

SPECIFIC ALTERATIONS OF COMMERCIAL PATTERNS
FOR A SELECTED GIRL WITH SPINA BIFIDA

by

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CHAPTER I

INTRODUCTION

For many years the persons in the United States have been aware of the special physical, social, and emotional needs of its millions of handicapped children, but awareness alone does not meet needs. Needs must be met by action (4).

Meeting clothing needs for the physically handicapped is important to the individual's adjustment to his disability. Physical needs that can be met through clothing are matters such as self-help features for dressing, comfort, and the elimination of strain on fabrics. Self-help features are those features that make dressing easier for the handicapped individual. Psychological and social needs include attractiveness of clothing and the feeling that one is not set apart from the peer group by the clothing he wears (16).

Although it is possible to design garments having several features to meet more than one need, it becomes readily apparent that mass production of garments for the physically handicapped is not feasible because of body deformities, body proportions, size, age, sex, and individual preferences. This may explain why much research in the field of clothing for the handicapped has been limited to specific areas (3,16).

Much of the research done on clothing for physically handicapped children has been limited to the areas of self-help and growth features, fasteners, alterations of ready-to-wear garments, and clothing for particular diseases including cerebral palsy and muscular dystrophy (16).

Hallenbeck (16), in a review of research on special clothing for the handicapped, recommended design features of clothing for physically handicapped children that include: easy-on and easy-off openings, easy to operate fasteners, growth features, comfort, convenience, easy-care fabrics, and designs that disguise the disability.

OBJECTIVES OF STUDY

The clothing problems of handicapped adults, teenagers, and children are much the same. Dressing is not an easy activity when it is complicated by braces, limited range of motion, or limited use of hands. Minor alterations of clothing may help define the difference between success and defeat when a disabled child is learning to dress himself. Therefore, the objectives of this study were to: (1) define the clothing problems of girls handicapped with spina bifida, and (2) investigate specific alterations of commercial garment patterns for girls with handicaps caused by spina bifida.

CHAPTER II

REVIEW OF LITERATURE

More children having birth defects and crippling diseases are surviving than ever before. Among the major handicaps in children are the spinal cord injuries, particularly spina bifida. To clarify spina bifida it will be compared with the normal spine.

NORMAL SPINE

The human spine is the bony structure of segments or vertebrae that make up the backbone or spinal column. Each vertebrae is composed of a weight-bearing part and a ring of bone known as the neural arch, the hollow casing for the spinal cord. Disks with semi-fluid centers enclosed in elastic membranes that permit flexibility join the weight-bearing portions. The neural arches are connected by joints that allow motion (34). The spinal column is divided anteriorly to posteriorly into the following sections: the cervical section, the thoracic section, the lumbar section, the sacral section, and the coccyx section, Appendix A, page 34. Various disorders may occur in any spinal segment simultaneously or at different developmental stages and may affect the functioning of the spine. It is not surprising, then, that a great number of congenital spinal developmental defects still lack a rational explanation (34).

SPINA BIFIDA

One of the most common congenital defects, spina bifida, leaves children multiple handicapped. With widespread surgical, medical, and

rehabilitative care many affected children live to adulthood and are able to perform to an acceptable degree.

Definitions and Types of Spina Bifida

Dorland's Illustrated Medical Dictionary (11) defined spina bifida as a developmental defect that is the result of imperfect development of the embryo and characterized by a defect in the bony structure of the spine. The malformation characterizing spina bifida is a failure of the neural arches in the vertebral column to close properly during embryonic life (17).

To summarize, Hoffman (17) described the embryonic development of spina bifida in the following manner. During the second week of pregnancy the neural tube of the human fetus developed from the thickened surface ectoderm called the neural plate and the first traces of the vertebral column could be recognized. In the fourth week the neural tube closed completely and at the end of three months the neural arches developed dorsally. The result is a defect of the vertebral arch only without spinal cord involvement. A protrusion taking the form of a sac covered with skin and filled with cerebrospinal fluid and nerve endings can accompany the defect in the vertebral arches. Brain, Wilkinson, and Heinemann (7) pointed out that spina bifida occurs most commonly in the lumbar and sacral regions of the spinal column, but may also be found in the cervical and thoracic regions.

Detailed assessments at birth and at regular intervals following have found physical injuries in children with spina bifida include: lower limb paralysis, junctions of the lower extremities, muscular atrophy, absence of deep tendon reflexes, malformation and joint injuries to the lower extremities, skeletal changes, defective urinary and bowel control, hydrocephalus, and infections in the central nervous system (21,24,27,28).

The forms spina bifida can take include: spina bifida occulta, a defect of the vertebral arch only; meningocele, a bulging sac containing cerebrospinal fluid only; meningomyelocele, a sac containing opened spinal cord and nerve fibers attached to sac wall; syringomyelocele, the central canal of the spinal cord dilated but closed and the posterior wall of the cord attached to a sac; and flat myelocele, complete failure of development with the central canal open to the body surface (31), Appendix B, page 36.

Incidence

Delivery books of the Boston Lying-In Hospital, Boston, Massachusetts, and the Providence Lying-In Hospital, Providence, Rhode Island, record cases of spina bifida as far back as 1832 and 1855 respectively. The period of 1890-1920 exhibited a ratio of two cases per one thousand live births in the United States. During the years 1928-1949 this ratio tripled with the peak years being 1929-1932 (26).

The ratio of incidence has been found to be different in different parts of the world. Findley (13) compared the number of spina bifida births per number of live births in a study carried out in Western Scotland during 1952-1964. For 758,644 live births 1,186 spina bifida cases were reported. This is an incidence rate of approximately six cases per one thousand live births.

In the same study mortality was reported to be highest in the first 9 months of life, and overall the largest number of deaths caused by spina bifida occurred in the first three years of life.

The specific cause of spina bifida is unknown and cannot be attributed to any single factor. Researchers have argued that the malformation is largely, if not entirely, environmentally determined. However, various congenital defects, including spina bifida, have been induced in animals

by a dietary deficiency of folic acid during pregnancy and in both laboratory animals and man by administering a ration of folic acid antagonists during pregnancy. Such observations suggest dietary deficiency of folic acid or abnormal metabolism of folic acid might be related to spina bifida in man(29).

Hoffman (17) suggested that spina bifida may be transmitted by a recessive mode of inheritance. This hypothesis is supported by the risk of reoccurrence found to be approximately five percent for a mother giving birth to another child with a congenital malformation of the central nervous system after birth of a child with spina bifida. Approximately 53 percent of the persons affected with this condition are females, and the female sex tend to be more seriously handicapped by it.

Other factors possibly affecting incidence of spina bifida are cited by Laurence (22). These included: maternal age, anoxia, drugs, dyes, stress, and seasonal variations. Increases in maternal age have been correlated with an increase in mongolism in the spina bifida victim, but there has been no constant chromosome abnormality found. Anoxia, drugs, dyes, and stress all have been found to produce neural tube malformations in laboratory animals. An excess of winter-conceived cases of spina bifida have also been noted. Spina bifida cases during this time possibly could be attributed to viral infections in the first trimester of pregnancy.

MacMahon and Yen (25) found the risk of reoccurrence of spina bifida in siblings was greater within five years after the birth of the first case than in siblings separated by other births. There was also a suggestion of a trend towards a lower rate of spina bifida in births separated by long intervals.

Treatment of Spina Bifida

In the medical and physiological treatment of spina bifida early surgery to explore the spinal cord in the region of the abnormality and to

prevent further deterioration of the neural function is important. When removing the sac care should be taken to preserve as much neural tissue as possible. Flaps of lumbar muscle and full thickness skin are used to close the vertebral defect. Technical difficulties and risk of damage to the spinal cord from surgery are less during the first 48 hours of life, and in many cases surgery within the first 24 hours after birth is best (17).

Walker (37) pointed out that when the feet are deformed, a combination of manipulation, strapping, and surgery are often employed. While the child is still in the hospital, the feet are manipulated in exercises to prevent further stiffening of the lower limbs. Manipulation continues daily from this time. After one week of manipulation, elastoplast strapping is used to maintain any correction that is obtained. Forefoot and heel deformities are often overcome by manipulation and strapping, but if they persist surgery would be performed to improve mobility in those that survive.

Incontinence present at birth usually cannot be improved and would be associated with infections and damage to the upper renal tract. Bladder and bowel control are first assessed by inspection and then followed by an extensive urological examination. Urinary diversions are made as growth progresses. These vary with individual need from a small pediatric collecting bag to a vesicotomy (13).

Hydrocephalus, an abnormal accumulation of fluid in the cranial cavity is commonly associated with the meningocele and meningomyelocele form of spina bifida. Hydrocephalus present at birth may not be recognized clinically during the first few weeks of life, but usually is evident by the age of six weeks. Correction of the condition is done by inserting a plastic valve to decrease pressure in the cranial cavity (17).

The appearance of the individual handicapped with spina bifida is characterized by a forward bending of the skeleton from the waist up as a

result of limited power from the waist down. When not using ambulatory devices for mobility, the individual is confined to a wheel chair. The clothing worn by the individual is affected by these factors as well as the need to allow room for a waste collection bag below the waistline.

REHABILITATION

The American Home Economics Rehabilitation Committee defined rehabilitation as:

...an individual 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 (1).

The assumption that a physically handicapped person cannot have a full life was one that was made too frequently. One of the biggest problems facing a handicapped person was his feelings about his disability and the attitudes and feelings of others, especially his family, toward the disability.

Jewson (18) stated rehabilitation involves the greatest possible restoration for the total person--not his physical restoration alone, but total improvement of his adjustment to his environment. This means that his family could make a tremendous impact on the individual and his rehabilitation. Thus, the individual could hardly be treated without taking his whole environment into consideration.

Siller (35) pointed out that the goal of rehabilitation is "directed toward promoting ego integrity and feelings of self worth." Therefore, those involved in rehabilitation of the individual must continuously change operations to meet the physical, psychological, and social realities of the rehabilitant.

Self-Concept

Social and psychological rehabilitation of any physically handicapped individual has centered on improving the individual's self-image and social status. The disabled often feel inferior, worthless and ashamed. Litman (23) affirmed that there is a direct relationship between a person's concept of self and the response to a program of physical rehabilitation. When a poor self-concept was present, the individual exhibited a lack of initiative, drive, effort, and cooperation in the rehabilitation program. When the individual had a good self-concept, acceptance of the disabilities was more realistic (15).

Jewson (18) discussed the significance of the self-concept and the role it plays in interpersonal relations. One of the points she made was that there was good reason to believe that the non-handicapped person held both positive and negative attitudes toward persons with disabilities and the positive attitudes would more readily be aroused in the family and outside it when the person had accepted his disability and thought other people could be accepting also.

Several studies were conducted by Richardson, Hastorf, and Dornbush (32) concerning the effect of the disability on the self-concept of the child. They found that self-description of handicapped children reflected the restriction of physical activity, deprivation of social experience, and the psychological impact of the handicap. Handicapped children had the same values as other children, but they were aware they could not live up to the expectations and might react intensely.

IMPORTANCE OF CLOTHING

Appearance is a simple and obvious symbol of the self. First impressions are made on the basis of personal appearance. Therefore,

learning to accept handicaps that alter personal appearance is important to the handicapped individual. This is extremely important during childhood when appearance affects the individual's personality development.

Kefgen and Touchie-Specht (20) suggested that physical handicaps are not as significant in a first impression as clothing and grooming. A physical handicap, particularly one that could not be corrected, was often overlooked. However, untidy appearance and poorly selected clothing were rarely ignored.

Clothing of the physically handicapped individual had an important role in the rehabilitation process, because clothes altered one's personal appearance which influenced the impression made on others and affected the inner self. If the individual did dress himself, he gained independence and self-confidence in himself, which in turn helped him in other activities of daily living (6).

Rusk and Taylor (33) stated the clothing problems of handicapped persons of all ages center around:

- 1) the design to permit greater ease in putting on and removing garments by individuals with limited muscle strength and limited range of motion in joints and by individuals who rely on braces, crutches, wheel chairs, and other mechanical aids; 2) the design to permit greater social acceptance and increase self-image by severely disabled individuals; and 3) the fabrics to resist undue wear caused by greater tension on the cloth as a result of more strenuous physical activities (33:1598-99).

In considering the special clothing needs of the physically handicapped child it was necessary first to consider the degree, type, and extent of the involvement of one who was to wear the clothing. The degree of impairment and individual characteristics were equally important in assessing the abilities of the child (38).

Zaccagnini (40) conducted a study in which simplified fasteners were adapted to ready-to-wear knit pullover shirts to aid a handicapped child to learn self-help in the dressing process. The child studied was handicapped by cerebral palsy. The fasteners used included: Velcro, #4 snap, wooden toggle with elastic loop, skirt hook and bar, large zipper, and gold clasp with oval ring. Velcro, large zipper, and gold clasp with oval ring were found as best for this particular child.

Dallas (10) investigated the dress features that were worn and preferred by a group of teenagers that were handicapped by cerebral palsy and a group that was non-handicapped. She interviewed both handicapped and non-handicapped girls to determine what features in daytime garments were worn and preferred by the two groups. She found, "Given an appearance that varies from the normal, attractive becoming clothes give a needed boost to the morale." After consideration of their physical needs, preferences and need for peer acceptance, Dallas designed two garments for cerebral palsied girls.

Jordan (19) dealt with satisfaction and dissatisfaction derived from everyday garments worn by physically handicapped children as expressed by their parents. The evaluated garments were pants, shirt, or dress that the child liked to wear for everyday activities. The durability of the garment tended to be an indicator of over-all garment satisfaction. No significant difference, according to the severity of the child's handicap, was found between ratings of overall garment satisfaction. Each child had individual clothing needs to be considered.

Bryce (8) described the dressing problems of handicapped children over and above those common to all children. These were obstructions due to mental retardation, poor coordination, poor balance, muscle weakness, contracture of the joints, spastic muscles, devices such as braces, crutches, and wheelchairs.

Proper clothing gave a child a feeling of satisfaction and self-confidence that often enabled the wearer to conquer difficult situations. Wearing what the peer group wore was of primary importance in the child's participation in group activities. Lucille Rea, in her article "Clothing and Child Development," emphasized this need to conform to the group.

Children are easily embarrassed and an inferiority complex can be started by something seemingly insignificant as a garment which looks a little odd when compared to those of other playmates (30:717)

Rea (30) also pointed out that color, design, and the cut of garments worn by a child contribute to his well-being.

Clothing is also a means by which a child can achieve confidence required for development. Children who are born handicapped have burdens placed upon them by their environment, and these set the limit of their development. If the handicapped child manages to dress himself he gains confidence which may help him gain confidence in other everyday activities.

Many of the studies in clothing for the handicapped found the handicapped wear ready-to-wear garments designed for normally functioning persons. Much information has been published on the adaptation of ready-to-wear garments for the handicapped child including Self-Help Clothing for Handicapped Children (3). Hallenbeck (16) was an advocate of mass producing clothes for the handicapped; however, Dallas (10), Frescura (14), and Cookman and Zimmerman (9), have all found limited applicability for any one design. This stimulates the need for research into adapting designs for specific handicaps.

CHAPTER III

PROCEDURE

The handicapped children studied were enrolled at the Capper Foundation for Crippled Children in Topeka, Kansas, during the Spring of 1972. This institution was selected because several children suffering from like physical and mental disabilities could be studied in the same situation.

Four girls, ranging from elementary age to early adolescence, who were handicapped with spina bifida were chosen as subjects because spina bifida was prominent among several girls at the foundation.

Parents of the subjects were sent introductory letters asking permission for their daughters' participation in the study prior to the start of the study, Appendix C, page 38.

OBSERVING THE GIRLS

Time was spent observing the girls in their normal setting at the foundation. The factors that were observed for each girl included:

1) physical limitations; 2) degree of mobility and the use of mechanical devices; 3) reaction of each to self, to other individuals, to the institutional setting, and to physical and occupational therapy; 4) clothing worn during the period; and 5) clothing problems recognizable through observation, see Appendix D, pages 40-42. Personnel of the foundation were contacted to obtain body build, weight, height and age; information on the type of spina bifida each girl had; her capabilities in dressing; and the devices or aids used that affected the appropriate clothing for her.

INTERVIEWING THE GIRLS

The subjects were interviewed to obtain information about their clothing practices and specific features of their garments. Information about both garments owned and preferred was recorded. Pattern books and textbooks were used to obtain the illustrations of various garment styles, collars, sleeves, and other design features included in the interview schedule. A copy of the interview schedule and sample illustrations of each design can be found in Appendix E, pages 48-49.

INTERVIEWING THE BOARD PARENT

The board parent of the girls was also interviewed. The board parent was in charge of the girls while in the residential home of the foundation. The information obtained from the board parent included: clothing that was most difficult for the girls to put on and take off; the garment styles, sleeve styles, neckline styles, and collar styles the girls wore most often; fasteners that were easiest for the girls to operate; other clothing problems she may have noticed; and improvements that were needed to meet the clothing needs of the girls handicapped by spina bifida. The same illustrations of the garment styles, collars, sleeves, and necklines were used for this interview schedule as were used for the interview with the girls. A copy of this schedule can be found in Appendix F, pages 61-62. The information obtained from observation of the subjects was compared with the information obtained from the interviews to draw conclusions about the preferred styles and features as well as clothing problems the subjects have in common.

MEASURING THE GIRLS

A series of measurements were taken to compare each girl's personal body measurements with those of "standard" body measurements given on a commercial pattern. Bust, waist, hip, and back waist length were the essential measurements in determining pattern size and figure type. However, additional measurements were taken to facilitate alterations for specific figure problems encountered by handicapped persons. The locations for taking the measurements can be found in Appendix G, page 64. A pattern chart was consulted to determine the size that would fit each girl best, Appendix G, pages 64-65.

SELECTING THE COMMON CLOTHING PROBLEMS

According to research, children handicapped by spina bifida have any of the following physical injuries present at birth or as development progresses: lower limb paralysis, junction of the lower extremities, muscular atrophy, absence of deep tendon reflexes, malformation and joint injuries to the lower extremities, skeletal changes, defective urinary and bowel control, hydrocephalus, and infections in the central nervous system (21,24,27,28). Therefore, it was anticipated that the girls would have the following clothing problems in common: uneven shoulder grainline caused by round shoulders, bodice too tight through the shoulder section, back skirt length too short and front too long because of forward-leaning stance, and additional width needed at waist because of collection bag for waste materials and braces.

SELECTING THE PATTERNS

Commercial patterns were selected for one subject from which garments would be constructed that would meet the following criteria: 1) design of simple lines that are attractive and allow for body movement, 2) design with openings and fasteners that are within the reach and grasp of the child, 3) design easily adaptable to required alterations, 4) design that will be easy for the child to put on and take off with limited movements, and 5) design that meets other clothing needs of the child. The choice of subject that would benefit most from this project was made with the aid of the foundation staff.

MAKING THE ALTERATIONS

Alterations were made on the commercial patterns that would meet the individual measurements and the individual fitting problems of the subject. Each of the selected alterations can be seen in Appendix H pages 67-68.

MAKING A TEST COPY

Test copies of the garments were made from muslin, because a fabric garment is easier to fit than a paper pattern. The purposes for using the test copy were:

1. To check the fit of the garment and the accuracy of pattern alterations.
2. To test design features for placement and proportions.
3. To test the appropriateness of the design on the figure and the degree to which the individual finds it comfortable...
4. To allow practice on new or complicated details (2:106)

After the test copy was constructed it was fitted on the individual. The steps involved in fitting and evaluating the copy were: to check the ease, line, grain, set, and balance; to determine the cause of any additional fitting problems; to decide on a remedy for any new problems; and to make the necessary changes and refit the copy. After a second test copy had been fitted and additional alterations made the fabric for the garments was selected (12).

SELECTING THE FABRIC

In making the choice of the particular fabric from which the garments were constructed, consideration was given to fabric construction and characteristics. A polyester knit was chosen as the most suitable choice because of its pliability and resiliency. The comfort, ease of care, and wearing quality of the fabric chosen were also important.

CONSTRUCTING AND EVALUATING THE GARMENTS

The garments were constructed, using the altered commercial patterns, in the selected fabric. After construction they were evaluated as to ease in putting on and taking off, ease in fastening the fasteners, effect of the design on movement and mobility, effect of the design on meeting other clothing needs of the individual, and reaction of the individual to the garments Appendix I, page 70. After a period of one week, the subject and board parent were asked to make suggestions as to how to improve the garments and to list problems they had noticed in the garments Appendix I, pages 71-72.

CHAPTER IV

FINDINGS

Data obtained to determine clothing problems of girls handicapped by spina bifida and to investigate specific alterations of commercial patterns for them have been presented under the following headings:

- Description of the handicapped girls
- Description of clothing practices and features
- Body characteristics and pattern size
- Description of the common clothing alterations
- Selection and adaptation of commercial garment patterns
- Construction of the garments
- Evaluation of the garments

DESCRIPTION OF THE HANDICAPPED GIRLS

The four girls included in this study were aged eight to sixteen. Their physical appearance was characterized by an endomorphic body structure in a short "stock" frame. The upper abdomen, chest, and arms were normal in strength, dexterity, and skin sensitivity; however, the lower extremities were insensitive to pressure, friction, and temperature. Common characteristics observed were the small feet and short legs of each girl in proportion to the rest of her body. An additional handicap of one girl was deafness.

Motor ability varied among the girls. For all of them the upper trunk did the majority of the movement with the lower trunk remaining rigid. Muscular weakness below the point at which spina bifida was located affected mobility, particularly the ability to balance while changing

positions from standing to sitting, sitting to standing, standing to lying down, and lying down to standing.

Most of the time the girls were confined to wheelchairs. Assistance, both mechanical and personal, was needed by three of the four girls when going from a sitting to a standing position. Arm crutches or walkers provided the mechanical assistance used by the girls who did walk. While walking the upper trunk of the girls leaned forward and their legs remained rigid. Attempts to teach the fourth girl to walk have been unsuccessful because metal braces irritated the skin and her extreme weight could not be supported by either her legs or braces.

Three of the girls were able to talk, and displayed "normal" verbal expression including proper pronunciation, vocabulary useage, and grammar. The fourth girl, who was deaf, was unable to talk. Lip-reading and sign language enabled her to communicate with her teacher. She could write notes to her peers to communicate with them but could not use sign language since they did not know it.

The self-image portrayed by all the girls was one of acceptance of their handicaps. Emotional stability characterized the girls. Fear and anger were very seldom expressed, and a happy disposition was displayed during most of the observation. The institution played a positive role in helping them meet their aspirations of making the most of the abilities they had.

The girls' reaction to other individuals varied. The greatest amount of time spent with peers was with members of the same sex. This was especially true for the adolescent girls. No interaction was observed with peers of the opposite sex for two of the adolescent girls; however, one adolescent and the elementary-age girl displayed interest in peers of the opposite sex.

Dependence on the adults at the foundation was exhibited by the girls. This was shown particularly in mobility needs and therapy classes. Physical and occupational therapy sessions were attended by three of the four girls. In physical therapy classes mobility and muscle-strengthening exercises were practiced, while in occupational therapy visual perception and hand coordination were practiced. The girls showed a positive attitude toward therapy.

DESCRIPTION OF CLOTHING PRACTICES AND FEATURES

The girls were all able to dress themselves except for minor problems with fastenings. Back fastenings were extremely difficult for them to operate, particularly so if the buttons were not large enough to grasp firmly or if the girls had difficulty in putting their arms behind their backs. Articles of clothing that were most difficult to put on and take off for the girls included: skirts, pants, tops, and dresses. Buttons and zippers were the fastenings used most often on the girls garments with the zipper being the easiest for them to operate. Another problem with the girls' clothing was in proper fit, especially through the bustline and derriere.

Dresses, jumpers, blouses and skirts, and shirts and pants were the garments and garment combinations worn most often by the girls. However, the girls had mixed feelings as to which garment or garments they liked best. When asked if they wore garments like those in the figures, Appendix E, pages 47-54, the girls all replied negatively. One girl did mention that she would like to wear pantsuits and fewer jumpers, while the others did not indicate any specific garments or styles that they preferred.

The preferred styles of sleeves, necklines, and collars varied between two choices for each feature. The set-in and raglan sleeves, Appendix E, figures 11 and 12, page 56, were liked better than the kimono sleeve; the round and V necklines, Appendix E, figures 13 and 14, page 57, better than the square; and the standing band and Peter Pan collars, Appendix E, figures 16 and 18, page 58, better than the convertible. These choices would indicate the range of individuality among the four girls.

Most of the clothing worn by the girls was ready-to-wear garments that were chosen either by the girls or by their mothers. Two of the girls pointed out that they had some garments made for them and one had selected pattern and fabric for these garments. Alterations were sometimes required for both the ready-to-wear and constructed garments. One alteration mentioned by the girls was making the back of the skirt longer to cover the derriere while they were standing. When alterations were necessary they were made by either the mothers or aides at the foundation.

Improvements in clothing for the girls handicapped by spina bifida that were suggested by the board parent included design features that would accommodate a large bustline and prominent derriere, and front fastenings for ease in putting on and taking off the garments.

The clothing worn during the observation period was similar to the preferred styles chosen by the girls in the interviews. Set-in sleeves were observed most often in the garments worn by the girls, and they were also one of the preferred styles of sleeves chosen in the interviews with the girls. The round neckline without a collar was noticed on the majority of garments; this style of neckline was one preferred by the girls. The standing band and Peter Pan were observed as the most common collar

treatment; these were the styles preferred by the girls. Zippers and buttons were found to be the most common fasteners used on their garments, as well as being those preferred by the girls. In summary, the girls' choices of preferred styles were like those styles worn by them.

BODY CHARACTERISTICS AND PATTERN SIZE

Several body characteristics were common to these girls handicapped by spina bifida though not necessarily common to all girls handicapped by spina bifida. These characteristics included: large bust, waist, and derriere; short length of upper torso at center front, center back, over bust, and over shoulder blades; broad width across back; and large upper arm.

Commercial pattern charts were consulted to determine the size of pattern that would best fit each girl. The bust size was used as the basic guide in making the choice. The sizes chosen for these girls were: a girls size 12, 30-25 1/2-32; a junior size 13, 35-26-37; a misses' size 16, 38-29-40; and a women's size 40, 44-36-46. A misses' size 18 was chosen as the size for slacks for the subject using a misses' size 16 for a dress or top.

DESCRIPTION OF THE COMMON CLOTHING ALTERATIONS

Clothing problems that these girls had in common were made evident after concluding the observations, interviews, and measurements. These were: a well-developed upper trunk caused garment to be too tight across bodice, upper arm, and upper back, shoulders were narrow in comparison to bust measurement, skirt back length was too short and front too long and additional width was needed at the waist because of a collection bag

for waste materials and braces. The anticipated problem of an uneven shoulder grainline caused by round shoulders was not found.

The clothing problems of other girls handicapped by spina bifida may not be identical to those found in this study; however, some similarity in body proportions caused by physical injuries present at birth should occur. These would include the problems of a well-developed upper trunk, a thicker waistline, and a prominent derriere.

SELECTION AND ADAPTATION OF COMMERCIAL GARMENT PATTERNS

The commercial patterns chosen were a smock, in misses' size 16, Appendix E, figure 5, page 52, and a slack pattern, in a misses' size 18, Appendix J, page 74. The smock pattern was chosen because it is a style currently in fashion. It also allowed for ease of fastening, ease in putting on and taking off, adequate allowance for body movement, and would require few alterations for a thick waistline. The slack pattern chosen was designed with seams centered down the front and back of each leg rather than on the side. This feature allowed for insertions of a zipper in the right center front seam to facilitate care of the collection bag as well as making the slacks easier to put on and take off. Elastic was added to the waist to control the fit of the slacks at the waist.

Specific alterations planned for the smock were: 1) increase in width for both front and back; 2) increase in width of the sleeve; 3) decrease in length of the sleeve and length of the smock front; 4) decrease in width of the shoulder; 5) decrease in width of the collar; 6) addition of a back yoke; and 7) addition of a "shirt-tail" edge to help camouflage difference in front and back smock length, Appendix H, page 67. The alterations made on the slack pattern included: 1) increase

in rise of the slack back; 2) addition of width for waist; 3) decrease in length of the slack legs; and 4) addition of an elasticized waist and zipper opening in the center of the right leg, Appendix H. page 68.

After the alterations were executed, a test copy of the garments was made from muslin to check the accuracy of the alterations, the placement and proportions of the design features, and the appropriateness of the designs. The first fitting pointed out the need for additional changes which included: raising the back yoke line, increasing the rise of the slack back an additional amount, an additional decrease in the width of the collar, lowering the neckline of the smock front and lengthening the collar to correspond to new measurement, and decreasing the length of the smock front an additional amount. A second test copy was then constructed. The fit and design of the garments were considered acceptable after the second fitting.

CONSTRUCTION OF THE GARMENTS

At the time of the final fitting, fabrics from which the garments could be constructed were selected. Samples of knits were selected in a variety of colors and patterns and mounted on 5" x 8" cards. The subject made the final choice of color and pattern of fabric to be used for the construction of the garments. The subject chose a polyester knit in pink and white check for the smock and a solid pink polyester knit for the slack.

EVALUATION OF THE GARMENTS

The smock and slack ensemble was evaluated by the investigator, the board parent, and the individual for whom the ensemble was constructed, Appendix I, pages 70-72. The factors for the evaluation were the ease in dressing, effects of the design, reaction of the individual, problems with the garments, and suggested improvements.

The dressing process was evaluated on the basis of ease in putting on, ease in taking off, and ease in fastening the fasteners. The child was seated in her wheelchair when the first attempt to put on and take off the ensemble occurred, and required minor assistance. She was helped into the slacks by putting them over her braces and pulling them up around the waist. She was able to operate the zipper closing and the hook and eye located in the center right of the slacks herself. The smock was held for her to slip on over her head, and she was able to fasten the zipper and snap closing alone. When taking the ensemble off assistance was needed in pulling the slacks off, but she was able to remove the smock alone. No difficulty in dressing was reported by either the individual or board parent after one week of use.

The design of the garments was evaluated for its effect on movement, mobility, and clothing needs of the individual. The design of the smock was found to be satisfactory for movement and meeting the clothing needs of the individual. It permitted ease in putting on and taking off while seated in a wheelchair as well as standing, permitted ample room for movement. The immediate effect of the design of the slack was also satisfactory. It permitted ample room for the braces and waste collection bag, permitted ease of fastening and ease of care of the bag. No particular

problems were encountered with the design of either garment according to the board parent and the subject.

The knit fabrics chosen for the garments were found to perform as anticipated. The subject reported the garments were very comfortable to wear. The performance of the garments after one week of wear and laundering was found satisfactory by the board parent. No future problems were anticipated with comfort and ease of care; however, the wearing quality could be affected by snagging the fabrics on the wheelchair, braces, or other mechanical aids with continued use. Therefore, stretch woven fabrics or plain woven fabrics in a blend could be considered for use.

No suggestions were made by either the board parent or subject for ways the smock and slack ensemble could be improved for this particular individual. The subject had no suggestions for garments made for other girls handicapped by spina bifida; however, the board parent reiterated the importance of correcting the back length of garments for these girls.

In a subjective evaluation the child seemed very pleased when given the smock and slack ensemble for her to wear and showed immediate interest in it. The appearance of the ensemble was considered "real fine" by the board parent, and the investigator evaluated it as good. The subject expressed appreciation for the ensemble when she completed the evaluation after one week of wearing it. The Director of Rehabilitation Services at the foundation indicated the subject displayed good rapport and response during the study.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions reached as a result of this study would not necessarily be applicable to all girls handicapped by spina bifida, but are restricted to the selected girls enrolled at the Capper Foundation for Crippled Children, Topeka, Kansas. Information obtained in this study may give insight into the alteration of commercial garment patterns for other girls handicapped by spina bifida.

The clothing problems of these girls were summarized after observations, interviews, and measurements were completed. Comments by the girls revealed the dressing process was relatively simple for them even though the upper half of their body was well developed. The problems in dressing were caused by back fastenings. It was concluded that pants and tops were the garment combinations the girls would prefer to wear if they could be made to fit them properly. The design features of sleeves, necklines, and collars preferred by the girls allowed for ease of movement and comfort, but also expressed individual preferences.

Observation indicated that the majority of their clothing was ready-to-wear garments; however, some clothing was made for them. The appearance of the garments worn by the girls made it apparent that their clothing did not fit properly. Therefore, investigating specific alterations of commercial garment patterns was recognized as important in meeting the clothing needs of these handicapped girls. It was noted that the alterations made must be suited for a particular handicap, and that individual clothing needs were of primary importance.

It was concluded that the alterations most suitable for constructing a smock and slack ensemble to fit one child properly were:

- 1) increasing the width of the bodice front, back, and sleeve;
- 2) decreasing the length of the bodice front and sleeve;
- 3) decreasing the width of the shoulders, lowering the neckline, and narrowing the collar;
- 4) increasing the back rise of the slack;
- 5) decreasing the length of the slack legs; and
- 6) adding width to the slack waistline.

The "shirt-tail" hem of the smock was added in an attempt to help camouflage the uneven hemline. Her lack of bladder control required special consideration. Since she wore a waste collection bag, it was important to utilize a fastening in the slack for ease of care. This was possible by adding a nine inch zipper placket in a right center front seam and adding elastic at the waist. A center front zipper, used for closing the smock, was hidden with a tab down the front.

The adaptation of other tops, slacks, dresses, or jumpers was recognized as a possibility for meeting clothing needs of girls handicapped by spina bifida. Using only one child in the execution of this study was an advantage because it allowed the investigator to know more about the physical characteristics of the child and her needs. If time permits, it is recommended that a study of this type be carried out with more than one individual for the purpose of comparison and further conclusions.

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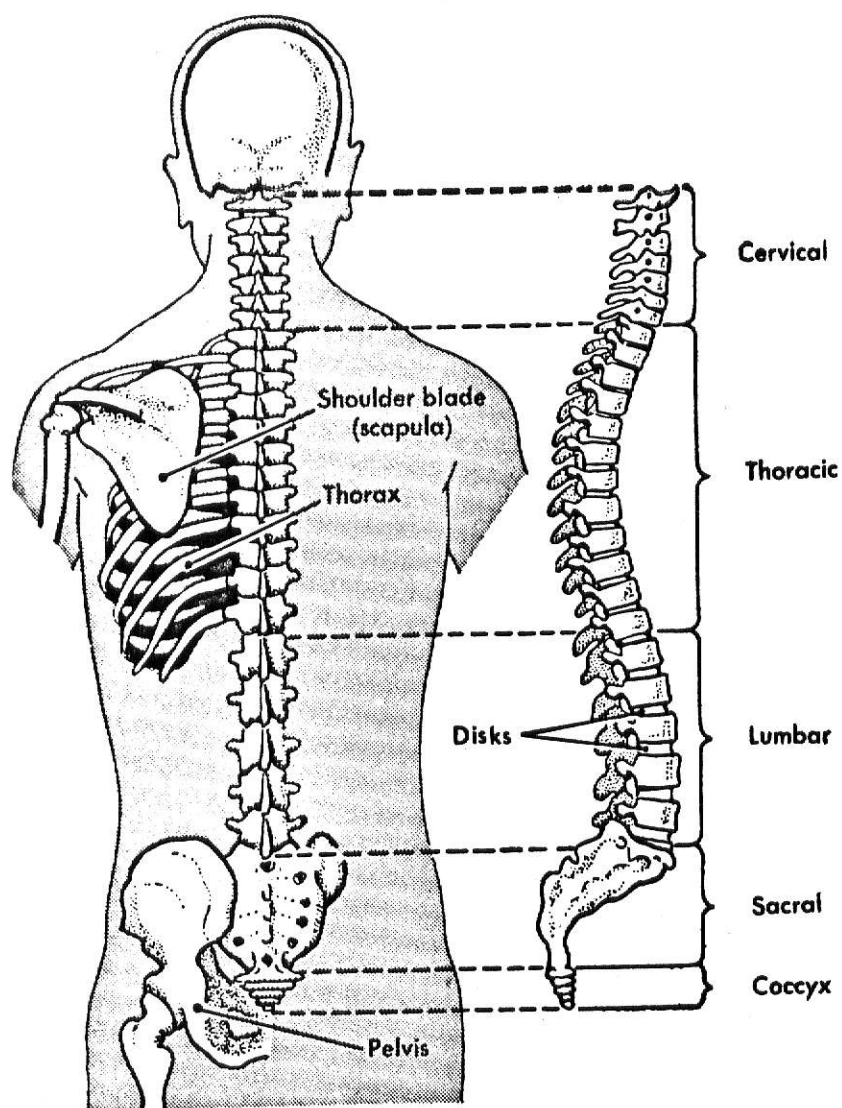
APPENDIXES

APPENDIX A
NORMAL SPINE

**THIS BOOK
CONTAINS
NUMEROUS PAGES
WITH DIAGRAMS
THAT ARE CROOKED
COMPARED TO THE
REST OF THE
INFORMATION ON
THE PAGE.**

**THIS IS AS
RECEIVED FROM
CUSTOMER.**

PLATE I
NORMAL SPINE



APPENDIX B
TYPES OF SPINA BIFIDA

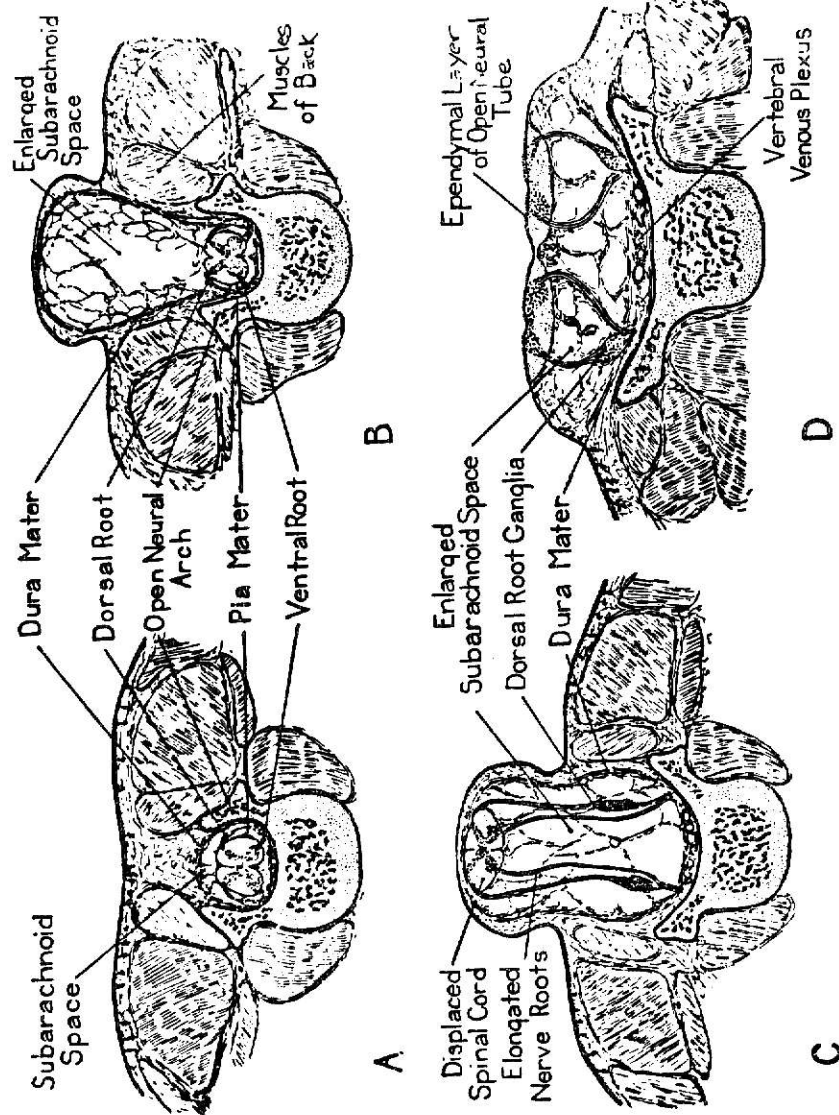


PLATE II
TYPES OF SPINA BIFIDA

APPENDIX C

LETTER OF INTRODUCTION TO THE PARENTS



January 10, 1972

Name of parents
Address of parents

Dear _____,

We of the Clothing, Textiles, and Interior Design Department of Kansas State University are interested in clothing for handicapped children. Currently we are working on the particular clothing problems of girls with handicaps caused by spina bifida. The information we hope to obtain will help us make recommendations on the design of garments to be worn by these girls for their greatest comfort and ease.

May we have your permission to include your daughter in the study to be conducted at Capper's Foundation for Crippled Children?

We would appreciate your cooperation in making this a worthwhile project.

Sincerely,

A handwritten signature in cursive script that reads 'Marilyn Sullivan'.

Marilyn Sullivan
Graduate Research Assitant

A handwritten signature in cursive script that reads 'Shirley E. Friend'.

Dr. Shirley Friend
Assistant Professor

APPENDIX D
OBSERVATION SCHEDULE

OBSERVATION SCHEDULE

Movements and Points to Observe	Yes	No	Comments
I. Physical Appearance			
A. Child's body build			
1. Ectomorph	—	—	
2. Mesomorph	—	—	
3. Endomorph	—	—	
B. Size of child			
1. Height			
2. Weight			
3. Age			
C. Special features			
1. Wears glasses	—	—	
2. Acne	—	—	
3. Well groomed	—	—	
4. Other			
D. Additional handicaps			
E. Characteristic manner of dress			
1. Dresses	—	—	
2. Jumpers	—	—	
3. Skirts and blouses	—	—	
4. Slacks and tops	—	—	
5. Other			
II. Motor Ability			
A. Head Control			
1. Able to move head	—	—	
2. Able to hold head erect	—	—	
B. Trunk and limb control			
1. Able to move upper trunk	—	—	
2. Able to move lower trunk	—	—	

3. Rigid, jerky, and uncontrollable movements	—	—
C. Child's balance at changing positions	—	—
1. Able to go from	—	—
a. Standing to sitting	—	—
b. Sitting to standing	—	—
c. Standing to lying	—	—
d. Lying to standing	—	—
2. Needs aid in changing positions	—	—
D. Child sitting	—	—
1. Sits erect with legs extended	—	—
2. Body and arms are	—	—
a. Rigid	—	—
b. Relaxed	—	—
E. Child standing	—	—
1. Stands still without losing balance	—	—
2. Sets feet far apart to give a wide base	—	—
3. Sways back and forth or side to side	—	—
F. Child's mobility	—	—
1. Has difficulty in maintaining movement	—	—
2. Walks	—	—
3. Moves from side to side with trunk rather than pulling and pushing with arms and legs	—	—
4. Uses assistive devices for movement	—	—
5. Trunk is erect when walking	—	—
6. Legs are rigid when walking	—	—

- G. Use of child's hands
1. Able to use thumb and fingers to grasp
 2. Able to hold items
 3. Good hand coordination
 4. Finger control difficult
 5. Needs help in activities using the hands
- H. Child's attention span
1. Needs help in keeping occupied in
 - a. Teacher planned activities
 - b. Self-selected activities
 2. Changes activity often
 3. Stays at activity
 - a. 10 minutes
 - b. 20 minutes
 - c. 30 minutes
 4. Reaction to
 - a. Planned activities
 - b. Self-selected activities
- I. Child's management of clothes
1. Takes off clothes by self
 2. Puts on clothes by self
 3. Has trouble with fasteners
 4. Needs help dressing
- III. Language
- A. Child expresses self well
 - B. Child communicates well
- IV. Emotions
- A. Child seems
 1. Happy
 2. Sad
 3. Indifferent

B. Child expresses

1. Fear
 - a. Frequently
 - b. Seldom
2. Anger
 - a. Frequently
 - b. Seldom
- C. Child's self-image seems
 1. Positive
 2. Negative
- D. Child's reaction to being in institution
 1. Positive
 2. Negative
 3. Indifferent

V. Interaction

- A. With peers
 1. React with same sex
 2. React with opposite sex
 3. Child is a leader
 4. Child is a follower
- B. With adults
 1. Dependent
 2. Demanding
 3. Negativistic

APPENDIX E
INTERVIEW SCHEDULE FOR GIRLS

INTERVIEW SCHEDULE FOR GIRLS

1. Can you dress yourself?

☐ yes

☐ no

If no, ask the child what kind of help is needed.

2. What are some of the problems you have with your clothing?

☐ suitable clothing not available due to handicaps

☐ improper fit

☐ design not adaptable to the handicaps

☐ durability and wearing quality is poor

☐ lack of fashion

☐ difficult to put on and to take off

☐ other--name _____

3. What articles of clothing are most difficult to put on and to take off?

☐ underwear

☐ sleepwear

☐ pants

☐ skirts

☐ shirts

☐ dresses

☐ sweaters or coats

4. Do you enjoy your clothing?

☐ yes

☐ no

If no, ask the child why she dislikes clothing.

5. Which of the following clothes or combination of clothes do you wear most often?

☐ dresses

☐ jumpers

☐ sweaters and skirts

☐ blouses and skirts

☐ shirts and pants

☐ other--name _____

6. Is this what you would like to wear best?

☐ yes

☐ no

If no, ask the child what she would like to wear best?

7. Do you wear dresses that have front darts like the shift you see in this picture (Figure 1)?

☐ yes

☐ no

If yes, ask the child how many dresses of this style she has.

8. Do you wear dresses that gather under the bustline as you see in this picture (Figure 2)?

____yes
____no

If yes, ask the child how many dresses of this style she has.

9. Do you wear dresses with a yoke as you see in this picture (Figure 5)?

____yes
____no

10. Do you wear dresses with a flared skirt and front fastening as you see in this picture (Figures 6, 7)?

____yes
____no

If yes, ask the child how many dresses of this style she has.

11. Do you wear dresses that fasten down the front and have a belt as you see in this picture (Figure 8)?

____yes
____no

If yes, ask the child how many dresses of this style she has.

12. Do you like one of these styles of sleeves better than the others?

____kimono (Figure 10)
____raglan (Figure 11)
____set-in (Figure 12)

13. Do you like one of these styles of necklines better than the others?

____round (Figure 13)
____v-line (Figure 14)
____square (Figure 15)

14. Do you like one of these styles of collars better than the others?

____standing band or turtleneck (Figure 16)
____convertible (Figure 17)
____Peter Pan (Figure 18)

15. Which of the following fasteners have been used most often on your clothing?

____buttons
____zippers
____Velcro
____grippers
____snaps
____hooks and eyes
____other--name _____

16. Which of these fasteners is easiest for you to operate?

____buttons
____zippers
____Velcro
____grippers
____snaps
____hooks and eyes
____other--name _____

17. Who chooses your clothing?

☐ your mother

☐ you

☐ you and your mother

☐ other--name _____

18. How is your clothing purchased?

☐ boughten ready-to-wear

☐ specially designed

☐ made for you

☐ other--name _____

19. Are alterations required for your clothes to fit you?

☐ yes

☐ no

20. If yes, ask the child who performs the alterations?

☐ mother

☐ unpaid friend or relative

☐ paid tailor, seamstress, etc.

☐ other--name _____

21. Is there anything more that you'd like to tell me about your clothes?

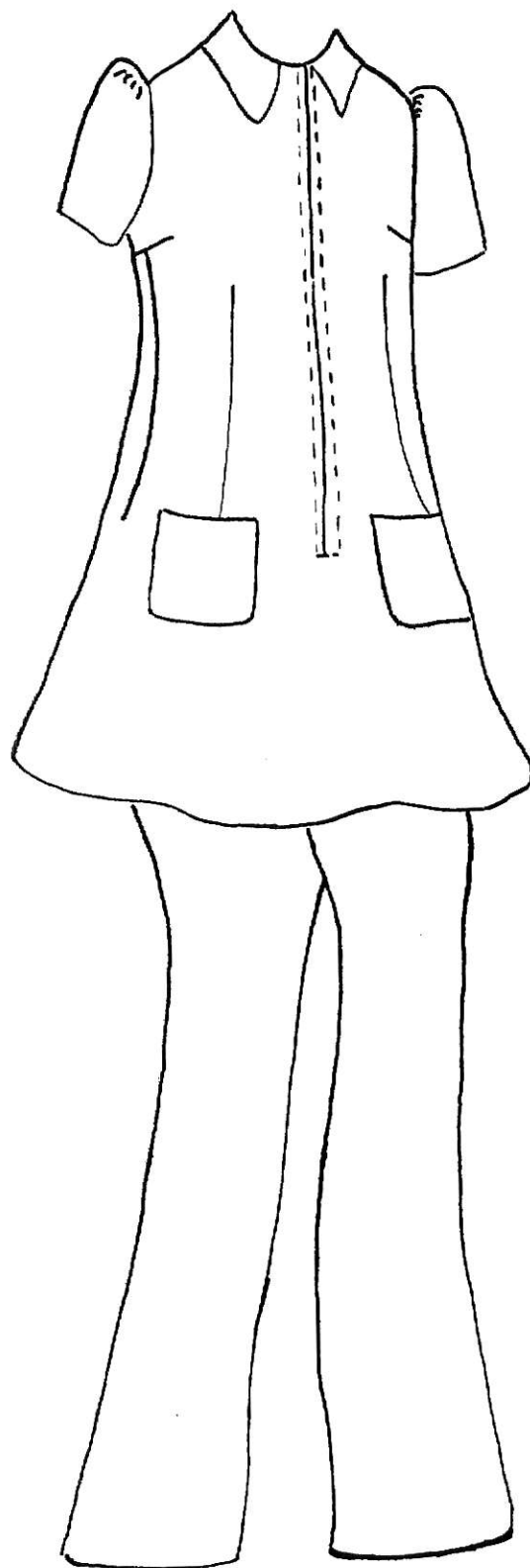


Fig 1. McCall's Pattern Number 2683

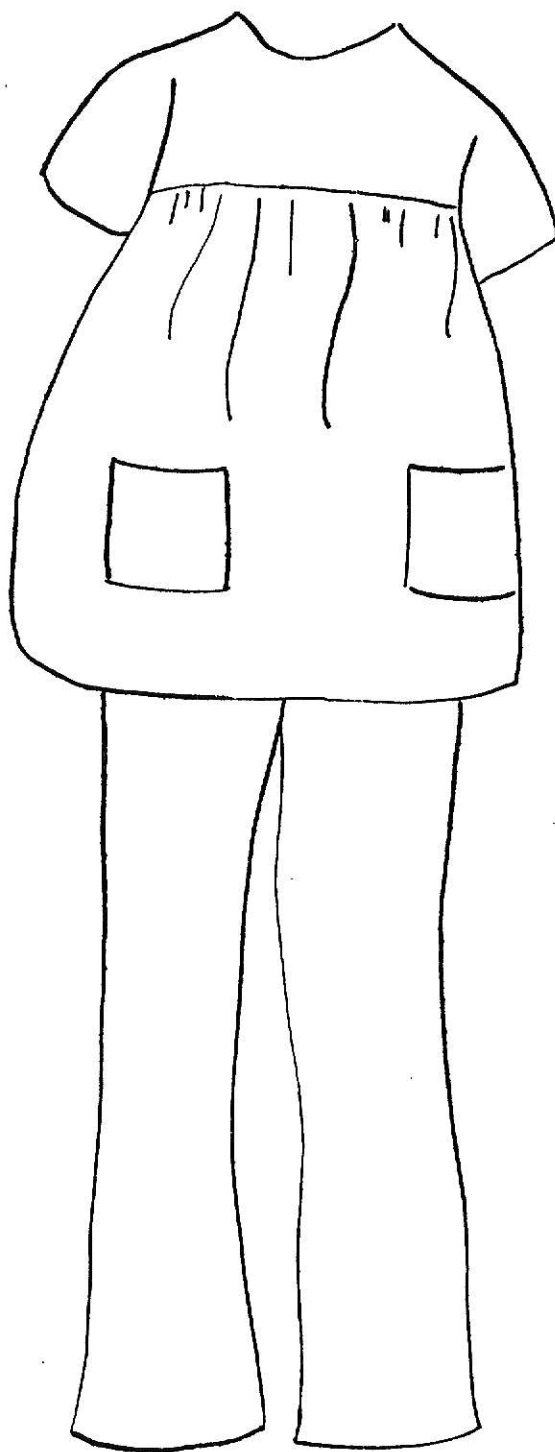


Fig. 2. McCall's Pattern Number 2997

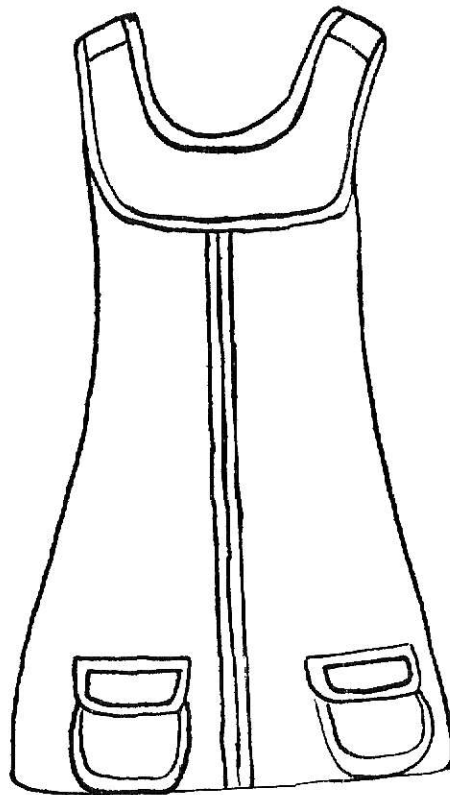


Fig. 3. Vogue Pattern Number 7858

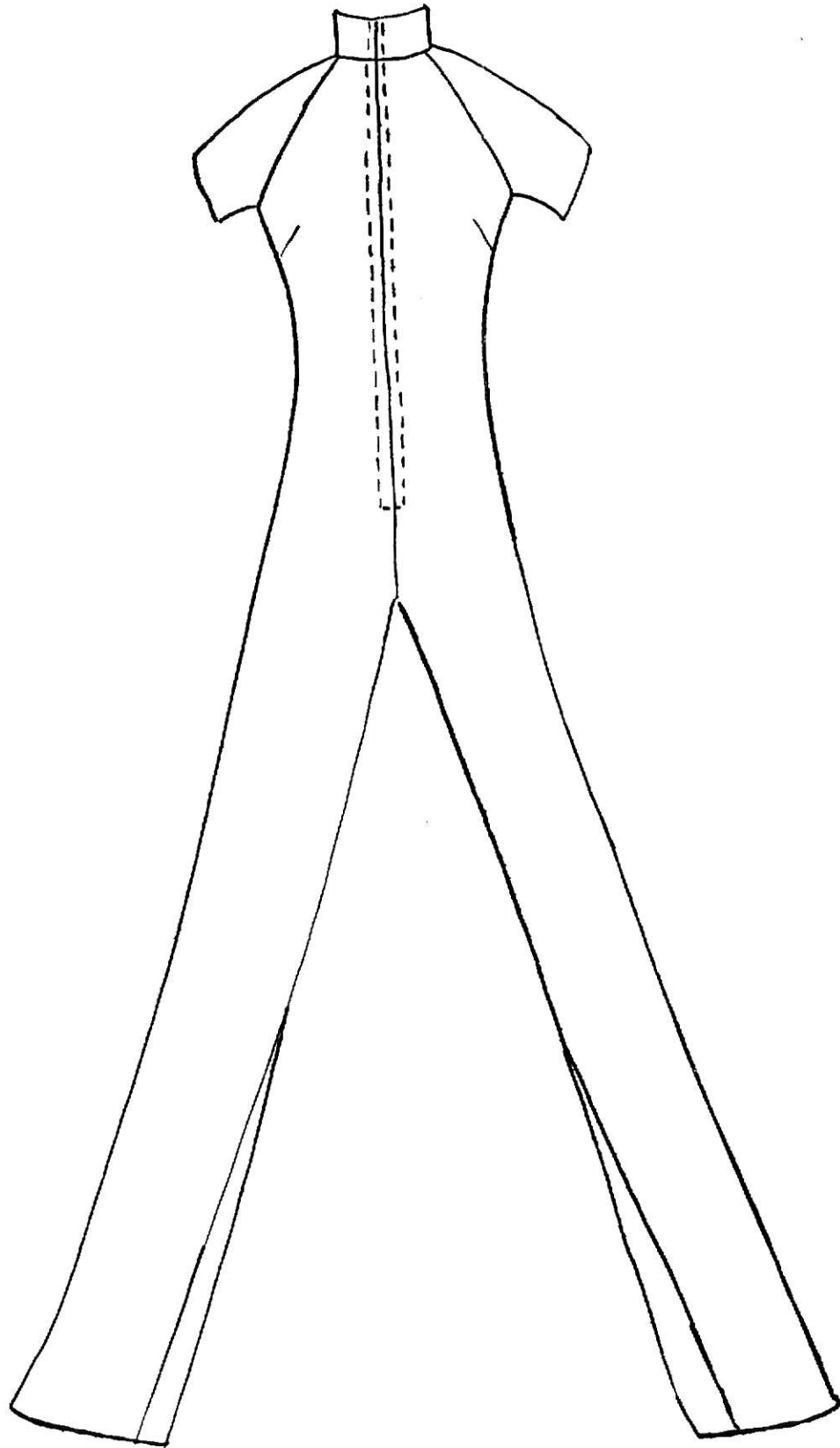


Fig. 4. McCall's Pattern Number 2657

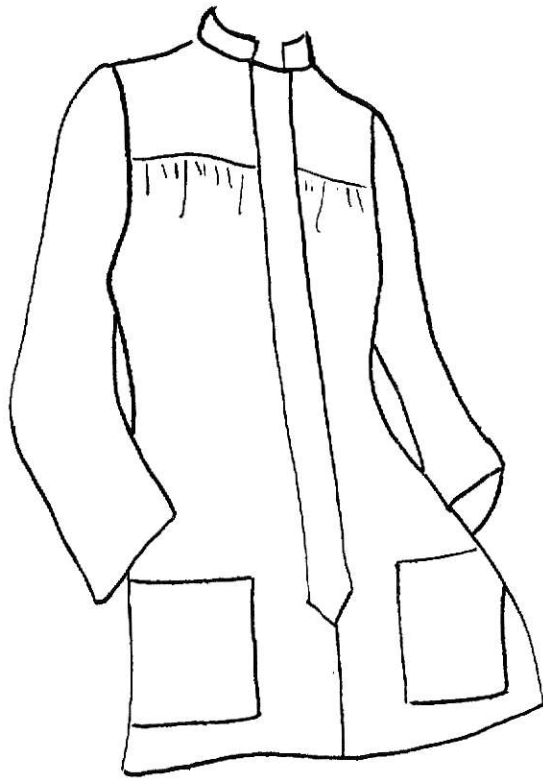


Fig. 5. Simplicity Pattern Number 9635

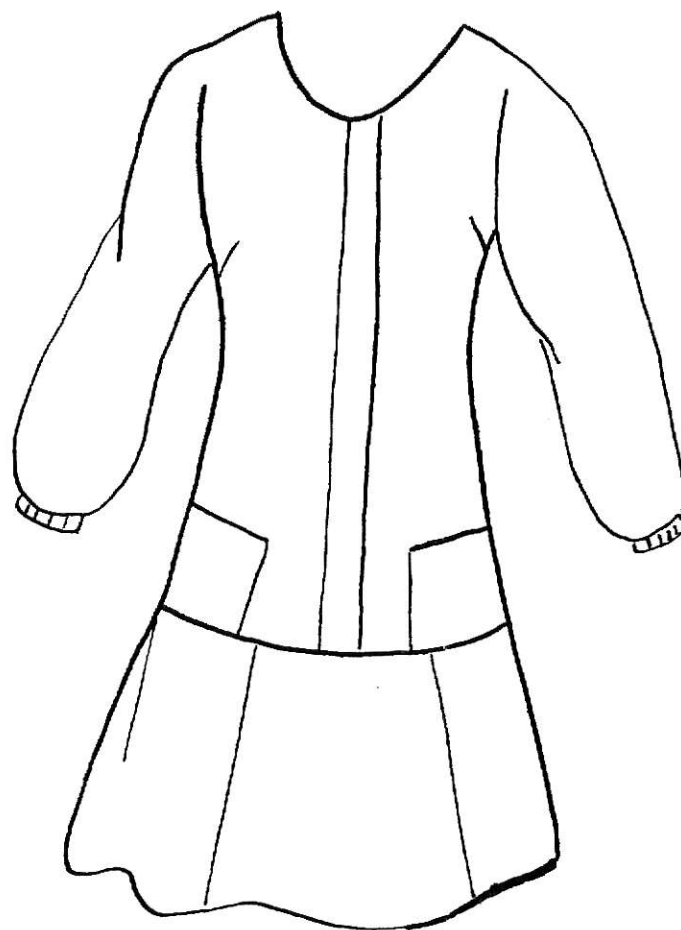


Fig. 6. Butterick Pattern Number 5867

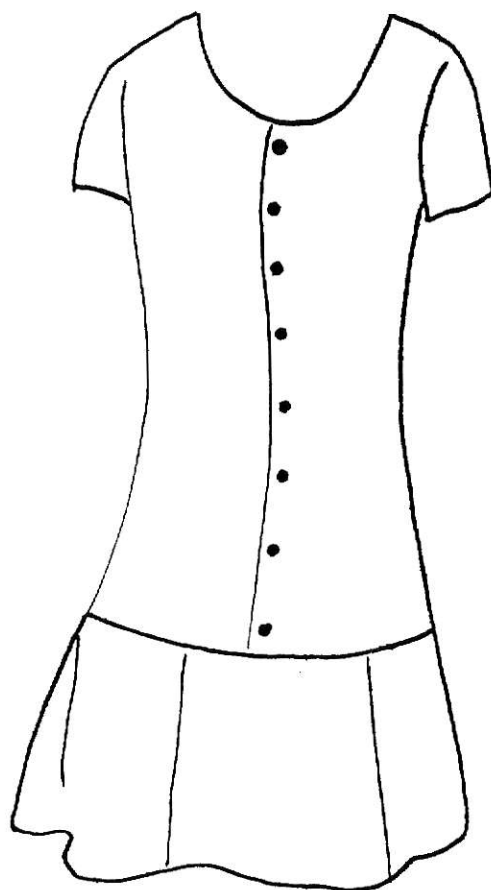


Fig. 7. Simplicity Pattern Number 8607

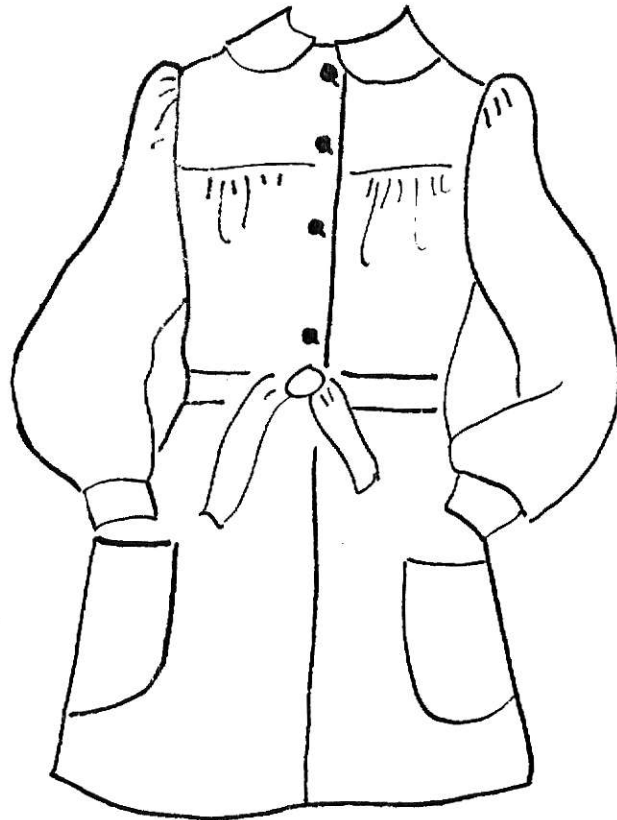


Fig. 8. Butterick Pattern Number 6492



Fig. 9. Butterick Pattern Number 6456

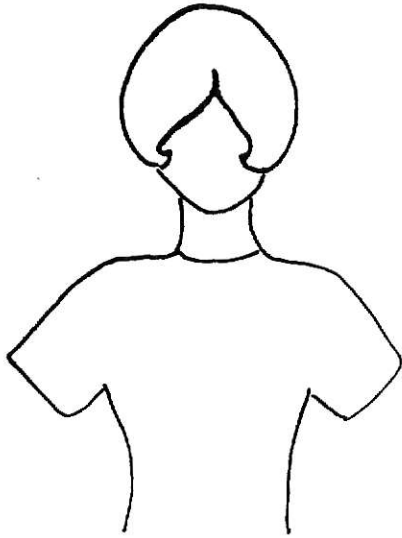


Figure 10
Kimono Sleeve

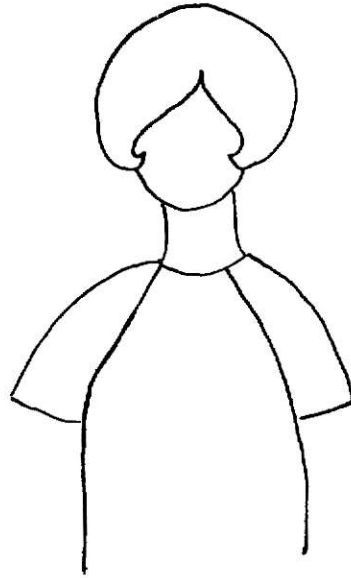


Figure 11
Raglan Sleeve

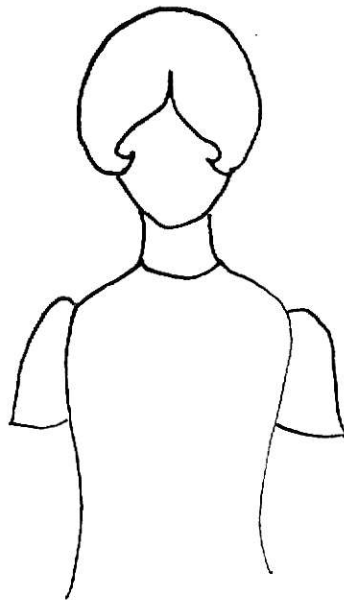


Figure 12
Set-in Sleeve

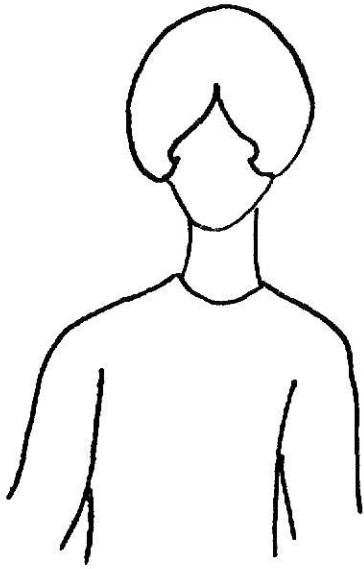


Figure 13
Round Neckline

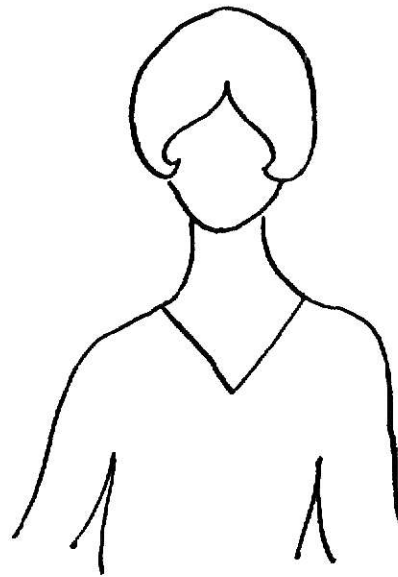


Figure 14
V-Neckline

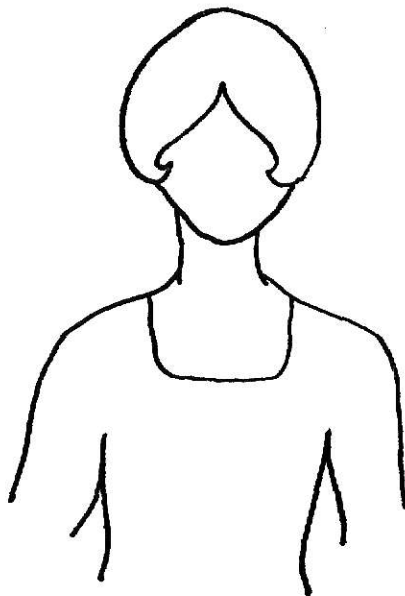


Figure 15
Square neckline

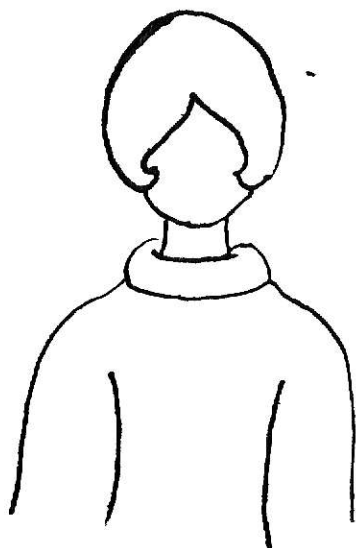


Figure 16
Standing Band or Turtleneck
Collar

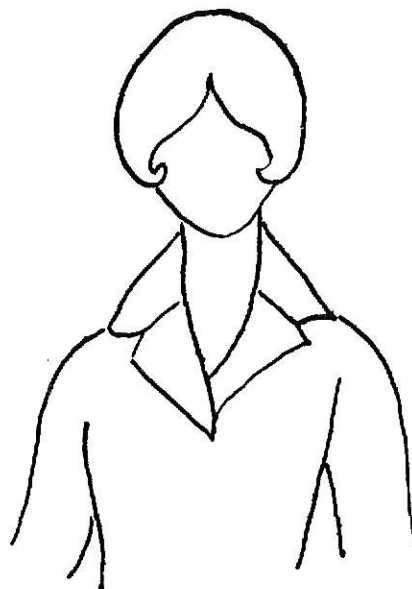


Figure 17
Convertible
Collar

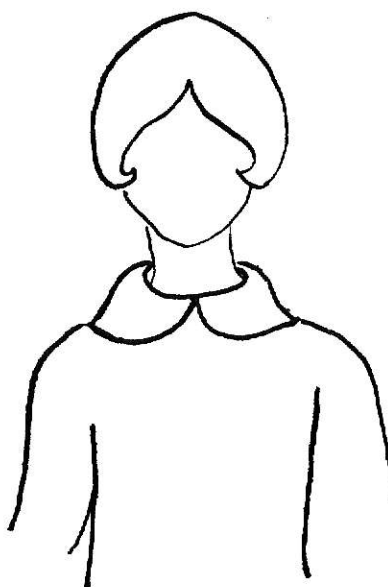


Figure 18
Peter Pan
Collar

APPENDIX F
INTERVIEW SCHEDULE FOR BOARD PARENT

INTERVIEW SCHEDULE FOR BOARD PARENT

1. What are some of the clothing problems of the girls handicapped by spina bifida?

- ☐ suitable clothing not available due to handicaps
- ☐ improper fit
- ☐ design not adaptable to the handicaps
- ☐ durability and wearing quality is poor
- ☐ lack of fashion
- ☐ difficult to put on and to take off
- ☐ other--name _____

2. What articles of clothing are most difficult for them to put on and to take off?

- ☐ underwear
- ☐ sleepwear
- ☐ pants
- ☐ skirts
- ☐ shirts
- ☐ dresses
- ☐ sweaters or coats

3. Which of the following dress styles do these girls wear most often?

- ☐ Figure 1
- ☐ Figure 2
- ☐ Figure 5
- ☐ Figure 7
- ☐ Figure 8

4. Which of the following sleeve styles do these girls wear most often?

- ☐ Figure 10
- ☐ Figure 11
- ☐ Figure 12

5. Which of the following neckline styles do these girls wear most often?

- ☐ Figure 13
- ☐ Figure 14
- ☐ Figure 15

6. Which of the following collar styles do these girls wear most often?

- ☐ Figure 16
- ☐ Figure 17
- ☐ Figure 18

7. Which of the following fasteners do the girls find easiest to operate?

- ☐ buttons
- ☐ zippers
- ☐ Velcro

_____grippers
_____snaps
_____hooks and eyes
_____other--name _____

8. What improvements do you see in meeting the clothing needs of the girls handicapped by spina bifida?

APPENDIX G
MEASUREMENT LOCATIONS AND CHART

MEASUREMENT LOCATIONS

1. Bust--measure fullest part of bust keeping tape parallel to the floor.
2. Waistline---measure snugly where the belt should be.
3. Hips--measure at the widest part, keeping tape parallel to the floor.
4. Blouse length, center back--measure from collar bone at back of neck to waistline.
5. Blouse length, center front--measure from base of neck straight down to waistline.
6. Blouse length, over bust--measure from middle of shoulder seam over bust straight down to waistline.
7. Back blouse length, over shoulder blades--measure from middle of shoulder seam over shoulder blades to waistline.
8. Upper back width--measure straight across back from top of one armhole seam to the other.
9. Width across shoulder blades--measure at a point seven inches down from shoulder seam at neckline from armhole seam to armhole seam.
10. Back neck seam--measure along back neckline from shoulder seam to shoulder seam.
11. Shoulder length--measure from base of neck to top of armhole line.
12. Chest width--measure at a point six inches down from shoulder seam at neckline, measure armhole seam to armhole seam.
13. Armhole depth--tie a cord around chest level with bottom of armhole and measure from shoulder seam at neckline straight down to cord.
14. Shoulder height--measure from shoulder seam at top of armhole down back to cord tied around chest.
15. Underarm length--measure from armhole down to waistline from cord tied around chest.
16. Sleeve length--measure from top of armhole down over elbow with arm bent to wrist bone.
17. Sleeve-cap length--measure from top of armhole seam to cord tied around the arm level with the armhole.
18. Upper arm or sleeve width--measure around fullest part of upper arm usually at bottom of the armhole.
19. Elbow--measure around elbow with arm bent for fitted long or three quarter sleeves.
20. Skirt length--measure from waistline to bottom of skirt or desired distance from the floor (39:97-99).

MEASUREMENT CHART

Item	Body Measurement	Pattern Measurement	Necessary Alteration
Bust.			
Chest width			
Back neck seam.			
Upper back width.			
Width across.			
Blouse length			
Center front			
Center back.			
Over bust.			
Over shoulder blades . .			
Armhole depth			
Shoulder height			
Underarm length			
Shoulder length			
Sleeve length			
Sleeve-cap length			
Upper arm			
Elbow			
Waistline			
Hips.			
Skirt length.			

APPENDIX H
ALTERATIONS OF PATTERNS

PLATE III

ALTERATIONS FOR THE SMOCK

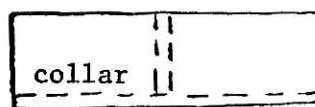
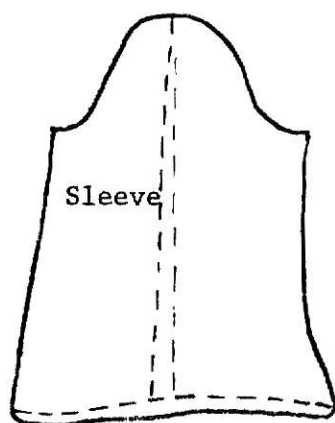
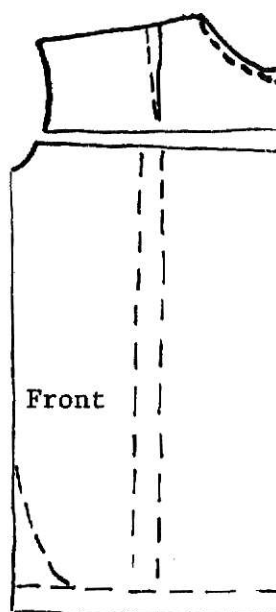
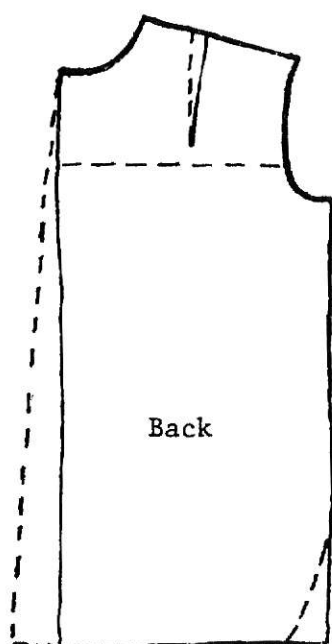
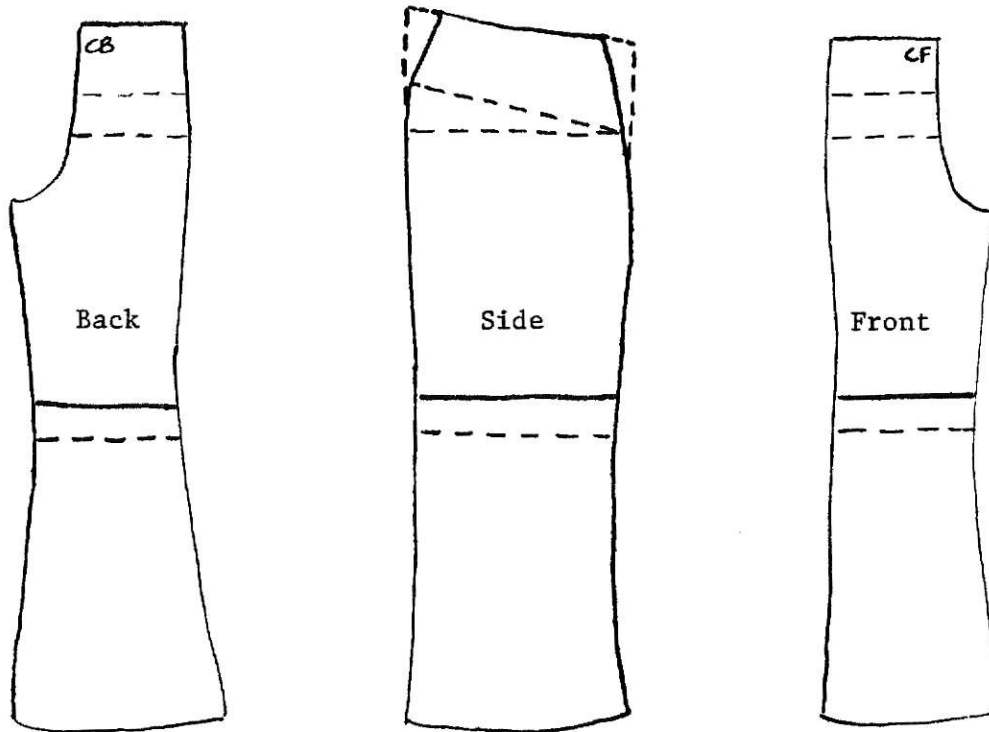


PLATE IV
ALTERATIONS FOR THE SLACK



APPENDIX I
EVALUATION OF GARMENTS

EVALUATION OF THE GARMENTS

1. Was the subject able to put on and take off the slacks and smock easily?

☐ yes

☐ no

☐ problems encountered--name _____

2. Was the subject able to use the zipper, snap, and hook fasteners easily?

☐ yes

☐ no

☐ problems encountered--name _____

3. Did the design of the slacks prohibit movement or mobility?

☐ yes

☐ no

☐ problems encountered--name _____

4. Did the design of the smock prohibit movement or mobility?

☐ yes

☐ no

☐ problems encountered--name _____

5. Did the design of the slacks and smock meet the clothing needs of the subject?

☐ yes

☐ no

☐ problems encountered--name _____

6. What was the subjects initial reaction to the slacks and smock?

7. What was the subjects reaction after one week of use of the garments? (The subject was asked to write a letter about the performance of the garments after one week of use.)

Debby, after one week of use of the slacks and smock, would you please answer the following questions for me and then mail this back to me.

1. Was the smock comfortable to wear?
2. Were the slacks comfortable to wear?
3. What problems did you have with either the smock or slacks?
4. Can you think of ways the smock or slacks could have been made better to meet your needs?
5. Did you like the fabric that the smock and slacks were made of?
6. Do you have any other suggestions for garments made for girls that are handicapped by spina bifida?

Mrs. Pagan, after Debby has had the use of the slacks and smock for one week, please answer the following questions for me and then mail this back to me.

1. Did Debby have difficulty in putting on and taking off the slacks or smock?
2. Was Debby able to maneuver the fasteners easily?
3. Did the design of the garments prohibit movement or mobility?
4. What problems did Debby have with either the slacks or smock?
5. Do you have suggestions for ways that these garments could be improved to meet Debby's clothing needs?
6. Was the fabric satisfactory after wear and laundering?
7. Do you have any other suggestions for garments made from girls that are handicapped by spina bifida?

APPENDIX J
SLACK PATTERN

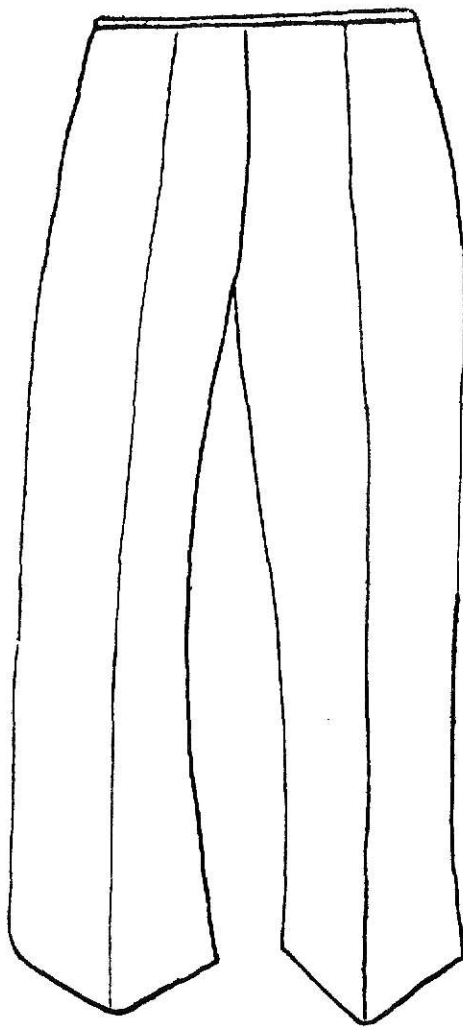


Fig. 19. Vogue Pattern Number 2612

SPECIFIC ALTERATIONS OF COMMERCIAL PATTERNS
FOR A SELECTED GIRL WITH SPINA BIFIDA

by

MARILYN BARTAK SULLIVAN

B.S., Kansas State University, 1970

AN ABSTRACT OF A MASTER'S THESIS

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requirements for the degree

MASTER OF SCIENCE

Department of Clothing, Textiles, and Interior Design

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Manhattan, Kansas

1972

The study investigated specific alterations of commercial garment patterns for girls handicapped by spina bifida. The handicapped girls' measurements were compared with "standard" body measurements used for pattern sizing. Clothing problems the girls had in common were defined after completing measurements, observations, and interviews. Preferences for garments and style features and designs that met the clothing needs of the handicapped were used as criteria for choosing commercial garment patterns to alter. Test copies of the garments were made for one individual after making pattern alterations necessary for her. Fitting the test garments enabled correction of any additional problems. The decision to use knit fabric for construction of the garments was based on its characteristics.

Evaluation was based on ease in dressing, effect on movement and mobility, effect on clothing needs of the individual, reaction of the individual, problems encountered, and recommendations for future use. Evaluations were done by investigator, board parent, and subject. Zippers placed in center front of smock and right center front seam of slack were found to make dressing simple for the individual. The design of the garments permitted ease in dressing; ample room for movement, braces, and waste collection bag. Knit fabrics chosen for garment construction were found to perform satisfactorily. Clothing needs of this individual were met by the adapted design; no problems were encountered with the ensemble. The individual expressed interest in the ensemble and the appearance was considered good.