

ADAPTING FASTENERS OF READY-TO-WEAR KNIT PULLOVER SHIRTS
FOR A CHILD WITH CEREBRAL PALSY

by

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CHAPTER I

INTRODUCTION

No longer is the physically handicapped person considered beyond the possibility of hope and help; rehabilitation has been the trend in recent years. This change in attitude has stimulated research in how the handicapped can best manage daily tasks. Much research considers the handicapped as a group; however, individual needs may vary within the basic concepts of rehabilitation.

Discussions with handicapped children and their parents, teachers, and physical therapists reveal that the fastenings on garments often hinder handicapped children from dressing themselves. Pullover garments are difficult for them to manage. Authorities agree that handicapped children should be encouraged to attempt normal tasks despite their limitations. It was hypothesized that if pullover ready-to-wear garments could be adapted by adding suitable fasteners, handicapped children would be encouraged to participate more in the dressing process. Supporting this hypothesis is the belief that these children are physically and mentally capable of helping themselves in many tasks.

OBJECTIVE OF STUDY

Many garments specifically designed for the handicapped are limited in choice of style, may be high in cost, and still may not be adaptable to some children due to their individual problems. Perhaps

these shortcomings could be remedied by adapting suitable fasteners to ready-to-wear garments. The objective was to obtain ease of dressing. The purpose of the study was to investigate fasteners to find the type best suited for a particular handicap and to adapt it to a child's ready-to-wear garment: a knit pullover shirt.

DEFINITION OF TERMS USED

During this study it was found that certain words could be interpreted in various ways. The following terms were defined for consistency of meaning.

Fastenings: Aids to attach, join or secure garment sections together. Included in this study were Velcro; Number 4 snap; wooden toggle with elastic loop; skirt hook and bar; large zipper; and gold clasp with oval ring.

Teaching Boards: Fabric samples incorporating a fastener were attached to a piece of wood and used to teach a child the mechanics of each fastener.

Self-help: The concept of clothing designed to enable the child to dress by himself.

CHAPTER II

REVIEW OF LITERATURE

HISTORY

Handicapped children have been a source of anxiety to man and society from the time of primitive man until today. Kessler (13) has stated that an imperfection in nature has always been "abhorrent to (the) human mind." For primitive man, who existed by the concept of survival of the fittest, handicapped members were a hindrance to the group because of the severity of nature and enemies. During an enemy attack, the handicapped were often captured and used as victims of ceremonial rites by the conquering tribe.

During the middle ages, the handicapped were often court jesters. As objects of amusement, they encountered cruelty and confusion. They were exploited by the nobility and were "souls" to be saved by the Church. (10)

Many of these earlier psycho-social prejudices have been carried over to today. The handicapped find reduced acceptance and the traditional attitude of charity. Kessler (13) attributed the preservation of this image to writers such as Dickens. Baker (3) believed the greatest obstacle the handicapped must overcome is the widespread misconception that they are separate from the "normal." Kessler (13:18) stated "all physically handicapped (persons) have problems to meet as they attempt to adjust," but they still acquire the needs and wants of man.

The handicapped child, especially, has been placed in a separate class. Kessler (13) attributed this class division to age grouping, the special position they hold in American folkways, and the sentimental appeal of children. This has been enhanced by the position children hold in our present day society. Today children are an obligation to be educated and cared for, often into their twenties. Parents have the primary obligation to care for the child. Allegra (1) believes that parents are best able to cope with the situation of a handicapped child with outside help. The necessity of physical therapy, vocational counseling, and special education has brought about the involvement of many agencies and people. This has resulted in an increased obligation for care of the handicapped child by the federal government, state agencies, private agencies, and individuals other than the parents. New, Ruscio, and Cinder (16) stated there has been interaction among the parents, the rehabilitation staff, and significant others to decide how to best aid the handicapped. Kessler (13) states that since 1930 more advances have occurred for the handicapped person than from the time of primitive man until the 30s. Still, much needs to be done to insure more interdisciplinary work, less overlapping of services, and a higher percentage of satisfactory results.

CEREBRAL PALSY

One of the major causes of handicaps in children is cerebral palsy. The complexity of the problems involved in working with cerebral palsied children is illustrated by the incidence of cerebral palsy and definitions of types of cerebral palsy.

Incidence

The United States Children's Bureau (27) lists cerebral palsy as one of the major diseases connected with the nervous system. There has been no one method available for determining the exact number of people with cerebral palsy in the United States. The United Cerebral Palsy Association (UCPA) has investigated methods to determine the incidence of cerebral palsy. They accept the results of four studies known as the work of Dr. Winthrop M. Phelps; the Schenectady, New York study; the Connecticut study; and the Georgia study. Dr. Phelps used observation to discover all types of severity of cerebral palsy. He found "seven persons (are) born each year with cerebral palsy for every 100,000 population." This means 300-350 cases of all ages per 100,000 population. The New York and Connecticut studies gathered a "crude" rate by dividing the population into the total number cases found. These cases were located through existing agencies and visits to the homes of those with cerebral palsy. This led to finding 1.52 cases per 1,000 population. (7)

The Georgia survey worked with fewer cases, but found 5.4 cases per 1,000 population under twenty-one years of age. On the basis of data from these four studies, the United Cerebral Palsy Association, Inc., makes a conservative estimate of the prevalence of 3.4 persons with cerebral palsy per 1,000 population. They break this down further into:

1. For each 1,000 in the general population under 21, there are two Cerebral palsied who need and can benefit from services.
2. For each 1,000 in the general population 21 and over, there is one Cerebral palsied who needs services. (7:3)

Definition and Types of Cerebral Palsy

Meyer A. Perlstein defined cerebral palsy as

. . . a condition characterized by paralysis, weakness, incoordination, or any other abnormality of motor function due to involvement of the motor control centers of the brain. The term covers a whole group of related conditions . . . (17:1)

He stresses that all this term means is that some injury or damage to the person's brain has resulted in difficulty in control of movements. Dallas (6) used the American Academy for Cerebral Palsy's list of types of cerebral palsy: spasticity, athstatic, rigidity, ataxia, tremor, and mixed. Baker (3:139) describes these terms as follows:

spasticity: "exaggeration of deep reflexes in which the stretch reflex is always present"--stiff movements,

athetosis: characterized by involuntary control of the reflexes--

This results in jerky movements and sudden jerks of muscles,

rigidity: slow muscle response,

ataxia: lack of balance; poor kinesthetic sense,

tremor: "characterized by involuntary motion alternating between flexor and extensor muscles"

mixed: a mixture of several types.

Other classifications include those by extremities affected and time of disease onset. The Association for the Aid of Crippled Children (6) uses the extremities affected and divides them into monoplegia, paraplegia, hemiplegia, triplegia, and quadriplegia. The times of onset as stated by Baker (3) and Dr. George Deaver (8) are:

Prenatal: (time of conception to time of birth) including heredity and congenital,

Natal: (from onset of labor to birth) including obstruction

of cord, mechanical respiratory obstruction, injury of brain during labor or delivery, sudden changes in pressure, and low vitamin K level.

Post natal: (time of birth of child) including trauma, infections, vascular disorders, carbon dioxide poisoning and neoplasms.

REHABILITATION

The exact direction that society has taken in rehabilitation of the handicapped can be seen in the attempt to arrive at a workable definition of rehabilitation. Rehabilitation is the consideration of a handicap while fulfilling the wants and needs of a person. Whitten states, "Rehabilitation is a concept rather than a process." (29:414)

The American Home Economics Association (AHEA) rehabilitation committee at a workshop (September 3-4, 1969), worked on two basic assumptions:

1. Every member of a democratic society has an inherent right to make a contribution to society and
2. Every society has an obligation to equalize, as best it can, the opportunities of the disabled and of the nonhandicapped to earn a living. (2)

The committee decided to use the National Rehabilitation Association's definition of rehabilitation with addition of one phrase at the end.

This definition reads:

Rehabilitation is an individualized process in which the disabled person, professionals, and others, through comprehensive, coordinated, and integrated services, seek to minimize the disability and its handicapping effects and to facilitate the realization of the maximum potential of the handicapped individual (and his family). (2)

It is important to consider the individualized process that is required to aid the handicapped. Rehabilitation involves a personal relationship between the handicapped and those helping him.

Siller (23:836) stated the goal of rehabilitation is always "directed toward promoting ego integrity and feelings of self worth." The operation of rehabilitation must constantly shift, being coordinated with the physical, psychological and social realities of the individual. The importance of flexibility and the interrelationship of man's physical, psychological, and social needs must be understood by those involved with rehabilitation.

Factors Affecting Rehabilitation

The understanding of rehabilitation research as a behavioral science "presupposes basic knowledge" about rehabilitation. (18) Rehabilitation research is concentrated on the disability or ways of adapting to the disability. (18) Both the disability and methods of adaptation must be understood to help the handicapped help themselves. An understanding of the internal and external barriers the handicapped faces as a human being must also be understood to aid them.

Authors categorize the factors influencing human behavior in various ways. For example, Litman (14) divides human behavior into three sets of influences: biogenic, sociogenic, and psychogenic. Hallenbeck (12) feels human needs fit into two classifications: physical and psychological. Factors related to clothing that would be applicable to both of Hallenbeck's categories are: self-help in dressing; comfort; and elimination of strain on fabric.

Physical factors. Learning to dress is a difficult process for all young children since physical development is slow and it takes much guidance and time to train young hands to accomplish new tasks. The physically handicapped child has the added problem of a handicap. Boettke (4) states 89 percent of the children she worked with needed help with dressing from occasional help to complete dressing. She worked with a group of children of which 57 percent had cerebral palsy, 9 percent polio, and the remainder were normal. The greatest physical problems she found were lack of arm or hand control, lack of arm muscle power, use of one hand, paralysis of one or both legs and general body weakness.

Many authorities believe that with time, patience and a desire to learn the child can be taught simple dressing procedures if clothing has been simplified. Special considerations are seen as needed for those having cerebral palsy. Deaver (8) feels that rehabilitation for cerebral palsy is "more difficult than on any other neuromuscular disease." The physical problems involved are varied and differ to some extent for each child. Mental as well as physical damage may occur. The difference between a physical handicap and the result of mental damage is often vague. To compare the development of the handicapped child and a nonhandicapped child of the same age is incorrect. The handicapped child's slower progress may be due to isolation encountered at an early age. With unfair comparison, the handicapped child's future progress may be damaged due to preconceived ideas.

Self-care activities requiring the maximum capability of the hands are important for advanced training and development. The most

important objective in rehabilitation is for the handicapped to be able to care for his daily needs. (8) Deaver (8) emphasizes that the simple basic activities of daily living are of primary value. Dressing is one of these basic activities. The child needs the task of dressing. If this cannot be accomplished by the child, either alone or with minimum help, other advanced tasks are irrelevant. If the parent of the child becomes sick, the child should be able to manage simple tasks.

No one has found the most adequate method of treatment and rehabilitation for cerebral palsied children. Authorities do agree that it must be a combined effort of physicians, teachers, professionals, parents, and child.

Deaver states Swartz' method of "muscle reeducation through voluntary effort." Swartz bases his theory on the following:

A child's development is no greater than the sum of his successful voluntary efforts to express himself emotionally, intellectually and physically. Children with neuromuscular disorders can be stimulated voluntarily to attempt various activities; if the activities are suitably simplified, the patient's efforts will be successful, success will encourage the child to attempt the increasingly complex activities which lead to physical independence. (8:364)

The importance of simplified clothing to aid the child in dressing could be a part of this theory. Those having difficulties with hand activities are in definite need of simple clothing. Deaver (8) also states those athetoid and spastic cerebral palsied children have "great difficulty in controlling the seven movements of the shoulder, the four movements of the elbow and wrist, and the many movements of the fingers and thumbs." Thus, the simplest type of clothing is necessary to enable these children to learn how to dress themselves.

Psychological factors. The handicapped child must be considered first as a child whose self-image is being formed. The handicapped child has the same needs and wants of any other child. Due to his handicap he is often unable to participate in the activities of his peers. (3) The hazard in this is the child is placed in further social isolation. The child's self-image will determine how much this isolation will affect him. The self-concept is developed from birth and is a combination of the behavior of the child and the responses from others to his behavior which are sorted and organized internally by the child. Whether this self-image is accurate or not is unimportant; how the child feels and reacts to the feelings generated will determine future behavior.

Richardson and Royce (19:476) conducted a study to determine the effect of physical disability on a child's description of himself. Each child was interviewed and asked to "tell me about yourself." Descriptions were tape recorded and analyzed. The results showed "functional restriction on physical activity, deprivation of social experience, and the psychological impact of the handicap." The results emphasized the "need for clearer understanding of the impersonal world of the child." The results indicated that these children shared in the same values as their peers, but were aware they could not live up to them. (19)

Children may revert to a passiveness which aids them in avoiding embarrassing situations. Siller (23) feels that help in developing a new self-image based on feelings of worth would help eliminate this problem. He feels that clothing could be one constructive way of achieving this improvement.

Stone (24) states that people base their expectation of the handicapped conduct from clothes; as well as mobilizing the activity of the handicapped. Children are attracted to something new and enjoy the variety. Color attracts them and attention drawn to them due to clothing improves their self-image and aids in their progress.

Social interaction. The handicapped child is influenced by those with whom he interacts just as other children are. In understanding the handicapped child we must consider the parents, the rehabilitation setting, the significant others, and also the interaction among all persons involved.

Robinault (20) believed we must remember that parents were people before they were parents. Few parents of a handicapped child had any understanding about problems of the handicapped until they found themselves in such a situation. Parents play an active part in the child's development. Dallas (6) believed that excessive solicitation, protection, sympathy, and parental concern throughout childhood and adolescence may bring about the need for personality adjustments. Boettke (4:3) states it is "easier for family and friends to do for (the) handicapped, but more beneficial for (the) child to learn." She found that too much help impedes the child's progress and makes it harder for him to adjust to the world. Allegra (1:69) believes that the goal of special education is to achieve a state where "each child functions as nearly independently as possible." The involvement of parents is a necessity in the total development of the child, but it should be handled with careful guidance. The child should be encouraged to do much on his own.

There seems to be agreement among authorities that dressing is one task many handicapped children can learn with properly designed clothes, much patience, and proper stimulation. If they do not encounter insurmountable frustrations, they may be able to gain from this experience. Each advance towards independence for these children is important in their development of self and personality.

Clothing To Make Growing Up Easier

Thompson (25) studied personal appearance as a clue to mental health as well as a technique useful in therapy. She stressed the establishment of personality through clothes and feeling of self-worth. Clothes may give an individual a boost to his morale and help him find his identity. Trotter (26) also believed clothing should "enhance one's self-esteem and be psychologically satisfying." Many of those handicapped through cerebral palsy have a poor body image. Authorities believe if we can improve a poor image to one of acceptance of self through clothing, this will improve their entire development by stimulating them to attempt other challenges.

According to Wagner (28), most work connected with clothing for the handicapped began in the 1930s. Gessell's investigation of the child's development began discussions of the easiest way to dress. The problems that handicapped children and adults encounter were then studied in relation to Gessell's findings. In the 1940s the emphasis was on disabilities caused during World War II; therefore, work did not center on children's problems. Wagner (28) states the 1950s brought an emphasis on clothing for activities in daily life. The 1960s were

devoted to exploring the idea of clothing for the improvement of self-image.

Several authors have discussed the design and service of clothing for handicapped children. Scott (22) has stressed the need for clothing with extra strength. The need for strong fibers, double bodices, gussets, and other types of reinforcements are a few things that make ready-made garments unsatisfactory for use. Lyman (15) urges the use of cooperative extension services to provide the needs and services the individual requires.

Mass production has not achieved financial success nor widespread acceptance by the handicapped. Cookman (5) designed professionally with Functional Fashions, and the handicapped have inspired their own designs for Fashion-ABLE. Hallenbeck (12) was an advocate of mass producing clothes for the handicapped, however, Dallas (6), Frescura (11), and Cookman (5), have all found limited applicability for any one design.

Hallenbeck (12) categorizes problems in clothing according to the effect the disability has on the person. Dr. Meyer Perlstein (17:1) states "What we really need to identify is the EFFECT of cerebral palsy upon the individual." According to Disabled Living Activities Group; Central Council for the Disabled (9:6), six categories are defined to cover existing problems:

1. clothing for disabled adults and adolescents able to partly dress themselves
2. clothing for young children other than babies
3. clothing for those who have to be dressed
4. clothing able to resist wear from crutches and braces
5. clothing for the incontinent
6. clothing for babies and toddlers of handicapped mothers

Dallas (6) investigated the features that were worn and preferred by two groups of teenagers: one group with cerebral palsy and one non-handicapped. She found, "Given an appearance that varies from the normal, attractive becoming clothes give a needed boost to the morale." A small part of Dallas' study was focused on the use of fasteners and the placement of closures by designers of clothing for handicapped children. Dallas (6) found that her sample of teenage girls owned garments using twenty-four zippers, three Velcro closures, sixteen snaps, and twenty-one hooks and eyes. Zippers were stated as preferred by the greatest number and Velcro as having the greatest possibilities.

The Clothing Panel; Disabled Living Activities Group, Central Council for the Disabled (9) has published a booklet called Clothing Fastenings for the Handicapped and Disabled. The purpose of this booklet was to "describe the types of fastenings that are available," how they may be used, and where they may be purchased. The publication was a combined effort of professionals and the handicapped. This booklet stimulates the need for research into the relative effectiveness of these fastenings for specific effects of a handicap.

CHAPTER III

PROCEDURE

Six fasteners were investigated to determine which were best suited for a child's particular handicap. The fasteners judged most appropriate were then adapted to ready-to-wear knit pullover shirts. Although the adaptations developed for this specific child's use may not be suitable for all other children with cerebral palsy, it was hoped the findings of this project would be applicable to other children.

In conducting this study, preliminary work was found necessary. The general procedure for the study included library research of the topic, clothing for handicapped children with cerebral palsy. This was followed by selection of a child, observation of the child's problems, preparation of teaching boards, trial testing, evaluation of teaching boards, adaptation of ready-to-wear knit pullover shirts, and evaluation of adaptations.

OBSERVATION OF PROBLEMS

It was necessary to discover what clothing problems existed for handicapped children in the Manhattan, Kansas, area. The desire to get a realistic sample in an area with relatively low population made it necessary to try several methods to locate a child with a physical disability resulting from cerebral palsy who would be suitable for the study.

To locate handicapped children contact was made through doctors, local nurseries, public schools, and private schools. In the public schools, the superintendent, the principals, and the special education department were consulted. Local pediatricians and personnel at the Kansas State University student health center were contacted also in an effort to locate children. In addition, officials of a private school, The Federation for Handicapped Children were interviewed.

Mothers of handicapped children with cerebral palsy were asked if they were willing to fill out a questionnaire concerning clothing for handicapped children (Appendix A). The questionnaire was filled out at the mother's convenience, either in the home or on the Kansas State University campus. The questionnaire was being developed for a study to be conducted by the Department of Clothing, Textiles, and Interior Design; Kansas State University. After the questionnaire was completed by the mother, answers were discussed to acquire a better understanding of the mother's particular problems with her child. At the end of the interview the mother was asked if she was willing to let her child be used for the experimental work involved in this project.

To acquire an understanding of the problems that handicapped children may encounter in dressing themselves, a visit was made to Capper's Foundation in Topeka, Kansas. Children at the Foundation were encouraged by the physical therapist to discuss their clothing problems. After each child was allowed to speak about his problems he was then questioned to provide further information.

Visits to the Federation for Handicapped Children, Manhattan,

Kansas, provided a third means of observing problems of handicapped children. This permitted observation of the amount of muscular control, nature of handicap, and types of clothing being worn by the children, as well as allowing an opportunity to discuss the physical limitations of the children with teachers and occupational therapists.

After as much as possible had been learned about problems existing for children in the Manhattan, Kansas, vicinity, a suitable child was selected for participation in the study. It was believed extensive work with one child could aid other children with similar handicaps. Since a very limited number of children with cerebral palsy was available, only one child was selected for the study.

DESCRIPTION OF CHILD

This study was done with a nine-year-old girl with cerebral palsy. The child was attending the nursery school operated by the Federation for Handicapped Children, Manhattan, Kansas where she was the only one with cerebral palsy and the only girl.

She weighed approximately thirty-two pounds and was forty-five inches tall. Her build was long and slender. She wore a child's size 6x. Physical limitations of the child included limited use of left side, with restricted hand and arm movements. Spasticity was evident in upper extremities and "scissoring" in lower extremities. (Scissoring refers to the tendency for the legs to cross.) She was confined to a wheel chair and attempts to teach her to walk have been unsuccessful thus far. Braces were worn only during attempts to walk. The child represented a mixed type of cerebral palsy.

The child was unable to talk, although her attentiveness was better than other children observed. She appeared to have determination and a strong will which it was hoped could be motivated and constructively channeled during this study. The child was toilet trained, but still wore diapers.

It was learned from her mother that the exact time of the onset of cerebral palsy was unknown. The child was born one month prematurely. Labor was not considered difficult or prolonged and the birth was normal. However, the mother "felt uneasy about the birth" of this child. She felt the child was slow in developing and noticed problems with her left hip. The child was not diagnosed as having any abnormality until she was twenty-one months old at which time the doctors did not diagnose cerebral palsy. Doctors at Kansas University Medical Center later diagnosed the child as having cerebral palsy.

The child has had several corrective operations on her spine and legs. She has experienced convulsions and receives daily medication of phenobarbital and Dilantin. Her last known convulsion was in 1968.

PREPARATION OF TEACHING BOARDS

In testing fasteners six types were used:

- 1- Velcro
- 2- Number 4 snap
- 3- large zipper
- 4- skirt hook and bar
- 5- toggle and elastic
- 6- gold clasp with oval ring

Velcro: Velcro consists of "two nylon strips, one a tiny mass of hooks and the other a mass of tiny loops." (9:28) Velcro was selected because it is easily separated by pulling apart, is adjustable, gives a secure closure, and is readily available at most notions counters. Boettke (4) highly recommends the use of Velcro for ease in fastening garments. Velcro can be purchased in long strips. For correct location and smoother placement, it was cut into small patches and applied in two locations, with a space between them. (Figure 1)

Number 4 Snap: The Number 4 snap, an extra large size, manufactured by Prym is made of rustproof brass. It is inexpensive and easily sewn to the garment by hand. (Figure 2)

Large Zipper: A Big-Zip pull-ring zipper was used for easy grasp and easy slide action. Exposed application in a seam was used to make the zipper ornamental as well as functional. (Figure 3)

Skirt Hook and Bar: Designed by Scovill, number 93 hook and bar has a safety catch, and "snaps shut, snaps open." It is easily hand-sewn to a garment. (Figure 4)

Toggle and Elastic: A wooden toggle, large and easy to grasp was used. A loop of elastic, 1/8 inch wide, chosen for its characteristic of giving was used to fasten it. (Figure 5)

Gold Clasp with Oval Ring: A gold clasp with ring by LaMode Button Company was selected for ease of opening and closing and attractive appearance of the clasp. The ring was an oval belt loop purchased separately. (Figure 6)

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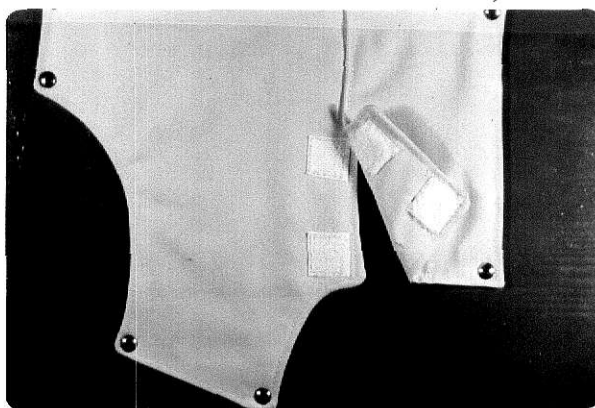


Figure 1. Velcro Teaching Board

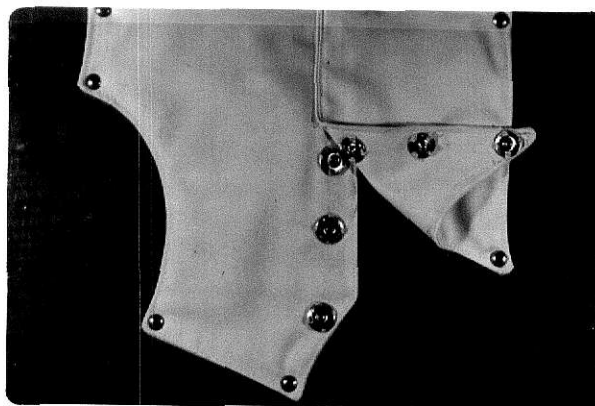


Figure 2. Number 4 Snap Teaching Board

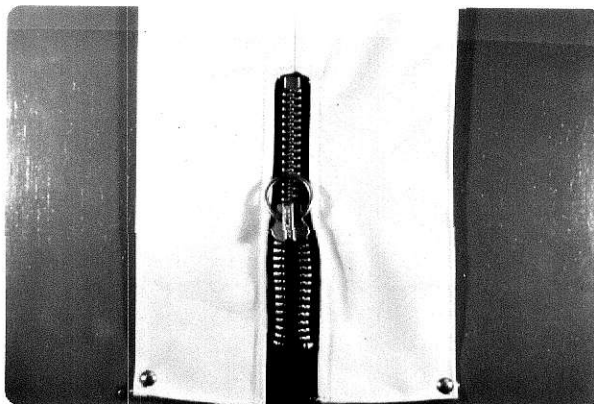


Figure 3. Large Zipper Teaching Board

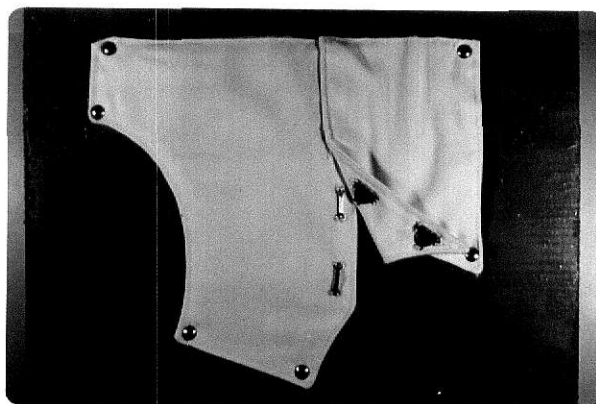


Figure 4. Skirt Hook and Bar Teaching Board

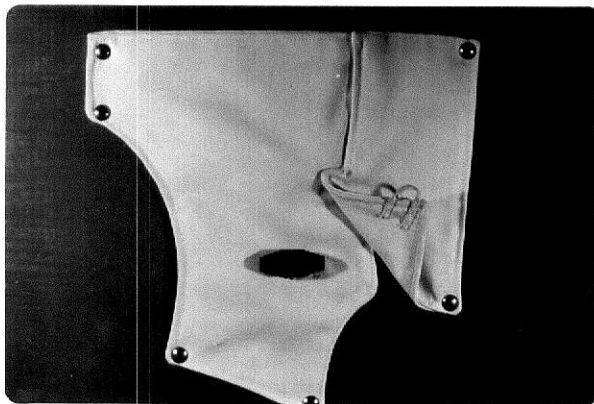


Figure 5. Toggle and Elastic Teaching Board

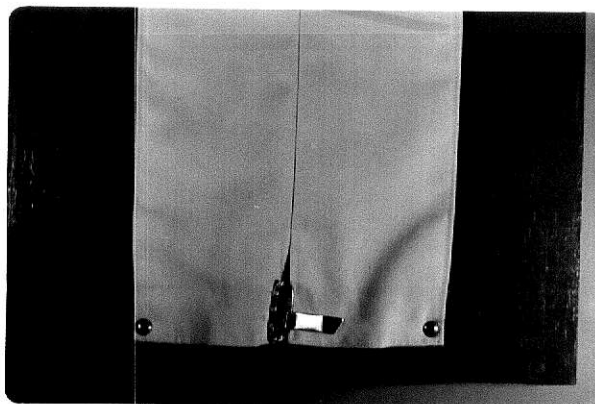


Figure 6. Gold Clasp With Oval Ring
Teaching Board

The following procedure was used for each fastener. A bodice with front closure was designed. The front closure area was sketched on tracing paper and the pattern pieces for it were made. (Figure 7) The bodice front was cut in fabric which was yellow Dacron and cotton broadcloth. (Appendix B) The bodice fronts used for the teaching boards were made with a double layer of fabric. An interfacing of unbleached muslin or hair canvas was used to provide a firmer backing underneath all fasteners, other than the zipper. Each of the six bodice fronts was top-stitched for added strength. The fasteners were inserted as described above. The samples were attached to boards with tacks. The boards, measuring one square foot, had been painted blue to make the project more interesting to the child.

TRIAL TESTING AND EVALUATION

The teaching boards were used for a trial test by introducing them one at a time to the child. The boards were presented in the following order: Velcro, Number 4 snap, large zipper, skirt hook and bar, toggle and elastic, and gold clasp with oval ring. The following guidelines were used:

1. Child was introduced to one fastener at a time. Board was held flat on table surface with neckline toward child to simulate actual wearing conditions.
2. Child was encouraged to work by herself; self-help was desired. The child's hand was guided through the motions involved.

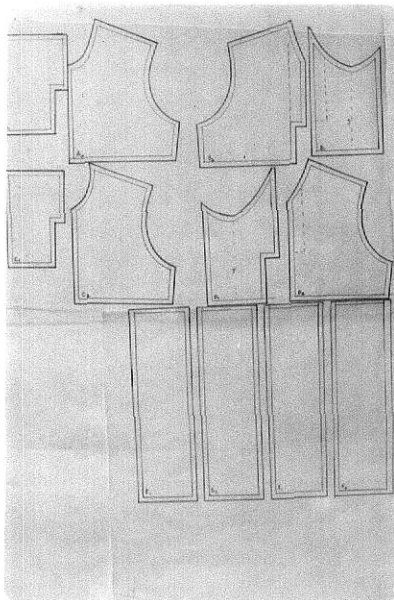


Figure 7. Pattern Pieces for Teaching
Board Bodices

3. Instructor and investigator evaluated child's use of each fastener after a period of practice with teaching board. Evaluation was based on the following: (a) assessment of the child's apparent like or dislike of fastener, (b) analysis of child's problems in using the fastener, (c) possible corrections or improvements in the fastener, and (d) decisions of whether this fastener would be recommended for this child. Based on the trial test using the teaching boards, three fasteners judged to be best for this particular child were chosen to be adapted to a ready-to-wear knit pullover shirt.

SELECTION OF PULLOVERS

Accurate body measurements of the child were next taken, including height, chest measurement, shoulder width and back length. Children's shops and department stores in Manhattan were visited to see what types of knit pullover shirts were carried in stock and catalogs of Sears, Roebuck, Inc., J. C. Penney's, and Montgomery Ward's were used to see what was readily available by mail order. Considerations in the selection of pullover included possibilities for adaptation to the child's handicap, fiber content, ease of care, and aesthetic appeal. Few knit pullover shirts were available during the month of June. Store catalogs provided the most complete information; therefore, the knit pullover shirt was ordered from Sears, Roebuck, Inc. This shirt, in red and white horizontal stripes, was labeled as being

beautifully tailored for boys and girls;
durable yarn resists abrasion
color stays bright
short sleeves
pointed collar
100% polyester

The shirts chosen had the advantageous feature of a front placket which was important because it could easily be adapted for use with the fasteners. It was hoped that simple adaptations such as these could be made by mothers of handicapped children without greatly increasing the cost of clothing.

After the shirt adaptations were completed the child was introduced to one shirt at a time and helped into it. First her left arm was inserted, then her right arm, and finally her head. She was placed in front of a mirror so she was able to see the fastener and was encouraged to close it. She was allowed to wear the knit top as long as she desired on the day it was presented to her.

Evaluation of the garment was made by the investigator, the nursery teacher, and the mother on ease of dressing and undressing, and on the child's apparent like or dislike of each shirt. The mother was also asked for her opinion of aesthetic appeal and launderability of each shirt.

CHAPTER IV

FINDINGS

Data obtained in this study to evaluate adaptive fasteners of ready-to-wear knit pullover shirts for children with cerebral palsy have been presented under the following headings:

Evaluation of teaching boards

Adaptation of fasteners to ready-to-wear

Evaluation of adaptation of fasteners to knit tops

EVALUATION OF TEACHING BOARDS

Six teaching boards were used, each with a different fastener. These were evaluated according to criteria in Appendix D. Some of the first work with the child was attempted in the nursery school setting but the child was easily distracted. The remainder was done when the child could be alone. The findings can be summarized as follows:

Velcro: Velcro was used easily by the child. She was able to perform the up-and-down movement required to close this fastener. No problems concerning the fastener were recorded but once she was able to accomplish the task, she lost interest in the Velcro teaching board. It was recommended that a longer opening be used in the adaptation of this fastener.

Snaps: The sound that the snaps made when being closed attracted the child. She was unable to operate the fastener at first and after practice was only able to operate it with help. Her inability to operate this fastening device was caused both by lack of finger strength,

and by lack of coordination required to make the two parts of the snap meet. Recommended improvements in the snap were a larger base and a fabric covering of the snap. Snaps were rejected for use with this child because the pressure required for closing and opening the snap was greater than the child could handle. It was felt snaps would have limited possibilities in garments without a hard surface, such as the board, against which she could press.

Zipper: The large zipper was viewed by the child with great interest. She enjoyed moving her fingers over the fastener and exploring it. She was able to use the fastener immediately. She accomplished this by hooking her finger in the zipper pull with her right hand and anchoring the bottom of the teaching board with her left hand. This fastener was considered acceptable as it was trial tested, and good for use in the child's clothes.

Skirt hook: The child showed no apparent interest in this fastener. She was unable to operate the fastener by herself. The back and forth movement that its operation required was difficult for her. With help the child's hands were able to move the hook back-and-forth; but, she became frustrated easily with this fastener and pushed the teaching board away. It was decided the fastener had limited use for her and it was rejected due to her difficulty in use and lack of interest in it. A larger bar would be necessary for this to be practical for use with other handicapped children.

Toggle and elastic: The child liked the toggle and elastic but it was difficult for her to operate this fastener. After two days, the child learned to anchor the toggle with her left hand and then after much

time and work she was able to engage it with the elastic. The child became frustrated because the elastic was difficult to control and the toggle also had a tendency to move due to the metal shank. For this device to be satisfactory improvements would be needed in both the elastic and in the toggle. This fastener was rejected because of its extreme difficulty for use.

Gold clasp and oval ring: The child enjoyed touching and investigating this fastener. She was unable to operate this fastener at first because she did not keep the clasp on a level plane to insert it into the oval ring. After being shown several times, she was able to accomplish this step. The second movement necessary in this fastener was the closing of the clasp which she was able to do easily. An oval ring larger than the one sold with the clasp was necessary for this fastener. This was due to the child's problem with hand control or breaking action. This fastener was considered acceptable for further use in the study. It was believed the challenge it offered, as well as the use of two movements, a threading and a pressing movement, were important in the child's learning. Also, the child's interest in this fastener was encouraging.

ADAPTATION OF FASTENERS TO READY-TO-WEAR

The three fasteners considered most satisfactory for use with the child used in this study were Velcro, large zipper, and metal clasp with oval ring. These three fasteners were adapted to the selected knit pullovers as follows:

Knit pullover Number 1: One knit pullover was used without any change as a "control" to compare both her ability to help dress herself and her relative interest or liking for the shirts with the altered fastenings. (Figure 8)

Knit pullover Number 2 (Velcro fastener): The placket was reversed so buttonholes were on the underside and they were zigzagged closed. The buttons were left on upper side of placket for decoration. Velcro was applied in three evenly spaced patches. The looped side was machine sewn and the soft side was sewn by hand. (Figure 9)

Knit pullover Number 3 (Gold clasp with oval ring): The placket was reversed so buttonholes were on the underside and they were zigzagged closed. The metal clasp was sewn on the upper side of the placket and the oval ring on the lower side. (Figure 10)

Knit pullover Number 4 (Large zipper): The placket section was removed from the pullover. Light-weight Pellon was used as a facing to finish the raw edges with twill tape inserted in the seam line for extra reinforcement. The zipper was inserted according to package instructions. A backing tab was added after it was found that the heavy metal teeth of the zipper irritated the child's skin. (Figure 11)

EVALUATION OF ADAPTATION OF FASTENERS

Fastening devices installed in duplicate knit pullover shirts were evaluated. One knit pullover shirt was used as purchased as a control. The fastening devices used for evaluation were Velcro, gold clasp with oval ring, and large zipper. Evaluation was made by the investigator, the nursery school teacher, and the mother.



Figure 8. Ready-To-Wear Knit
Pullover Shirt



Figure 9. Velcro Fastener Adapted to Knit
Pullover Shirt



Figure 10. Gold Clasp With Oval Ring Adapted
to Knit Pullover Shirt



Figure 11. Large Zipper Adapted to
Knit Pullover Shirt

The findings were as follows:

Knit pullover Number 1: The knit pullover used as purchased was difficult for the child to use. She was unable to fasten the small buttons. She did enjoy the knit pullover and wore it for many hours.

Knit pullover Number 2: The Velcro fastener was observed as being very satisfactory. The child wheeled herself over to the mirror where the knit pullover was located. While the knit pullover was held for her she undid the Velcro. She was helped into the knit top and was able to fasten it alone. Slight difficulty was encountered with the piece of Velcro nearest the neck. Once she accomplished this task she was anxious to do something else.

The mother stated that the child "liked it immediately." In attempting to use the Velcro the child had no problem in working the fastener and it was "very easy for her to fasten and unfasten."

Knit pullover Number 3: The gold clasp and oval ring was less satisfactory because of its difficulty. The child enjoyed touching the metal clasp and was anxious to put on the knit pullover. In attempting to operate the fastener she had difficulty in trying to anchor the oval ring. Help was required both to hold the oval ring and to thread the metal clasp through it. Once the metal clasp was inserted in the oval ring, the child was able to close the metal clasp by herself. She did not want to wear this top for an extended period of time. It was believed she disliked the fastener.

The mother stated the child liked this the least of the three fasteners and "got bored after having trouble fastening it." She stated, "I believe this was more difficult for her to work with."

She attributed this to "poor coordination with left hand." The child was able to fasten the metal clasp when it was not on her but this shirt fastening was judged the most difficult for her to operate.

Knit pullover Number 4: The investigator showed the knit pullover with the large zipper to the child and encouraged her to put it on by herself. Again she needed aid in getting the knit top over her head and arms in the sleeves. She was able to work the fastener when encouraged to do so. First, she held the garment down with her left hand, then pulled on the zipper with her right hand. She enjoyed feeling the fastener and appeared pleased with herself for this accomplishment.

The mother believed this was the child's favorite knit pullover. In fastening the zipper she stated it was "easy for her to grasp the large ring and pull up and down." The mother occasionally would aid the child by holding the garment down while the child pulled the zipper. The child's reaction to wearing this knit pullover was "very good" and the child "enjoyed being able to maneuver (the) zipper." The mother compared the ease of fastening the large zipper to that of Velcro.

In an overall evaluation the mother stated that the child was "happy when I brought them (knit pullovers) out for her to wear and always showed immediate interest." The appearance of the knit pullovers was evaluated as good. "Shirts always appeared neat and wrinkle-free." The Velcro was the only knit pullover shirt laundered and stains were removed easily. The mother stated the importance of this due to the fact the child needs "more frequent changes" than other children. The garment retained its shape well and was easy to launder.

The nursery school teacher believed in future studies it would be recommended to alter the colors of the knit pullovers used. The mother, nursery school teacher, and investigator were all amazed that the child's interest was maintained for such a long period of time.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

From the findings it was concluded that fasteners could be successfully used on ready-to-wear knit pullover shirts to aid the child used in this study in the dressing process. It was found from use with the teaching boards that fasteners used must be suited for a particular handicap. The child's individual needs were of primary importance. The use of teaching boards aided in teaching the child how to use the fastener. She was able to see and investigate the fastener more thoroughly.

There were two problems in adapting the fasteners to the ready-to-wear knit pullovers. One problem was the difference in operating the fastener on the stiff background of the teaching board and the soft background of the body. The other problem was the child's difficulty in seeing the fastener on the body without the use of a mirror.

It was concluded from the teaching boards that Velcro; gold clasp and oval ring, and large zipper were most suitable closing devices for use by the child in this study. Her limited control of the left arm required special consideration. It was equally important to try to encourage her to use the left hand as much as possible. This was possible in the zipper and gold clasp with oval ring. The Velcro was most adaptable to the knit tops. It was the easiest to apply, least expensive and easy for the child to fasten. It was liked by both the child

and mother and could easily be used in other areas. The gold clasp and oval ring was the least desirable fastener used in the adapted knit tops. This was difficult for the child to manage and limited in possibilities for future adaptations. It was recommended that improvement could be made in using a stiffer fabric for the pullover or a backing to add stiffness. The use of the separately purchased oval ring was necessary to make the gold clasp feasible.

The large zipper was concluded to be the best liked fastener by the child and mother. Its usefulness is limited due to the heaviness and design of the zipper. It was necessary to install a tab underneath the zipper to prevent the teeth of the zipper from harming the child's skin.

Other general conclusions were reached regarding the type of pullover chosen and the conditions for conducting such experiments. The high neckline on the pullover selected made fastening the top fasteners difficult and a lower neckline would be recommended. In conducting this type of study with children an environment with minimum distraction is recommended. This child was easily distracted. Using only one child in the study was an advantage because it allowed the investigator to know more about the child and her behavior. Often it was necessary to repeat testing because the investigator believed that the child was not motivated at the time of the test. The investigator worked with the child in such other activities as puzzle solving in order to be able to recognize her mannerisms.

It is recommended that future studies of this individual type be made on children with different types of handicaps.

The author believes that more research is needed on the correlation between the use of teaching boards and actual adaptations. Additional methods are needed to evaluate a child's reactions. Use of a movie camera to observe the child's hand movements and facial expressions would be valuable. Information thus stated would be valuable for teachers, therapists, doctors, and parents in learning more about the child's inner world in attempting to complete a task.

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APPENDIXES

APPENDIX A

Many parents of children with physical handicaps encounter problems in providing clothing for their child. The purpose of this questionnaire is to pinpoint the problems connected with clothing that you may be having. Once we know more about the type of clothing problems you have, more can be done to solve them. Will you please answer the following questions with your child in mind?

1. Child's

Age _____ (to the nearest year)

Sex _____

2. Physical limitations of child: (check all that apply)

_____ lack of control over hand movements?

_____ limited use of arms?

_____ braces on legs?

_____ confined to wheel chair?

_____ incontinence?

_____ other (specify)?

3. What problems do you face in clothing your child?

_____ suitable clothes not readily available?

_____ price too high?

_____ improper fit?

_____ design not adaptable to child's handicap?

_____ durability and wearing quality poor?

_____ lack of fashion in clothes suitable for handicap?

_____ clothing difficult to put on and remove?

_____ other (specify)?

4. The articles of clothing that present you or your child with the greatest problems are:

_____ underwear?

_____ sleepwear?

_____ slacks or trousers?

_____ skirts?

_____ dresses?

_____ sweaters?

_____ coats?

5. Of these, the article he (she) has the greatest problem with has been _____.

6. What improvement would you like to see concerning design or function of this garment?

7. How do you acquire most of your child's clothes? (If more than one source is used, indicate approximate percentage for each).

_____ through regular ready-to-wear sources?

_____ by purchase of clothes especially designed for children with physical limitations?

_____ by sewing at home to adapt to his disability?

8. If alteration of ready-to-wear clothing is required, it is done by

_____ mother?

_____ unpaid friend or relative?

_____ paid tailor or seamstress?

_____ other (specify)?

9. Do you feel your child would benefit from having clothes designed with his handicap in mind?
- _____no?
- _____yes?
10. What is your child's interest in clothes?
- _____is indifferent to clothes?
- _____enjoys selecting clothes and wearing them?
- _____dislikes clothes and effort of dressing?
- _____forms attachments to favorite articles of clothing?
- _____other (specify)?
11. Has your child expressed any particular complaints about his (her) clothing?
- _____no?
- _____yes (specify)?
12. Considering the age of your child and his (her) ability to dress himself (herself), is your child:
- _____as self-sufficient as most children this age?
- _____less self-sufficient than many other children the same age?
- _____dependent on others to be dressed and undressed?
13. If child dresses with help, what kind of assistance is required?
14. Please state below any problem you've had clothing your child that has not been considered in this questionnaire.

APPENDIX B

FABRIC FOR TEACHING BOARDS

APPENDIX C

GUIDELINES FOR TRIAL TEST WITH TEACHING BOARDS

- I. Child is introduced to one fastener at a time. Board held flat on table surface with neckline toward child to simulate actual wearing conditions.
- II. Child encouraged to work by herself: Self-help is desired.
Aide will demonstrate use.
- III. Instructor evaluates child's use of each fastener according to the questions in Appendix D.

APPENDIX D

EVALUATION OF TRIAL TEST

Instructor evaluates child's use of each fastener according to the questions below.

1. Did the child like the fastener?
2. Was she able to operate the fastener immediately?
3. Was she able to operate the fastener with practice?
4. Did she encounter any particular problems?
5. Do you feel any changes or improvements can be made to this fastener to make its use easier for the child?
6. Would you use this fastener for this child's clothes?

Fastener used: _____

APPENDIX E

GUIDE FOR EVALUATION OF KNIT PULLOVER SHIRT

Date: _____

Fastener: _____

1. Child's interest in knit top; like or dislike
 - a. immediately
 - b. after a period of time
2. Child: her attempt in using the fastener
 - a. what was easy
 - b. problems encountered
3. Child's reaction to wearing the garment
4. Parent's reaction to fastener
 - a. aesthetic
 - b. ability for child to operate fastener
 - c. appearance after one wash
5. Improvements to make fastener easier to use, more aesthetic or other comments.

ADAPTING FASTENERS OF READY-TO-WEAR KNIT PULLOVER SHIRTS
FOR A CHILD WITH CEREBRAL PALSY

by

JUDITH ZACCAGNINI

B. S., Framingham State College, 1969

AN ABSTRACT OF A MASTER'S THESIS

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requirements for the degree

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During preliminary study it was revealed that the fastenings on garments often hinder the handicapped child from dressing himself. It was hypothesized that simplified fastenings adapted to ready-to-wear knit pullover shirts could enable the handicapped child to learn self-help in the dressing process. One handicap, cerebral palsy, and one child were used.

Six teaching boards were made, each incorporated a different fastener including: Velcro, Number 4 snap, wooden toggle with elastic loop, skirt hook and bar, large zipper, and gold clasp with oval ring. The child was taught to use these fasteners on these boards. Evaluation was based on child's like or dislike of fastener, problems encountered with fastener, corrections or improvements possible, and recommendation for future use.

Three fasteners, Velcro, large zipper, and gold clasp with oval ring, were evaluated as best for this particular child's needs. These fasteners were adapted to center front positions of knit pullover shirts. The child attempted to operate these fasteners. Evaluations were based on ease of dressing and undressing and child's like or dislike of fastener adapted to knit pullover shirt. Evaluations were done by investigator, teacher and parent.

Velcro, light weight and easy to operate, had the best potential for future use. The large zipper held the most fascination for the child; however, bulk and a rough surface were problems. The child was able to operate this fastener. The gold clasp and oval ring were difficult for the child to operate due to the position of the fastener close to the neck and lack of a firm surface.