscles, we do not all smile in precisely the same way to the same extent, or on the same occasions.

**Mimic Gestures** - Gestures which transmit signals by imitation

Mimic Gestures are those in which the performer attempts to imitate, as accurately as possible, a personal, an object or an action. The essential quality of a Mimic Gesture is that it attempts to copy the thing it is trying to portray. No stylized conventions are applied. A successful Mimic Gesture is therefore understandable to someone who has never seen it or performed before. No prior knowledge with a particular item is represented. There are four kinds of Mimic Gestures.

First there is Social Mimicry or 'putting on a good face'. We have all done it. This should not be confused with what psychologists call 'role-playing'. When indulging in Social Mimicry we deceive only others but when role-playing, we deceive ourselves as well. Second, there is Theatrical Mimicry — the world of actors and actresses, who simulate everything for our
amusement. Essentially it embraces two distinct techniques. One is the calculated attempt to imitate specifically observed actions. The actor who is to play a general, say, will spend long hours watching films of military scenes in which he can analyse every tiny movement and then consciously copy them and incorporate them into his final portrayal. The other technique is to concentrate instead on the imagined mood of the character to be portrayed to attempt to take on that mood and to rely upon it to produce, unconsciously, the necessary style of body actions.

The third is the Partial Mimicry in which the performer attempts to imitate something, which he is not and never can be such as a bird or raindrops. Usually only the hands are involved, but these make the most realistic approach to the subject they can manage. If a bird, they flap their 'wings' as best they can if raindrops they describe a sprinkling descent as graphically as possible. Widely used mimic gestures of this kind are those which convert the hand into a 'gun' an animal of some sort, or the foot of an animal or those which use the movements of the hand to indicate the outline shape of an object of some kind.

The fourth kind Mimic Gesture can best called Vacuum Mimicry, because the action takes place in the absence of the object to which it is related. If a man is hungry, for example he can go through the motions of putting imaginary food into my mouth. If he is thirsty, he can raise his hand as if holding an invisible glass and gulp invisible liquid from it. The important Feature of Partial Mimicry and Vacuum Mimicry is that like Social and Theatrical Mimicry, they strive for reality. They can be understood internationally.
Schematic Gestures - Imitations that become abbreviated or abridged

Schematic Gestures are abbreviated or abridged versions of Mimic Gestures. They attempt to *portray* something by taking just one of its prominent features and then performing that alone. There is no longer any attempt at realism.

Schematic Gestures usually arise as a sort of gestural shorthand because of the need to perform an imitation quickly and on any occasions. Just as, in ordinary speech, we reduce the word 'cannot' to 'can't' so can elaborate miming of a charging bull becomes reduced simply to pair of horns jabbed in the air as a pair of fingers.

When one element of a mime is selected and retained in this way, and the other elements are reduced or omitted, the gesture may still be easy to understand, when seen for the first time, but the stylization may go so far that it becomes meaningless to those not 'in the know'. The schematic gesture then becomes a local tradition with a limited geographical range. If the original mime was complex and involved several distinctive features, different localities may select different key features for their abridged versions. Once these different forms of shorthand have become fully established in each region, then people who use them will become less, and there quickly develops, in gesture communication, a situation similar to that found in linguistics. Just as each region has its own verbal language, so it also has its own set of Schematic Gestures.
Some objects, however, have one special feature that is so strongly characteristic of them that even with Schematic Gestures; there is little doubt about what is being portrayed. Cattle are nearly always indicated by their horns alone, and the two horns are always represented by two digits. In fact if an American Indian, a Hindu dancer, and an Australian Aborigine met, they would all understand one another's cattle signs, and we would understand all three of them. Each culture has its own variant, but the fact that horns are such an obvious distinguishing feature of cattle means that, despite local variations, the bovine Schematic Gestures is reasonably understandable in most culture.

Symbolic Gestures - Gestures which represent moods and ideas

A symbolic gesture indicates an abstract quality that has no simple equivalent in the world of objects and movements. Here we are one stage further away from the obviousness of the enacted Mimic Gesture.

Two basic problems where Symbolic Gestures are concerned either one meaning may be signaled by different actions, or several meanings may be signaled by the same actions, as we move from culture to culture. The only solution is to approach each culture with an open mind and learn their Symbolic Gestures.

As part of this process, it helps if a link can be found between the action and the meaning, but this is not always possible. In some cases we simply do not know how certain Symbolic Gestures arose. It is clear that they are symbolic because they now represent some abstract quality, but how they first acquired the link between action and meaning has been lost somewhere in their long history.
In earlier times it was common place to make a more conspicuous sign of the cross (to cross oneself) by movement the whole arm, first down wards and then sideways, in front of the body, tracing the shape of the cross in the air. This can still be seen in some countries today in a non-religious context, acting as a 'good luck' protective device.

**Technical gestures - Gestures used by specialist minorities**

Technical Gestures are invented by a specialist minority for use strictly within the limits of their particular activity. They are meaningless to anyone outside the specialization and operate in such a narrow field that they cannot be considered as playing a part in the mainstream of visual communication of any culture.

Television-studio signals are a good example of Technical Gestures in use today. Other Technical Gestures are found wherever an activity prohibits verbal contact. Firemen, crane-drivers, airport- signalmen, dealers at auction, and restaurant staff, all have their own special Technical Gestures. Either because they must keep quiet, must be discrete or cannot be heard, they develop their own sets of signals. The rest of us can ignore them, unless we, too, wish to enter their specialized spheres.

**Coded Gestures - Sign-language based on a formal system**

Coded Gestures, unlike all others, are part of a formal system of signals. They interrelate with one another in a complex and systematic way, so that they constitute a true language. The special feature of this category is that the individual units are valueless without reference to the
other units in the code. Technical Gestures may be systematically planned, but, with them, each signal can operate quite independently of the others. With Coded Gestures by contract, all the units interlock with one another on rigidly formulated principles, like the letters and words in a verbal language.

The most important example is the Sign Language of hand signals used by the hearing impaired, of which there is both a one-handed and a two-handed version. Also, there is the Semaphore Language of arm signals, and the language of the race course. These all require considerable skill and training and belong in a totally different world from the familiar gestures we employ in everyday life. They serve as a valuable reminder, though of the incredibly sensitive potential we all possess for visual communication. It makes it all the more plausible to argue that we are all responding, with greater sensitivity than we may realize, to the ordinary gestures we witness each day of our life.

**Gesture Variants** - Personal or local variations on gestural themes

Gestures, by definition, transmit signals, and these signals must come across clearly if we are to understand their messages. They cannot afford to be vague and woolly: they must be crisp and sharp and difficult to confuse with other signals. To do this they have to develop a 'typical form' that shows comparatively little variation. And they must be performed with a 'typical intensity' showing much they same speed strength and amplitude on each occasion that they are brought into action.
We all wave in much the same way, clap our hands at roughly the same speed, beckon with much the same amplitude, and shake our heads with the same sort of rhythm. This is not a conscious process. We simply tune into the cultural norm. We smoothen the path of the hundreds of tiny messages that fly between us whenever we meet and interact. Somehow we manage to match up our gestures with those of our companions, and they do the same with ours. Together we synchronize the intensities of our gesturings until we are all operating in concert, as if under the control of an invisible cultural conductor.

As always with human behaviour, there are exceptions to this general rule. We are not automations. We show personal idiosyncracies—individual variations on the cultural themes. One man, with a particularly fine set of teeth, shows an exaggeratedly intense, open-lipped smile, and he does this even in mild situations. Another man, with bad teeth, gives a more closed smile even when strongly stimulated. One man bellows with laughter, while another titters, in reaction to the same joke. These are the Gesture Variants and they provide each of us with a behavioural 'style' or body-personality. They are small differences compared with our general gesture-conformity, but they can become important personal labels nonetheless.

Except in special cases, Gesture Variants constitute a threat to this system and tend to be eliminated or reduced. In this way, each culture develops its own clear-cut repertoire of discrete visual signals, each unit being clearly differentiated from all the other. Only when our wanderlust and our modern mobility lead us into foreign parts, does this efficient communication system start to break down.
Multi message Gestures - Gestures that have many meanings

A multi message Gesture is one that has a number of totally distinct meanings, depending on the time and the place. When an American wants to signal that something is OK, fine, perfect, great etc., he raises his hand and makes a circle with his thumb and forefinger. This circle-sign has only one message for his, and he might be surprised to discover that in other countries it can mean something quite different. In Japan, for instance, it is the gesture for money. In France it mean 'zero' or 'worthless'. In Malta it means that someone is a male homosexual. In Sardinia and Greece it is an obscene comment or insult to either a male or female. Apart from the fact that such differences can obviously lead to all kinds of misunderstandings when foreigners meet, it is puzzling that such contradictory messages should have arisen in the first place. To find the explanation we have to look at the basic symbolism used in each case.

The American sign for something perfect is derived from the hand posture for precision. If we want to say that something is precise or exact, we make the movement of holding something very small between the tips of our thumb and forefinger. People all over the world do this unconsciously when speaking about some fine point. The object the hold is imaginary- they merely go through the motions of holding it, and in this way they automatically form a ring or circle with the thumb and forefinger. In America this unconscious gesticulation became amplified into a deliberate signal, the expression of exactness developing into the message 'exactly right' or perfect, and the famous OK sign was born.
Multi message Gestures with as many meanings as the circle-ring are comparatively rare, but there are large number of signs that have more than one basic message. Wherever the action involved has a built-in ambiguity, there we are likely to find alternative meanings if we look far enough.

**Gesture Alternatives - Different gestures that transmit the same signal**

Just as one gesture can have many different meanings, so can many different gestures have the same meaning. If a message is basic enough and of sufficient importance to appear in widely varying cultures, the chances are high that it will be transmitted by gestures that are strikingly different both inform and in origin.

If two men are standing on a street corner and they see an attractive girl walking past, one may turn to the other and signal his appreciation by a simple gesture. Even within one particular culture there are usually several ways in which he can do this; but when we cast our net wider and observe this fleeting incident on street corners in many different countries, the list of possible signals becomes even more impressive.

**Hybrid Gestures - Signals made up of two original gestures**

A Hybrid Gesture is one that combines two separate gestures, with distinct origins, in a single action. A popular threat display is the cutting through the air of a stiffly flattened hand-the Hand Chop gesture, common in Italy and various other countries around the Mediterranean. Its meaning is obvious enough—I will chop off your head. In Tunisia this gesture often
becomes grafted on to the French sign meaning 'zero' or 'worthless' which is performed by making a ring from the thumb and forefinger form the circle, while the other three fingers are held stiffly flattened. In this posture the hand is chopped repeatedly though the air. The message is 'I will kill you tomorrow'. It is a combination of the two parent messages 'worthless' and 'kill'. In effect, the signal says: 'You are so worthless that I will kill you tomorrow'.

Hybrid Gestures of this kind are extremely rare in ordinary social gesturing. When giving a visual signal, people tend to do one thing at a time. Gesture communication is unitary rather than a language that combines visual 'words' into visual 'sentence'. Of course, we may perform a whole stream of gestures, one after the other, and we may grimace while gesticulating, but that is not the same as welding together two distinct combine two actions that both have the same general meaning, but are brought together in the hybrid form to produce a double-strength signal. The insulting Forearm Jerk gesture, for instance may be combined with the equally insulting Middle-finger, Jerk, or with the obscene sign. Usually these are given separately, but when done together they intensify the insult that is being hurled at the victim.

**Compound gestures** - Gestures made up of a number of distinct elements

A Compound Gesture is one that is made up of a number of separate elements, each of which has at least some degree of independence.
Many human gestures have only one element. If a man is busy working at his desk and someone asks him if the work is going well, he may answer by giving a thumb-up sign. He can do this without looking up and without pausing in his work. He merely extends a hand with the thumb raised. The rest of his body contributes nothing, and yet the message is understood.

This is a simple gesture and it contrasts sharply with more complex ones involving related but discrete features. Human laughter, or, rather, what happens when a man laughs, is a good example of a Compound Gesture. When the display occurs at its very highest intensity, the laughers simultaneously:

1. emits a hooting or barking sound; 2. opens his mouth wide;
3. pulls back his mouth-corners; 4. wrinkles up his nose;
5. closes his eye; 6. wrinkles at the corners of his eyes
7. weeps; 8. throws back his head;
9. raises his shoulders; 10. rolls his trunk about;
11. clasps his body; and 12. stamps his foot.

A Compound Gesture is made up of three kinds of elements. First there are the essential elements. These are the ones that must be present if the display is to be understood. In the case of a simple gesture, such as the thumb-up, the essential element of the gesture—there is nothing else. But with Compound Gestures, such as laughing, these need
be no essential elements at all. Each element may be expendable provided there are enough of the other elements present. Not one of the 12 laughter signals listed above is absolutely essential to the message. Each can be replaced by other features.

Second, there are the key elements. These do not have to be present, but they are the most important features of a display, and their special quality is that they can, by themselves in the absence of all the other elements, still transmit the message. Although the sound of laughter is not an essential element in the display, it is a key element, because it can operate on its own in the absence of all the visual elements.

Third, there are the amplifiers, or supporting elements. These cannot operate on their own and only transmit the message if other elements are present. For instance, if a man retracts his neck, or throws his head back, these actions alone do not mean 'laughter' to an onlooker. Most of the visual aspects of laughing are of this type, but with some other Compound Gestures this is not the case.

Relic Gestures - Gestures survived long after their primary contexts have vanished

A Relic Gesture is one that has outlived its original situation. It might be a historic relic, surviving long after the period that gave birth to it or, a personal relic, such as an infantile pattern lasting into adulthood.
There is usually a special reason for the survival of a gesture from an earlier historical period – some slight advantage it has over its modern equivalent. Without this, it would die out along with the context that created it. A good example is the telephone gesture. The telephone rings and the caller asks to speak to someone who is on the far side of a noisy, crowded room. The person who has taken the call asks the caller to wait and signals across the room. Halfway across he catches the eye of the person he wants and gestures to him: ‘You are wanted on the telephone.’

Some writers give the impression that the discovery of a relic element in adult actions somehow makes them ridiculous or superfluous. But in fact quite the opposite seems to be true. If we perform Relic Gestures today, as modern adults, it is because they are of value to us as modern adults. For some reason they still assist us in our daily lives. To understand their origins is to clarify their value for us, not to condemn them as ‘childish’ or ‘old-fashioned’. If the disaster victim rocking to and fro feels the comfort of being rocked again in his mother’s arms, this feeling may help him to cope better with the disaster that has befallen him. If the young lovers exploring each other’s mouths with their tongues feel the ancient comfort of parental mouth-feeding, this may help them to increase their mutual trust and thereby their pair-bonding.
**Regional signals** - The way signals change from country and district to district

A Regional Signals is one that has a limited geographical range. If a Norwegian, a Korean and a Masai were brought together on a desert island, they would easily be able to communicate their basic moods and intentions to one another by their actions. All humanity shares a large repertoire of common movements, expressions and postures. But there would also be misunderstandings. Each man would have acquired from his own culture a special set of Regional Signals that would be meaningless to the others. If the Norwegian were shipwrecked instead with a Swede and a Dane, he would find his task much easier, because their closer origins would mean a greater share of these regional gestures, since localized actions, like many worlds do not follow precisely the present-day national boundaries.

This comparison of gestures with words is significant because it reveals immediately our state of ignorance as regards gestural geography. We already know a great deal about linguistic maps, but we know far too little about Gesture Maps. Ask a Linguist to describe the distribution of any language you like to name and he will be able to provide accurate, detailed information for you. Take any word, and he will be able to demonstrate its spread from country to country. He can even present you with local dialect maps for some parts of the worlds and show you, like Professor Higgins in Pygmalion, how slang expressions are limited to certain small areas of big cities. But ask anyone for a world-wide gesture atlas, and you will be disappointed.
Kerala Scenario

Table 2.1

Deaf and Dumb population in the state of Kerala according to the 1990-91 census.

<table>
<thead>
<tr>
<th>Disability</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blind</td>
<td>28960</td>
<td>33997</td>
<td>62957</td>
</tr>
<tr>
<td>Deaf and Dumb</td>
<td>25183</td>
<td>23923</td>
<td>49106</td>
</tr>
<tr>
<td>Physically handicapped</td>
<td>103249</td>
<td>75548</td>
<td>178797</td>
</tr>
<tr>
<td>Mental retardation</td>
<td>28985</td>
<td>22640</td>
<td>51625</td>
</tr>
<tr>
<td>Mental disorder</td>
<td>28960</td>
<td>7555</td>
<td>36515</td>
</tr>
<tr>
<td>Total</td>
<td>215337</td>
<td>163663</td>
<td>379000</td>
</tr>
</tbody>
</table>

In Kerala about 25183 males have got disabling hearing impairment. In females, 23923 are hearing impaired. Table 2.1 is based on the report of the Expert Committee State Planning Board, August 2000.

Disabling hearing impairment

Disabling hearing impairment in children - under age of 15 years should be defined as a permanent unaided hearing threshold level for the better ear of 31 dB or greater the 'hearing threshold level' is taken as the better ear average hearing threshold level for the four frequencies 0.5, 1, 2 and 4 kHz.
**Congenital hearing impairment**

Congenital hearing impairments typically occur before, or shortly after birth but prior to the learning of speech and language usually before age 3 (Jacobson, 1997). Acquiring hearing impairments occur after speech and language have developed. To be able to detect the complete speech signal even at soft conversational levels, a child's hearing sensitivity must be 15 dB HL or better at all frequencies in both ears (Dobie and Berlin, 1978).

**Minimal or Slight Hearing Impairment**

1. Minimal or Slight Hearing Impairment: 16 to 25 dB HL for Children hearing faint or distant speech (in fact, at least 10% of classroom instruction may be missed);

2. detecting subtle conversational cues that could cause the child to respond inappropriately;

3. keeping up with fast-paced communicative interaction; and

4. hearing the word-sound distinctions that comprise morphological markers for tense, plurality, possessives, and so on.

In addition, the child may appear immature and be more fatigued that peers due to the increased level of effort needed to hear (Anderson, 1991; Brackett, 1997; Pillai, 1997).
Unilateral hearing impairment

A unilateral hearing impairment occurs when a person has one ear that has normal hearing sensitivity and the other ear has at least a mild permanent hearing impairment. Over 50% of children with unilateral hearing impairments experience educational difficulties (Bess, Klee, and Culbertson, 1986). Even when speech is directed to the good ear, the child with a unilateral hearing loss has more difficulty understanding the message than does a child with two normal ears (Gravel, Kurtzberg, Stapells, Vaughan, and Wallace, 1989). The same difficulties that apply to the child with a slight hearing impairment, mentioned previously, apply to the child with a unilateral hearing impairment.

Differences in behavioral patterns between children with normal hearing and children with unilateral hearing impairment have been noticed (Cluberston and Gilbert, 1986; Oyler, Oyler and Matkin, 1988; stein, 1983). Children with unilateral hearing impairments have been described as being more distractible, more frustrated, more dependent, less attentive, and appearing less confident in the classroom than their peers with normal hearing. Behavior difficulties may be more obvious than hearing difficulties in the child who has a unilateral hearing impairment (Cargill and Flexer, 1991).
**Moderate Hearing Impairment**

Moderate Hearing Impairment: 41 to 55 dB HL

Prior to effective hearing management, a child with a moderate hearing impairment might understand face-to-face conversational speech at a distance of 3 to 5 feet. If content/topic and vocabulary are known 50 to 75% of the speech signal can be missed with a 40 to 45 dB hearing impairment (Mueller and Killion, 1990).

**Moderately Severe Hearing Impairment**

Moderately Severe Hearing Impairment: 56 to 70 dB HL

If amplification technologies are not used, spoken communication must be very loud and very close to be minimally understood. A child with a 55 dB hearing can miss 100% of classroom information (Matkin, 1981). If the child does not receive appropriate early and continuing intervention, he or she is likely to have marked difficulty in school, an evidence significantly delayed language, syntax, reduced speech intelligibility, and perhaps an atonal voice quality. Social behaviors also are likely to be problematic.
Severe Hearing Impairment

Severe Hearing Impairment: 71 to 90 dB HL

Even though a child with a severe hearing impairment cannot hear conversational speech at all without amplification, with appropriately fitted amplification, that child should be able to detect all speech sounds as well as environmental sounds (Ling, 1989). Without appropriate early intervention (and early intervention includes the use of amplification technology—hearing aids and assistive listening devices—for children with any degree of hearing impairment), spoken language will not develop. With appropriate amplification and auditory-based intervention strategies, the child with a severe hearing impairment can be functionally hard of hearing and not functionally deaf and thus be able to learn and live in a mainstreamed environment, perhaps with the assistance of some support services (Brackett, 1997, Davis, 1990, Ling, 1989, Ross, Bracket, and Maxon, 1991).

Profound Hearing Impairment

Profound Hearing Impairment: 91 dB HL or greater

A person with a profound hearing impairment cannot hear sounds without amplification. However, very few people have absolutely no residual hearing. The vast majority of persons with profound hearing impairments do have some residual or remaining hearing. The ability of a child with a profound hearing impairment to benefit from amplified sound is dependent on many factors, (Goldberg and Flexer, 1993; Ling, 1989; Pollack, 1985; Ross, 1990; Ross, Bracket and Maxon, 1991).
Table 2.2
Grades of hearing impairments

<table>
<thead>
<tr>
<th>Grades of impairment</th>
<th>Corresponding audiometric iso value (average of 500, 1000, 2000, 4000 Hz)</th>
<th>Performance</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>No impairments</td>
<td>25 dB or better (better ear)</td>
<td>No or very slight hearing problems. Able to hear whispers</td>
<td></td>
</tr>
<tr>
<td>Slight impairment</td>
<td>26-40 dB (better ear)</td>
<td>Able to hear and repeat words spoken in normal voice at 1 m.</td>
<td>Hearing aids may be needed</td>
</tr>
<tr>
<td>Moderate impairment</td>
<td>61-80 dB (better ear)</td>
<td>Able to hear and repeat words using raised voice at 1 m.</td>
<td>Hearing aids usually recommended</td>
</tr>
<tr>
<td>Severe impairment</td>
<td>61-80 dB (better ear)</td>
<td>Able to hear some words when shouted into better ear.</td>
<td>Hearing aids needed. If no hearing aids available, lip-reading and signing should be taught</td>
</tr>
<tr>
<td>Profound impairment including deafness</td>
<td>81 dB or greater (better ear)</td>
<td>Unable to hear and understand even a shouted voice.</td>
<td>Hearing aids may help understanding words. Additional rehabilitation needed. Lip-reading and sometimes signing essential</td>
</tr>
</tbody>
</table>

Infants and children must have access to detailed sound before auditory learning can occur. Hearing impairments from disease or damage in the auditory system interfere with sound access, thereby precluding or certainly diluting, a child’s auditory learning capabilities. Sensory input and auditory experience are necessary for neural development and organisation of the auditory brain centres.

**Peripheral hearing impairment**

There are three general types of peripheral hearing impairments that interfere with sound access. Based on location of damage (the site of lesion) in the auditory system, hearing impairments may be classified as conductive, sensorineural, or mixed (Northern, 1996).
Family environment of the Hearing Impaired

Parent's reactions to their children also vary as a function of etiology. When the etiology of deafness is unknown, parents are more likely to feel guilty about their child's deafness. (Meadow, 1968) Parental hearing status has pervasive effects on the hearing impaired child.

For a report on the stress experiences of parents with hearing-impaired children in Germany, 317 parents completed a survey on how their families communicate and socialize, among other issues. The report focuses on how contacts with other parents and with hearing-impaired adults affect stress experiences, in the context of the child's hearing status and the means of communication. Parents who frequently meet with other parents show evidence of a warm, accepting, trusting relationship with their child. Parents who have many contacts with hearing-impaired adults show evidence of a strong sense of competence in regard to their child's upbringing. The findings confirm the implication found in most reports describing empirical studies. Social support is to be regarded as a cornerstone of psychosocial intervention and has to play a role as possible in institutional programs. Hinternair (2000)

Peterson et al. (2000) summarizes the results of 11 separate studies of deaf children's performance on standard tests of false belief understanding, the results of which combine to show that deaf children from hearing families are likely to be delayed in acquiring a theory of mind. Indeed, these children generally perform no better than autistic individuals of similar mental age. Conversational and neurological explanations for deficits
in mental state understanding are considered in relation to recent evidence from studies of deaf, autistic, and normally developing children with varied levels of access to talk about mental states at home with family members during the pre school years. Children in whom deafness is hereditary are more likely than other children to have deaf parents (although it should be noted that because of recessive inheritance patterns, not all genetically deaf children have deaf parents) contrary to popular belief, however, the combination of a deaf child with deaf parents is rare. Only about 10% of deaf children have deaf parents (Rainer, Alsthuler and Kallman, 1963).

Northern and Dawns (1989) offered a set of objectives for the organisation of parent education programmes. They laid emphasis on emotional support and stressed the importance of parents involvement and authority on the decision of educational philosophies. Hafer and Richmond (1988) noted that when hearing parents learn that their child is deaf they must quickly become experts on a wide range of topics: hearing loss, speech and hearing aids, auditory training and methods of communication. In order to give parents a more realistic understanding of the social and cultural ramifications of being deaf, parents should be given access to information on deaf culture.

Educational methods and practices for the Hearing Impaired

During the past decade, more and better research efforts have been conducted to evaluate the various methodologies used for deaf children. However, it still appears that no single methodology works for all deaf children (Job and Monica, 20(12)).
There are three main communication approaches in the Philosophies of deaf education. They are

i. Auditory / oral method

ii. Manual communication and

iii. Total communication

Auditory / oral method

This term refers to programmes in which emphasis is given to spoken language and a maximum use of residual hearing.

Manual communication

Hand signs and finger spelling are the key components of these methodology

Total communication

This describes programmes where the simultaneous use of speech, signs, listening, gestures and other visual cues are encouraged. This philosophy of Total communication came into existence in the late 1960s. It soon became the method of teaching language as well as social and academic skills to deaf children. Parents and teachers claimed that their communication with deaf children improved tremendously. Suddenly - through visual means deaf children were able to participate in conversations and were able to communicate their questions, emotions and needs through
an individually created linguistic system. Although the communication between deaf children and their hearing surroundings improved greatly, their spoken language skills did not improve to the same extent. Deaf children felt at ease with these visual language. Later, after due study and research, it was proved that this visual system of gestures was actually a language in its own right with Phonological, Morphological and Syntactical rules. Thus the hearing world came to a deeper understanding and respect of this system from which bilingualism in deaf education began to be propagated (Lane, 1995).

Although an enormous body of research is available to determine the 'best' communication mode for hearing impaired children, the overall results has been inconsistent.

Studies supporting auditory / oral programmes have been published, and studies favouring total communication systems have been quoted. It would appear that a number of favours, which may or may not be interrelated, influence the result, as well as, the interpretation of the result among these many studies, e.g. hearing loss, age of onset of hearing impairment, attitudes, personality, etc. (Monica, 2002).

Muscleman et al (1996) noted that language itself is not a unitary ability, but consists of a number of skills that respond differently to different interventions. In particular it is necessary to distinguish between spoken language, receptive language and mother child communication.
total communication programmes scored higher on measures of receptive language and mother-child communication, whereas children in auditory/oral programmes had better spoken language.

Silverman and Lane (1970) reported that 85% of children enrolled in schools for the deaf were being instructed by the oral method, at least in their early years. The fundamental assumption was that every deaf child should be given an opportunity to communicate by speech first. According to McConnel and Liff (1975) children who become good listeners also use the vision necessary to become good lip readers.

The use of visual channel then seems to come naturally. According to Luthermann (1976), the auditory/oral approach presupposes that lip reading or visual awareness of the face need not be taught. Rather, the impaired auditory modality must be trained, the child uses visual information as he/she needs it.

Education is a preparation for life. A deaf person’s life as an adult, from about the age of 25 to 75, is usually largely affected by the type of education he/she has had initially. When planning for a child’s future, we should ensure that he/she grows up having adequately mastered a language and will be able to communicate comfortably with the people and around. An adult also needs knowledge and skills to understand the various aspects of life, and to know where to acquire these skills as and when required (Stillman, 2002).
Prevention of hearing impairment

One per 1,000 infants has severe to profound congenital hearing loss that, without intervention, will profoundly affect development. It is hoped that neonatal hearing screening will improve outcomes for individuals who are congenitally deaf. However, early identification will not yield the anticipated outcome gains without early intervention. The community speech and language pathologist, audiologist, pediatrician, or infant educator, in consultation with the referral audiologist, is charged with counseling the family and identifying appropriate services. We should explore available intervention choices including methods of communication and cochlear implantation. (Samsong Fang et al., 2000)

Marschark et al. (1998) reviews theoretical and empirical issues concerning the relations of language and memory in deaf children and adults. An integration of previous studies, together with the presentation of new findings, suggest that there is an intimate relation between spoken language and memory. Either spoken language or sign language can serve as a natural mode of communication for young children (deaf or hearing), leading to normal language, social, and cognitive development. Nevertheless, variation in spoken language abilities can be shown to have a direct impact on memory span. Although the ways in which memory span can effect other cognitive processes and academic achievement are not considered in depth here, several variables that can have direct impact on the language-memory interaction are considered. These findings have clear implications for the education of deaf children.
Deaf in Psychiatric setting

In order to examine the effect of congenital or early acquired deafness on hallucinatory modalities in schizophrenia, 67 pre-lingually deaf schizophrenic patients were interviewed (using sign language) about their hallucinatory experiences over the entire course of illness. The clinical records of subjects' previous hospitalizations was also analysed. In the deaf sample, visual and tactile hallucinations were plainly over-represented as hallucinatory modalities in comparison with hearing schizophrenic samples. Although some patients reported visual hallucinatory perceptions of sign language messages, the hallucinatory reception of meaningful information in deaf patients seems also to remain affiliated to the 'auditory' modality. It was concluded that the different representation of hallucinatory modalities reflect in particular the influence of 'the deaf way' of sensory experience on imagery processes. (Schonauer et al, 1998)

Sporadic encounters with deaf patients seeking psychotherapy present a challenge to general clinicians outside specialized services for the deaf: Skills for working with people who do not share one's own language mode and culture are not routinely taught in most training programs, so clinicians may be unprepared when they first encounter a deaf patient. While it would be ideal to be able to match deaf patients with therapists fluent in their preferred language mode, this is often not feasible in smaller centers. Working with a trained professional sign-language interpreter can be a productive alternative, as long as patient, therapist, and interpreter understand and are comfortable with the process. Peer-reviewed literature on sign language
interpretation in psychotherapy is sparse but some practical guidelines can be gleaned from it and supplemented by information provided by the deaf community through the Internet. One psychiatric resident's first experience of psychotherapy working with a sign-language interpreter, summarizes the understanding of deaf culture and experience, of the unique characteristics of sign language, and of the effects on the therapeutic relationship of the presence of the interpreter. (Porter, 1999)

The results from a national study of forensic referrals to the UK's three specialist psychiatric services for deaf people who are users of sign language, a search of 5,034 referrals identified 431 relevant cases. From these, data were collected on patient characteristics, offending behaviour, court disposal and diagnosis. In addition, data were used to estimate the need for a specialist forensic deaf service in UK. The results show a steady and continuing rise in forensic referrals from the mid-1980s. They contradict previously held assumptions about the late age of first conviction and about the reluctance of the courts to impose probation supervision on deaf people. They confirm and expand our understanding of the high proportion of sexual and violent offences in this clinical population. Nearly 50% of the samples were found on assessment not to be suffering from a mental disorder - a category that excludes patients diagnosed with personality disorder. Figures from the past 30 years and from the past 5 years only are consistent in demonstrating that around 60% of this group would have benefited from a specialist forensic deaf service at some time in the assessment/treatment process. (Young et al., 2001)
Communication used by hearing impaired children

Historical Perspective

Some historical perspective is needed to appreciate the issues affecting current educational programs for deaf children. Historically, language has played an important role in defining “humanity”. As language has often been unjustly equated with speech, those without speech have sometimes been considered to be less than fully human. The Justinian legal code (A.D. 530) allowed neither legal rights nor obligations for those who were “deaf and dumb from birth” (Bender, 1960). The deaf person continued to be devoid of legal rights, including the right to inherit property, through the 1500s. This condition apparently provided the impetus for a Spanish nobleman, Pedro Ponce de Leon to engage a monk to educate his deaf children. The monk attempted to teach speech to the children by associated objects with the printed word, and then by associating movements of the vocal cords of printed characters (Quigley, 1969).

Education of the deaf children of Spanish noblemen was continued in the early 1600s by Juan Martin Paolo Bonet who introduced a one-handed manual alphabet for finger spelling words in combination with speech and writing. In the eighteenth century, the gestural system already used by deaf people was expanded and refined by the Abbé l'Epee to be used in a French public school for deaf children. While l'Epee was developing a manual program in France, Samuel Heinicke was developing an oral program in Germany emphasizing speech and speech reading, and forbidding manual communication, which he believed would interfere with the development of oral language. A continuing and vehement controversy over this issue grew between Heinicke and l'Epee.
In the United States, the key figure in establishing public education for deaf children was Thomas Hopkins Gallaudet, whose interest had been raised through his work with a neighbor's deaf child. The neighbor Mason Fitch Cogswell, sent Gallaudet to Europe to study the oral methods being used in England and the manual methods being used in France. However, the founder of the English oral school-Thomas Braidwood-was unreceptive to the proposed visit, and thus Gallaudet studied only the manual methods refined by l'Epee. Not surprisingly the school Gallaudet established on his return (The American School for the Deaf in Hartford Connecticut) utilized manual communication in its program.

Manual communication remained the norm in the United States until 50 years later when the Clarke School in Northampton, Massachusetts was established. Here the oral methods originally developed by Heinicke were used. During the next century the oral method became increasingly popular and manual instruction typically was used only with children who did not progress satisfactorily with purely oral methods.

In the 1970s use of manual communication in the schools has again increased. But, unlike the earlier method of l'Epee, manual communication today is only one part of the "Total Communication" approach in which all possible communication channels are used, so that oral-aural skills are emphasized as well.

The heated debate between Heinicke and l'Epee that began in the 1800s still continues vigorously. Those espousing the "oral only" method have had three major criticisms of using manual communication in the
schools. First, they suggest that its use will interfere with the child's motivation for developing oral-aural skills, as it is easier for the deaf child to master sign language than spoken language. In a related criticism the opponents of manual communication suggest that the development of manual skills rather than of oral-aural skills will prevent the capacity for expressing abstract ideas, and that people using manual languages will necessarily be limited to concrete thinking.

**Sign language**

Sign language is often referred to as the mother of all languages. Long before humans learnt to communicate orally or in written form, signs were used for communication. As the human being evolved, so too did forms of communication both orally and through recorded scripts. However, deaf people and those with certain communicative disorders require sign language, which is the most natural form of communication. It does not entail an accurate knowledge of either spelling or grammar of a spoken language. For them sign language is a boon (Gopalakrishnan, 2002).

According to Ridgeway (1969) "the sign language with deaf children is part mime; it is beautiful to watch, highly expressive and receptive". The language of signs has been subjected to systematic analysis by several investigators including Tervoort (1964) and Bornstern (1973). Their conclusion is that sign language is an independent language and not just a translation of oral. Natural gestures and finger spelling depend on understanding when a sign tends to become repeated and understood by more than one person, it is "formalised" and no longer a natural gesture.
Despite being brought up in the oral tradition, Garretson (1965), a respected deaf educator and long time advocate of the use of finger-spelling, and sign, cites the following factors as reasons for supporting the use of sign language (1) Denying a child to use his/her hands along with speech and lip reading creates anxiety and emotional stress. (2) with the use of finger spelling, sign and speech, the deaf person is in no doubt as to what is being considerably larger and clearer than lip movement. Finger spelling and signs do not discriminate against any one, and all have equal opportunity to participate and learn from classroom activities.

Sign Language is as rich in terminology and expression. It is an elegant language with its own logical grammar used by a language minority in our societies. It is pleasure to sign. Very directly and comprehensively, you can express your emotions and information in a combination of facial expressions, body language and gestures. By way of varied speed and impulsiveness of your signs and gestures, you convey fully the characteristics of an action or an opinion in a beautiful wholistic manner.

Teaching Sign Language is possible with appropriate study material. Much to the surprise of the participants of the course, there was ready-made training materials available. The package used was: The Bridge to the World of the Hearing Impaired- Textbook for Instruction and Exercise. Volume I gives basic signs for 660 German words; the aim of Volume II (850 words) is “to prove that Sign Language makes the transmission even of difficult facts and circumstances possible”. Each page has about 16 illustrations of signs followed by approximately 30 sentences for exercise.
It is next to impossible to learn Sign Language alone or only from books, as our understanding of the sketches will often be incomplete. Moreover, the deeper understanding of how signs relate according to the location, classification, situation, etc. cannot be expressed to satisfaction in a book. At best we learn from a person with hearing impairment supported by a book, an important pointer for special teachers' preparation in India.

For persons with hearing impairment who sign, this important means of communication is at the same time 'normal' and 'special'. It is their mother tongue in the sense that they feel most comfortable and fully able to express themselves as they use it; it is also, special because it is a 'foreign' language within their own environment because in the hearing world hardly anybody is interested in learning Sign Language. We people who do hear should be exposed to Sign Language at school so as to enable us to understand children with hearing impairment. Instead of them being forced to learn our language, we can learn theirs, reach out to them and bridge the communication gap.

Many basic signs are universal, the same as human body language, but most signs differ from culture to culture and regionally. The signed 'vocabulary' can be learnt just as any other vocabulary. It builds up with time and experience.

We have to acquire the ability to use the system of finger-spelling quickly, too. Names, geographical locations, cities, etc. will be spelled most of the time.
For an adult learner, it is easy to learn some signs but not easy to understand people with hearing impairment. At the end of my course, my teacher invited me to the Bonn 'Bowling Club of Hearing Impaired Women'. When I arrived, several lively and cheerful conversation groups were engaged in discussions. Here and there I saw a known term, and I somewhat grasped the context. But the signed (German) conversation was too fast and multi-faceted to follow. Hence, sign language is no different from any other foreign language we want to master: practice, practice and practice is required.

Most people with profound hearing loss need Sign Language interpretation. A society which denies this option to the 'language minority' of Sign Language users excludes them from full participation. One of the central prerequisites of Sign language interpretation is the development of a uniform vocabulary, the research of existing Sign Language grammar and the publication of a dictionary. (Kenig, 1999).

**Advantages of Signing**

1. The signs for **smart** and **clever** are the same; speech reading brings out the difference. For deaf-blind persons, manual spelling is used along with an explanation.

2. The past tense of **FEED** is **FED**. However, 'I am fed up' is not signed as the 'past tense feed' and 'up' sign.

3. At times, the spelling is the same but meanings are different. For example, 'He threw the ball' and 'He threw up a big tantrum' I bow, bow and arrow, ribbon bow; 'My feet are tired' and 'The table is 4 feet high' Signing brings out the meaning and clarity.
4. Words that look similar on the lips, especially in a running speech with other words, can cause confusion. For example, fist and feast ('My fist is small' and 'Your feast is rather big, how many people are there? (celebrating a festival/event), pull and pool, etc. Therefore signs made conceptually bring forth a world of language for the child to explore. Some children can be helped to use a dictionary. This will aid greater fluency.

5. Signing is a skill; it is a whole new language

6. Signing can also denote:
   a. Urgency in your hand movements (tactile) e.g. hurry up, hurry up.
   b. A rhythmic visual pattern
   c. A blind intelligent child who will never develop speech for neurological reasons will still need to express himself/herself manually (signs for tactile communication). Therefore manual communication fulfills a role not only for deaf and deaf-blind children but also for blind children without speech. (Vacha, 1999)

In India no uniform sign language has developed for the whole country. This may be because of the existence of a number of languages and their various dialects. Also, not many schools encourage sign language as it may not be acceptable to our society. Teacher lay emphasis on speech irrespective of the degree of hearing loss. Even if the child fails to learn oral communication, many teachers are not willing to teach sign language because they themselves are not familiar with it (Monica and Job, 1999)
Sign languages in different parts of the world

American Sign Language

The major sign language system used by most deaf adults in the United States is American Sign Language, also known as ASL or Ameslan, differing most obviously from spoken languages by utilizing a visual-gestural mode rather than an oral-aural mode. For many decades, Ameslan was assumed to either a loose collection of gestures, or an abbreviated form of English produced manually. More recently, however, careful linguistic analyses by William Stokoe of Gallaudet College and by Ursula Bellugi, Edward Klima, and their colleagues at the Salk Institute of Biological Studies have shown that neither of these assumptions is true. Instead, Ameslan is a language in its own right, with the full capacity for expression both abstract and concrete thoughts and feeling.

Several investigators also have been studying the acquisition of Ameslan by deaf children of deaf parents. In such settings, where Ameslan is the parents' primary language, the children learn Ameslan effortlessly, much the way that hearing children acquire the spoken language of their parents.

Schlesinger and Meadow (1972) studied the acquisition of sign language in two children of deaf parents and observed that the development of linguistic constructions paralleled those found in the acquisition of English. For example, children's early signs were holophrasic, with single signs being used to express complex ideas. To illustrate this stage, Schlesinger reports that when one of the children (Ann) was 15 months old, she used the sign SMELL to mean 'I want to go to the bathroom' and 'I am soiled please change me' and 'I want the pretty smelling flower'
Bellugi and Klima (1972) have also noted similarities between the milestones in the acquisition of Ameslan and of spoken English. They have found that young deaf children initially overgeneralize linguistic rules, later restricting them appropriately. They have also observed that deaf children combine signs to form phrases comparable in length and intent to those produced by hearing children and show many of the same developmental progressions (e.g., comparable increases in the mean length of utterance). Moores and his colleagues have also been following the acquisition of sign in deaf children of deaf parents, and are examining such areas as acquisition of negation, the use of the locative, use of pointing, and question formation. (Hoffmeister, Moores, and Best, 1974)

**Sign languages other than ASL**

In addition to Ameslan, there are several other manual language systems commonly used with deaf children. These systems are tied directly to the structure of English Varying in how precisely the two correspond. In the forms with the most precise correspondence (Signing Exact English: Seeking Essential English, referred to as SEE), English word order and other aspects of English grammar (e.g., tense inflections) are translated directly into manual equivalents. In addition, signs are often "initialized" to match the vocabulary distinctions of English. For example in Ameslan, "way" "road" and "street" are all signed identically, with the two palms facing one another and moving out from the body at about waist level. In SEE, all three would be signed with the same movement and at the same position, but would be distinguished by substituting letters of the manual alphabet ("w", "r", and "s", respectively) for open hand.
In more common forms of manual English (referred to as Signed English or Siglish), signs still follow English word order, but other correspondences are not maintained. For example, prepositions are often omitted, few inflections are added to signs (so that, for example, the difference between “I cry” and ‘I cried” would be indicated by context rather than by a past tense “ed” marker), initialization is used less extensively, and so on. It is most useful to conceptualize these forms of sign language as points along a continuum from lesser to greater correspondence to English, rather than as separate languages.

Thus, although Ameslan and the various forms of signed English share much of the same sign vocabulary, they do not share the same grammar. For those who learn Ameslan as a native language learning English, may be compared to learning a second language. Given this perspective, Cicoured and Boese(1972) and Charrow and Fletcher (1974) have suggested that English instruction for deaf children should utilize the kinds of techniques that have been developed for teaching English as a second language to other non-native speakers of English. It should be noted that the use of two languages raises many of the same issues associated with any other bilingual population. Whereas the combination of Amelsan and English may be interpreted as bilingualism, the combination of signed and spoken English is not true bilingualism because both share the same grammar and are simply produced in different modes. Thus it is possible to speak and sign English simultaneously, that is, to produce English in two modes at the same time. (It is not possible to sign Ameslan and speak and sign English simultaneously as their grammars are not identical).
The use of English in two modes—bimodal English—has become increasingly common, both within the classroom and the family. Schlesinger and meadow (1972), for example, have established a program in which hearing parents are taught signed English to use with their deaf children. Hilde Schlesinger has been studying the acquisition of English by deaf children exposed to bimodal English.

Young et al., (2000) used the term Deaf for a group of people who use sign language, who come into contact with the criminal justice system in the UK, and for whom mental health needs are associated with their offending behaviour. It critically reviews the existing literature regarding evidence of the prevalence and characteristics of this group drawing on a range of contexts: prisons, high-security services, specialist mental health services, and the police and courts. Particular attention is paid to the relationship between deafness, sign language use, mental disorder and unfitness to plead. Also, consideration is given to the extent to which a limited range of linguistically appropriate disposals for Deaf mentally disordered offenders may account for their twelve-times-higher prevalence in the high-security population than in the general population. Finally, the clinical characteristics of this population are discussed in relation to a range of psycho-social consequences of Deafness and sign language use in the UK today.

The study of signed languages provides an opportunity to identify those characteristics of language that are universal and to investigate the effect of production modality (signed vs. Spoken) on the grammar. Over time, American Sign Language (ASL) has accommodated itself to the production
and perception requirements of the manual/visual modality, resulting in a prosodic system that is comparable in function to spoken languages but different in means of expression. The present focus is on phrasal prominence in ASL. (Wilbur 1999) reviewed the marking of stress and phrase boundaries in ASL, and discuss prominence assignment at the phrasal level, with brief mention of lexical stress. At the kinematic level, there is a modality effect in marking of linguistic prominence but no modality effect with respect to marking phrase position. Of significance is the fact that ASL lacks phrasal prominence plasticity, that is the ability to move prominence to mark focus in a sentence location other than phrase final. The typological implications of how ASL handles prominence as compared to other languages are shown.

British Sign Language relies extensively on the use of spatial locations for reference in discourse. Locations may be conventional or arbitrary or they may form part of a 'map' of the real world. Verbs in sign language are classified according to their use of space: 'agreement verbs' inflect for person and number using arbitrary spatial locations, 'spatial verbs' use locations in a topographic representation of space, and 'plain verbs' use no spatial locations. The development of the spatial reference system is discussed and some preliminary findings are presented in a study investigating the use and development of the pronominal reference system in British Sign Language, and the interaction of the system with verb class. Educational implications of the results are also considered (Clibbens, 1998).
Advantages of Manual Communication

Those supporting manual communication argue that empirical evidence rejects all three criticisms. In response to the first, several studies have shown that children who have had early exposure to manual communication do as well, or better than children who had not had this exposure. Investigators have compared deaf children of deaf parents (i.e. children exposed to manual communication) to deaf children of hearing parents (i.e. those exposed only to spoken English). Children in the former category performed better on tests of educational achievement, reading, and writing (Meadow, 1968; Stuckless and Birch, 1966; Vernon and Koh, 1970). In addition, most studies have shown that deaf children of deaf parents are not inferior even on oral skills, despite the presumably worse oral input from their deaf parents. In speech reading measures, comparable performance by the two groups of children was reported by Meadow (1968) Quigley and Frisina (1961), and Vernon and Koh (1970) and better performance by deaf children with deaf production and intelligibility, comparable performance in the two groups was found by Meado (1968) and Vernon and Koh (1970), with Quigley and Frisina (1961) reported differences favoring those with hearing parents, and Stuckless and Birch (1966) reported difference favoring those with deaf parents.
Although there are many variables other than the use of manual communication that differentiate the two groups of children, the findings reviewed here strongly suggest that manual communication need not hamper later skills, even skills specifically related to spoken language.

Visible speech and gestures are two forms of available language information that can be used by listeners to help them understand the speaker's meaning. Previous research has shown that older adults are particularly dependent on visible speech, yet seem to profit less than younger adults from the speaker's gestures. To understand how visible speech and gestures are used when listening becomes difficult, the authors conducted an experiment with a dichotic shadowing task. The experiment examined how accurately participants could shadow the right- or left-ear input when instructed to attend selectively to a particular ear and whether performance benefited from visual input. The results indicate that older adults' shadowing performance was unaffected by visible speech and gestures. Younger adults did benefit by both visible speech and gestures. Thus, under extremely attention-demanding listening conditions, older adults are unable to use a compensatory mechanism for encoding visual language (Thompson et al., 1999).

Adult language learners are notorious for their lack of ultimate mastery of language structure. A review of recent literature suggests that their superior processing capacity may play a role in this failure.
Three experiments in which adults were taught an unfamiliar sign language confirmed this hypothesis. Adults learning under normal conditions showed faster learning of studied materials, but made more errors in trying to generalize the language to new contexts than did adults performing a concurrent capacity-limiting task. Specifically, these errors involved producing signs in new contexts holistically—i.e. exactly as they were learned, rather than adjusting them appropriately to the new context. Similarly, adults practicing signs as wholes also produced more holistic, frozen signs, than did those practicing subcomponents of signs. In both cases, adults learning under normal conditions were failing to learn the internal structure of the language and were therefore limited in their ability to generalize to new contexts (Cochran et al., 1999).

In the theoretical review all the variables are defined and communication methods used by hearing impaired are discussed with historical perspective. Different sign language around the world are mentioned here, which supports the importance of studying gestures.
REVIEW OF RELATED STUDIES
STUDIES RELATED TO GESTURES

Gesture Production

In a study by Kelly (1998) a comparison is made among 18 children’s and 18 adults’ ability to detect information conveyed through representational hand gestures of videotaped children verbally and gesturally explaining their problem-solving reasoning. They found that children and adults recalled information conveyed through representational gestures. Mismatching gesture negatively affected the precision of adults but not children’s speech recall.

Alibali et al., (1994) studied whether the information children express only in gestures can be understood by adults not trained in gestures coding was studied with 20 teachers and 20 undergraduates who saw vignettes of 12 children explaining solutions to equations. Both teachers and undergraduates frequently understood strategies children had not expressed in speech.

Two experiments examined how developmental changes in processing speed, reliance on visual articulatory Cued memory retrieval, and the ability to interpret representational gestures influence memory for spoken language presented with a view of the speakers (visual spoken language) Experiment 1 compared 16 children (M = 9.5 yrs) and 16 young adults using an immediate recall procedure. Experiment two replicated the method with new speakers, stimuli, and participants. Results showed that
both children's and adult's memory for sentences was aided by the presence of visual articulatory information and gestures. Children's lower processing speeds do not adversely affect their ability to process visual spoken language. However, children's ability to retrieve the words from memory was poorer than adults. Children's memory was also more influenced by representational gestures that appeared along with predicate terms than by gestures that co-occurred with norms (Thompson et al., 1998).

Speech and conversational hand gestures were recorded during interviews of 23 younger (M = 21 years) and 19 older adults (M = 70 years). Three kinds of questions were used in order to activate either visual images, motor images, or no mental image (abstract topics). On average, the rate of gesture production did not differ in younger and older adults, but it was significantly influenced by imagery conditions. Gesture production was higher in the motor than in the visual imagery condition, and lowest in the abstract condition. A significant interaction between age and imagery conditions influenced the proportion of representational gestures, which were relatively less frequent in older adults, especially in the visual imagery condition. Content analysis of verbal responses showed that imagery values did not differ in younger and older adults, but that concrete words were less frequent in responses to abstract questions than in the two other conditions. The implications of these results concerning the mechanisms of gesture production and the age-related changes in conversational behavior are discussed. (Feyereisen et al., 1999).
Fuji (1999) examined the relation between the ability of speech and gesture production. Four-year-old preschoolers, 5-year-old preschoolers, 1-3rd graders, 4th-6th graders, and university students (N = 56) were instructed to explain a swing and a slide verbally. Their explanation was video-recorded and analyzed. The results showed that, although the total duration of speech production increased linearly as a function of age, the frequency of gestures changed tracing a U-shaped pattern. Gesture production decreased in school children but not in university students. Each group produced gestures different from those of other participants with regard to the pattern. Beats were produced only by university students while the viewpoint of gestures and speech-gesture relations differed between groups. Only university students produced gestures regarded to be profoundly related to language competence. Gestures produced during the early period of human development were considered complementary to language competence, while those produced by adults were seen as redundant to their speech.

Seventeen toddlers with specific expressive language delay (14 boys and 3 girls between 18 and 33 months of age) were compared to two control groups, one matched for language production and the other matched for age and language comprehension, on measures of spontaneous and imitated gesture production. Late talkers performed like age/comprehension-matched controls on all experimental measures of gesture production and on production of later appearing, more symbolic gestures as reported by parents. Late talkers performed like language-matched controls on earlier appearing communicative gestures and gestural routines as reported by parents. All three groups produced more gestures in canonical imitation conditions spontaneously. Results are discussed in the contexts of the Local Homology Model and characteristics of toddlers with specific expressive language delay. (Thal et al., 1996)
Although a number of studies have demonstrated the effects of self-talk on sport performance, the research literature on the antecedents of self-talk in competitive sports is rare. The purpose of this study was to examine both the antecedents and the consequences of self-talk during competitive tennis performance. Eighteen adult tournament players were observed during United States Tennis Association-sanctioned matches. Players' audible self-talk, observable gestures, and tennis scores were recorded using the Self-Talk and Gestures Rating Scale (Van Raalte, Brewer, Rivera, and Petitpas, 1994b). Results indicated that all players used observable self-talk and gestures during their matches. Furthermore, for all players, match circumstances (e.g., point outcome, serving status) predicted the use of negative self-talk. Positive and instructional self-talk were predicted by match circumstances for some players. The results suggest that match circumstances contribute to the generation of self-talk and provide useful information for researchers interested in better understanding the antecedents of self-talk. (VanRaalte et al., 2000)

In two experiments selective attention to angry faces was investigated in relation to trait anger and anxiety. A pictorial emotional Stroop task comparing colour-naming latencies for neutral and angry faces was employed. In Experiment 1 using an unmasked task, individuals scoring high on trait anger showed an attentional bias for angry faces. In Experiment 2, unmasked and masked versions of the task were used. Individuals were selected on low and high trait anxiety, but there was no
indication of a relation between attentional bias scores and anxiety. When individuals were subsequently reallocated to groups on the basis of trait anger scores, the high anger group showed an attentional bias for angry faces in the unmasked and the masked task. (VanHonk, et al., 2001)

The rapid detection of facial expressions of anger or threat has obvious adaptive value. In this study, we examined the efficiency of facial processing by means of a visual search task. Participants searched displays of schematic Faces and were required to determine whether the faces displayed were all the same or whether one was different. Four main results were found: (1) When displays contained the same faces, people were slower in detecting the absence of a discrepant face when the faces displayed angry (or sad/angry) rather than happy expressions. (2) When displays contained a discrepant face people were faster in detecting this when the discrepant face displayed an angry rather than a happy expression. (3) Neither of these patterns for same and different displays was apparent when face displays were inverted, or when just the mouth was presented in isolation. (4) The search slopes for angry targets were significantly lower than for happy targets. These results suggest that detection of angry facial expressions is fast and efficient, although does not "pop-out" in the traditional sense. (Fox et al., 2000)

Beattie et al., (2000) presents a series of empirical investigations to test a theory of speech production proposed by Butterworth and Hadar (1989; revised in Hadar and Butterworth, 1997) that iconic gestures have a functional role in lexical retrieval in spontaneous speech. Analysis one
demonstrated that words which were totally unpredictable (as measured by the Shannon guessing technique) were more likely to occur after pauses than after fluent speech, in line with earlier findings. Analysis 2 demonstrated that iconic gestures were associated with words of lower transitional probability than words not associated with gesture, even when grammatical category was controlled. This therefore provided new supporting evidence for Butterworth and Hadar's claims that gestures' lexical affiliates are indeed unpredictable lexical items. However, Analysis 3 found that iconic gestures were not occasioned by lexical accessing difficulties because although gestures tended to occur with words of significantly lower transitional probability, these lower transitional probability words tended to be uttered quite fluently. Overall, therefore, this study provided little evidence for Butterworth and Hadar's theoretical claim that the main function of the iconic hand gestures that accompany spontaneous speech is to assist in the process of lexical access. Instead, such gestures are reconceptualized in terms of communicative function.

Gouta et al., (2000) examined the effect of the changes in facial expressions in different parts of the face on emotion recognition. Fifty two university students participated in the study. Seven emotions were selected as being the most suitable for categorization and expression: namely, anger, fear, surprise, disgust, sadness, happiness, and neutrality. Picture of these emotions were used to create stimulus materials, composed facial expressions were created by combining the upper and the lower parts of the pictures expressing different emotions. The participants were asked to categorize the type of emotion represented by each picture. The results showed that the upper area of the face was more often associated with
anger, fear, surprise, and sadness. On the contrary, the lower area was more often associated with disgust and happiness. There were no significant differences between parts of the face associated with neutral emotions.

The processing of emotional expressions is fundamental for normal socialisation and social interaction. Fifty-five children (aged 11-14 years) in mainstream education participated in this study. They were presented with a standardised set of pictures of facial expressions and asked to name one of the six emotions illustrated (sadness, happiness, anger, disgust, fear, and surprise). Following experimental testing, their behaviour was rated by two independent teachers on the Psychopathy Screening Device (PSD). The PSD assesses two dimensions of behavioral problems: affective-interpersonal disturbance and impulsive behaviour/conduct problems. The results showed that the ability to recognise sad and fearful expressions (but not happy, angry, disgusted, or surprised expressions) was inversely related to both level of affective-interpersonal disturbance and impulsive/conduct problems. These results are interpreted with reference to current models of empathy and its disorders. (Blair, 2000)

White (2001) In four experiments found participants made speeded same-different responses to pairs of face photographs showing the same woman or different women with the same expression or different expressions. Compared with responses to positive pairs, negative pairs were matched more slowly on identity than on expression. A secondary finding showed that face expressions (same, different) influenced identity responses, and identities influenced expression responses, equally for positive and negative pairs. The independence of this irrelevant-dimension
effect from the contrast effect supports the conclusion required by the main finding—that negation slows perceptual encoding of surface-based information used for identification more than it does encoding of edge-based information used for expression recognition.

Two experiments, were conducted by Kamachi (2001) to investigate the role played by dynamic information in identifying facial expressions of emotion. Dynamic expression sequences were created by generating and displaying morph sequences which changed the face from neutral to a peak expression in different numbers of intervening intermediate stages, to create fast (6 frames), medium (26 frames), and slow (101 frames) sequences. In experiment 1, participants were asked to describe what the person shown in each sequence was feeling. Sadness was more accurately identified when slow sequences were shown. Happiness, and to some extent surprise, was better from faster sequences, while anger was most accurately detected from the sequences of medium pace. In experiment 2 an intensity-rating task and static images as well as dynamic ones to examine whether effects were due to total time of the displays or to the speed of sequence. Accuracies of expression judgments were derived from the rated intensities and the results were similar to those of experiment 1 for angry and sad expressions (surprised and happy were close to ceiling). Moreover, the effect of display time was found only for dynamic expressions and not for static ones, suggesting that it was speed, not time, which was responsible for these effects. These results suggest that representations of basic expressions of emotion encode information about dynamic as well as static properties.
A familiar face can be recognized across many changes in the stimulus input. In a study, the many-to-one mapping of face stimuli to a single face memory is referred to as a face memory's 'attractor field'. According to the attractor field approach, a face memory will be activated by any stimuli falling within the boundaries of its attractor field. It was predicted that by virtue of its location in a multi-dimensional face space, the attractor field of an atypical face will be larger than the attractor field of a typical face. To test this prediction, subjects make likeness judgments to morphed faces that contained a 50/50 contribution from an atypical and a typical parent face. The main result of four experiments was that the morph face was judged to bear a stronger resemblance to the atypical face parent than the typical face parent. The computational basis of the atypicality bias was demonstrated in a neural network simulation where morph inputs of atypical and typical representations elicited stronger activation of atypical output units than of typical output units. Together, the behavioral and simulation evidence supports the view that the attractor fields of atypical faces span over a broader region of face space that the attractor fields of typical faces. (Tanaka, 1998)

Bartlett et al., (1999) found that facial expressions provide an important behavioral measure for the study of emotion, cognitive processes, and social interaction. The Facial Action Coding System (Ekman and Friesen, 1978) is an objective method for quantifying facial movement in terms of component actions. Bartlett (1999) applied computer image analysis to the problem of automatically detecting facial actions in sequences of images. Three approaches were compared: holistic spatial analysis, explicit
measurement of features such as wrinkles, and estimation of motion flow fields. The three methods were combined in a hybrid system that classified six upper facial actions with 91% accuracy. The hybrid system outperformed human non-experts on this task and performed as well as highly trained experts. An automated system would make facial expression measurement more widely accessible as a research tool in behavioral science and investigations of the neural substrates of emotion.

A Study by Dimberg et al., (2000) revealed that when people are exposed to emotional facial expressions, they spontaneously react with distinct facial electromyographic (EMG) reactions in emotion-relevant facial muscles. These reactions reflect, in part, a tendency to mimic the facial stimuli. They investigated whether corresponding facial reactions can be elicited when people are unconsciously exposed to happy and angry facial expressions. Through use of the backward-masking technique, the subjects were prevented from consciously perceiving 30 minutes exposures of happy, neutral, and angry target faces, which immediately, were followed and masked by neutral faces. Despite the fact that exposure to happy and angry faces was unconscious, the subjects reacted with distinct facial muscle reactions that corresponded to the happy and angry stimulus faces. Our results show that both positive and negative emotional reactions can be unconsciously evoked, and particularly that important aspects of emotional face-to-face communication can occur on an unconscious level.

Young (M = 23 years) and older (M = 77 years) adults' interpretation and memory for the emotional content of spoken discourse was examined in an experiment using short, videotaped scenes of two young actresses talking.
to each other about emotionally-laden events. Emotional nonverbal information (prosody or facial expressions) was conveyed at the end of each scene at low, medium, and high intensities. Nonverbal information indicating anger, happiness, or fear, conflicted with the verbal information. Older adults' ability to differentiate levels of emotional intensity was not as strong (for happiness and anger) compared to younger adults. An incidental memory task revealed that older adults, more often than younger adults, reconstruct what people state verbally to coincide with the meaning of the nonverbal content, if the nonverbal content is conveyed through facial expressions. A second experiment with older participants showed that the high level of memory reconstructions favoring the nonverbal interpretation was maintained when the ages of the participants and actresses were matched, and when the nonverbal content was conveyed both through prosody and facial expressions. (Thompson et al., 2001).

Developmental Studies

Dancer et al., (2000) studied 12 children with normal verbal language, ages 4, 5, and 6, were matched with 12 children with impaired verbal language. When the two groups were compared for comprehension and production of nonverbal gestures as well as verbal language, the latter group scored more poorly in both areas. Implications for speech-language pathologists and other professionals in the assessment and remediation of language in language impaired children are mentioned.
Preschool aged children (3 and 5 years) were asked to judge the emotion expressed in museum art under two situations; one where they observed an adult conspicuously make judgments of the emotion portrayed in paintings and a second where they were not exposed to adult judgments. In the experimental condition, children were presented with five paintings (four portraying a target emotion and one an alternate emotion) and watched as an adult chose three paintings that expressed one of four target emotions (happy, sad, excited or calm). Children were asked to pick the fourth from the remaining pair of paintings. In the control condition, children were asked to choose the painting portraying the target emotion from the pair without watching an adult make choices. All stimuli had been previously rated by artists to be good exemplars of each of the emotion categories. The results indicated that 3-year-olds were at chance in the control condition, but matched art to emotion in a manner that was consistent with artists' norms in the experimental condition. Five-year-olds showed better than chance performance in the control condition, and even higher levels of performance in the experimental condition. These findings suggest that children's judgements of expressiveness in art may be facilitated by social interaction with others who take an aesthetic stance toward paintings. (Callaghan, 2000).

Research seeking to determine whether imitation of gestures is within the neonate's and young infant's competence has yielded discrepant findings. Some studies report imitation of at least one gesture, tongue protrusion, whereas others fail to find significant matching of even this action for infants aged 1 to 4 month videotaped presentations of a peer and an adult modelling tongue protrusions and mouth opening/closing were shown to infants with mean ages of 13 and 23 weeks in an attempt to test the
efficacy of peer models and to free modeling from any potential bias. With both baseline and arousal controls to assess the significance of tongue protrusions and mouth openings to their respective models, no significant effect of modeling were discernible at either age in study 1, study 2 was conducted to address possible design limitations of the first investigation. Only one significant effect favoring an interpretation of imitative was obtained; it occurred at 12 weeks, following video presentations of tongue protrusions by an adult. This single effect may have been a chance result. Granting the two-dimensionality of the video image, imitative-like matching appears not to be engendered with great efficacy by a dynamic pattern that preserves characteristics of facial gestures, whether the gestures are modeled by an infant peer or by an adult. (Abravanel, 1997).

Kahana Kalman et al., (2001) investigated the role of person familiarity in the ability of 3.5-month-old infants to recognize emotional expressions. Infants (N = 72) were presented simultaneously with two filmed facial expressions, happy and sad, accompanied by a single vocal expression that was concordant with one of the two facial expressions. Infants looking preferences and facial expressions were coded. Results indicated that when the emotional expressions were portrayed by each infant’s own mother, infants looked significantly longer toward the facial expressions that were accompanied by affectively matching vocal expressions. Infants who were presented with emotional expressions of an unfamiliar woman did not. Even when a brief delay was inserted between the presentation of facial and vocal expressions, infants who were presented with emotional expressions of their own mothers looked longer at the facial expression that was sound specified, indicating that some factor other than temporal synchrony guided their
looking preferences. When infants viewed the films of their own mothers, they were more interactive and expressed more positive and less negative effect. Moreover, infants produced a greater number of full and bright smiles when the sound-specified emotion was "happy," and particularly when they viewed the happy expressions of their own mothers. The average duration of negative effect was significantly longer for infants who observed the unfamiliar woman than for those who observed their own mothers. These results show that when more contextual information—that is, person familiarity—was available, infants as young as 3.5 months of age recognized happy and sad expressions. These findings suggest that in the early stages of development, infants are sensitive to contextual information that potentially facilitates some of the meaning of others' emotional expressions.

Soken (1999) examined seven-month-old infants perception of positive (happy, interested) and negative (angry, sad) affective expressions was investigated using a preferential looking procedure (n = 20 in each of 6 conditions). The infants saw two videotaped facial expressions and heard a single vocal expression concordant with one of the facial expressions. The voice on the soundtrack was played out of synchrony with the ongoing affective visual display. Infants participated in one of six conditions (all possible pairs of the four expressive events). Infants visual fixations to the affectively concordant and affectively discordant displays were recorded. Infants looked longer at the affectively concordant displays than at the affectively discordant displays in all conditions except the happy/sad and interested/sad conditions. For these two comparisons, facial discrimination was demonstrated by the infants preferential looking at happy and interested expressions compared to the sad expression. Thus, 7-month-old infants
discriminate among happy, interested, angry, and sad expressions, demonstrating differentiation among specific, dynamic expressions. The results are discussed in terms of the information specifying facial and vocal affect and the possible role of familiarity in learning to differentiate among affective expressions during infancy.

Bahrick et al., (1998) investigated the ability of 4- and 7-month-old infants to match unfamiliar, dynamic faces and voices on the basis of age or maturity. In Experiment 1, infants received videotaped trials of an adult and a child of the same gender, side by side, speaking a nursery rhyme in synchrony with one another. The voice to one and then the other face was played in synchrony with the movements of both faces in a random order across 12 trials. On one block of 6 trials a man and a boy were presented, and on the other block a woman and a girl. Results indicated significant matching of the faces and voices at both ages, and the infant's prior experience with children appeared to facilitate matching at 7 months. Further, a visual preference for the children's faces was found. Experiment 2 assessed matching to the same events by 7-month-olds, only with the faces inverted. Results indicated no evidence of matching; however, the visual preference for the children's faces was replicated. Together, the findings suggest that infants are able to detect invariant intermodal relations specifying the age or maturity of a person's face and voice. This matching was most likely based on information that was degraded by inverting the faces, including invariant relations between the sound of the voice and configurational aspects of the face, or between temporal aspects of the voice and the relative motion of facial features.
Maurer et al., (1999) tested 1-month-olds for cross-modal transfer of shape between touch and vision using a procedure described by Meltzoff and Borton, but including controls for side bias and stimulus preference. In Experiment 1 (N = 48), infants' looking times to smooth and nubby visual stimuli were not influenced by previous oral exposure to one of the shapes during the preceding 90 s, except for an effect on the first test trial in one group; this effect could have been due to limited cross-modal transfer, to Type 1 error, or to side bias, possibly interacting with a small stimulus preference. The failure of that effect to replicate in a group (N = 16) with less side bias (Experiment 2) suggests that it was not due to cross-modal transfer. Experiment 3 (N = 32), an exact replication of Meltzoff and Borton's experiment, also failed to yield evidence of cross-modal transfer. Overall, there is not good evidence that 1-month-olds can transfer information about these shapes from touch to vision. Future studies exploring the ability to transfer information about other shapes will be easier to interpret if they include controls for side bias and stimulus preference.

The view that the motor program activated during imitation is organized by goals was investigated by Bekkering et al., (2000) asking pre-school children to imitate a set of hand gestures of varying complexity that were made by an experimenter sitting in front of them. In Experiments 1 and 3, children reached for the correct object tone of their own ears or one of two dots on a table) but preferred to use the ipsilateral hand. This ipsilateral preference was not observed when hand movements were made to only one ear (Experiment 2), or when movements were directed at space rather than physical objects (Experiment 3). The results are consistent with the notion that imitation is guided by goals and provide insights about how these goals are organized.
Hrubes et al., (2001) examined when students are having difficulty with cognitive tasks is important in educational settings. This study investigated whether college students emitted observable displays of cognitive difficulty when engaged in solitary problem-solving tasks. Participants high and low in self-monitoring tendencies were videotaped while solving both hard and easy problems. Ten-second segments of the videotapes were rated for displayed difficulty levels. Results indicate that college students do emit nonverbal displays indicating task difficulty: Students displayed significantly less difficulty while solving easy problems than while solving hard problems. Results also indicated that the difficulty displays of low self-monitors were more discernible than the difficulty displays of high self-monitors.

DEntremont et al., (1999) examined 5-month-olds' responses to adult facial versus vocal displays of happy and sad expressions during face-to-face social interactions in three experiments. Infants interacted with adults in either happy-sad-happy or happy-happy-happy sequences. Across experiments, either facial expressions were present while presence/absence of vocal expressions was manipulated or visual access to facial expressions was blocked but vocal expressions were present throughout. Both visual attention and infant affect were recorded. Although infants looked more when vocal expressions were present, they smiled significantly more to happy than to sad facial expressions regardless of presence or absence of the voice. In contrast, infants showed no evidence of differential responding to voices when faces were obscured; their smiling and visual attention simply declined over time. These results extend findings from non-social contexts to social interactions and also indicate that infants may require facial expressions to be present to discriminate among adult vocal expressions of affect.
Gender and Gestures

Sixteen right-handed participants (8 male and 8 female students) and 16 left-handed participants (8 male and 8 female students) were presented with cartoon faces expressing emotions ranging from extremely positive to extremely negative. A forced-choice paradigm was used in which the participants were asked to rate the faces as either positive or negative. Compared to men, women rated faces more positively, especially in response to right visual field presentations. Women rated neutral and mildly positive faces more positively in the right than in the left visual field, whereas men rated these faces consistently across visual fields. Handedness did not affect the ratings of emotion. The data suggest a positive emotional bias of the left hemisphere in women. (VanStrien et al., 2000).

Three studies documented the gender stereotypes of emotions and the relationship between gender stereotypes and the interpretation of emotionally expressive behavior. Participants believed women experienced and expressed the majority of the 19 emotions studied (e.g., sadness, fear, sympathy) more often than men. Exceptions included anger and pride, which were thought to be experienced and expressed more often by men. In Study 2, participants interpreted photographs of adults' ambiguous anger/sadness facial expressions in a stereotype-consistent manner, such that women were rated as sadder and less angry than men. Even unambiguous anger poses by women were rated as a mixture of anger and sadness, Study 3 revealed that when expectant parents interpreted an infant's ambiguous anger/sadness expression presented on videotape only high-stereotyped men interpreted the expression in a stereotype-
consistent manner. Discussion focuses on the role of gender stereotypes in adults' interpretations of emotional expressions and the implications for social relations and the socialization of emotion. (Plant et al., 2000)

DeSantis et al., (2000) tested the prevailing view that there is a gender difference for use of a smiling facial expression. Photographs of adult females and males taken in the United States throughout the twentieth century were analyzed. A comparison was made between females and males for smiling in individual pair, and group photographs that were taken for various occasions, all of which could nominally be considered at least neutral and at most celebratory. In nearly every type of photographic category, women were more likely to smile - and to do so more fully - than men in a comparable setting and time, even though the proportion of each gender smiling in photos increased as the century has progressed.

Emotional facial expressions are often asymmetrical, with the left half of the face typically displaying the stronger affective intensity cues. During facial perception, however, most right-handed individuals are biased toward facial affect cues projecting to their own left Visual hemifield. Consequently, mirror-reversed faces are typically rated as more emotionally intense than when presented normally. Mirror-reversal permits the most intense side of the expresser's face to project to the visual hemifield biased for processing facial affect cues. This study replicated the mirror-reversal effect in 21 men and 49 women (aged 18-52 yr.) using a videotaped free viewing presentation but also showed the effect of facial orientation is moderated by the sex of the perceiver. The mirror-reversal effect was significant only for men but not for women, suggesting possible sex differences in cerebral organization of systems for facial perception. Suggested
that gesture overlap was reduced for neurologic individuals with scanning speech. Speaking rate change did not influence F2 onset frequencies, and presumably gesture overlap, for healthy or disordered speakers. F2 onset frequency differences for utterance-initial and -medial repetitions were interpreted to suggest reduced co-production for the utterance-initial position. The utterance-position effects on F2 onset Frequency, however, likely were complicated by position-related differences in articulatory scaling. The results of the regression analysis indicated that gesture sliding accounts, in part, for temporal variability in F2 trajectories. Taken together, the results of this study provide support for the idea that speech production theory for healthy talkers helps to account for disordered speech production. (Killgore et al., 1999)

Cross Cultural Studies

George et al., (1998) present a model of cross-cultural negotiations which describes how the affect negotiators experience during negotiations influences the character of the negotiation process and its outcomes. Three categories of determinants of negotiator affect are proposed: Individual differences, cross-cultural differences, and contextual factors. The ways in which negotiator affect influences information processing during negotiations are then described. It is suggested that the influence of affect, through substantive information processing, may lead to either positive or negative Spirals in negotiations, influencing the ability of negotiators to reach an integrative solution. Finally, the ways in which negotiators can break out of destructive negative spirals by engaging in motivated rather than substantive information processing are discussed.
Roberson et al., (2000) sought to replicate and extend the work of E. Rosch Heider (1972) on the Danish with a comparable group from Papua, New Guinea, who speak Berinmo, which has 5 basic color terms. Naming and memory for highly saturated local, non-focal, and low-saturation stimuli from around the color space were investigated. Recognition of desaturated colors was affected by color vocabulary. When response bias was controlled, there was no recognition advantage for focal stimuli. Paired-associate learning also failed to show an advantage for focal stimuli. Categorical Perception effects for both English and Berinmo were found, but only at the boundaries of existing Linguistic categories. It is concluded that possession of linguistic categories facilitates recognition and influences perceptual judgments.

To create a set of Chinese faces expressing emotions. Chinese adults in Beijing were asked to think about a situation and then to pose the facial expression appropriate to that emotional state. The emotions posed were happiness, surprise, disgust, sadness, fear, and anger. The expressions were photographed and a number of the best examples of each expression were selected. In Experiment 1, raters were given six labels and were required to select the one that best fit each emotional expression. In Experiment 2, another group of raters assessed the photographs on the six labels, using a 7-point scale. Sixty-two photographs fulfilled the criteria of 70% agreement in ratings in Experiment 1 and a rank rating of at least 4 in Experiment 2. This resulted in 9 to 12 reliable examples of each emotional expression, a good set of photographs of expressions, useful to those wishing to study emotion in China and cross-cultural settings. (Wang et al., 1999).
In infant psychiatry the mother's sensitivity toward understanding and observing her newborn infant's emotional states seems to be of importance for the mental development of the child. To study this matter, we imported a new method (the IFEEL pictures) into Scandinavian culture and studied Finnish mothers' responses in the IFEEL test, which consists of 30 infant facial photographs. Compared with pre-war Croatian mothers, Finnish mothers reported less distress, joy, interest, passivity, and sadness but more shyness and disgust. Compared with American mothers, the Finnish mothers saw less distress and more surprise. The study paid attention to linguistic and methodologic aspects in adapting this new assessment method to Finnish culture. The IFEEL method seems to be a useful assessment when evaluating mothers' observations of pictures of infants' emotional states. (Hiltunen et al., 1999)

Photographs of hemifacial composites (left-left, right-right and normal presentation, right-left) of three cultures (Japanese, Oriental Indian and North American) displaying six emotions (happy, sad, fear, anger, surprise, disgust) and a neutral state were administered successively (one by one) as well as simultaneously (three hemifacial photographs of an expression at a time) to observers for judgment on a 5-point scale in terms of distinctiveness of expression. Cultures did not vary for their distinctiveness of facial expressions, suggesting universality in this respect. Culture-specificity was, however, observed with respect to hemifacial asymmetry and valence of emotion expressions: (1) Japanese showed a right hemifacial bias for positive and left hemifacial bias for negative emotions; Indians and North Americans showed left hemifacial bias for all emotions, and (2) negative emotion expressions were least distinctly identifiable in Japanese faces followed by Indian and North American faces. (Mandal, 2001)
Nespor et al., (1999) studied the interaction of phonology with syntax, and, to some extent, with meaning, in a natural sign language. It adopts the theory of prosodic phonology (Nespor and Vogel, 1986), testing both its assumptions, which had been based on data from spoken language, and its predictions, on the language of the deaf community in Israel. Evidence is provided to show that Israeli Sign Language (ISL) divides its sentences into the prosodic constituents, phonological phrase and intonational phrase. It is argued that prominence falls at the end of phonological phrases, as the theory predicts for languages like ISL, whose basic word order is head first, then complement. It is suggested that this correspondence between prominence pattern and word order may have important implications for language acquisition. An assimilation rule whose domain is the phonological phrase provides further evidence for the phonological phrase constituent. The rule involves a phonetic element that has no equivalent in spoken language: the nondominant hand. In this way, it is shown how a phonetic system that bears no physical relation to that of spoken language is recruited to serve a phonological-syntactic organization that is in many ways the same. The study also provides evidence for the next higher constituent in the prosodic hierarchy, the intonational phrase. Elements such as topicalized constituents form their own intonational phrases in ISL as in spoken languages. Intonational phrases have clear phonetic correlates, one of which is facial expressions which characterize entire intonational phrases. It is argued that facial expressions are analogous to intonational melodies in spoken languages. But unlike the tones of spoken language, which follow one another in a sequence, facial articulations can occur simultaneously with one another and with the rest of the communicative message conveyed by the hands. This difference, it is
argued, results from the fact that the many facial articulators are independent, both of each other and of the primary articulators, the hands. The investigation illuminates the similarities as well as the differences of prosodic systems in the two natural human language modalities, and points out directions for future research.

The effects of Asian and Caucasian facial morphology were examined by having Canadian children categorize pictures of facial expressions of basic emotions. The pictures were selected from the Japanese and Caucasian Facial Expressions of Emotion set developed by Matsumoto and Ekman (1989). Sixty children between the ages of 5 and 10 years were presented with short stories and an array of facial expressions, and were asked to point to the expression that best depicted the specific emotion experienced by the characters. The results indicated that expressions of fear and surprise were better categorized from Asian faces, whereas expressions of disgust were better categorized from Caucasian faces. These differences originated in some specific confusions between expressions. (Gosselin et al., 2000)

Church et al., (1999) investigated the structure of affect in the Filipino culture and compared the results to those in Western studies. Four samples of students (ns = 397 to 530) rated their mood for today, the past week, or in general, using near-comprehensive sets of Filipino mood adjectives. Results of exploratory and confirmatory factor analyses supported a hierarchical model of affect and the cross-cultural comparability of self-report mood dimensions (i.e., higher-order Positive and Negative Affect, plus specific affects corresponding to hypothesized universal or basic emotions). The
results were more consistent with biological theories of affect than a strong social constructivist perspective. In the present studies we addressed the structure of affect and its generality across cultures by investigating affect structure in several Philippine samples. The results have implications for cross-cultural universality and evolutionary biological versus social constructivist views of emotions or affect.

Nursing involves deep human interpersonal relationships between nurses and patients. But in modern Korea, the nurse-patient relationship tends to be ritualistic and mechanistic, patients usually express the hope that nurses be more tender and kind. Patients expect nurses to express their warmth especially through nonverbal behaviour. This study was conducted to identify patients' preference for nurse's nonverbal expressions of warmth. Through the confirmation of these preference, nurses may learn how to enhance their interpersonal relationships with patients. Subjects for the study were 73 patients who had been admitted to a university teaching hospital for at least three days and agreed to be interviewed by the investigator. The interactions were studied nonverbal expressions of warmth during nursing rounds and administration of oral medication. The interview schedule was especially designed by the investigator to measure the nurse's posture, the distance between the nurse and the patient, the nurse's eye contact, facial expression, hand motion and head nodding. Data analysis included frequencies, percentages and X2 – test. The results of this study may be summerized as follows: 1. Patient's preference for nurse's nonverbal expressions of warmth during nursing rounds. Preferred nurse's posture was sitting (50.7%) or standing (49.3%) opposite the patient. Preferred distance between the nurses and the patient was close to the bed (93.2%), less than
1m. preferred eye contact was directed to the patient's eyes or their affected part (41.1%). Preferred facial expression was smile (97.3%). Preferred hand motions were light gestures (41.1%). Patients preferred head nodding which approved their own opinions (69.9%). 2. Patient’s preferences for nurse’s nonverbal expressions of warmth during administration of oral medication. Preferred nurse’s posture was standing and waiting to confirm that the medication had been taken (58.9%). Preferred distance from the patient was at arm’s length, 0.5-1m (64.4%). Patients preferred direct eye contact (58.9%) and a smile (94.5%). Patients preferred that the nurse put the medicine directly the patient’s hand (64.4%). Whether the nurse nodded her head or not was not considered important. 3. The relation of general and administration of oral medication. During nursing rounds, the age of subjects (p = 0.010) and the standard of education (p = 0.026) related to the distance between the nurse and the patient. The sick hospital ward related to the eye contact (p = 0.01) and facial expression (p = 0.010). (Kim, 1990).

STUDIES RELATED TO HEARING IMPAIRMENT

The relationship between knowledge of American Sign Language (ASL) and the ability to encode facial expressions of emotion was explored. Participants were 55 college students, half of whom were intermediate-level students of ASL and half of whom had no experience with a signed language. In front of a video camera, participants posed the affective facial expressions of happiness, sadness, fear, surprise, anger, and disgust. These facial expressions were randomized onto stimulus tapes that were then shown to 60 untrained judges who tried to identify the expressed emotions. Results indicated that hearing
subjects knowledgeable in ASL were generally more adept than were hearing nonsigners at conveying emotions through facial expression. Results have implications for better understanding the nature of nonverbal communication in hearing and deaf individuals. (Goldstein et al., 2000)

TEACHING METHODS

Two boys who both had a profound bilateral hearing impairment met at a specialised sign preschool. Their preconditions were quite different since in one of them the hearing impairment was detected in the maternity ward with the aid of otoacoustic emissions and habilitation had begun at age 4 months. The other boy’s impairment was not detected until age 2 years, habilitation was thus much delayed. Data were collected on the two boys using interviews with parents and teachers observation and video recording in the children’s own environment at home and in the specialised sign preschool characteristic differences between the boys are described regarding their social and linguistic development relating to the time of detection of the hearing and the importance of early sign language acquisition was observed. (Magnusson, 2000).

Zbortekova (1998) in his research follow up and comparisons of cognitive and personality development specifications of 30 hearing-impaired children attending integrated education with their peers in special schools. He found difference in the level of speech competence, social capability differentiation. In addition to integrated education, application of early professional care and stimulating family environment play their role.
Connor et al., (2000) examin ed the relationship between the teaching method, oral or total communication, used at children’s school and children’s consonant production accuracy and vocabulary development over time. Children who participated in the study (N = 147) demonstrated profound sensorineural hearing loss and had used cochlear implants for between 6 months and 10 years. Educational programs that used an oral communication (OC) approach focused on the development of spoken language, whereas educational programs that used total communication approach (TC) focused on the development of language using both signed and spoken language using Hierarchical Linear Modelling (HLM) they compared the consonant production accuracy receptive spoken vocabulary and expressive spoken and/or signed vocabulary skills, over time of children who were enrolled in schools that used either OC or TC approaches while controlling for a number of variables. These variables included age at implantation, preoperative aided speech detection thresholds, type of cochlear implant device used, and whether a complete or incomplete active electrode array was implanted. The results of this study indicated that as they used their implants the children development improved consonant production accuracy and expressive and receptive vocabulary overtime, regardless of whether their school employed a TC or OC teaching method. Furthermore, there appeared to be a complex relationship among children’s performance with cochlear implant age at implantation, and communication/teaching strategy employed by the school. Controlling for all variables, children in OC programmes demonstrated, on average, superior consonant – production accuracy with significantly greater rates of improvement in consonant – production accuracy scores overtime compared to children in TC programmes. However, there was no significant difference...
between OC and TC groups in performance of rate of growth in consonant – production accuracy when children received their implants before the age of 5 years. There was no significant difference between OC and TC groups in receptive spoken vocabulary scores or in rate of improvement over time. However, children in TC group achieved significantly higher receptive spoken vocabulary scores than children in OC group if they received their implants before the age of 5 years. The TC group demonstrated superior scores and rates of growth on the expressive vocabulary measure (Spoken and / or signed).

**Family Environment**

Deaf pre-schoolers and hearing family members learned sign language in a 5-year intervention project. Once weekly, each child met with a teacher who was deaf. Parents, siblings and other relatives met about once monthly to study sign language and all families in the project signed together about twice yearly. The families indicated satisfaction with the project, they learned to sign and their social networks expanded. Parents favored bilingual education sign language as the main language but learning their mother tongue Finnish was also important. Learning sign language was not easy, especially for the fathers. The families that were most actively involved in the lessons learned the most. (Takala, 2000).

Two groups of students, one with prelingually acquired deafness and a hearing control group participated in an experiment designed to examine the effect of communication mode on working memory coding and information processing capacity. A research paradigm based on a letter
processing task was used as a test tool. Sixteen of the participants who were deaf (mean grade 6.9) were raised by bearing parents advocating a strict oral approach at home and at school. Another 16 students with deafness (mean grade 6.9), all of them children of deaf parents, acquired sign language as their primary language. The mean grade of hearing control group was 6.5 contrary to expectations, the groups information processing capacity was not biased by their preferred communicating mode. Although the stimuli material was linguistic in nature no evidence for linguistic coding was found. (Miller, 2001).

Language impairments have been hypothesised to have genetic component previous studies of the familial aggregation of language impairments have relied on a retrospective approach based on parental/self reported history of language development. Spits et al., (1997) examined familial aggregation prospectively by investigation of language acquisition and cognitive development in the younger siblings and off - spring of individuals with well defined language impairments. It was predicted that children with a positive family history for language impairments would be more likely to show delays in language acquisition than would age-and gender-matched controls. Similar delays were not expected in nonlinguistic domains such as conceptual, gestural or general cognitive development. Ten children with a positive family history and 10 age-and gender-matched controls were tested. Analyses of linguistic and cognitive assessments at 16 to 26 months confirmed the predictions. Children with a family history of language impairments have power receptive and expressive language scores than controls, with 50% of them scoring at least 1.5 SD below the
mean for their age. At the same time, performance on a number of tasks that did not rely on language abilities did not differ as a function of family history. These results indicate that children with a positive family history for language impairments are at risk for language delay, the results also support a familial component to language impairments.

Yamaguchi (1998) examined the effects of conflicts with the hearing world and deaf identity on psychosocial development in college students with hearing impairment. A questionnaire consisting of conflicts with the hearing world scale (Yamaguchi, 1997) and Erikson Psychosocial stage inventory (Nakanishi and Sakata, 1993) was administered to 141 college students with hearing impairments. To examine the effects of conflicts with the hearing world on psychosocial development and the effects of deaf identity on psychosocial development multiple regression analyses were conducted. The main results were as follows:

As to the examination concerning all students, it was shown that conflicts with the hearing world had various and negative effect on psychosocial development, the acceptance of disability and integrated identity, 2. As to the examination concerning past educational history, remarkably differed relations were shown between conflicts with hearing world, deaf identity and psychosocial development.
Performance of Hearing Impaired

In a project two studies examined the validity of parent report for measuring language in children with specific language delay who are older than the normative group, but who have language levels within the range measured by the instruments. In study 1, scores on the MacArthur communicative development inventory: words and sentences were compared to behavioural measures of production of vocabulary and grammar in 39 to 49 month old children with language delay. Results indicated moderately high to high concurrent validity correlations in both domains (67-86). In study 2, scores on the MacArthur communicative Inventory: worlds and Gestures were compared to behavioural measures of vocabulary comprehension and production and gesture production in 24 to 32 month old children with language delay. Result indicated a moderately high concurrent validity correlation for vocabulary production (.66). Parent report of comprehension and gesture scores did not correlate significantly with their behavioural counter parts, but gesture scor-es were moderately highly correlated with language comprehension (.65). (Thal et al., 1999)

Cienkowski (2000) studied the relation between rated intelligibility and correct key word repetitions of sentences was examined in listeners with normal hearing and listeners with hearing loss. Ten lists of 10 CID sentences were arranged in two randomly ordered groups. Listeners were asked to complete two tasks: 1. Rate the intelligibility of 50 sentences on a scale of 0 of 100% and 2. Repeat each of Rs. 50 sentences, which were scored as the number of key worlds repeated correctly. Sentence were presented at five signal – to –noise ratios. The start level for sentence
presentation was established using the method of adjustment and the revised speech intelligibility rating passages correlations of rated intelligibility and correct repetition were 0.85 for listeners with hearing loss. This study confirms the earlier work of speaks, Parker, Harris and Kuhl (1972) and the findings demonstrate that listeners with hearing loss preserve the ability to rate the intelligibility of speech.

Pittman (2000) examined the perceptual-weighting strategies and performance – audibility functions of 11 moderately hearing impaired children (HI) 11 age-matched normal hearing children (NH), 11 moderately HI adults, and 11 NH adults. The purpose was to (a) determine the perceptual – weighting strategies of HI children relative to other groups and (b) determine the audibility required by each group to achieve a criterion level of performance. Stimuli were 4 nonsense syllables (/us/, /u integral/, /uf/, and /u theta/). The vowel, transition and fricative segments of each nonsense syllable were identified along the temporal domain, and each segment was amplified randomly within each syllable during presentation. Point-biserial correlation coefficients were calculated using the amplitude variation of each segment and the correct and incorrect responses for the corresponding syllable. Results showed that for /us/ and /u integral/, all four groups healty weighted the fricative segments during perceptions whereas the vowel and transition segments received little or no weight. For /uf/, relatively low weights were given to each segment by all four groups. For /u theta/ the NH children and adults weighted all three segments equally low performance – audibility functions of the fricative segments of /us/ and /u integral/ were constructed for each group. In general, maximum performance for each group was reached at lower audibility levels for /ls/ that for /integral/ and
steeper functions were observed for the HI groups relative to the NH groups. A decision theory approach was used to confirm the audibility required by each group to achieve a greater than or equal to 90% level of performance. Results showed both hearing sensitivity and age effects. The HI listeners required lower levels of audibility listeners to achieve similar levels of performance. Likewise, the adult listeners required lower levels of audibility than the children, although this difference was more substantial for the NH listeners than for HI listeners.

Metaphor comprehension and use were evaluated in children with hearing impairment (HI) who performed within normal age limits on norm-referenced measures of language. Participants were 13 children with mild to moderate sensory neural hearing loss and 12 children with normal hearing and normal development (10:0 to 15:7 years: month). Three verbal metaphor tasks (Comprehension, preference and Completion) and one visual metaphor task, the Metaphor Triads Task (MTT), were administered. No significant group differences were found on any of the tasks. Both groups exhibited the same metaphor competence and response patterns on the four tasks. These findings add to a growing body of literature showing that a significant number of children with mild-to-moderate hearing impairment have age-appropriate language abilities. (Wolgemuth, 1998).

A cross cultural study conducted by Most (2000) in his study evaluated the effect of speech features and context on the auditory-visual perception of Hebrew speaking adults with profound hearing loss. All participants has profound sensorineural hearing loss (95 dB-IL+). They were presented with the following speech perception materials selected to evaluate the effect of the following
variables: 1. /acca/ nonsense syllables to evaluate the effect of voicing place and manner of articulation on perception, 2. Non meaningful and meaningful words to assess the effect of phoneme position, and 3. Sentences to evaluate the effect of length, type and knowledge of the topic of perception. Speech material was introduced through the auditory-visual modality. Results mainly on visual information; therefore perception of variables with pool visual information. Front place of articulation, fricative, initial phonemes and short sentences were perceived better than back place of articulation, nasals, final phonemes and long sentences respectively.

Stimulus context and audibility

Stelmachowicz (2000) investigated the influence of stimulus context and audibility on sentence recognition was assessed in 60 normal hearing children, 23 hearing impaired children and 20 normal hearing adults performance-intensity (PI) functions were obtained for 60 semantically correct and 60 semantically anomalous sentences. For each participant, an audibility index (AI) was calculated at each presentation level, and a logistic function was fitted to ran-transformed percent-correct values to estimate SPL and AI required to achieve 70% performance. For both types of sentences, there was a systematic age-related shift in the PI functions suggesting that young children require a high AI to achieve performance equivalent to that of adults. Improvement in performance with the addition of semantic context was statistically significant only for the normal hearing 5-years olds and adults. Data from the hearing impaired children show age-related trends that were similar to those of normal hearing children, with the majority of individual data falling within the 5th and 95th percentile of normal.
Cochlear Implant

Increases in the phonetic inventories of a group of children in the fifth and sixth years of experience with a cochlear implant are reported, extending a previous 4-years study (T.A Serry and P.J. Blamey 1999). Thirty-six out of 44 phones in Australian English reached the criterion of 50% correct in the conversational samples of 5 or more children. This level of performance corresponds to intelligible, but not completely natural, speech. The rate of improvement in the sixth year was slow, indicating a probable plateau in performance. The 8 phones that did not attain the 50% criterion in 5 or more children were /li/ and /isi/. Potential reasons for the slow development or non development of these phones include very low frequency of occurrence for /isi/ and the perceptual and articulatory characteristics of /isi/. /i/ is also subject to a high degree of allophonic variation in the fluent speech of normally hearing speakers, probably accounting for much of the variability in its articulation in the conversational samples. (Blamey, 2001).

Studies related to Causes of hearing impairment

To find out the prevalence and causes of hearing impairment among children of school-entry age, in rural areas of coastal south India. The study adopted the World Health Organization (WHO) guidelines viz., “The prevalence of Ear and hearing Disorders Protocol”. A total of 855 children studying in the first year of school were examined using a Portable Pure Tone Audiometer and an Otoscope. Children with hearing impairment were re-examined to find out the type of hearing impairment. Mothers of all children were interviewed in their
homes, in order to obtain details of socio-economic status, family history and history of consanguinity. Hearing impairment was detected in 102 children (11.9%) and impacted wax was found to be the most common cause of hearing impairment (86.3%) observed among 74 of these children. The prevalence of hearing impairment was significantly lower among children belonging to high socio-economic status (P=0.0036). Hearing impairment and preventable ear diseases were found to be important health problems among children of school-entry age group in this region. Regular screening of children of school-entry age will ensure that children begin their school-life without this disability. (Rao et al., 2002)

In order to determine the prevalence of hearing impairment and otitis media in rural primary school children, a pilot study of 284 children aged 6-10 years was performed by Jacob et al., (1997). These children were screened by otoscopy, pure tone audiometry and tympanometry. The overall prevalence of otological abnormalities (excluding was) was 21.5%. Hearing impairment was detected in 34 children (11.9%). Conductive hearing impairment was predominant (10.9%). Otitis media was diagnosed in 17.6% of children. While 91.2% of children with hearing impairment had associated middle ear disease, only 53.4% of those with middle ear disease were detected as have hearing impairment. The importance of including tympanometry as part of the screening protocol is highlighted.

Information has been collected by questionnaire from parents and teachers of 928 deaf school children in South India. 374 of these children were examined during a 21-day visit to Madras. These findings are part of the outcome of the visit by a working party organised and financed by the
commonwealth society for the deaf. The society has organised surveys of deafness in West Africa and Garrbia. In this survey the causes of severe deafness in Madras have been identified. Streptomycin injections were responsible for 3.6% of cases and meningitis for 5.3%. Examination found 29% of children with ophthalmic signs of intrauterine rubella. These could be prevented. Only a third of Indian mothers of children with eye signs are aware of having had rubella infection during pregnancy. (Gray, 1989)

Attitudes towards career choice

Parasnis et al., (1996) investigated the expressed attitudes of deaf people in India towards career choice for deaf and hearing people. Deaf adults from Pune, India rated the suitability of 12 professions for deaf and hearing people and gave written comments on the suitability of any other professions they could list. The results, in general, were consistent with those of other studies in the United States, England, Italy, South Africa and India with hearing teachers and parents of deaf children, which indicated that the hearing status of imagined deaf and hearing advises selectively influenced attitudes towards the suitability of certain professions. Some differences in profession preferences also emerged indicating that the deaf respondents' criteria for career choice appeared to be primarily based on the use of hearing, speech, and visual skills required for a particular career. There was some suggestion that culturally specific factors played a role in shaping attitudes. These findings underscore the importance of understanding the attitudes of deaf people.
Attitudes of teachers and parents

The attitudes of teachers and parents of deaf children in India toward career choices for deaf and hearing people were investigated with respondents rating the suitability of eight professions for an imagined group of equally qualified deaf and hearing advisees. The attitudes of parents and teachers in India were found to be similar to those reported in previous studies conducted in the United States, Italy, England, and South Africa and showed that the hearing status of the imagined advisees selectively influenced the respondents’ ratings of their suitability for those professions. These results suggested that differences in the availability of educational or technological support for deaf people do not necessarily lead to differences in attitudes regarding career choice for deaf people. (Parasnis et al., 1996)

Cross cultural study

Wind (1983) A ring-like pigment deposit in the perilimbic conjunctiva of dark-skinned subjects was found more frequently among deaf than among non-deaf children in Tanzania and Kenya, and in both more frequently in these countries than in South Africa, Florida, Malawi, India and Ethiopia. It is hypothesized that this is due to differences in the regions’ general health conditions in the individual’s case history, in genetically determined pigmentation, and in the individual’s age.
Study among ethnic group

A detailed audiological study by Kameswaran et al., (1976) combined with certain haematological investigations which were never previously done was undertaken on Todas, a small vanishing tribe of Nilgiris, South India. Ten per cent of the Todas studied exhibited otosclerosis which, though lower than that of a previous study, is still a very high percentage when compared to the general population. The incidence of chronic supportive otitis media in Todas is markedly low (1-6 per cent) and 13-3 per cent of Todas had sensorineural hearing loss. Evaluation of hearing thresholds at various frequencies in the different age groups did not show much variation from that of the general population. The incidence of presbyacusis is not found to be low as reported earlier. Blood pressure recordings did not show any age-related increase. The majority of Todas studied belonged to the blood group 'B' (63 per cent) and 16-6 per cent belonged to the 'AB' group, which is distinctly different from the distribution pattern seen in the general India population. There was no significant variation in the serum cholesterol level in Todas.

STUDIES RELATED TO SIGN LANGUAGE

An extensive study by Gopalakrishnan (1998) to make a dictionary of Indian Sign language revealed that only 42% of the words in the lexicon had common signs, when the entire country taken was into account. Only 8.9% of the words had two different sets of signs. Approximately 25% of the words had different signs and only 3.5% of the words on the national average, did not have any signs.
Two experiments investigated whether profoundly deaf children's rhyming ability was determined by the linguistic input that they were exposed to in their early childhood. Children educated with cued speech (CS) were compared to other deaf children, educated orally or with sign language. In CS, speech reading is combined with manual cues that disambiguate it. The central hypothesis is that CS allows deaf children to develop accurate phonological representations, which in turn, assist in the emergence of accurate rhyming abilities. Experiment 1 showed that the deaf children educated early with CS performed better at rhyme judgement than did other deaf children. The performance of early CS users was not influenced by word spelling. Experiment 2 confirmed this result in a rhyme generation task. Taken together, results support the hypothesis that rhyming ability depends on early exposure is linguistic input specifying all phonological contrasts, independently of the modality (visual or auditory) in which this input is perceived. (Charlier, 2000)

Brennan (2000) studied that incorporating the use of sign language, and more specifically a game called sign-O, into their day, teachers can increase students recall also studied the rationale of using sign language, gives directions for playing sign-O, provides extension activities and includes a game board ready for duplication.

Breaem (1999) compared the signing of deaf early and late learners of Swiss German Sign language, found the difference in the production of the signs by the two groups of signers. Specifically he found that for early learners, signing was easier to watch and to understand because it was somehow more “rhythmic”. In order to discover reasons for this impression,
analyses were made of temporal aspects of the production of signs which might function as prosodic elements in this visual corporal language. Two kinds of rhythmic patterning were found in the spontaneous signed narratives which formed the data of the original study. The first is temporal balancing of syntactic phrases in which the final phrase is produced with approximately the same duration as that of the preceding phrase in certain kinds of discourse. This kind of temporal balancing was found in this study is a regular side to side movement of the torso which phonetically marks larger chunks of some types of discourse. This marking is used consistently by the early learners but not by the late learners, who tend rather to transfer prosodic markers from their first language, German, to their sign language production.

Three experiments provide support for a key prediction of Newport's (1988) "Less is more" hypothesis. Adults were found to learn a miniature artificial language better when they were initially presented with only small segments of language than when they were presented immediately with the full complexity of language. Adults who were presented initially with individual words and only later with complex "sentences" composed of several such words learned the meanings and morphology of those words better than did adults who were presented with sentences throughout learning. The externally imposed constraint of processing only small segments of language is conjectured to be similar to the internal processing constraints of children that have been proposed to aid children in their acquisition of language. (Kerstöen, 2001).
Competent reading comprehension involves using cognitive and meta-cognitive strategies. The ability to infer meaning and to interact with printed text, is a strategy necessary for effective reading. This study records the use of an intervention to teach inferential reading to underachieving readers who are pre-lingually deaf (9 to 18 yrs. of age) using pictorial material and printed text. The two experimental groups made significant reading gains during the 30-week period of intervention. The implications for teaching inferential reading is stressed (Walkel et al., 2002).

Sign languages used around the world

In a study by Campbell, et al., (1999) there were two experiments. In experiment 1 they showed that-question type-a syntactic distinction in British Sign Language (BSL)-can be perceived categorically, but only when it is also identified as a question marker. A few hearing non-singers were sensitive to this facial display continuum between "surprise" and "puzzlement" was perceived categorically by deaf and hearing participants, irrespective of their sign experience (Experiment 2). The categorical processing of facial displays can be demonstrated for sign, but may be grounded in universally perceived distinctions between communicative face actions. Moreover the categorical perception of facial action is not confined to the six universal facial expressions.

Newport has noted differences in how American Sign Language (ASL) in used by the three groups of deaf adults: those with deaf parents (native signers); those, with hearing parents, who learned ASL upon entering school at age 5 years (early signers; Galvan (1999) extended this research to
children by investigating the use of Morphological inflections in ASL by native and early signers. Thirty deaf children between ages 3 and 9 years were asked to sign a story in ASL. The videotaped stories were analysed for morphological and contextual complexity. Qualitative differences were found between native early signers on measures relating to the aspectual complexity of signers but not on measures relating to the complexity of the utterence. Implications of these differences are discussed in terms of communication at home and ASL use in the class room.

Fourteen native deaf ASL signers participated in an experiment in which videotaped production of isolated ASL signs or ASL sentences were presented at normal playback speed and at speeds 2, 3, 4 and 6 times normal speed. For isolated signs identification scores decreased from 95% correct to 46% correct across the range of rates that were tested; for sentences, the ability to identify key signs decreased from 88% to 19% over the range of rates tested. The results indicate a breakdown in processing at around 2.5 to 3 times the normal rate as evidenced both by a substantial drop in intelligibility in this region and by a shift in error patterns away from semantic and toward formational. These results parallel those obtained in previous studies of the intelligibility of the auditory reception of accelerated finger spelling. Taken together, these results suggest a modality independent upper limit to language processing. (Fischer, 1999)

Emmorey (1998) studied the differences between linguistic and non-linguistic mental rotation. There were two experiments. Experiment - I required subjects to decide whether a signed description matched a room presented on videotape, Deaf ASL signers were more accurate when viewing
scenes described from the narrator's perspective (even though rotation is required) than from the viewer's perspective (no rotation required). In the second experiment, deaf signers and hearing non-signers viewed videotapes of objects appearing briefly and sequentially on a board marked with an entrance. This board either matched an identical board in front of the subject or was rotated 180 degrees. Subjects were asked to place objects on their board in the orientation and location shown on the video, making the appropriate rotation when required. All subjects were significantly less accurate when rotation was required, but ASL signers performed significantly better than hearing non-signers under rotation. ASL signers were also more accurate in remembering object orientation. Singers then viewed a video in which the same scenes were signed from the two perspectives (i.e. Rotation required or no rotation required). In contrast to their performance with real objects, signers did not show the typical mental rotation effect. Males outperformed females on the rotation task with object, but the superiority disappeared in the linguistic condition. The habitual use of ASL can enhance non-linguistic cognitive processes; this providing evidence for (a form of) the linguistic relativity hypothesis.

The relationship between knowledge of American Sign Language (ASL) and the ability to encode facial expressions of emotion was explored. Participants were 55 college students, half of whom were intermediate level students of ASL and half of whom had no experience with a signed language. In front of a video camera, participants posed the affective facial expressions of happiness, sadness, fear, surprise, anger and disgust. These facial expressions were randomised onto stimulus tapes that were then shown to 60 untrained judges who tried to identify the expressed emotions.
Results indicated that hearing subjects knowledgeable in ASL were generally more adept than were hearing non-signers at conveying emotions through facial expression. Results have implications for better understanding the nature of nonverbal communication in hearing and deaf individuals (Goldstein, 2000).

Nespor (1999) studied the interaction of phonology with syntax, and to some extent, with meaning, in natural sign language. It adopted the theory of prosodic phonology (Vogel, 1986), Testing both its assumptions, which had been based on data from spoken language, and its predictions, on the language of deaf community of Israel. Evidence is provided to show that Israeli sign language (ISL) divides its sentences into the prosodic constituents, phonology phase and into national phrase. It is argued that prominence falls at the end of phonological phrases as the theory predicts for language like ISL, whose basic word order may have important implications for language acquisition. An assimilation rule whose domain is the phonological phrase provides further evidence for the phonological phrase constituent. The rule involved a phonetic element that has no equivalent in spoken language. The non-dominant hand. In this way, it is shown how a phonetic system that bears no physical relation to that of spoken language is recruited to serve a phonological syntactic organisation that is in many ways the same. The study also provides evidence for the next higher constituent in the prosodic hierarchy into national phrase. Elements such as topicalised constituents form their own into national phrases in ISL as in spoken languages. Into national phrases have clear phonetic correlates, one of which is facial experience which characterise entire into national phrases. It is argued that facial expressions are analogous to into national melodies in
spoken languages. But unlike the tones of spoken language, which follow one another in a sequence, facial articulations can occur simultaneously with one another and with the rest of communicative message conveyed by the hands. This difference it is argued, results from the fact that the many facial articulators are independent both of each other and of the primary articulators, the hands. The investigation illuminates the similarities as well as the difference of prosodic systems in the two natural human language modalities and points out directions for future research.

The results of a preliminary study of the status of signed languages in Nunavut based oil field visits and interactions with deaf people and their families in three communities in Canada found the possibility of "Inuit Sign Language" exists is discussed within the framework of various theories of language development and also within the context of earlier literature which indicates that many Aboriginal Communities had (and possibly still have) flourishing signed language. The need for increased research by psychologists on the complex linguistic environment of deaf persons in Nunavet is emphasised. (MacDougall, 2001).

Shimizu (1998) proposed the existence of a factor which might facilitate inferential meaning in sign language. This factor was to be derived from formational parameter components of signs associated with emotion. He assumed that it was introduced into sign language system, and fixed as a semantic convention. In order to demonstrate such hypothesis emotional and abstract expressions from lexical items of Japanese sign language (JSL) were extracted, excluding iconic or socio-conventional expressions derived
from conventional gestures. Thirty-six noniconic lexical items of JSL were presented with neutral face expressions, to 98 tertec adult subjects using 20 semantic differential rating scales; subjects were to report impressions on the meaning of each sign item. Kinesic components of the signs were divided into 8 categories and 25 subcategories. A multivariate analysis (HAYASHI1) was applied to these data. The results showed that some kinesic components greatly contributed to particular semantic ratings. An additional experiment with artificial body movements was executed, and similar results were obtained.

Head et al., (1999) investigated temporal characteristics of speech produced during simultaneous communication (SC) by inexperienced signers. Recordings of stimulus words embedded in sentences produced with speech only versus SC were made by 12 students during the first and last weeks of an introductory sign language course. Results indicated significant temporal differences between speech only and SC conditions during both the first week and last week of the class. Inexperienced signers appeared to sign between words in SC during the first week of the class, thereby extending inter word intervals. At the last week of the class they appeared to shift toward simultaneously signing while producing the words, thereby elongating segmental temporal characteristics such as vowel duration. The specific temporal differences between SC and speech only conditions were consistent with previous findings regarding the effect of SC on temporal characteristics of speech with experienced signers.
Senghas (2001) investigated the language production of a generation of deaf Nicaraguans who had not been exposed to a developed language. He examined the changing use of early linguistic structures (specifically, spatial modulations) in a sign language that has emerged since the Nicaraguan group first came together. In under two decades sequential cohorts of learners systematized the grammar of this new sign language. He further studied whether the systematicity being added to the language system is from children or adults. The results indicated that such changes originate in children aged 10 and younger. Thus, sequential cohorts of interacting young children collectively possess the capacity not only to learn, but also to create language.

Mayer (2002) investigated the ways in which American Sign Language (ASL) and English based sign allow for comprehension of text content, and to determine how these two avenues of communication might mediate the process of reconstructing 'Signed meaning' in a written text. He argues that comprehensible input in a visual mode is possible in either ASL or English based sign. English based signing may be an effective means of bridging the gap between inner speech and written text.

Chonan (1998) investigated the effects of rehearsal strategies on the task of discourse memory subjects were instructed to memorize discourse under a spontaneous rehearsal condition. Analysing the rehearsal strategies the subjects employed, it was revealed that all the strategies could be clustered in to the following four types:
1. Sign mouthing strategies
2. Silent reaching strategies
3. Mouthing strategies, and 4. Vocalising. Based on the results of the probability of recall, the subjects were divided into two groups: High-performers and Low – Performers. It was also found that most of high performers made use of sign mouthing strategies, whereas most of low performers made use of silent reading strategies. Then subjects were instructed to memorise discourse by making use of four types which were observed in previous study, showing that all the strategies improved their recall performances for High-performances, and that sign-mouthing strategies improved the recall performers.

The visual spatial memory of 15 deaf signers, 15 hearing signers, and 15 hearing non signers for shoes, faces and verbalizable objects was measured using the game concentration. It was hypothesised that the deaf and hearing signers would require fewer attempts than the hearing non signers on the shoes and faces tasks because of their experience in using a visual spatial language; and in the case of deaf also possibly, due to a compensatory mechanism. It was also hypothesised what memory for shoes would be more like that for faces than for simple objects. It was also anticipated that there would be no difference between the three groups memories for verbalisable objects. Deaf signers were found to be similar to hearing signers, both of whom were better than hearing non signers on the faces and shoe tasks. Generally, performance on the faces and shoes task was similar and followed the same pattern for the three groups. The three groups performed a similar level on the objects task. There were no gender differences. (Arnold, 2001)
Richardson (2001) examined approaches to studying among deaf student taking courses by distance learning who preferred to communicate using either sign language or spoken language. In comparison with hearing students, the deaf students obtained higher scores on comprehension learning, surface approach, improvidence and fear of failure. Whilst they obtained higher scores on reproducing orientation, their qualitative responses indicated that this was not because they had been driven to use rate memorisation. In addition, the deaf students seemed just as capable as the hearing students of adopting a meaning orientation. In the specific context of distance education, there were no differences in approaches to studying related to the students preferred mode of communication. However, communicating by sign language rather than speech had different practical consequences for the students effective work load.

Conclusion

Information on how hearing impaired children use gestures is scarce. Essentially, proponents of this approach relied on individual case studies or small selected samples, which is insufficient for demonstrating the viability of any communication option for children who are deaf or hard of hearing. Existing data is not sufficient. Although such information is vital, the development of gestures and its effect in determining linguistic competency with a large enough group of children remains unexplored. There is no known Indian study in children with hearing impairments that specifically examines their gesture usage.