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COMPARISON OF THE FIT OF DRESSES CONSTRUCTED BY  
THE TRADITIONAL METHOD FROM BASIC FITTING PATTERNS  
AND DRESSES CONSTRUCTED FROM COMPUTERIZED  
PATTERNS.

The University of North Carolina at Greensboro,  
Ph.D., 1975  
Home Economics

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COMPARISON OF THE FIT OF DRESSES CONSTRUCTED BY THE TRADITIONAL  
METHOD FROM BASIC FITTING PATTERNS AND DRESSES  
CONSTRUCTED FROM COMPUTERIZED PATTERNS

by

Peyton Hudson Clark

A Dissertation Submitted to  
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in Partial Fulfillment  
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Doctor of Philosophy

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Approved by

  
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APPROVAL PAGE

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CLARK, PEYTON HUDSON. Comparison of the Fit of Dresses Constructed by the Traditional Method from Basic Fitting Patterns and Dresses Constructed from Computerized Patterns. (1975) Directed by: Dr. Eunice M. Deemer. Pp. 103.

The purposes of this study were (a) to explore and compare two methods for obtaining individualized fit in patterns which might be used as individualized slopers for flat pattern design courses and (b) to assess whether a better fit could be achieved with the use of a computerized pattern rather than a basic fitting pattern adjusted to individual measurements. The latter is designated as the traditional method for obtaining an individualized sloper.

Data were obtained from a comparison of the fit of garments made from the two types of patterns. Students assigned to two sections of the Dress Design and Construction I course offered during the spring semester, 1974, at the University of North Carolina at Greensboro participated in the study.

A control group of 15 students used basic fitting patterns and the method commonly used at the University of North Carolina at Greensboro for obtaining an individualized sloper. This method consisted of selecting a basic fitting pattern in the type and size corresponding to the actual body measurements, by comparison of body measurements with those published in standardized size charts by pattern companies. The basic fitting patterns so selected were adjusted in circumferences at bust, waist, hip, and biceps, and in-length of bodice and shoulder seam when comparison of body and chart measurements revealed a discrepancy. No more than three of these adjustments were indicated for any single pattern. An experimental group of 16 students used

computerized patterns developed from 17 individual body measurements obtained by a company-trained home economist. No adjustments were made to these patterns prior to their use.

The same structural details could be observed in all of the patterns used in the study--jewel neckline, A-line shifts with tailored short set-in sleeves. Consisting of three main pieces, the patterns had a dart emanating from the underarm seam in the front and from the shoulder seam in the back. A second dart in the back was located vertically between the shoulder and hip areas.

The dresses made from these patterns were constructed of grain perfect suiting weight plaid fabric of polyester and cotton by students in a supervised laboratory setting. Completed garments were modeled for a panel of 12 judges, 6 of whom were professional (experience or degree in clothing) and 6 of whom were non-professional (no experience or degree in clothing). Using a checklist developed for the study, each judge evaluated 93 items for each dress during four evaluation sessions. A preliminary session was used to familiarize all judges with the terminology of the checklist.

The evaluations by all judges for each garment on each item were tallied. Judge agreement scores (percent of judge agreement) were obtained for each item over all dresses combined and for each dress over all items combined. The judge agreement scores were computed for the entire group of 12 judges. Complete agreement among all judges on a single dress or item was represented by a score of 1.00. Less than complete judge agreement was represented by a score of less than 1.00, reflecting the percent of judges who gave the same evaluation to the dress or item. The 50 items on which judge agreement was 75 percent or above for the total group of 12 judges were selected as 'consensus' items. They were the basis for

determination of differences in fit between the two groups of dresses.

The percent of judge agreement for all judges on each of the "consensus" items was computed for each dress. A numerical average for the "consensus" items was computed for each dress. The average obtained provided the score which indicated the excellence of the judged fit of each dress. The scores for the dresses were used to perform a t-test for the comparison of fit of each of the two groups of dresses. The results of this test led to the rejection of the hypothesis that there would be no statistically significant difference between the fit of basic dresses made by the traditional method from a basic fitting pattern and the fit of dresses made from computerized patterns.

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## I. INTRODUCTION

### Origin and Aim of Study

Perfection of fit in a custom-sewn garment is a major objective of teachers and students in the discipline of clothing and textiles, as well as women who sew for themselves and others. The desire for a better and more perfect fit than that obtained through the purchase of ready-to-wear garments is stated often as one of the reasons women prefer to construct their own garments.

Individuals who sew have traditionally been able to achieve an improved fit by performing tedious and time-consuming adjustments of commercial patterns. Fortunately, indeed, have been those rare individuals whose measurements adhere to the mean used as the standard for commercial pattern sizes. Persons with figure irregularities or with measurements which differed from a standardized size have been forced either to accept less than optimum fit or to make adjustments to pattern pieces where discrepancies existed. The resulting garment might still fall short of an acceptable and comfortable fit, be unbecoming, or accentuate postural variations or figure irregularities.

The four measurements for determining size of commercial patterns are three circumferential measurements of the body at bust, waist, and hip, and one lengthwise measurement of the back waist length. Clothing specialists and home economists employed

by pattern companies recommend the use of these measurements to consumers when selecting sizes in commercial patterns. These and additional body measurements may be utilized to determine the amount and number of pattern adjustments needed. Seldom are figure irregularities, such as a high hip or shoulder, curvature of the spine, sway back, or other numerous common irregularities detected by total circumferential measurements. It is obviously impossible for companies to consider such idiosyncracies in the production of standardized patterns for mass distribution. Consequently, poor fit may occur in garments made from commercial patterns even though attempts have been made to individualize the fit by means of adjustments to the pattern.

Methods commonly used to identify and determine needed pattern adjustments have produced successful results only in proportion to the degree of skill, experience, and fashion sense of the fitter. Improved fit is often sacrificed because the beginner, and even the experienced seamstress, lacks the necessary perception and skill to either (1) identify the source of the fitting problem or (2) employ the correct adjustment technique to produce a more individualized and correct fit.

Achieving a well-fitted garment which may be used as a basis for the production of patterns is usually a primary goal of any student enrolled in a course in which principles of flat pattern design are taught along with related principles of pattern adjustment and fitting. The basic garment, cut to grain perfection from a commercially produced basic pattern in closest correspondence to

the body measurements of the student, is carefully fitted to the individual. Because grain line accuracy must be maintained throughout the entire operation, a fabric of woven check or plaid, such as gingham, frequently is chosen for this garment. Once the basic garment has been brought to the level of optimum fit (a process which often entails numerous alterations) it must then be transferred in its final form to brown paper to become an individualized sloper used in producing patterns of various designs. Traditionally, this portion of the flat pattern design course has consumed from one-third to one-half of the laboratory time allotted to the course.

An alternate method for the development of an individualized sloper was investigated with the hope of being able to utilize to greater advantage a larger portion of the laboratory time as well as the total contact time between students and teacher. A more expedient method for developing the sloper would release a greater portion of course time for employing the principles of flat pattern design and for more actual design activity by each student.

Bane (1972) outlined three different methods which could be used in teaching flat pattern design at the college level. She stated that it is impossible both to develop the individualized sloper and provide the amount of designing experience which students need in a single course of three semester hours credit. Former students of flat pattern design at the University of North Carolina at Greensboro have indicated that the requirements of the course as now structured have consumed more time than any other laboratory course which carries equivalent credit; yet, when asked which

activities should be eliminated, the reply has almost invariably been that all assignments were necessary for the learning which occurred.

Former students of the course believe that there is greater pride and incentive experienced by students who design and construct garments either for themselves or for other individuals rather than for standardized mannequins in full or half scale size. Students lament the time devoted to developing the basic sloper but generally have shared the belief that this activity is essential to the additional satisfaction gained from designing acceptable and comfortable apparel for individuals.

When the computerized Silhouette Custom-Fit Pattern was developed and advertised by the Scovill Manufacturing Company, it appeared to offer a solution to the dilemma of time and activity devoted to sloper development. The use of a computerized pattern could make possible, in one course of three semester hours credit, the practice of design theory, fitting skills, and construction techniques. Also, it was anticipated that student interest would increase in these courses if personal achievement and progress were more readily observable.



## II. REVIEW OF RELATED LITERATURE

The review of selected literature which appeared to pertain to this study was explored as it related to the fit of patterns and garments made from patterns and to the development and use of computerized patterns. Studies and theories relating to fit were found in abundant supply, but only theories relating to computerized patterns could be located. The information included in this review of literature pertaining to the latter topic has been gathered from professionals in the field of computerized pattern making and from a few articles in newspapers and trade publications.

### Studies and Theories Related to Fit

Before 1940, when standardization of pattern sizes was in its infancy and many commercial patterns were tissue paper shapes with no printed markings which could be purchased by home sewing enthusiasts for 15 cents, there was already concern for producing well-fitted garments. Erwin, in 1933, stated in her book, Practical Dress Design,

unless the garment is perfectly fitted it will not give that impression of well-groomed smartness which you desire. Of course, it must be well-stitched and tailored, too, but fitting gives it that air, that style, which makes you feel 'right in your clothes (Erwin, 1933, p. 111).'

Erwin quoted an authority on clothing of that period, George Van Ness Dearborn (1918), who, in turn, quoted Norris as follows:

'The sort of feeling that one gets when one's clothes fit absolutely,' as Norris puts it, comes only from fitness, from an absolute fit, not tightness--a uniform snugness

with a reasonable amount of looseness for the organism as a conscious and living and variously active 'machine' with vital and mental processes to carry on within the clothes, and . . . 'well-fitting clothes . . . imply taste and culture (Erwin, 1933, p. 111).'

Erwin's first edition contained guidelines rather than hard and fast rules for fit. She maintained that "The properly fitted garment gives one the impression of being neither too large nor too small (Erwin, 1933, p. 112)." She acknowledged, too, the influences of fashion, the size of the body, the body build, and figure faults on the impression of fit given by a modeled garment. She presented a guide for ease allowances in a foundation pattern, followed by a discussion of four additional factors in fit of garments which she termed line, grain, balance, and wrinkles (Erwin, 1933, p. 120-121). In Erwin's revised 1954 edition, the five standards of fit were again enumerated, but with a change in terminology from wrinkles (which were a negative connotation) to set (a positive connotation). She defined set as the absence of wrinkles. Throughout a number of the studies concerned with the fit of women's clothes which were conducted during the last 15 years, Erwin's five standards of fit are observed and used constantly.

Maude Latham Hooten in 1960 at Texas Women's University conducted a comparative study of the variations in fit within one size of the basic block as designed by five commercial pattern companies then in business. She evaluated the fit of basic gingham dresses cut from patterns in Misses sizes 14 and 16 on 25 women in each of the two size groups being investigated. She referred to Erwin's definition of a well-fitted garment and included definitions of each of the five

standards of fit identified by Erwin--ease, line, grain, balance, and set--in her evaluation of the fit of the gingham dresses (Hooten, 1960, p. 6).

Jane Louise Frazier in 1961 at the University of Rhode Island explored "the mechanics employed during past years for the control of fit of dresses" and attempted to expose "the manner in which the fitting of garments has developed" over a fifty year period beginning in 1900 (Frazier, 1961, p. 4). One of the aims of Frazier's study was "to relate the concepts of fit to body shape, commercial patterns, and the shapes of undergarments" (Frazier, 1961, p. 7). Frazier enumerated a number of factors which have served as guides in evaluating the fit of garments, and a general concept of fit. These were:

grain control, necessary ease, adequate fullness of width for the style, sufficient length, well-placed seamlines, set or smooth fit of the fabric, balance of the garment. The way these factors enter into a concept of "good fit" of a particular style depends upon the dictates of fashion (Frazier, 1961, p. 9.).

Frazier's belief that concepts of good fit are dependent upon fashion changes is a point acknowledged by most clothing authorities. In fact, in an article entitled "You and New Sizing" published in 1968, the educational director of Simplicity Patterns stated that the reason for New Sizing was attributable, in part, to a change in the preferences for closeness of fit in garments over a period of years. It was her opinion that garments in the 1960's were preferred to fit closer to the body than in previous years (Frazier, 1961, p. 10). Erwin recognized the influence of fashion on the fit of garments in her 1940 edition of Practical Dress Design, by the statement which followed her chart for

ease allowances: "You will find it essential to correct this chart from year to year as a summary of the season's styles, but any changes made should conform to the principles discussed (Erwin, 1940, p. 115).

In 1967, Carol G. Bixby at the University of Rhode Island conducted "A Comparison Study of the Use of Size-Right Shells versus Standard Figure Analysis for Correct Pattern Size Selection" in which it was necessary to judge the fit of jumpers constructed by students in an experimental and a control group. Bixby used as a basis for fit evaluation, five criteria credited to Edna Bryte Bishop, which were (a) perfect balance in relation to the individual figure, (b) smooth fit without wrinkles, (c) shoulder seam exactly on top of the shoulder, (d) waistline seam exactly at the waist, and (e) side seams perfectly straight (Bixby, 1967, p. 17). Also, Bixby quoted from books by Mabel D. Erwin, Jessie Lambert Fielding, and Caroline E. Wingo, from correspondence written by Mildred Graves Ryan, then the educational director of McCall's Patterns, distributor of the shells used in the study, and from theses by Jane L. Frazier and Thelma H. Berry. Bixby developed a rating scale for evaluation of fit by referring to writings of Ryan and Berry. The rating scale had for each criterion a range of five scores beginning with excellent (scored as 1) and ending with poor (scored as 5). Twelve criteria composed the rating scale which was formulated for use by high school students, and was, therefore, probably not as complex as one intended for use by professionals or adults with more extensive experience in fitting. The rating scale was divided into six sub-headings pertaining to ease, line, grain, set, darts, and balance

(Bixby, 1967, p. 49). One can observe here a marked similarity to Erwin's standards of fit.

In 1967, Martha Mae McKibben at Iowa State University produced a score sheet for fit by modifying an earlier one developed by Burleigh in 1961. McKibben's study was concerned with the fit of drafted bodices only rather than entire garments (McKibben, 1967, p. 4).

Sandra Jane Edwards at Texas Technological University developed, in 1968, a "self instruction program on the basic principles of fitting clothing for elementary clothing construction courses at the college level" (Edwards, 1968, p. 1). Her review of literature provided, according to Edwards

a brief history of programmed instruction, a discussion of the types of programs and techniques used to develop them, guidelines for writing a program, and optimistic expectations for the future of programming (Edwards, 1968, p. 6).

Edwards did not include an exploration of the topic of basic principles of fitting garments but did denote in the bibliography such authors as Erwin and Kinchen (1964), Shelden (1967), Hillhouse and Mansfield (1948), Erwin (1954), and the Iowa Home Economics Association (1965) (Edwards, 1968, pp. 66-68). Edwards' overall objective was that the learner upon completion of the program would be able to identify a properly fitted garment and would be able to fit an improperly fitted garment so that desirable evidences of grain, balance, ease, line, and set were in evidence (Edwards, 1968, p. 5). Edwards developed a 20 question multiple choice test designed to evaluate the effectiveness of the self instructional program by being administered as a pre-test and a post-test to the participating students.

In 1969, Clarice S. Fisher in a study entitled, "A Comparative Study of Basic Dresses Constructed from the Drafted Japanese Basic Dress Pattern and the Simplicity Commercial Basic Dress Pattern," had two objectives (Fisher, 1969, p. 1). The first was to compare the fit of the two types of patterns; the second, to develop an instrument for evaluating the fit of basic dresses (Fisher, 1969, p. 3). The instrument was composed of 36 aspects of fit for the bodice and sleeves and 9 for the skirt. These various criteria were judged on a five point scale by professionals in the field of clothing. A rating of one denoted satisfactory fit. In Fisher's study comparing the fit of a standardized pattern with the fit of an individualized pattern, neither type of basic dress was found to produce what had been designated as a superior fit (Fisher, 1969, p. 39).

Mary Jo Babcock completed a study in 1970 in which she compared the size 12 Misses basic patterns manufactured by the four main commercial pattern companies--Vogue, Butterick, McCall's, and Simplicity. She quoted Picken's postulate that "only two women in 100 can buy a dress or a pattern that does not require some adjustment to achieve a good fit" (Babcock, 1970, p. 9). Babcock traced the historical development of commercial patterns to the 1967 adoption of 'New Sizing.' In her research, she superimposed corresponding pattern pieces of the different companies to distinguish differences in proportions and shape. Each pattern was measured at 65 points and compared in this manner to every other. Muslin dresses were constructed and modeled by 30 young women

whose bust measurements approximated 34 inches. A panel of three professionally qualified judges evaluated the fit of the dresses at 30 observation points. They used the "Fit Observation Check Sheet" developed for the purpose by Babcock (Babcock, 1970, p. 44). Babcock's results indicated that on ratings of general appearance, the Vogue and Butterick patterns were superior. They provided a more satisfactory fit with fewer necessary alterations in the bodice for a majority of women, although they also appeared to provide the least satisfactory fit in the skirt (Babcock, 1970, p. 41).

Bertha Elizabeth Seifert in the same year completed a study at Iowa State University of "Pattern Alteration Based on Brassiere Cup Size" using nine subjects and three professionally qualified judges. The subjects were photographed in each of two bodices constructed for the study, and fit of the bodices was judged from photographs. Seifert's recommendation was that "personal appearance of subjects before judges will increase the probability of accuracy of evaluation" (Seifert, 1970, p. 53). Seifert developed a rating sheet for fit with a number of open end questions which she used in the study.

Shirley Ann Wall in 1971 completed a study at Southern Illinois University in which she investigated differences in ease differential of the fit of bodices constructed from two different thicknesses of polyester double knit fabric. The three bodices were placed on dress forms and the ease differential determined by measurements taken at specified points. Wall was interested

in fit in the area of the bustline, but her review of literature included definitions of fit from various authorities including writings by Thelma H. Berry, Mabel D. Erwin, Jessie Worden, et. al., and the Iowa Home Economics Association. Fit, as defined by Berry, was:

Fit is a correspondence in dimensional form or shape and in placement of detail between the outer covering and the figure to provide for physical structure and for activity of the wearer, to suit the purpose of the garment, and to fulfill the intended style without distortion on the deviant as well as the normal figure (Wall, 1971, p. 14).

Fit, as defined by Worden, Golding, and Stam was:

A well-fitted garment is both comfortable and flattering to the three dimensional figure made up of hollows, planes, and bulges. It fits smooth and free of wrinkles, bulges, and folds (Wall, 1971, p. 26).

Fit, as defined by the Iowa Home Economics Association, Wall quoted as:

A garment should fit smoothly over the curves of the body with side seams perpendicular to the floor and should have sufficient ease to provide comfort when sitting and walking (Wall, 1971, p. 17).

Fit, as defined by Erwin in her 1940 edition was:

One of the outstanding characteristics of a well-fitted dress is its absolute freedom from puckers or wrinkles. A wrinkle is an undesirable fold in a garment. A wrinkle occurs when there really is not quite enough cloth to cover an extra large bulge on the body (Well, 1971, p. 17).

Fit, as defined by Chambers and Moulton had earlier been quoted in Babcock's thesis:

A properly fitted garment . . . conformed to the figure and had adequate ease for movement . . . **free of wrinkles** and cut and manipulated in such a way that it appeared to be part of the wearer (Babcock, 1970, p. 11).



### Theories Related to Computerized Patterns

A survey of the literature revealed that very little information has been printed on the subject of computerized patterns, aside from the information published by the manufacturer of the Silhouette patterns. One story written by Annie Lee Singletary in a fall 1972 edition of a North Carolina newspaper stated that "computers have now tackled the job of giving women better-fitting clothes" (Singletary, Winston-Salem Journal, 1972). In the newspaper article, Ms. Singletary related the duties of Mrs. Marlene Jass of Charlotte, Silhouette representative with the responsibility for training store personnel in the correct way to measure customers for Silhouette patterns. A caption, under a photograph of Mrs. Jass taking a customer's measurements, read "For Perfect Fit." A trade newspaper made mention of the Silhouette patterns as having been eagerly accepted by the larger woman. The article included the following in regard to fit:

There is now a greater emphasis on fit in clothes. The knits gave us comfort we had not known before, with the return to woven, rigid fabrics we are demanding the same comfort and fit we had in the knits; it is not easy to achieve (Home Sewing Trade News, April, 1974).

The information which follows was supplied to the author by Ms. Pat Perry during a conference in the New York City headquarters of the Silhouette Company, during the summer of 1973. The history of apparel patterns computerized to provide individualized fit for retail customers began in New York City in 1971. The idea of individualized patterns for home sewing consumers originated with Mr. Douchon Mrak, who employed the idea of producing patterns on

an individual basis for women who experienced difficulty in achieving satisfactory fit from commercial standardized patterns. Mrak introduced his patterns to the public at B. Altman's in New York City and within two weeks more than a thousand orders had been received. The consumer response was overwhelming and Mrak and his staff could not keep pace with the demand for the patterns, which were being drafted by hand from nine body measurements supplied by each customer. The original patterns were simple three piece patterns which left the addition of design details entirely to the consumer.

Executives from Scovill, one of the world's largest producers of sewing notions, noted the popularity of Mrak's patterns, as evidenced by the large number of women attending the promotional programs at B. Altman's. They also noted that the management of the Silhouette Company lacked the expertise and personnel, as well as the financial backing, to expand their production and to reach a major portion of the home sewing market. However, the small force had added a second dress style and two pants patterns for which up to 10 measurements of the customer were required. The Scovill Company, having all the resources which the Silhouette Company seemed to lack, acquired major ownership of the Silhouette Company in February, 1972. Mrak and his major management personnel remained with the company and, together with management personnel of Scovill, they expanded their market and their pattern offerings.

To solve the problem of meeting the tremendous demand for the individualized patterns for which the hand drafting method had proved impractical, Mrak cooperated with computer technicians and

together they developed a method for drawing the individualized patterns by computer in only a fraction of the time required by the original hand methods. The patterns offered to the customers were still very basic ones and it still required skill on the part of the consumers to produce variations in necklines, sleeves, pockets, fullness, and other design elements. Even though the individualized patterns did produce a better fit than the consumers were accustomed to obtaining from commercial standardized patterns, they did not offer the variety in design obtainable from commercial patterns.

The variety available in the Silhouette patterns was increased by developing an overlay technique, which enabled the home sewer to interchange all the design elements of her different Silhouette dress patterns. This interchange was made possible by coded marks (+) and grain line markings placed in strategic locations on the various pieces so that they could be matched with identical markings on other pattern pieces and used interchangeably among all the various dress patterns, which, by Fall, 1973, totaled seven in number. In addition, the two pants patterns with three options each were still offered. The Silhouette Custom-Fit dress patterns included the following: the basic sheath, the basic A-line shift, the basic two-piece dress, the basic princess, the basic shirtwaist, and the basic wraparound. Other variations could be achieved by using the dress patterns as pant tops and combining them with the pants patterns. When all fourteen of the planned series of computerized patterns became available, over 8,000 combinations of parts would be possible.

Guides for using the computerized patterns and for constructing garments in general were sent to each customer with her first pattern. These instruction guides produced by Perry and her assistants were in the form of colored 8 1/2 by 11 inch double sheets, each devoted to certain topics, i.e., layouts, seams, hems, pockets, collars. Succeeding orders for patterns were readily placed by the customer with the retail store in her area selling the Silhouette patterns. The customer simply presented her plasticized identification cards so that the number could be recorded on the order sheet. Computerized patterns could also be ordered directly by mail, once the customer had an identification number, which indicated that her measurements were on file in the New York office.

If the customer experienced more than a 10 pound gain or loss of weight, she was advised to have her measurements taken again and have a new pattern drawn. All customers were advised to make a muslin garment from the computerized pattern within six weeks of its receipt to test the accuracy of the fit before cutting out expensive fabric. If the customer found she needed help with fitting or had a complaint about her pattern, she could meet with a Silhouette representative during one of her regularly scheduled trips to the local store where the customer purchased the pattern.

Distribution of the computerized patterns was limited to certain large population areas in order to provide the best service for customers. Those large areas included Pittsburgh, Philadelphia, Chicago, New York, Atlanta, Los Angeles, Detroit, and Charlotte.

Area home economists were selected for each of the cities in which Silhouette patterns were offered to the public. A home economist headquartered in New York visited each of the cities to interview applicants for the area positions. During the interview, each was administered a written test designed to evaluate her knowledge of pattern and garment fit. On the basis of the test and the interview, a representative was selected from among the applicants. The representatives received a concentrated two day training session at the New York headquarters, then returned to the area city to train personnel in cooperating retail stores to measure customers and to supply information to consumers.

Plans for perfection of the fit of Silhouette patterns were constantly being proposed and considered by the New York headquarters staff. The company reduced the amount of advertising in late spring, 1973, purportedly for the purpose of providing time for the technical staff to polish and improve the various guide sheets and training materials in use at that time. According to Perry, the Silhouette pattern had survived the initial growing pains of a space age product, quite unlike the UNO made to measure patterns by Compusize, Incorporated which, because of marketing problems, were available for only a short time.

Perry mentioned plans for the future which included a new computer program using either a larger number or a different combination of individual measurements in the production of patterns which would provide greater accuracy in fit. She also spoke of a device which would mechanically measure the customer's body by enclosing

her within it, thereby eliminating human errors and subjectiveness introduced by the representative obtaining customer measurements.

### III. SPECIFIC STATEMENT OF THE PROBLEM, HYPOTHESIS AND ASSUMPTIONS

#### Purpose

The overall purpose of this study was to explore and compare two methods for obtaining individually fitted patterns which might be used as slopers for flat pattern designing. The specific purpose was to assess whether better fitting garments could be obtained by a class using computerized patterns than those obtained by a class using basic fitting patterns adjusted to selected individual body measurements. The two methods selected for comparison were the traditional method using a basic fitting pattern and that using the computerized pattern.

#### Hypothesis

Hypothesis. There will be no statistically significant difference between the fit of basic dresses made from Silhouette Custom-Fit Patterns and those made according to the traditional method from Butterick Basic Fitting Patterns.

#### Assumptions

As a basis for the hypothesis, the following assumptions were made:

1. Figure irregularities and individual divergences from the standardized pattern sizes occurred in each group studied in similar frequency and to a similar degree.

2. All subjects in both the experimental and control groups completed one elementary clothing course at the college level, or its equivalent, in which each student had exposure to and experience in the fundamentals of clothing construction, and achieved a similar degree of skill in garment construction and pressing techniques.
3. The techniques used by all subjects in cutting and assembling the basic dresses were similar in degree of accuracy, perfection, and manner of execution, to the extent that they received the same instructions and executed the instructions under the supervision of the author.
4. The judges were considered capable of judging excellence of fit according to prescribed standards set forth in the checklist.
5. The checklist was an instrument developed for distinguishing between the presence and absence of the factors of fit and could be used with equal ease and results by professional and non-professional judges.
6. Almost all figures, regardless of their closeness to perfection, are at least slightly different on the right and the left sides in one or more portions of the body.



### Definitions

Basic fitting pattern. A term used by the four major manufacturers of commercial garment patterns in the United States to designate a kind of dress pattern produced for the purpose of testing the fit of a standardized figure type and size in a classic silhouette devoid of design details. Generally available in two styles, one has a waistline seam consisting of five major pattern pieces and the other consists of three pattern pieces of front, back, and sleeve with no waistline seam. The latter was used in this study.

Silhouette custom-fit pattern. Individualized dress patterns produced by computer in several different basic designs to conform to 17 individual body measurements taken and recorded by a trained specialist representing the manufacturer. At the time of the study, such patterns were produced only by a division of Scovill Manufacturing Company.

Computerized pattern. In this study, a term used interchangeably with Silhouette Custom-Fit Pattern.

Individualized sloper or master pattern. A pattern consisting of three major pieces, devoid of design details and seam allowances which is derived from a garment fitted carefully to an individual body. Structural details include jewel neckline, normal armscye, fitted sleeve, horizontal bust darts, vertical shoulder darts, vertical double-pointed darts between shoulder and hip in back, with a center back zipper closure. The skirt silhouette is A-line at side seams.

Traditional method. A method of producing a sloper for an individual figure which begins with a basic fitting pattern and consists of the following procedures:

1. Adjusting a commercial basic fitting pattern in length and width where differences exist between individual body measurements and body measurements listed in the pattern size chart. Adjusting shoulder length and sleeve capline where differences exist between actual pattern measurements and body measurements plus ease allowances.
2. Cutting a grain perfect garment of gingham or other dimensionally stable plaid or checked fabric from the adjusted basic pattern with provision for generous silhouette seam allowances.
3. Constructing a grain perfect garment by machine stitching exactly on marked stitching lines with a basting stitch.
4. Pin fitting the basted garment to an individual body by slashing, tucking, inserting fabric strips, and changing dart and seam locations and sizes where necessary to improve and individualize fit.
5. Basting and marking all pinned changes with careful attention to accuracy.
6. Judging the perfection of fit achieved by all foregoing procedures.

7. Transferring the corrected garment sections to paper, maintaining grain perfection, to produce the individualized sloper.

The comparison of fit of the garment prepared by the traditional method will be judged along with the garments made from computerized patterns after step 3, sewing of the garment to produce a completed dress.

Major body measurements. The four measurements commonly considered in the selection of figure type and size in a commercial pattern. Circumferences of the body at bust, waist, and hip levels and length of body from prominent vertebra at base of neck to waistline, commonly referred to as "back waist length."

Fit: The occurrence of the five standards of fit - line, grain, ease, balance, and set - defined by Mabel D. Erwin (1954) as follows:

Line: basic silhouette seams, the circumference seams, the shoulder seam, the underarm blouse seam, and the side seam of the skirt . . . in a continuous line from tip of ear to ankle . . . at right angles to circumference seams and the floor . . . to divide the front and back of the body about equally (Erwin, 1954, p. 9).

Grain: threads or yarns, the units that make cloth . . . at center front and back at both bust and hip, the lengthwise grain is perpendicular to the floor . . . crosswise grain is horizontal or parallel with the floor . . . grain on the right half should match that on the left half. In a plain sleeve, the lengthwise threads should hang vertically from top of shoulder to the elbow and crosswise threads in the upper sleeve should be parallel with the floor (Erwin, 1954, p. 12).

Ease: garment seems to be the right size, neither draws nor is baggy, and does not ride up in sitting or wear (Erwin, 1954, p. 9).

Balance: Skirt . . . extends same distance from the legs from right to left and from front to back. Sleeve has as much ease back of the shoulder seam as in front of it . . . shoulder seam rests evenly on shoulder, not tighter one place than another, bulges away from the neck no more than it does at the armhole (Erwin, 1954, p. 12).

Set: freedom from wrinkles (Erwin, 1954, p. 12).

#### IV. PROCEDURE OF THE INVESTIGATION

This study evolved from experiences in the instruction of students in flat pattern design theory and practice and interest in locating expedient but accurate means by which students could produce individualized slopers.

A pattern for an individual produced by computerization using 17 personal body measurements appeared to hold promise of greater expediency and accuracy than the traditional method for development of an individualized sloper. It seemed reasonable to expect that many fitting problems could be eliminated if each individual's measurements were used in producing her pattern, rather than the standardized measurements of the basic fitting pattern used traditionally as a basis for obtaining an individualized sloper.

Confirmation of the above theory would relieve students and instructor of flat pattern design of the present necessity for spending hours of valuable laboratory time in achieving improved fit in basic garments made from basic fitting patterns by the traditional method. The time formerly consumed in developing the individualized sloper could then be spent practicing design techniques and construction details.

### Selections of the Patterns

In order to conduct a comparison of pattern fit, it was first necessary to locate two patterns identical in design lines and structural details. There was only one commercial basic fitting pattern for which a comparable computerized pattern was available. This fact was verified by Ms. Pat Perry, technical director for Silhouette patterns, and editor of the Vogue Sewing Book, first edition. Upon Perry's recommendation, the Butterick basic fitting pattern number 3001 and the Silhouette Custom-Fit Pattern number 2 were selected for comparison. (Appendix A) The Butterick 3001 is available in Misses, Women's, Half-Sizes, and Young Junior/Teen figure types in sizes 6 through 18, 42 through 48, 10 1/2 through 24 1/2, and 5/6 through 15/16, respectively.

The style of the garments may be described as A-line shifts with underarm bust darts, back shoulder darts, double pointed vertical darts between shoulder and hip, a faced jewel neckline, and tailored full-length or short set-in sleeves. The patterns consisted of only three main pieces--front, back, and sleeve--and although there was no waistline seam, each pattern was marked with a horizontal line denoting the waistline location. Another horizontal line, on the sleeve above the elbow dart, indicated the short sleeved version.

### Selection of the Sample

The sample for this study consisted of students enrolled in two sections of Clothing Design and Construction I at the University of North Carolina at Greensboro during the 1973-74 school year. Both

classes were assigned to the author for instruction. One section was arbitrarily selected to use the basic fitting patterns and the traditional method and was designated as the control group. A second section of students meeting on the same days, but at different hours, as the control group was selected to use the computerized patterns and was designated as the experimental group.

### Selection of Pattern Sizes

Selection of computerized patterns. The production of a computerized dress pattern for any individual is based on 17 prescribed measurements taken and recorded by a professional home economist trained in the particular technique developed by the company. The students who used computerized patterns were measured by a professional home economist according to the procedure explained in Measuring Guide (Perry, 1973). The 17 body measurements were recorded on order forms provided by the Silhouette Company (Appendix B). The orders for the patterns were placed with the New York office three weeks prior to the time the patterns were needed.

Selection of basic fitting patterns. The students who used basic fitting patterns were measured for patterns during the supervised class laboratory meeting. Each student worked with a "fitting partner" to obtain accurate measurements for pattern type and size, according to approved procedures. Each student was advised to compare first her back waist length measurement with those given in charts for the various type patterns to determine the correct figure type (Appendix C). The unavailability of Butterick 3001 in junior

petite, misses petite, and junior figure types meant that some students had to select a figure type not in closest agreement with the back waist length measurement.

Each student using basic fitting patterns compared the three circumferential measurements with those listed in the pattern size charts. When the student's circumferential measurements were between the measurements stated for two succeeding pattern sizes, she was advised to select the smaller size, by virtue of the fact that all patterns contain several inches of ease in the bust and hip areas, and a lesser amount in the waistline, as well. In instances where bustline measurements agreed with the standardized size but hip measurements did not agree, students were advised to select the pattern size according to bust measurement and then to alter the pattern in the hipline area. The basic fitting patterns were purchased at a local department store. Because of the 17 measurements taken by the representative of the Silhouette Company for the computerized pattern, it was assumed and verified by Perry that no alterations in the pattern should be made prior to layout and cutting.

Transfer and pattern markings. Each participant traced her pattern onto brown paper, and added certain markings to the resulting pattern which proved helpful in the accurate placement of the pattern pieces on the fabric. These included (a) extending the grainline arrows the full length of each pattern piece (b) locating and placing the hipline markings at the proper locations for the individual and parallel to the hemline (c) placing the scye line



markings on front and back bodices and (d) locating and placing the capline marking on the sleeves.

The students using computerized patterns added 5/8 inch seam allowances to all edges of the brown paper transfer before cutting out **the patterns and** beginning the layout. Those students using the traditional method and basic fitting patterns altered the brown paper transfer patterns according to prescribed methods where agreement between body measurements plus ease did not agree with pattern measurements at the bustline, hipline, waistline, capline, and in length of bodice, sleeve, and shoulder seam. After the alterations were completed, seam allowances were added, the patterns were cut out, and layout on the fabric was begun.

#### Selection and Preparation of Fabric

Selection of fabric. A "suiting" weight fabric of a blend of polyester and cotton with a woven geometric check or plaid design was used for the garments. The fabric was relatively easy to align for grain perfection and provided the desirable degree of dimensional stability and weight to support the silhouette of the pattern design. The author believed that design lines woven in both directions would contribute to a greater awareness of grain direction and increased accuracy during construction, and would more readily distinguish the presence of balance and set than would a fabric without such a design.

Preparation of fabric. The fabric for the study was cut into three and a half yard lengths for distribution to the students in both sections for further preparation, which included the following: (a) laying out on cork top tables (b) checking of grain, both crosswise

and lengthwise, at 12 inch intervals with a tailor's square, and (c) perfecting yarn alignment by pressing fabric lightly with steam, and where necessary, by pulling the fabric in a diagonal direction, clipping the selvages at intervals, and pinning to a cork top table to preserve grain alignment.

### Production of Garments

Pattern layout and cutting. After completion of the foregoing processes, the fabric was ready for the pattern layout. The students worked in pairs, completing the layout on a single thickness of fabric and cutting to the center fold lines or cutting out the entire pattern piece. Using the first pieces cut as patterns, the corresponding opposite sides were then cut. This technique assured identical grainlines and design placement on the two sides. Each layout was checked for grainline accuracy and matching of the design prior to approval for cutting. Final checks were made to ensure the grain of the fabric was aligned perfectly and the pattern pieces accurately placed on the fabric to produce a chevron at the side seams.

Construction of the garments. After cutting, the darts and seamlines were marked on the wrong side of the fabric with tracing paper and tracing wheel. When marking was completed, the patterns were removed from the fabric and stay stitching, basting, and final stitching and pressing were completed during several successive laboratory periods. No student was permitted to take the garment from the laboratory nor to make any further alterations in pattern or

fabric at this point. Students completed setting in of sleeves, stitching of seams, facing of neckline, stitching of hems in skirt and sleeves, and installing of zipper. The garments were pressed a final time and stored on hangers in the clothing laboratory for later use in the study.

### Selection of Judges

The opinions of judges, both professional and non-professional, were considered to be an objective means of assessing the fit of the garments resulting from the use of the two types of patterns. Opinions from persons experienced in the field of clothing were considered to be a more objective method for evaluating the fit of garments than evaluation by the instructor.

The suggestion for selecting two groups of judges, one group being professional persons educated or employed in some area of clothing, and one group being non-professional persons educated or employed outside the clothing area, was made by the statistician, who believed comparison of the results of judging by the two groups would give an indication of the breadth of application and verity of the instrument. Agreement among judges was designated as one way to determine that (a) a specific criterion of fit was interpreted and understood by the judges in the same manner and that (b) each criterion of fit was either evident or lacking in each garment.

One group of judges was selected according to their expertise and knowledge of the fit of garments. It was assumed that home economists who had taught courses in fitting, alteration, or construction of garments could be considered "professional" judges,

as well as persons who work as fitters and alterationists. The term "professional" implies the ability to recognize the presence or absence of fit in a garment.

"Non-professional" judges also were asked to judge the fit of the garments. The criteria for their selection were the reverse of those used in the selection of the professional judges. It was assumed that persons who had never taught or received instruction in the subject of fitting or alteration of garments could be considered as non-professional judges.

#### Development of the Checklist

An instrument was needed to record opinions of garment fit. A checklist appeared to be the most appropriate and expedient means for obtaining and recording opinions of judges (Appendix D). The items included in the checklist were those assembled in an extensive survey of theses and books pertaining to the subject of fit of garments.

Criteria for the first draft of the checklist were obtained from a survey of the literature pertaining to fit. An attempt was made to include all of the factors which appeared to be distinguishing evidences of fit in dresses of simple, basic design.

A study by Sandra Jane Edwards at Texas Technological College in which she developed a "self instruction program of fitting principles" appeared comprehensive and inclusive. Edwards had based her work on fitting principles enumerated by Mabel D. Erwin, a well-known author of clothing textbooks. Practical Dress Design (Erwin, 1954)

had been selected as the text for the course in which this study was to be conducted. Erwin's text, consequently, served as the source of many of the criteria included in the checklist.

Much time was required in selecting descriptive terms which had neither a value orientation nor a technical connotation, yet were concise and clear. The criteria were arranged under the five headings--line, grain, ease, balance, and set. These headings are the five standards of fit identified by Erwin and which are in evidence in a number of locations in any garment which fits the wearer.

Content validity of the checklist. The first draft of the checklist was evaluated by a total of seven faculty members or doctoral candidates in the clothing and textiles area, each of whom had earned one or more advanced degrees in the subject matter area. Their suggestions for improvement of the instrument were incorporated during the first revision. From those experts came suggestions for addition of criteria, deletion of criteria, rewording, and rearrangement under different headings. The original list of criteria were generally applicable to all basic dresses. The revised list became more specific to the dresses in the study and the headings were changed to coincide with a portion of the garment rather than with the standards of fit.

It was believed that results evidencing agreement among professional and non-professional judges on specific criteria and specific dresses would be an indication of the content validity of the checklist. Because the development of an instrument was not

the initial purpose of this study, it was believed that a thorough and systematic examination of textbooks and studies relating to fit and consultation with professionals in the field would serve the purpose of locating appropriate and discerning criteria which would, in turn, lend content validity to the checklist.

Face validity of the checklist. According to Anastasi, (1954), a test which is being used by adults must have face validity "to function effectively in practical situations." Among the colleagues who evaluated the checklist, there was no indication of doubt that any of the criteria were a measure in some way of the fit of a dress.

Construct validity of the checklist. Suggested methods for assessing the construct validity of an instrument are correlations between the new instrument and similar instruments which have been validated. Three checklists used in previous studies by Fisher, Babcock, and Bixby were similar in the criteria included for judging fit. Many of the same criteria were included in the checklist constructed for this study. So far as could be determined no correlation coefficient had been obtained for any of the three previous checklists to assess their construct validity. However, because there were practical and visible similarities between the checklist used for this study and those used in preceding studies, both in content and structure, the author was relatively confident that construct validity for the checklist had been achieved.

The first revision. An important change suggested by colleagues involved the reorganization of the criteria under

headings related to portions of the garment rather than to Erwin's standards of fit (Appendix E). This reorganization eliminated the need for models to turn frequently so that judges could assess the presence or absence of a standard of fit in the various parts of the garment at one time. It was believed that as a model turned to accommodate one judge's evaluation, she could be interfering with the evaluation being conducted by another judge. Frequent movements could also disturb the set of the garment on the body so that it would not be as likely to remain the same throughout the period of judging. Subsequently, the criteria were categorized according to the area of the garment in which they could occur-- front, back, right side, and left side. This reorganization necessitated the repetition of items which are present in more than one location of the garment, and appeared, at the same time, to clearly divide the task of judging into smaller tasks pertaining to specified parts of the garments.

All criteria were stated in phrases of less than a typed line in length. These were listed to the left of the pages in the checklist, providing spaces for squares to the right of each, within which judges could indicate the presence or absence of the particular criterion from their observations.

#### The Judging Process

The judging of the fit of the garments was scheduled at times when all models and all judges could be present. It was held in a classroom near the laboratory where the garments had been

constructed. Each student model carried a card displaying the number assigned to her dress for the judging. The students were asked to stand relaxed but erect, with weight distributed evenly on both feet. They were further asked to respond to requests from judges to walk, sit, or raise their arms. Checklists enumerating items to be judged for each dress were distributed to each judge at the beginning of the session.

### The Pilot Study

A pilot study was conducted during the fall semester preceding the main investigation which was planned for the spring semester. Most of the specifications presented in the foregoing section were adhered to for the pilot study. A time lapse of about two months was planned between the two investigations to allow sufficient time for revision of the procedure and the checklist and for other changes indicated by the pilot study.

Selection of the sample. Ten students participated as subjects on a volunteer basis. Five were enrolled in each of the two sections of the flat pattern design course offered during the fall semester, 1973.

Selection of the patterns. The pre-selected pattern styles were used by the two groups of students. Measurements for the computerized patterns were taken and recorded by the author, after a training session at Silhouette headquarters in New York City. Instructions in Measuring Guide (Perry, 1973) were followed carefully. Measurements were recorded on the appropriate forms provided by the



company, and the forms were mailed to New York. Basic fitting patterns for the other five students were purchased locally after measurements were taken and type and size determined according to the procedures set forth in the preceding section.

Completion of the garments. A one quarter inch woven checked fabric in dark red and white of 65 percent polyester and 35 percent cotton was used for all the dresses (Appendix F). All procedures described in the foregoing section to prepare the fabric and patterns and to complete the garments were followed.

Selection of the judges. Five professional judges and five non-professional judges, whose qualifications were in agreement with those stated previously, participated.

The judging process. The judges and models convened in a classroom for three hours during a scheduled laboratory period for the evaluation of the modeled garments. The judges were seated in two rows opposite the models who stood in a single line in the front of the classroom in numerical order according to the number between 1 and 10 which they had drawn. The number-bearing card held by each of the models was the only distinguishing feature among the dresses. Each judge was given a pencil and a checklist consisting of six pages. The judges identified their respective checklists by placing their initials in the upper right corner as instructed.

The revised checklist. The revised checklist contained most of the items in the original checklist which had been submitted to various colleagues for approval and evaluation. The items were categorized by Erwin's five standards of fit rather than by their

location in the garment. The revised checklist used for the pilot study, as a result of suggestions, was composed of five headings, four of which were portions of the dress--front, back, right, and left sides--and one general heading entitled "overall." Listing the criteria along the smaller dimension of legal size pages allowed enough space to the right for 20 columns of squares so that evaluations for all 10 garments were recorded on the same page. The first page contained 21 criteria pertaining to the backs of the dresses. The third and fourth pages contained the same 18 criteria for the right and left sides of the dresses, respectively. The fifth and sixth pages contained criteria pertaining to the right and left sleeves and those listed under the "overall" heading. An attempt was made to word each criterion in such a way as to make it a desirable feature of a dress and thus a symbol of good fit. This wording meant that each affirmative opinion recorded signified the presence of a desirable feature or the absence of an undesirable feature.

Changes resulting from the pilot study. Difficulties experienced by the judges in evaluating the fit of the dresses were attributed to several sources. The arrangement of the checklist placed twenty blocks side by side for scoring to the right of each criterion. The judges experienced difficulty in visually locating the block pertaining to the correct criterion and to the correct garment simultaneously. The wording in some criteria was confusing, especially in instances where negative characteristics had been changed to positive phrasing, such as "absence of wrinkles," or where value terms had been included. An optical illusion--blurring

of the red and white checks upon extended viewing--was reported by a few of the judges. A deterrent also occurred as the models became fatigued by the prolonged judging session. As their postures relaxed the number of wrinkles and other undesirable characteristics visible in the dresses increased. These and other observations indicated a need for obtaining observations from each judge as quickly as possible and also a need for reducing the participation time required of each model during the judging process. For these reasons, it seemed important to assign numbers randomly to the models to determine the order in which they would appear before the judges. As a result of the pilot study, changes were made in the scale and the intensity of the color contrast of the fabric, in the judging procedure, in the order and arrangement of the checklist, in the number of subdivisions of the checklist, in the number of pages and color of pages making up the checklist, as well as in the length of the sleeves in the garments themselves, and in the manner in which numbers were assigned to the garments. It was anticipated that these changes would increase the accuracy and efficiency of the main investigation.

### The Main Investigation

The main investigation was conducted during the spring semester, 1974, following the pilot investigation completed during the preceding semester.

Selection of the sample. Thirty-one students enrolled in two sections of the flat pattern design class which met on Tuesdays

and Thursdays were selected for participation in the study. Those 16 students pre-registered for the afternoon section were contacted several weeks prior to the first class session and asked to confirm an on-campus appointment for the purpose of being measured by a professional from the computerized pattern company. All of the students honored the appointments and by the end of the day the manufacturer's trained representative had recorded measurements and completed orders for all of the 16 computerized patterns to be used in the study. One of the students announced her continuing participation in a weight reduction program and her intention to lose 20 pounds during the coming semester. She was encouraged to participate in the study so that her experiences in the class would be similar to that of all the other students, although it was realized that if she indeed did decrease her weight by more than 10 pounds before the judging session, the results obtained for her garment would be excluded in the analysis of the data. The 15 students in the morning section of the class were arbitrarily designated to use the basic fitting patterns. Their measurements were taken and pattern types and sizes determined during the first class meeting. None of the students participating in the main investigation had been involved in any capacity with the pilot investigation.

Selection of fabric. The fabric was selected in two variations of the same colors in order to obtain the quantity needed (Appendix G). The fabric was a 50 percent blend of polyester and cotton in an evenly woven plaid of muted red and blue on a white background. The color contrasts were not strong and the plaid formed squares of two inches,

large enough to eliminate the possibility of disturbing optical effects and yet small enough to encourage detection of grain lines. The fabric was the same weight and dimensional stability as that which had proved satisfactory in the pilot study.

Preparation of fabric. The fabric was prepared in the following manner: (a) cutting into three and a half yard lengths; (b) laundering in a top loading washing machine using detergent, warm water, and fabric softener; and (c) air drying by laying out to grain perfection in single layers on flat surfaces.

Completion of garments for judging: The fabric and patterns were prepared and the garments completed and readied for judging according to the previously specified procedures. As a result of observations during the pilot study the decision was made to use short sleeves in the dresses to simplify the judging of balance in the sleeve.

Selection of judges: Six persons whose qualifications were in agreement with specifications for "professional" judges cooperated as judges for the completion of the study. None of these professionals had been consulted in any way during the construction of the checklist or during the pilot study. Six additional persons whose qualifications were in agreement with the specifications for "non-professional" judges cooperated, as well. None of these persons were familiar with the pilot study nor had they participated in the pilot study in any capacity.

The final checklist. The checklist used in the main investigation was a revision of the checklist used in the pilot study

(Appendix H). The number of items was reduced from 116 to 93, as a result of the elimination of the subdivision entitled "overall," which appeared to be redundant. The number of pages in the complete checklist was reduced from six to four, with those pertaining to each part of the dress complete within one page. The pages were color-coded as they pertained to a part of the dress, thus the pages were green, blue, pink, and yellow, respectively, for the front, back, right side, and left side. A second important change involved the elimination of such terms as "free of," "absence of," and "not" in the wording of 27 items in the checklist. This improved phrasing reduced the length of the items and increased the ease of interpretation, by wording all the phrases in affirmative terms so that negative terms did not confuse the meanings. Consequently, all of the positively stated criteria no longer described attributes desirable in dresses with perfect fit. The presence of any of the 27 undesirable attributes indicated by a check in the "yes" column would be indicative of a dress with less than optimum fit.

A set of four color-coded, prenumbered checklists for each dress was prepared for each of the judges. This arrangement simplified the judging process and coding of results. It also eliminated errors which had occurred when judges recorded their evaluations in the 20 side-by-side boxes on the first checklist.

Preparation of judges. As a result of observations made during the pilot study, it was determined that the judging process be divided into four sessions for the separate judging of the fronts, backs, and the sides of the garments. This division reduced the

length of time the models were required to stand before the judges, and limited the judging process during each session to just one page of the checklist. Prior to the actual judging sessions, an additional special meeting was arranged as a training session for the judges. All of the judges but none of the student models attended the hour long session in which the checklist was introduced to the judges. An attempt was made to define and interpret the terms and their meanings as they pertained to basic dresses. Three garments in which selected criteria had been made readily observable were modeled during the training session. Two of the garments were constructed and fitted to exemplify the presence of undesirable characteristics while the third garment was an example of desirable characteristics and, therefore, of near optimum fit. All of the garments were of the same fabric and identical in structural details to the garments used in the study.

The judging process. The actual process of judging fit of the 31 dresses was divided into four sessions at the same time on four successive Tuesdays and Thursdays. The models were assigned numbers randomly so that no bias could occur as a result of the order of judging. The models, instructed as to stance and movements for the judging, stood on an 8 inch platform so judges, also standing, could locate more easily the approximate center of the garment at eye level. The platform was sufficiently wide to accommodate 16 models in two rows facing in opposite directions. The judges moved in a clockwise direction around the platform to positions in direct alignment with the modeled garments being evaluated. No judge was permitted

tactile contact with the garments or the models, although the models did respond to individual requests from judges for postural changes or body movements. Each judge evaluated each garment individually and independently of other judges.

At the beginning of each judging session, each judge was provided with the 31 color coded checklist sheets to be used during the session. The evaluations were recorded by a penciled check in the "yes" or "no" columns to the right of each criterion. During the first session, the judges completed the evaluations of the fronts of the dresses in an hour and a half. At three successive sessions of the same approximate length, the judging of the back and sides of each garment was accomplished. Only 30 dresses were included in the analysis of the data, although all of the 31 students in the two classes modeled dresses which were evaluated by the judges.



## V. TREATMENT OF THE DATA

The observed fit of the garments made from the two types of patterns was compared by examining the amount of agreement among groups of judges on each of the 93 items in the checklist over all dresses combined. Judge agreement scores were the basis upon which comparisons in this study were made. These scores were computed by determining the percentage of judges who evaluated in the same way each of the 93 items of the checklist as to presence or absence of the characteristic described for all the dresses combined. The method of scoring consisted of checking a square in the "yes" column if the characteristic described by the item was present in the dress, and by checking a square in the "no" column if the characteristic described was absent.

Complete agreement among all judges was represented by 1.000; less than complete agreement was denoted by a fraction of 1.000, reflecting the percent of judges who checked the "yes" column for a particular item. For example, 12 out of 12 judges agreeing resulted in a score of 1.000, but 8 out of 12 agreeing resulted in a score of .667. When the judge agreement scores were being computed separately for the professional and non-professional groups of judges, the number of judges in each of the two groups, 6, was used as the denominator.

Group-wise judge agreement. The judge agreement scores for the professional and non-professional groups of judges on each item

and each dress were compared first with each other and then separately with the corresponding scores for the combined group of 12 judges. The amount of judge agreement was determined by coding all "yes" scores on the 66 items describing desirable attributes of optimum fit as '1,' and all "no" scores on undesirable characteristics as '0.' For the 27 items which were phrased in the affirmative but are undesirable characteristics in garments of optimum fit, the coding method was the reverse of that used for the items which described desirable characteristics, i.e., a '1' indicated a "no" score and a '0' a "yes" score.

Pair-wise judge agreement. Pair-wise judge agreement score comparisons was the method employed to determine whether one or more judges were consistently in disagreement with the majority. The decisions of each judge on each of the 93 items for each of the dresses were individually paired with the judgment of each and every other judge who participated in the study to determine inter-judge agreement. On the basis of these paired comparisons, the evaluations of fit by judges scoring substantially lower than the majority of judges could be excluded from the interpretation of the results if necessary.

Individual average agreement. The scores awarded by the judges were totaled and averaged for each of the items on the checklist for all dresses. Averages for professional and non-professional judges were computed separately, as well as the averages for the combined group of 12 judges. Because averages indicating complete agreement equaled 1.000, the averages of these scores was anticipated to be a fraction of 1.000.

"Consensus" items. The items on which all judges attained judge agreement scores of at least 75 percent were categorized as "consensus" items. Only "consensus" items were used as a basis for determining whether a difference in fit did exist between dresses constructed from basic fitting patterns and computerized patterns. This determination was made by comparison of single numerical scores obtained for each of the dresses as a result of averaging the scores received by each dress for all of the "consensus" items.

Ideally, it would be desirable to compare the two patterns on all of the 93 items included in the checklist. However, it was anticipated that a number of items in the checklist would be excluded from the analysis because of low judge agreement scores. The failure to obtain minimum judge agreement on "non-consensus" items was interpreted as follows:

1. Some items were difficult to judge because they were either lacking in objectivity or were ambiguous in the manner stated, so that the judge did not understand the item sufficiently to judge its presence or absence in each of the garments.
2. Some items were difficult to judge because, even though the judge understood the terminology used and the characteristic described by each item, the characteristic or its antithesis was so barely observable in the dress under evaluation that the judge was unsure as to whether it should be evaluated as present or absent.

As a result of these aforementioned conditions, the items which failed to be evaluated consistently by the judges (below 75 percent) were not included among the "consensus" items. The score awarded to such items represented low judge agreement; consequently, no confidence could be placed in these items for the purpose of analysis and interpretation of data. No purpose could be served by including such items in the analysis because there could be no assurance that the attribute described by the item was represented accurately by the score. In other words, the score was unlikely to reflect the presence or absence of the characteristic described by the item.

Selection of "consensus" items. The selection of "consensus" items was determined in the three following ways:

1. The items on which judge agreement scores for the combined groups of judges were at least 80 percent were selected to comprise the first set of "consensus" items, which totaled 21 in number.
2. The items on which judge agreement scores for the combined groups of judges were at least 75 percent were selected to comprise the second set of "consensus" items, which totaled 50 in number, including the 21 in the first set.
3. The items selected by three professionals in clothing and textiles on the basis of those deemed most likely to distinguish between the fit of the dresses made from the two types of pattern were selected as the third set.

A t-test was the means by which each set of "consensus" items was analyzed to determine whether a statistically significant difference existed between the fit, as measured by judge assessment, of dresses constructed from basic fitting patterns used according to the traditional method and dresses constructed from computerized patterns.

Purpose of the analysis. The purpose of the analysis was to obtain an overall statement of comparison of the general appearance and fit of the dresses made from the two kinds of patterns. The score earned by each dress on each item of the checklist was therefore of no interest in this particular study. The study was concerned with the composite appearance of the individual garments and the comparison of the fit between the two groups of garments. For that reason no analyses or comparisons were made which were concerned with separate portions of the individual garments such as the sleeves or the bodice.

The basic measurement used in the comparison of fit of the two groups of dresses was an average of the judge agreement scores received by each dress on all of the "consensus" items. This score was obtained in the following manner:

The percent of judge agreement for the combined groups of judges on each of the "consensus" items was computed for each dress. These numbers indicated the degree of presence of the desirable characteristics described by the items. A value of 1.000 indicated the strongest presence of each desirable characteristic in each dress.

## VI. PRESENTATION AND DISCUSSION OF DATA

The methods discussed in the preceding treatment of data chapter were used to compute judge agreement scores for all dresses for each of the 93 items for the (a) professional judges (b) non-professional judges and (c) total group of judges. These results are shown in Table 1. Similarly, the judge agreement scores on all items for each dress were computed for the three groups of judges, and these results are presented in Table 2. An examination of Tables 1 and 2 indicates no substantial differences in judge agreement between the professional and non-professional groups of judges. For some items one group of judges exhibited higher judge agreement scores, but for other items, the trend was reversed. On 41 of the 93 items, the non-professional judges exhibited greater judge agreement than the professional judges, while on 48 items of the 93, the professional judges exhibited greater agreement than the non-professional judges. On 4 of the items, the agreement scores for the professional and non-professional judges were identical. Although the two groups differed on the judge agreement scores for 89 items, there was no substantial discrepancy between the scores. The greatest discrepancy between judge agreement scores for the two groups was 14.4 percent on one item. On an additional eight items, the discrepancies were above 10 percent; but on the remainder of the items the discrepancies ranged from .5 to 9.4 percent.

Table 1  
 Percent of Judge Agreement for all 93 Items

Item	Groups of Judges			Item	Groups of Judges		
	All	Profes- sional	Non-pro- fessional		All	Profes- sional	Non-pro- fessional
1	77.5	79.4	81.1	21	69.4	71.1	73.3
2	69.4	72.2	70.0	22	70.0	70.6	76.1
3	71.4	75.6	70.6	23	71.9	73.3	76.1
4	73.6	78.3	74.4	24	94.4	93.9	95.0
5	75.3	80.0	77.2	25	76.1	73.3	82.2
6	74.2	77.2	74.4	26	76.7	81.1	77.8
7	72.2	83.3	70.0	27	78.9	78.9	81.1
8	68.1	75.6	67.2	28	76.4	74.4	87.2
9	76.9	76.1	77.8	29	75.0	74.4	77.8
10	74.4	78.3	73.9	30	83.9	84.4	83.3
11	71.7	77.2	70.6	31	79.7	81.7	77.8
12	66.9	67.2	71.1	32	67.8	69.4	77.2
13	77.5	80.0	79.4	33	78.6	83.3	75.0
14	68.3	68.9	70.0	34	81.9	86.1	77.8
15	68.9	71.9	68.3	35	81.7	83.3	81.1
16	72.5	76.7	75.0	36	66.9	72.2	72.8
17	68.1	68.9	72.8	37	69.2	71.1	71.7
18	68.3	66.1	70.6	38	78.6	83.3	73.9
19	72.2	73.3	73.3	39	69.4	71.7	72.8
20	87.2	87.8	87.8	40	72.5	76.7	77.2

Table 1 (continued)

Item	Groups of Judges			Item	Groups of Judges		
	All	Profes- sional	Non-pro- fessional		All	Profes- sional	Non-pro- fessional
41	75.6	77.2	75.0	62	71.4	78.3	73.3
42	80.8	84.4	78.3	63	77.5	82.2	73.9
43	75.3	78.3	73.3	64	78.9	85.6	75.6
44	78.9	84.4	77.8	65	74.7	77.2	74.4
45	81.1	83.3	83.3	66	81.7	83.3	81.1
46	81.8	85.6	77.8	67	76.9	80.6	75.6
47	73.9	76.1	76.1	68	77.8	84.4	77.8
48	70.6	77.8	74.4	69	71.1	76.1	71.7
49	70.6	70.6	73.9	70	78.1	73.3	83.9
50	83.1	85.6	83.9	71	81.7	80.0	86.7
51	71.1	75.6	68.9	72	82.5	87.8	80.6
52	71.4	71.7	78.9	73	66.7	71.7	66.1
53	75.6	77.8	78.9	74	70.3	70.0	72.8
54	71.9	73.9	77.8	75	70.0	70.6	73.9
55	71.1	75.0	72.8	76	74.4	75.6	76.7
56	71.9	72.8	83.3	77	70.0	76.1	73.9
57	76.9	79.4	86.7	78	76.4	76.7	80.6
58	75.3	80.6	75.6	79	79.4	80.0	82.2
59	74.4	81.7	73.9	80	80.6	87.2	78.3
60	70.0	69.4	72.8	81	76.1	87.2	72.8
61	73.1	75.0	83.3	82	78.1	76.7	79.4



Table 1 (continued)

Item	Groups of Judges			Item	Groups of Judges		
	All	Profes- sional	Non-pro- fessional		All	Profes- sional	Non-pro- fessional
83	79.4	78.3	89.4	89	78.1	80.0	77.2
84	73.3	76.7	74.4	90	81.9	88.9	77.2
85	85.8	89.4	86.7	91	84.2	88.3	82.2
86	85.3	83.9	88.9	92	83.6	81.7	85.6
87	80.3	76.7	87.2	93	80.0	79.4	80.6
88	86.9	86.7	88.3				

Table 2  
Percent of Judge Agreement for all Dresses

Dress <sup>a</sup>	Groups of Judges			Dress <sup>b</sup>	Groups of Judges		
	All	Profes- sional	Non-pro- fessional		All	Profes- sional	Non-pro- fessional
1	75.5	79.6	75.4	3	79.7	79.0	83.2
2	75.5	79.6	77.6	4	74.2	75.6	76.3
5	75.2	81.0	76.2	6	80.6	81.9	81.2
7	73.9	76.0	76.5	9	74.3	77.6	78.1
8	74.9	76.3	77.4	11	74.5	76.3	74.4
10	78.0	82.6	78.5	15	75.4	75.4	78.0
12	79.7	83.9	79.7	16	69.4	70.8	72.6
13	77.2	79.0	78.1	17	76.8	77.2	81.4
14	74.6	77.8	75.6	18	77.8	80.5	77.6
20	75.2	75.3	77.2	19	74.6	79.2	75.6
21	74.1	77.2	76.7	22	81.6	82.8	84.0
23	71.9	74.0	72.9	25	70.4	76.3	73.8
24	72.8	76.9	73.1	26	76.3	77.1	77.4
27	79.1	81.2	78.9	28	78.8	81.4	80.1
30	75.1	79.2	76.3	29	74.1	76.0	78.0
Average for all dresses	75.5	78.6	76.8		75.9	77.8	78.1

a made from computerized pattern

b made from basic fitting pattern by traditional method

On 18 of the 30 dresses, the professional judges exhibited greater judge agreement than the non-professional judges, while on 12 dresses the non-professional judges exhibited greater agreement than the professional judges. On none of the dresses were the scores of the professional and non-professional groups of judges identical, although on six of the dresses the discrepancies were quite small, ranging from .3 to .9 percent.

Again, even though there were discrepancies between the judge agreement scores of the two groups of judges on all dresses, they were deemed quite small. The greatest difference between the agreement scores for the two groups of judges was 4.8 percent which occurred in evaluation of dress 5. The second greatest discrepancy of 4.2 percent occurred in evaluation of dresses 1 and 12 from computerized patterns and dresses 3 and 17 from basic fitting patterns. The discrepancy of 4.1 percent occurred in evaluation of dress 10, while on the remainder of the dresses the discrepancies in judge agreement scores ranged from .3 percent to 3.8 percent.

Because the discrepancies between judge agreement scores on most items and dresses were small, it was decided that overall judge agreement was an acceptable measure to use for the analysis of the data, and that separate groupings of professional and non-professional judges could be disregarded in the analysis of fit of the dresses. In making this decision the probability of the existence of statistically significant differences between the judge agreement scores on the items and between the dresses was recognized. These differences would have indicated that some judge evaluations should be eliminated

from the final analysis. However, in decisions relating to the selection of judges and items, the decision was made to rely upon practical differences rather than upon statistical differences. It was generally agreed among the members of the advisory committee that statistical significances might or might not be indicative of practical significances.

Once the differences between judge groups had been examined for the purpose of determining whether one of the groups should be eliminated from the analysis, it was necessary to examine the percentage of agreement of each judge with each and every other judge, in the interest of determining whether one or more judges' scorings should be eliminated from consideration in the study. The pairwise agreement scores, as defined in the preceding chapter, were computed. Table 3 exhibits the agreement scores for all possible pairings of judges.

Using the results tabulated in Table 3, an average percent of agreement score was computed for each judge and is shown in Table 4. These individual 12 scores were compared to determine whether one or more judges had exhibited a lower percentage of agreement than the majority of judges. The average percent of agreement scores were distributed between 59.9 percent and 68.1 percent. The discrepancies between any two adjacent scores did not exceed 4.2 percent, which was the discrepancy between the lowest and the second lowest average scores computed for the judges. Nine of the judges had average scores ranging between 64 percent and 67 percent. The scores of both groups of judges were interspersed nearly evenly throughout the range, but both the highest and the lowest average scores belonged to non-professional judges.

Table 3  
Percent of Agreement between Pairs of Judges on All 93 Items

Judge <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12
1	100.0	67.9	66.4	65.5	71.1	67.6	64.6	68.7	64.9	61.4	57.8	66.5
2	67.9	100.0	66.8	67.1	66.3	67.1	68.3	65.7	64.3	67.2	59.0	71.3
3	66.4	66.8	100.0	65.4	68.0	63.8	71.0	65.6	66.3	71.4	60.0	71.3
4	62.5	67.1	65.4	100.0	62.2	64.1	63.3	65.0	64.4	65.5	62.1	65.5
5	71.1	66.3	68.0	62.2	100.0	67.7	62.8	61.8	64.4	65.8	59.1	68.5
6	67.6	67.1	63.8	64.1	67.7	100.0	63.9	63.7	62.5	64.5	58.8	68.4
7	64.8	68.3	71.0	63.3	62.8	63.9	100.0	62.9	60.8	63.5	56.3	66.1
8	61.7	65.6	65.6	65.0	61.8	63.7	62.9	100.0	67.4	67.6	60.0	69.1
9	61.9	64.3	66.3	64.4	64.4	62.5	60.8	67.4	100.0	70.7	61.0	67.3
10	61.0	67.2	71.4	65.8	65.8	64.5	63.5	67.6	70.7	100.0	61.8	72.4
11	57.9	59.0	60.1	62.1	59.1	58.8	56.3	60.0	61.0	61.8	100.0	62.7
12	66.5	71.3	71.3	65.5	68.5	68.4	66.1	69.1	67.3	72.4	62.7	100.0

<sup>a</sup>Judges 1 through 6 are professional judges; judges 7-12 are non-professional judges.

Table 4  
Average Percent of Agreement between Pairs of Judges

Judge (Professional)		Judge (non-Professional)	
1	64.5	7	64.1
2	66.5	8	64.6
3	66.9	9	64.7
4	64.3	10	66.5
5	65.3	11	59.9
6	64.7	12	68.1
Average	64.6		65.4

The information derived from the individual pairings of judge agreement scores corroborated the findings presented in Tables 1 and 2. No substantial differences in judge agreement scores appeared to exist between groups of judges or between any possible pairings of individual judges.

Selection of "consensus" items. It can be observed from Table 1 that judge agreement was substantially higher on some items than on others. Those items which exhibited the highest percent of total judge agreement were selected as "consensus" items--the basis for the comparison of fit between the two types of dresses. Two sets of these items were selected on the basis of the judge agreement scores. The first set of items included all those on which judge agreement scores were at least 80 percent. The total number of "consensus" items in set 1 was 21 and included the following items, numbered according to their order in the checklist: 20, 24, 30, 34, 35, 42, 45, 46, 50, 66, 71, 72, 80, 85, 86, 87, 88, 90, 91, 92, and 93. The second set of items included all those on which judge agreement scores were at least 75 percent. The total number of "consensus" items in set 2 included the 21 items in set 1 plus the following 29 items by number: 1, 5, 9, 13, 25, 26, 27, 28, 29, 31, 33, 38, 41, 43, 44, 53, 57, 58, 63, 64, 67, 68, 70, 78, 79, 81, 82, 83, and 89.

A third set of 13 items with at least 75 percent judge agreement scores was obtained from a list of items selected by three clothing professionals. The list was composed of those items which the professionals believed to be discriminatory between the two types of

patterns used in making the dresses for the study. This set included the following items, again by number: 13, 25, 33, 35, 43, 53, 69, 70, 71, 90, 91, 92, and 93.

According to the procedure, the percent of judge agreement for all judges on each of the "consensus" items in the three sets was computed for each dress. A numerical average for each of the sets of "consensus" items was computed for each dress. The average obtained provided the score which measured the judged excellence of fit of each dress. These numerical scores are presented for each dress in Tables 5, 6, and 7.

The scores presented in Tables 5, 6, and 7 were used to perform a t-test to compare the excellence of fit of each of the groups of dresses on each of the three sets of "consensus" items. The first comparison, based on the set of 21 'consensus' items in Table 5, (those with a minimum score of 80 percent) produced a t-statistic of -3.344. Using the .05 level of significance with 28 degrees of freedom, the critical value of -2.408 was obtained. Therefore, the hypothesis that there will be no statistically significant difference between the fit of basic dresses made by the traditional method from a basic fitting pattern and the fit of dresses made from computerized patterns is rejected. On the set of 21 "consensus" items there is a statistically significant difference in fit between the two groups of dresses.



Table 5

Average of Scores Received for Set of "Consensus"  
Items of 80 Percent or Above Judge Agreement

Dresses constructed from computerized patterns		Dresses constructed from basic fitting patterns	
1	57.5	3	79.8
2	59.1	4	76.2
5	59.9	6	49.6
7	48.0	9	47.6
8	44.1	11	44.1
10	44.8	15	81.4
12	42.5	16	75.0
13	41.3	17	81.8
14	71.0	18	80.6
20	61.9	19	71.8
21	71.0	22	84.1
23	61.5	25	60.3
24	59.9	26	77.0
27	62.3	28	76.6
30	61.9	29	78.2
Average for all dresses	56.5		70.9

Table 6

Average of Scores Received for Set of "Consensus "  
Items of 75 Percent or Above Judge Agreement

Dresses from Computerized Patterns	Average of Scores	Dresses from Basic Fitting Patterns	Average of Scores
1	48.7	3	79.5
2	58.7	4	69.0
5	56.0	6	56.0
7	53.7	9	49.5
8	49.3	11	54.2
10	55.2	15	70.8
12	52.5	16	67.0
13	52.3	17	75.8
14	65.5	18	72.2
20	58.2	19	63.5
21	67.8	22	80.2
23	55.5	25	58.7
24	54.3	26	70.2
27	54.0	28	72.0
30	55.7	29	73.8
Average for all dresses	55.8		62.6

Table 7

Average of Scores Received for Set of 13 Items Selected  
by Professionals of 75 Percent or  
Above Judge Agreement

Dresses constructed from computerized patterns		Dresses constructed from basic fitting patterns	
1	46.8	3	67.3
2	24.4	4	64.1
5	24.4	6	43.6
7	41.7	9	37.8
8	34.6	11	50.0
10	46.8	15	69.9
12	40.4	16	62.2
13	40.4	17	71.2
14	60.9	18	61.5
20	36.5	19	37.8
21	47.4	22	78.9
23	35.3	25	47.4
24	29.5	26	48.1
27	34.6	28	61.5
30	35.3	29	73.1
Average for all dresses	38.6		58.3

The second comparison, based on the set of 50 'consensus' items in Table 6 (those with at least 75 percent judge agreement scores) produced a t-statistic of -4.215. Using the .05 significance level with 28 degrees of freedom, the critical value of -2.408 was obtained. Therefore, the hypothesis that there will be no statistically significant difference between the fit of basic dresses made by the traditional method from a basic fitting pattern and those made from computerized patterns is again rejected. For the set of 50 'consensus' items as shown in Table 6, there is a statistically significant difference in fit between the two groups of dresses and, therefore, between the fit obtained from the two types of patterns.

The third comparison, based on the set of 13 'consensus' items in Table 7, (those with at least 75 percent judge agreement scores and selected as discriminatory by professionals in the area of clothing) produced a t-statistic of -4.646. Using the .05 significance level with 28 degrees of freedom, the critical value of -2.408 was obtained. Therefore, the hypothesis that there will be no statistically significant difference between the fit of basic dresses made by the traditional method from basic fitting patterns and those made from computerized patterns was rejected a third time.

### Discussion of Data

One group of dresses for each of three sets of "consensus" items was judged to evidence a greater number of characteristics desirable in a well-fitted garment. The other group of dresses judged consisted of those constructed from a basic fitting pattern which had been adjusted by the student model as the first procedure of the traditional method to obtain an individualized sloper. The basic fitting patterns, at the cost of one dollar each at current 1974 prices, were selected on the basis of four individual body measurements from a range of standardized sizes. Adjustment to the patterns in the four areas of the basic measurements (circumferences of bust, waist, and hip and length of bodice) and in two additional areas (circumference of biceps and length of shoulder seam) were made as indicated by comparisons of individual body measurements of the subject models with measurements in the size charts. Adjustment to the patterns did not exceed three in number for any single pattern. The complicated adjustment of the bustline dimensions was not indicated for a single pattern. The resulting adjusted patterns produced a significantly better fit than the computerized patterns which, at the cost of eleven dollars each, had been created specifically for each individual from 17 of her body measurements taken by a professional home economist trained in particular techniques developed by the pattern company.

Neither of the pattern types produced what was considered a perfectly fitting dress. The low judge agreement scores were interpreted by the author as justification for the exclusion of 43 of the 93 items on which the dresses were evaluated by the judges. These items were not considered discriminatory in the evaluation of the fit of the dresses. A total of 50 'consensus' items remained upon which the groups of dresses were found to differ significantly in fit.

Of those 50 discriminating "consensus" items, 16 of the items had a matching item on another page. For example, items 1 and 24 were "shoulder seam visible." Item 1 was for evaluation of the front of each dress and item 24 was for evaluation of the back of each dress. Items 66 and 88 were "smooth, continuous neckline curve" on the right and left sides of the dresses, respectively. Three of the items--13, 20, and 44--were concerned with diagonal wrinkles in the front and back of each dress whereas items 70, 92, 71, and 93 applied to the evenness of the hem or its antithesis. Items 50 and 72 evaluated the chevroned plaids from hip to hem of the right and left side seams. The fact that the eight pairs of parallel items received similar judge evaluations seemed to indicate that there was a consistency in these factors throughout the dresses and it was distinguished readily by the judges.

The procedure which the students followed for the traditional method of producing a sloper required approximately three hours longer for each student to complete than the procedure for constructing dresses using computerized patterns. Students using the traditional method were

required to measure and record body dimensions of a partner and then to cooperate during the reciprocative process. Each student then evaluated her individual measurements as to type and size needed in a commercial pattern by comparison with standardized measurements. After obtaining the patterns, the students transferred them to brown paper by tracing and made from one to three pattern adjustments as indicated by comparisons of measurements.

Those students using computerized patterns were required to stand for approximately 15 minutes while body measurements were being taken by the company representative. When her pattern was received, each of the students transferred the pattern to brown paper and added seam allowances in preparation for the layout on the fabric. There was a conserving of time by the students using computerized patterns in the process preceding layout and cutting. However, the author extrapolated that the three hours of student time saved at that point in the use of a computerized pattern would have been consumed later in the attempt to bring the resulting garment closer to an optimum level of fit. In addition, weighing the cost difference which showed the computerized pattern to be 11 times more costly than the basic fitting pattern, it was concluded that the use of computerized patterns in the production of individualized slopers afforded little if any advantage in the conservation of student time, money, energy, or of instructor time. For these reasons, it is recommended that the traditional method of producing an individualized sloper be used for students engaged in the study of flat pattern design theory and methods. It may be concluded from the findings of this

study that the home sewer who knows basic clothing construction techniques should be able to obtain a more satisfactory fit by adjusting a basic fitting pattern according to six body measurements than by obtaining the computerized pattern used in this study. The procedures followed by the students in adjusting their basic fitting patterns are those prepared and published by Vogue and McCall's Pattern Companies specifically for use by educators and consumers. The directions and accompanying diagrams are clearly and concisely explained. These publications are available to the general public and can be used successfully by any individual with a minimal understanding of pattern adjustments.

In Measuring Hints (Anonymous, 1973), an eight page booklet from the Silhouette Company, a number of suggestions were provided for the information of the company's home economists engaged in measuring customers for patterns. A number of figure problems and their implications for computerized patterns are discussed. Recommendations are given for procedures to follow and bases for decisions which must be made by the representative in consultation with the customer. A number of problem figures which the computerized patterns cannot satisfactorily fit were listed as the following:

1. Women with a drastic difference in measurements from one side of the body to the other . . .
2. Those women with extremely curved upper backs (Dowager Hump).
3. Pregnant women or those women whose waist measurements are equal to or larger than their high hip measurement.
4. Women who must wear a body brace or those who use crutches or wheelchairs.
5. Women who are planning on immediate and/or great loss of weight.



6. Any woman whose hip measurement exceeds 61" or whose upper arm measurement exceeds 21" (Anonymous, 1973, p. 7).

Only one of the preceding criteria was applicable to any of the subjects in this study. One of the student models was participating in a weight loss program and although she was allowed to participate in the construction of the dress and the judging sessions, the evaluations of her garment by the judges were eliminated from the analysis of the data.

Because none of the group of 15 students using the computerized patterns in this study had any of the problem figures defined by the Silhouette Company, the fit provided by the computerized patterns could be expected to approach the level of optimum fit advertised in the promotional literature. The findings indicated that the fit of the dresses constructed from computerized patterns failed to produce a better fit as evaluated by both the professional and the non-professional judges.

Specific portions which differed between the two groups of dresses were observed. The silhouettes of all the dresses became an A-line flare as the side seams approached the hemline. The degree of flare on the side seams of dresses worn by girls of average or smaller than average proportions (size 12 or less) appeared to be the same for all dresses. However, as the student model's hip dimensions increased disproportionately with other body dimensions and the sizes were larger than 12, a noticeably greater degree of angularity occurred at the side seams of the dresses made from computerized patterns. The angle was so great that several judges

commented on their unattractiveness. No item was included on the checklist describing the angularity of the flare precisely. Also, this characteristic was noticed by the author during construction of the garments.

The biceps circumference of the sleeves in the dresses from computerized patterns was observed to be tight and binding more frequently than in dresses from basic fitting patterns. The right sleeves generally were evaluated as more binding, and, consequently, poorer in fit than the left sleeves. This could be expected since the vast majority of the models were right-handed and, as a result, could be expected to evidence a greater muscle development in the right arm and shoulder due to its more frequent and extended use. The yarns at the biceps level of both sleeves were observed by the judges to be parallel to the floor more frequently in the dresses made from the computerized patterns. This condition is indicative of a more generous allowance of length in the sleeve caps of the computerized patterns.

The dresses from computerized patterns were judged to wrinkle and strain between the sleeves across the shoulder level far more often than dresses from the basic fitting patterns. There was no measurement taken by the specialist from the Silhouette Company of this portion of the body or garments when measurements were made for the patterns. Measurements of the subject models for this area of the body were not compared to the corresponding area of the basic fitting patterns. The fact that the dresses from basic fitting patterns were judged to fit more often in the upper shoulder area

indicated that a greater amount of ease had been allowed in the basic fitting patterns.

The "consensus" items which had 80 percent or above judge agreement were not found with any regularity throughout the checklist. Only one item on the first page of the check list had a sufficiently high judge agreement score to qualify for the first category of consensus items. The only item of the 23 used in evaluating the fronts of the dresses which had above 80 percent judge agreement was "diagonal wrinkles present above waist when standing relaxed." Seven items used in evaluating the backs of the dresses showed 80 percent or above judge agreement. They were concerned with (a) visibility of the shoulder seam, (b) fit of the neckline, (c) location of darts in alignment with bulges above and below waistline, (d) indentation at the waistline, (e) cupping under the derriere, and (f) wrinkles near the waistline.

Only three of the 22 items listed for the right side of each dress showed 80 percent or above judge agreement, while for the left side eight of the 22 showed that amount of agreement. In the judging of both sides of the dresses, the items concerned with chevroned plaids along the side seams, smooth continuous curve of the neckline, and dipping or rising of the hemline had 80 percent or above judge agreement. Five additional items had above 80 percent judge agreement for only the left sides of the dresses. Those items were (a) seam follows natural crease where arm joins body, (b) rides up on neck and wrinkles, (c) smooth and easy at hipline, (d) yarns at hipline parallel to floor and (e) hemline parallel to floor.

The greater number of items agreed upon among the judges for the left side of the garments may be explained by the assumption that the left sides generally appeared to fit the models better than did the right sides. The larger shoulder and arm on the right side for the majority of the models might have affected the evaluation by distorting the lines of the dress just enough to make the characteristic barely observable. Snugness on the right side could make the characteristic appear and disappear, then reappear, varying with the slightest movement of the wearer. On the left side where more ease was present in the dress due to the slightly smaller shoulder and arm development on that side, the characteristic would not be so readily influenced by the slightest movement of the model. This fluctuation on the right side of the garment could explain the failure of the judges to agree as frequently in their evaluations of the right sides of the dresses.

## VII. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Research concerned with the fit of garments constructed from various kinds, types, and sizes of patterns attempts to establish standards of fit for garments. Many of the studies rely on judges to evaluate the fit achieved by the use of different kinds of patterns or techniques of fitting garments or patterns to bodies.

In this chapter the investigation is summarized, the conclusions are presented, and recommendations for future study are set forth.

### Summary

This study compared the fit of basic dresses constructed by the traditional method from basic fitting patterns with those constructed from computerized patterns. Experimental and control groups, each consisting of 15 students, were arbitrarily selected from among those students enrolled in a course in flat pattern design in the School of Home Economics at UNC-G during the Spring Semester 1974. Each subject in the control group used a commercial basic fitting pattern selected on the basis of four individual body measurements from a range of standardized figure types and sizes. The patterns were treated in the traditional method as defined for the flat pattern course. The patterns were adjusted in the four areas of the basic measurements (bust, waist, hip circumferences and back waist length) and in two additional areas (biceps circumference and shoulder seam

length) if discrepancies between actual body measurements and measurements in the size charts or of the pattern pieces were noted. Each subject in the experimental group used a computerized pattern created specifically for her on the basis of 17 body measurements made and recorded by a professional home economist representing the computerized pattern company.

The design lines and structural details of all the patterns were identical. The style of the resulting garments may be described as A-line shifts with underarm bust darts, back shoulder darts, double pointed vertical darts between shoulder blades and hips, a faced normal neckline, and tailored short set-in sleeves. The patterns consisted of only three main pieces which were front, back, and sleeve. There was no waistline seam but each pattern bore a horizontal line denoting the waistline location.

The 31 subjects constructed the dresses from the same suiting weight polyester and cotton fabric in a muted two inch even plaid design. The dresses were then modeled by the subjects in a randomly assigned order during four sessions scheduled for the evaluation of the fit of the dresses. The models were instructed as to stance and body movements for the judging sessions.

The checklist used to evaluate the fit of the dresses was assembled from a survey of various references and studies pertaining to fit. The checklist was revised several times to incorporate suggestions obtained from colleagues and from judges participating in the pilot study. In its final form it comprised 93 items located on four pages, one each pertaining to the front, back, left

side, and right side of the dresses. At each of the four judging sessions a different color-coded page of the checklist was completed for each garment by each judge.

Prior to the first of the four judging sessions, a training session for the judges was conducted. The hour long meeting was designed to familiarize the judges with the terminology used in the checklist. Checklists were distributed to the judges and the items were explained and demonstrated. Three basic dresses in which selected items in the checklist had been made readily observable were modeled for the judges.

The checklist was used by 12 judges to evaluate the fit of each dress. The judges were placed into one of two groups according to their expertise and knowledge of fit. One group of six judges was classified as "professional," based on the fact that each earned her livelihood and/or held a degree in the field of clothing and textiles. It was assumed that each had knowledge of the principles of fit and had the ability to recognize presence or absence of fit in garments. The other group of six judges was classified as "non-professional" based on the fact that none had ever enrolled in any formal courses in clothing and textiles and were not cognizant of the principles of fitting dresses.

Percent of agreement among judges on the items in the checklist was the basis for comparing the fit of the basic dresses. Judge agreement scores were computed by determining the percentage of judges who evaluated in the same way each of the 93 items of the checklist as to presence or absence of the characteristic described for all the dresses combined.

The scores awarded by the judges were totaled and averaged for each of the items on the checklist for all dresses. The items on which all judges attained judge agreement scores of at least 75 percent were denoted as "consensus" items. Only "consensus" items were used as a basis for determining whether a difference in fit existed between the two types of dresses. This determination was made by comparison of the single numerical scores obtained for each dress as a result of averaging the scores received by each dress for all the "consensus" items. A t-test was the statistical technique used to determine whether a statistically significant difference existed between the fit of dresses constructed according to the traditional method from basic fitting patterns and dresses constructed from computerized patterns. The study was concerned with the composite appearance of the individual garments and the comparison of the fit between the two groups of dresses. For that reason, no analysis or comparison was made which concerned separate portions of the individual dresses, such as the sleeves or the bodice.

The hypothesis that there would be no statistically significant difference between the fit of basic dresses made by the traditional method from basic fitting patterns and those made from computerized patterns was rejected.



### Conclusion

On the basis of the data obtained in this study it was concluded that until computerized patterns can provide a more satisfactory fit or can be obtained at a cost more competitive with that of basic fitting patterns, the basic fitting patterns of various commercial pattern companies are a dependable source for obtaining a sloper for flat pattern design courses.

### Recommendations for Further Study

The recommendations for further investigation may be divided into two groups--those related to the checklist used for obtaining judge evaluations and those related to comparisons of the fit of dresses constructed from different kinds of patterns.

To perfect a checklist which distinguishes between the fit of basic dresses and which produces consistent results when used by both professional and non-professional judges, incorporation of the following procedures is recommended in further studies:

1. Using only the 50 "consensus" items for obtaining judge evaluations of the fit of dresses constructed from different kinds of patterns.
2. Including in the study more than one training session for all judges.
3. Structuring of the training sessions to include not only explanations and examples of the consensus items, but also practice in recognizing the presence or absence of the characteristics described by the "consensus" items.

To compare the fit of dresses constructed from different kinds of basic patterns, based on evaluations by judges using the perfected checklist, the following investigations are recommended:

1. Comparison of the fit on individual subjects of dresses made from the basic fitting patterns of the three major pattern companies and the computerized pattern company, under the following conditions:
  - (a) judging of the fit of garments constructed from the patterns without any adjustments.
  - (b) a second judging of the fit of garments constructed from the same commercial patterns which have been adjusted as indicated by a comparison of individual and standardized measurements and by analysis of the fit of garments constructed for the first evaluation.
2. Comparison of the fit of dresses constructed from patterns as described in (1) above with subjects randomly selected from an older group of women.

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Appendix A

# BUTTERICK

# 3001

**75c**

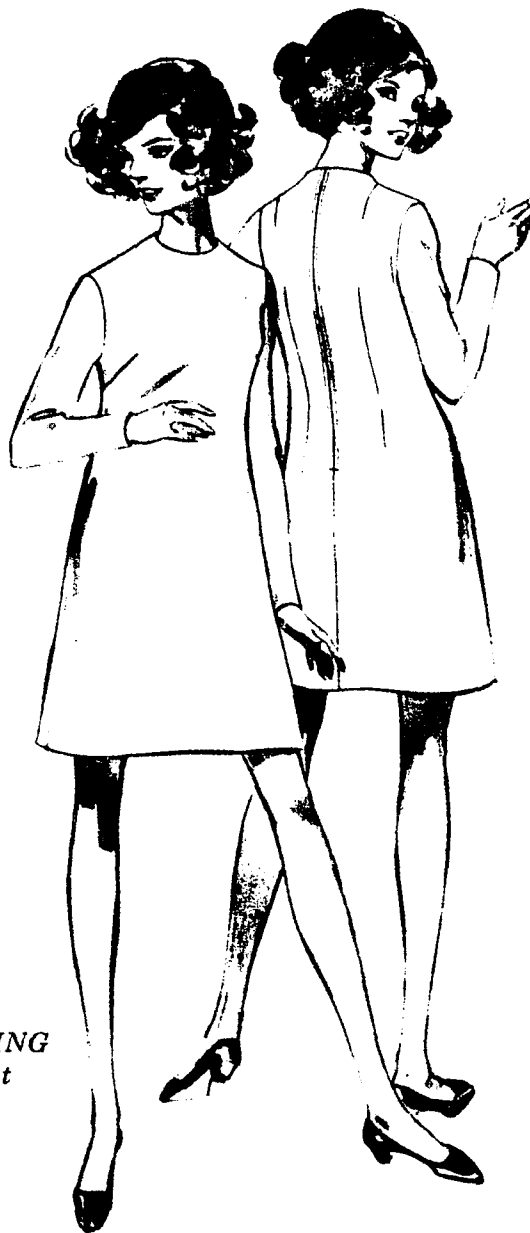
Canada 85¢

**SIZE 12**
**BUST 34**

***your  
personal  
A-line  
fitting  
pattern***

***For Perfect Fit Of  
NEW SIZING Patterns  
Without Waistline Seams***

- \* *Determine your figure type and pattern size, then record your measurements on the chart provided.*
- \* *Follow the step-by-step Cutting and Sewing Guide to make your Personal Fitting Pattern in fabric, adjusting it to fit your figure.*
- \* *Use this Personal Fitting Pattern as your guide for altering Butterick NEW SIZING patterns without a fitted waist or waistline seaming.*



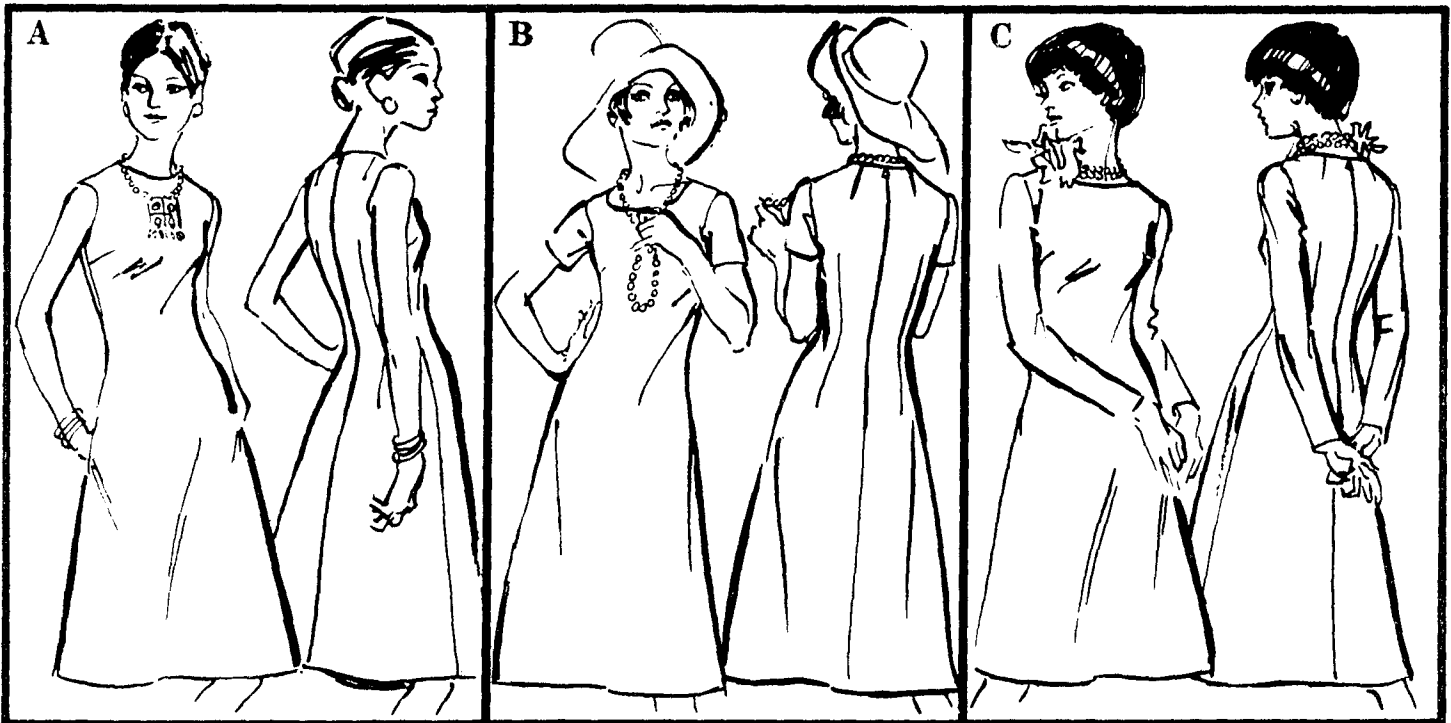
6 - 8 - 10 - 12 - 14 - 16 - 18

From the Silhouette Custom-Fit Patterns Collection

## 2. Basic A-Line Shift

### Design and Construction Details

Your basic shift is slightly fitted at the waist level and falls gracefully over the hips into an A-Line skirt. Darts shape the bustline. The necklines range from jewel to scoop to bateau. Your A-Line can be made sleeveless or with short or long set-in sleeves. The in-seam pockets at the sides are optional.



The center front can be cut on the fold and it is suggested that the back have a center back seam with a zipper closing. A 2" hem is allowed, but should be adjusted to the desired depth for fabric variations, see HEMS. Applied shaped facings are used on all necklines, sleeveless armholes and the long sleeves. The short sleeves are self-faced.

Appendix B



# Silhouette® Custom-Fit Pattern

Scovill Manufacturing Company  
545 Madison Avenue, New York, N.Y. 10022

85

**Sewing Notions Division**

**Scovill**

## Order Form

**IMPORTANT: PLEASE PRINT ALL INFORMATION IN CLEAR BLOCK LETTERS  
TO ORDER: Mail top 3 copies to address above, original white copy will be returned  
to customer with pattern, last copy to be held in the store.**

Date \_\_\_\_\_

Check (✓) here if change of address

Store Name or Branch \_\_\_\_\_ Dept. No. \_\_\_\_\_ Customer's Name \_\_\_\_\_

Address \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

<b>Special Information CHECK ✓ ONE</b>  New Order _____ Reorder - No Size Change _____ Reorder - Measurement Change _____ Correction _____ Special Order (Specify) _____	<b>For office use only</b>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

<b>Age Group</b>	
<input type="checkbox"/>	up to 20
<input type="checkbox"/>	21 - 35
<input type="checkbox"/>	36 - 50
<input type="checkbox"/>	51 - 65
<input type="checkbox"/>	66 up
Weight _____	lbs.
Height _____	

**Customer's ID number**

--	--	--	--	--	--	--	--	--	--

On all Reorders and Corrections, please  
Customer's ID number \_\_\_\_\_

\_\_\_\_\_  
Demonstrator's Name and No.

\_\_\_\_\_  
Customer's Signature

Dress Measurement Chart							Inches	Quart. Inch
	A	B	C	D	DD	EE		
1. BUST (cup size)	1	2	3	4	5	6		4
2. WAISTLINE								4
3. HIGH HIP (3" below the waistline)								4
4. HIP (Measure widest part of Hips)								4
5. How far down from the waistline to the widest Hip level								4
6. SHOULDER SEAM TO APEX								4
7. SHOULDER SEAM TO WAISTLINE								4
8. SHOULDER SEAM TO HEM								4
9. APEX TO APEX								4
10. SHOULDER WIDTH								4
11. SHOULDER TO ELBOW								4
12. ARM LENGTH								4
13. NECKLINE TO WAISTLINE BACK								4
14. ACROSS BACK (From underarm seam to underarm seam)								4
15. UPPER ARM								4
16. WRIST								4
17. ARMHOLE DEPTH (Armseye)								4
18.								4
19.								4
20.								4

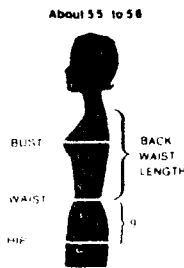
Pants Measurement Chart	
1. WAISTLINE	
2. SIDE SEAM TO SIDE SEAM (At waist level BACK)	
3. HIGH HIP (3" below the waistline)	
4. SIDE SEAM TO SIDE SEAM (At High Hip level BACK)	
5. HIP (Measure widest part of Hip)	
6. How far down from the waistline to widest Hip level	
7. SIDE SEAM TO SIDE SEAM (At Hip level BACK)	
8. LENGTH TO KNEE (Waistline to Mid-knee)	
9. LENGTH (Waistline to desired length)	
10. THIGH (4" down from Crotch)	
11. KNEE	
12. CROTCH - at Side Seam	
13. CROTCH INSEAM TO WAIST Center Front	
14. CROTCH INSEAM TO WAIST Center Back	
15.	
16.	
17.	
18.	
19.	
20.	

Appendix C

# Measurement Chart

APPROVED BY THE MEASUREMENT STANDARD COMMITTEE OF THE PATTERN INDUSTRY

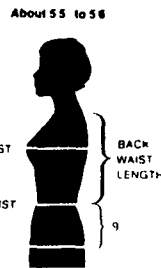
Use this chart for Basic Fitting Patterns 3002,3003,3004 and all patterns numbered above 6652. For all others see pattern envelope.



## MISSES'

Misses' patterns are designed for a well proportioned, and developed figure; about 5'5" to 5'6" without shoes.

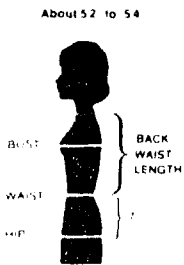
Size	6	8	10	12	14	16	18	20
Bust	30 1/2	31 1/2	32 1/2	34	36	38	40	42
Waist	23	24	25	26 1/2	28	30	32	34
Hip	32 1/2	33 1/2	34 1/2	36	38	40	42	44
Back Waist Length	15 1/2	15 3/4	16	16 1/4	16 1/2	16 3/4	17	17 1/4



## WOMEN'S

Women's patterns are designed for the larger, more fully mature figure; about 5'5" to 5'6" without shoes.

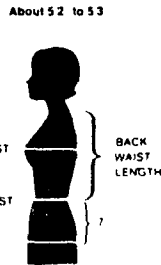
Size	38	40	42	44	46	48	50
Bust	42	44	46	48	50	52	54
Waist	35	37	39	41 1/2	44	46 1/2	49
Hip	44	46	48	50	52	54	56
Back Waist Length	17 1/4	17 3/8	17 1/2	17 5/8	17 3/4	17 7/8	18



## MISS PETITE

This new size range is designed for the shorter Miss figure; about 5'2" to 5'4" without shoes.

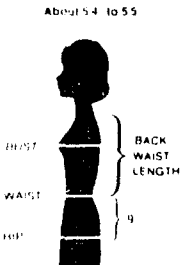
Size	6mp	8mp	10mp	12mp	14mp	16mp
Bust	30 1/2	31 1/2	32 1/2	34	36	38
Waist	23 1/2	24 1/2	25 1/2	27	28 1/2	30 1/2
Hip	32 1/2	33 1/2	34 1/2	36	38	40
Back Waist Length	14 1/2	14 3/4	15	15 1/4	15 1/2	15 3/4



## HALF SIZE

Half size patterns are for a fully developed figure with a short backwaist length. Waist and hip are larger in proportion to bust than other figure types; about 5'2" to 5'3" without shoes.

Size	10 1/2	12 1/2	14 1/2	16 1/2	18 1/2	20 1/2	22 1/2	24 1/2
Bust	33	35	37	39	41	43	45	47
Waist	27	29	31	33	35	37 1/2	40	42 1/2
Hip	35	37	39	41	43	45 1/2	48	50 1/2
Back Waist Length	15	15 1/4	15 1/2	15 3/4	15 7/8	16	16 1/8	16 1/4



## JUNIOR

Junior patterns are designed for a well proportioned, shorter waisted figure; about 5'4" to 5'5" without shoes.

Size	5	7	9	11	13	15
Bust	30	31	32	33 1/2	35	37
Waist	22 1/2	23 1/2	24 1/2	25 1/2	27	29
Hip	32	33	34	35 1/2	37	39
Back Waist Length	15	15 1/4	15 1/2	15 3/4	16	16 1/4

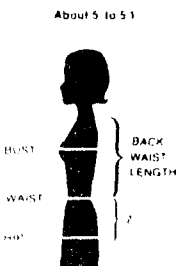


## CHILDREN'S MEASUREMENTS

Measure around the breast, but not too snugly. Toddler patterns are designed for a figure between that of a baby and child.

### TODDLERS'

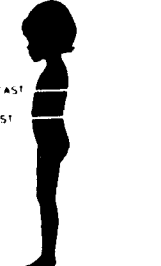
Size	1/2	1	2	3	4
Breast	19	20	21	22	23
Waist	19	19 1/2	20	20 1/2	21
Approx. Height	28"	31"	34"	37"	40"
Finished Dress Length	14"	15"	16"	17"	18"



## JUNIOR PETITE

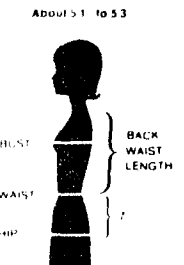
Junior Petite patterns are designed for a well proportioned, petite figure; about 5' to 5'1" without shoes.

Size	3jp	5jp	7jp	9jp	11jp	13jp
Bust	30 1/2	31	32	33	34	35
Waist	22 1/2	23	24	25	26	27
Hip	31 1/2	32	33	34	35	36
Back Waist Length	14	14 1/4	14 1/2	14 3/4	15	15 1/4



## CHILDREN'S

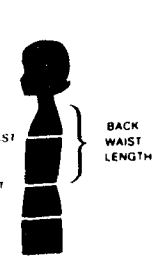
Size	1	2	3	4	5	6	6x
Breast	20	21	22	23	24	25	25 1/2
Waist	19 1/2	20	20 1/2	21	21 1/2	22	22 1/2
Hip				24	25	26	26 1/2
Back Waist Length		8 1/4	8 1/2	9	9 1/2	10	10 1/2
Approx. Height	31"	34"	37"	40"	43"	46"	48"
Finished Dress Length	17"	18"	19"	20"	22"	24"	25"



## YOUNG JUNIOR/TEEN

This size range is designed for the developing pre-teen and teen figures; about 5'1" to 5'3" without shoes.

Size	5/6	7/8	9/10	11/12	13/14	15/16
Bust	28	29	30 1/2	32	33 1/2	35
Waist	22	23	24	25	26	27
Hip	31	32	33 1/2	35	36 1/2	38
Back Waist Length	13 1/2	14	14 1/2	15	15 3/8	15 3/4



## GIRLS'

Girls' patterns are designed for the girl who has not yet begun to mature. See chart below for approximate heights without shoes.

Size	7	8	10	12	14
Breast	26	27	28 1/2	30	32
Waist	23	23 1/2	24 1/2	25 1/2	26 1/2
Hip	27	28	30	32	34
Back Waist Length	11 1/2	12	12 3/4	13 1/2	14 1/4
Approx. Height	50"	52"	56"	58 1/2"	61"
Finished Dress Length	26"	27"	29"	31"	33"

Appendix D

APPENDIX D

	BODICE		SKIRT		ARMHOLE OR SLEEVES		S E A M S		
	FT	BK	FRONT	BACK	RT	LT	RT	LT	CB
<b>VERTICAL SEAMS</b>									
<u>Straight, not wavy</u>									
<u>Perpendicular to the floor</u>									
<u>Appear to cross or enter all horizontal seams at right angles</u>									
<b>SIDE SEAMS AND BACK SEAMS</b>									
<u>Appear as a continuation of the shoulder seam</u>									
<u>Appear to cut the body in half from front to back</u>									
<u>Appear to enter hemline at right angles</u>									
<u>Drop straight or slightly away from body contours (don't cup)</u>									
<b>SHOULDER SEAMS</b>									
<u>At top of shoulder, not visible from front to back</u>									
<b>NECKLINE</b>									
<u>Smoothly curved; a continuous line from front to back</u>									
<u>Hugs base of neck without binding</u>									
<u>Hugs base of neck without gaping</u>									
<u>Sets up well in back</u>									

	BODICE		SKIRT		ARMHOLE OR SLEEVES		S E A M S		
	FT	BK	FT	BK	RT	LT	RT	LT	CB
ARMSCYE									
Smoothly curved									
Appears to follow the natural creases where arm joins body									
Extends to the end of the shoulder on top									
Free from bulging and/or gaping									
Snug under the armpit (1/2 inch below with arm relaxed)									
SLEEVES									
Appear smoothly molded and merged into the armhole and shoulder									
Cover the wristbone when elbow bent									
Encircles the wrist, dropping slightly above little finger									
Free of horizontal wrinkles at biceps when arm raised at 45 degree angle to side									
HEMLINE									
Parallel to the floor; smooth and uniform hang									
Hemline on sleeve drops slightly above little finger									
DARTS									
Point to fullest part of the body contour									
End short of the crest of the bulge									
Do not release too little fullness for bulge (evidence: diagonal wrinkle)									

DARTS CONT'D	BODICE		SKIRT		ARMHOLE OR SLEEVES		S E A M S		
	FT	BK	FT	BK	RT	LT	RT	LT	CB
Align with body contours they serve									
GRAIN									
Fabric plaid lines chevron on the seams or match horizontally									
Vertical lines (threads) of fabric are perpendicular to the floor at centers									
Horizontal threads are parallel to the floor at bust level between darts									
Shoulder blades									
Biceps line									
Hipline									
Slight dip or crosswise threads on side seam same on both sides									
EASE									
Horizontal sitting crease disappears									
Absence of horizontal wrinkles or strained appearance when walking									
Absence of horizontal folds or sags which indicate too much length									
Absence of wrinkles at shoulders when arms crossed at front									
Absence of diagonal wrinkles near prominent body bulges									
Ease at elbow allows easy bending									
Wrist circumference appears correct for hand									
Lower sleeve evidences no strain when arm bent									
Armhole appears large enough (not binding at the arm socket)									
Sleeves fall into a natural easy position after arm movement									

EASE CONT'D	OVER ALL	BODICE		SKIRT		ARMHOLE OR SLEEVES		S E A M S			
		FT	BK	FT	BK	RT	LT	RT	LT	CB	
Ease at bicep line appears to be about two inches											
Garment does not ride up at hemline or waistline											
Garment is not too small-an unflattering revelation of flesh											
Garment appears to have the same degree of looseness/tightness in all areas											
<b>SET</b>											
Shoulder seams lie flat and smooth against shoulders											
Vertical seams evidence no bulges or distortions											
Garment appears to be supported by shoulder and body contours											
Garment appears to belong to the wearer											
Garment moves gracefully with wearer											
Garment requires no manual adjustment after activity											
<b>BALANCE</b>											
Garment stands away from body equally from side to side											
Garment stands away from body equally from front to back											
Sleeves appear to have some fullness both in front of and behind the arm											
Neckline does not ride up in front only to sag in back											

Please rank the garments by number on fit. Beside number 1 you should place the number of the garment which appeared to you to fit its wearer best.

1.	6.	11.	16.	21.	26.	31.
2.	7.	12.	17.	22.	27.	32.
3.	8.	13.	18.	23.	28.	33.
4.	9.	14.	19.	24.	29.	34.
5.	10.	15.	20.	25.	30.	35.



Appendix E

APPENDIX E

	A		B		C		D		E	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Side Seams drop straight or slightly away from body contours										
Garment stands away from body equally from side to side										
Neckline hugs base of neck without binding										
Neckline smoothly curved, continuous line										
<b>DARTS</b>										
Align with the bulge they serve										
Point to fullest part of the body bulge										
End just before the crest of the bulge										
Release correct amount of fullness for bulge										
Release too little fullness for bulge										
Release too much fullness for bulge										
Vertical lines of fabric appear <u>  </u> to floor at center										
Horizontal threads are parallel to floor										
At bust/shoulder blade level between darts										
At hipline										
** Horizontal sitting crease disappears upon standing										
** Absence of horizontal wrinkles when walking										
Absence of diagonal wrinkles near prominent body bulges										
Garment does not ride up at hemline or waistline										
Waistline indentation of garment occurs at natural waistline										
* Absence of strain when arms folded in front										

\* Back

\*\* Front

	A		B		C		D		E		F	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
<b>VERTICAL SEAMS</b>												
Plaids chevron or match												
Shoulder seams lie flat and smooth												
Straight, not wavy												
Evidence no bulge or distortions												
Perpendicular to floor												
Continuation of shoulder seams												
Cuts body in half from front to back												
<b>ARMSCYE</b>												
Smoothly curved												
Follows natural creases where arm joins body												
Extends to end of shoulder on top												
Free from bulging (gaping)												
Snug under armpit (1/2" below when arm at side)												
Appears large enough for comfort												
Garment stands away from body equally front and back												
Neckline does not ride up in front												
Neckline does not sag or stand away in back												
Hemline appears parallel to floor												
Hemline smooth and uniform												



## Appendix F

Front		Yes	No
SHOULDER SEAMS			
1	visible		
SKIRT			
2	Drops straight or slightly away from body contours		
3	Stands away from body equally on each side		
NECKLINE			
4	Hugs base of neck without binding		
5	Binds neck or gape away from neck		
6	Smoothly curved, continuous line		
SLEEVES			
7	Bottom edges parallel to floor		
8	Seam at end of shoulder where arm joins		
DARTS			
9	Align with the bulges they serve		
10	Point to fullest part of body bulges		
11	End just before reaching the crest of the bulge		
12	Release correct amount of fullness for bulge		
13	Diagonal wrinkles		
GRAIN			
14	Vertical yarns of fabric at Center Front perpendicular to floor		
15	Horizontal yarns between bust points parallel to floor		
16	Horizontal yarns at hipline parallel to floor		
WRINKLES			
17	Horizontal sitting crease disappears upon standing		
18	Horizontal or diagonal wrinkles occur when walking		
19	Diagonal wrinkles present below waist when standing relaxed		
20	Diagonal wrinkles present above waist when standing relaxed		
WAISTLINE			
21	Indentation occurs at natural waistline of wearer		
HEMLINE			
22	Dips or rises		
23	Smooth, even, continuous line; parallel to floor		

Back		Yes	No
<u>SHOULDER SEAMS</u>			
24	visible		
<u>SKIRT</u>			
25	Drops straight or slightly away from body contours		
26	Stands away from body equally on each side		
<u>NECKLINE</u>			
27	Hugs base of neck without binding		
28	Rides up; too high; too tight		
29	Smoothly curved, continuous line		
30	Gape, stands away from base of neck		
<u>SLEEVES</u>			
31	Bottom edges parallel to floor		
32	Seam at end of shoulder where arm joins		
<u>DARTS</u>			
33	Align with the bulges they serve		
34	Point to fullest part of body bulge above waist		
35	Point to the fullest part of the body bulge below waist		
36	End just before reaching the crest of the bulge		
37	Release correct amount of fullness for bulge		
<u>GRAIN</u>			
38	Vertical yarns perpendicular to floor at Center Back		
39	Horizontal yarns just below shoulder blades parallel to floor		
40	Horizontal yarns at hipline parallel to floor		
<u>WRINKLES</u>			
41	Horizontal folds occur near waistline		
42	Garment appears to indent at wearer's natural waistline		
43	Garment wrinkles and strains across shoulders when arms folded		
44	Diagonal wrinkles present above waist		
<u>SKIRT</u>			
45	Cups under derriere		
46	Wrinkles or rides up near waistline		
47	Diagonal wrinkles present		
<u>HEMLINE</u>			
48	Dips or rises at bottom edge		
49	Smooth, continuous line around bottom edge		

Side	Yes	No
<u>SIDE SEAMS</u>		
50		
51		
52		
53		
54		
55		
<u>SLEEVE</u>		
56		
57		
58		
59		
60		
61		
62		
<u>NECKLINE</u>		
63		
64		
65		
66		
<u>SKIRT</u>		
67		
68		
69		
<u>HEMLINE</u>		
70		
71		



Side	Yes	No
<u>SIDE SEAMS</u>		
72 <u>Plaids chevron or match from hem to hip</u>		
73 <u>Straight, no wavy</u>		
74 <u>Pulled, distorted, or strained</u>		
75 <u>Perpendicular to floor</u>		
76 <u>Continuation of the shoulder seam in appearance</u>		
77 <u>Cuts body in half from front to back</u>		
<u>SLEEVE</u>		
78 <u>Smoothly merges into armhole and shoulder</u>		
79 <u>Seam follows natural crease where arm joins body</u>		
80 <u>Appears large enough for comfort</u>		
81 <u>Horizontal yarns at biceps level parallel to floor</u>		
82 <u>Binds at biceps when arm raised 30 degrees</u>		
83 <u>Falls naturally smooth after arm movement, no wrinkles</u>		
84 <u>Stands away from arm equally front and back</u>		
<u>NECKLINE</u>		
85 <u>Rides up on neck; wrinkles</u>		
86 <u>Gape or sags from neck</u>		
87 <u>Lies smoothly around base of neck</u>		
88 <u>Smooth, continuous curve</u>		
<u>SKIRT</u>		
89 <u>Stands away from body equally front and back</u>		
90 <u>Smooth and easy at hipline</u>		
91 <u>Yarns at hipline parallel to floor</u>		
<u>HEMLINE</u>		
92 <u>Parallel to floor</u>		
93 <u>Dips or rises</u>		

**Appendix G**

