CONSUMER AND LABORATORY EVALUATION
OF SCREEN PRINTED FABRICS

A thesis submitted in partial satisfaction of the requirements for the degree of Master of Science in Home Economics

by

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June, 1979
The thesis of Beverly Selland Ellingsberg is approved:

/ / Committee Chairman

San Fernando Valley State College
June, 1970
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ABSTRACT

CONSUMER AND LABORATORY ANALYSIS
OF SCREEN PRINTED FABRICS

by

Beverly Selland Ellingsberg

Master of Science in Home Economics

June, 1970

Textile products can be printed by several different methods. The method considered in this study is silk screen printing, an important resist process in present use. Therefore, this research was conducted to investigate the hypotheses that a selected sample of screen printed fabrics will exhibit high colorfastness ratings as measured by standard test procedures; that consumers are interested in the colorfastness properties of textile products; and, that consumers use their knowledge of screen printed textiles when making decisions concerning the purchase of selected textile products.

A questionnaire was developed to determine consumer interest in the colorfastness properties of printed textiles, consumer knowledge of screen printing, consumer interest in purchasing textile products having screen
printed designs, and the influence of identifiable screen
prints in the consumer's decision to purchase textile
products. This questionnaire was given to 100 women
living in the San Fernando Valley in the Los Angeles area.

Chi squares were computed with the use of a General
Electric 445 computer.

Twenty screen printed fabrics of various fiber con-
tent were selected and tested for colorfastness to laun-
dering, carbon-arc light, perspiration, and crocking.
The fabric samples were evaluated using AATCC scales.

The selected fabrics included swimwear, drapery, and
apparel. Two of the four swimwear fabrics had good color-
fastness qualities. The other two fabrics would not be
considered colorfast. The four drapery fabrics general-
ly were colorfast in each of the four tests. The 12
apparel woven and knit fabrics varied in colorfastness
qualities.

Generally, the fabrics with wash and wear, fast
color or a similar finish were more colorfast in each
of the tests. The type of dye used or lack of finish
could be factors that would affect the colorfastness
qualities. The method used to screen print did not seem
to have any effect on the colorfastness qualities. There-
fore, only some of the selected screen printed fabrics
exhibited high colorfastness ratings.

The conclusion drawn from the analysis of the data
developed from the questionnaire is that consumers are interested in the colorfastness properties of textile products but that consumers are not specifically interested in textile products that have been screen printed.
I. INTRODUCTION

Statement of the Problem

The purposes of the study are 1) to determine color-fastness properties of a selected sample of screen printed fabrics, 2) to determine consumer interest in the colorfastness properties of printed textiles, and 3) to determine consumer knowledge of screen printing, consumer interest in purchasing textile products having screen print designs, and the influence of screen printed design on decisions to purchase selected textile products.

Justifications

Screen printing has become popular in the past several years. Before this, approximately 80 to 90 percent of all printed fabrics available to the consumer were produced by direct roller printing. Results of a study by retailers (35:58) indicated that consumers tended to avoid purchasing printed fabrics because the colors were not durable. Jonasas (17:27) has indicated a possibility that screen printing machines may eventually replace most of the roller printing machines. Therefore, it appeared desirable to determine if screen printed fabrics have good colorfastness properties, if
consumers are interested in purchasing screen printed textile products and if they are interested in colorfastness of prints.

**Hypotheses**

The following hypotheses were formulated as a basis for investigating the problem.

(1) A selected sample of screen printed fabrics will exhibit high colorfastness ratings as measured by standard test procedures.

(2) Consumers are interested in the colorfastness properties of textile products.

(3) Consumers with knowledge concerning and interest in screen printed textiles use these data in decision making regarding the purchase of selected textile products.

**Limitations**

This study has certain limitations: 1) Only 20 fabric samples were tested for colorfastness properties. The number of fabrics tested was limited by time and by availability of screen printed fabrics. 2) The sample used in the questionnaire was comprised of women with the following differences: income level, marital status, age, and family size. However, the sample was predominately white, middle class, and from suburban Los Angeles com-
munities, Canoga Park and Woodland Hills, located in the San Fernando Valley.

Assumptions

The following assumptions were made:

1) The fabrics tested were correctly labeled and were screen printed.

2) Questionnaires are a reliable method of collecting data.

3) The selected sample will provide meaningful consumer data.
II. REVIEW OF LITERATURE

Color Evaluation

What do consumers want in textile products? A. Frank Tosi (38:32) has stated that consumers want colors that are pleasing, sturdy, washable, and sunfast. Willie Mae Rogers (29:27-3) has reported that some of the qualities consumers want in textile products include 1) brighter, more intense colors with improvement in colorfastness, particularly of deep-shade colors, 2) colors that do not bleed when textile items, including belt backing, are laundered, 3) colorfast trim on garments, 4) increased lightfastness in hues that have two separate colors combined to achieve a secondary hue, and 5) dark colors that would not rub off onto another fabric; for example, a color from colored pajamas rubbing off onto a white bedsheet.

Consumers apparently consider colorfastness to be important when purchasing colored textile products. A survey of consumer complaints has indicated that 17 percent of the consumers in a population sample listed fading from laundering as one complaint, while 9 percent listed sunlight fading. A retailer (35:58) indicated that the consumer seldom knows the quality of color par-
particularly in a print fabric. Before present coloring and printing techniques were perfected, the consumer tended to shy away from print fabrics especially if one printed fabric did not "hold up" well; the consumer then frequently concluded that all prints did not "hold up" well.

Consumer demands for brighter colors with better performance qualities have caused the textile industry to reorganize its test procedures. (7:30) These improved test procedures have been established by the American Association of Textile Chemists and Colorists. (39:21) (hereafter referred to as the AATCC.)

The AATCC (39:19) is an organization founded to conduct tests for the purpose of establishing industry standards for textile colors and chemicals. These standards, such as colorfastness to laundering, crocking, perspiration, and light are used by companies as a basis for determining their actual standards (38:32).

The AATCC has also established measuring devices to provide a method of judging behavior of a fabric following exposure to most of the color and appearance destroying agents.

Color change can be evaluated by using the gray scale developed by AATCC. The International Standards Organization also has recommended use of this gray scale according to Magaichi Suga. (36:136)

Consumer satisfaction can be improved by using color
instruments in a textile color laboratory as reported by John W. Ward. (40:52) One such instrument, a spectrophotometer, may be used for color measurement and evaluation of manufactured textile products. (37:34) Marvin E. Taylor (37:34) stated that a dyer can be assisted in color problem solving when a spectrophotometer is used.

The new fibers have prompted the dye industry to conduct research programs directed toward the development of dyes that meet the standards of fastness qualities so that the right dye is used with the right fiber. (23:149) Textile products are periodically checked to make certain the fastness standards are maintained.

Printed fabrics had their early beginning during the ancient Egyptian era. (8:32) These types of fabrics have enjoyed periodic revivals in popularity with a definite emphasis on bright and large prints during the last few years. The future of print fabrics appear promising with printed fabrics expected to comprise between 25 to 27 per cent of the textile fabric production by 1977. (43:42)

The American Printed Fabrics Council has assisted in promoting the increased popularity of printed textile products. The Council established a unit of artists who were brought together to create exciting designs that could be printed on fabric. The Council is also improving the textile printing industry by: (8:34-5)
1) encouraging artists to work in the textile field

2) increase fashion publicity to keep prints in apparel and home furnishings in the public eye

3) increase exposure of printed fabrics in retail stores

4) conduct campaigns to keep cutters, designers and decorators aware of the variety of uses of printed fabrics

5) seeking new end-uses for printed fabrics

6) improving performance of synthetics and blends in order to compete on basis of fashion

7) encourage chemical companies to find new colors to produce prints with fashion bloom and dazzle

8) perfect coloring techniques

9) encourage the design of more efficient and economical machinery in order to lower production costs.

Textile products can be printed by several different methods. The method involved in this study is silk screen printing. This has become popular in the past several years. Screen printing, which is a stencil (resist) method of printing on fabrics can be done by hand or by machine. Screen printing is considered to be the most recent and important resist process in present use. Robert W. Pinault (24:102) has stated that screen print-
ing is continually expanding due to bigger markets, increased emphasis on style, better technology, and good processing economics.

Silk Screen Printing - Basic Method

Screen printing (3:99, 2:493, 26:594) is done using a stencil that has been formed by stretching bolting cloth of silk, metal, nylon, or polyester filament yarns over a wooden or metal frame thereby forming a screen frame. The design and the fabric to be printed will determine the size of the mesh used for the screen. The mesh can vary from 88 x 88 to 300 x 300 (24:106) with the finer mesh used for detailed patterns. The print design is applied to the screen by using a resist adhesive medium or by photography.

When a design is applied to a screen using the resist method, the design is painted on the screen with a greasy medium such as paint or ink. The remaining screen openings are closed by applying a water-soluble gum to the screen. The greasy design areas reject the gum so that the greasy medium is free of gum. A solvent, such as turpentine, is used to wash away the greasy medium, but not the gum, making only the design areas pervious to ink. Fine detail is not possible when this method is used.

(20:579)

The photographic method (20:579) uses a photographic
negative developed from a film to produce a design on a screen. The screen mesh is impregnated with a photo-sensitive gelatin and then exposed to a light that passes through the negative. The photographic negative masks out light and prevents light-hardening of selected areas of the screen. The areas not hardened by light are removed by washing the screen with water. Thus, a negative is made for each color in the design and a screen developed for each color. More complex and fine detail are possible when this method is used.

The hand screen printing method (26:594) uses a long print table which has been made from non-warping wood. The table top is covered with: 1) a heavy wool felt, 2) oilcloth, and 3) a replaceable cotton cloth. The fabric to be printed is fastened securely with pins to the print table and the screen frame is placed over the fabric. Dye is placed along one edge of the frame and the color is forced through the untreated portion of the screen onto the fabric with the use of a rubber squeegee which moves back and forth across the screen forcing the dye through the design. The rubber squeegee is made of a heavy strip of rubber that projects from two pieces of wood. The rubber can be of different thicknesses having differing amounts of flexibility. The sharper the squeegee edge the sharper the design since less color is forced through the screen. Repeats are made by moving
the screen to preset positions on the table. One screen is made for each color in the design. The dye must dry after each color is applied. Steam heat is used to set the colors.

Screen printing by hand is usually restricted to runs of less than 5,000 yards. (26:594) The amount of printing that can be done is determined by the length of the table, number of employees, and the number of colors used in the design.

Screen Printing - Historical Developments

Mr. J. I. Biegeleisen (6:1) states that the screen printing process had an obscure beginning.

A patent for a silk screen was issued to Samuel Simon of Manchester, England, in 1970. (6:2) However, a squeegee was not included in the patent since the paint was forced through the screen by means of a bristle brush.

The commercial process had its beginning approximately 60 years ago. The commercial process was first developed in America on the West Coast in 1914. (6:3) Mr. John Pilsworth of San Francisco was issued a patent for the Selectasine method which consisted of a single screen using several colors. This method was used by sign painters and flag, pennant, and banner decorators. A patent was granted in 1925 for an automatic screen printing press but it was not adopted by the industry because the quality
of the printing was not of an adequate standard. In 1929 Mr. A. S. Danemon (6:4) developed and patented a knife-cut stencil film tissue called Profilm. This film made it possible to achieve designs with finer details.

(6:4)

A few years later the film was perfected by Joe Ulano who named the film Ulano Nufilm. This film was "easier to cut, adhered more easily to the silk, and was more efficient timewise" than the original Profilm. (6:4)

The next development related to the silk screen process was the improvement of the paints used. The paints or dyes were made to dry quickly either by normal air currents or by forced air so that the drying time for each color printed was substantially reduced resulting in increased printing speed.

The development of faster drying paints contributed to the use of automatic screen printing machines. While automatic machines use the same principle as the hand method, electronic devices are used to control both the pattern and the dyes. Screen printed designs, therefore, can be produced more rapidly and with substantial improvement over the hand method.

Screen Printing - New Developments

Advances have been made 1) in techniques for stenciling fabrics, especially in the monofilament synthetic
fiber construction, 2) in stretching and photocopying equipment, 3) in methods and materials for frames that give finer, longer lasting detail with more ease, and 4) in improved epoxy lacquers that have extended screen life. (25:40) These advances lessen the problems associated with screen printing so that the characteristics of screen printing are more flexible and adaptable.

The revival (43:42) of the Mod look by the teenager increased the demand for prints with large bold patterns. Only screen printing can produce large prints in a practical way. The increased emphasis on style is responsible for the popularity of screen printing designs since screen printing is very versatile for fabrics that will be used for apparel items and also for home decorating. (24:102) The growth of demand for printed fabrics has been one factor that has encouraged companies to use automatic screen printing machines. (5:75)

Automatic screen printing machines have been in use since 1950. (13:381) There has been a rapid growth in the use of flat bed and rotary machines. (17:27) These automatic machines have substantially increased productivity while using a minimal number of operators. Some new features in these automatic screen printing machines include new feeding systems, drying chambers and automatic programming. (27:154) These and other machinery developments do and will achieve an all-around quality of
printing at ever increasing speeds which will continue to lower the cost of screen printing. Automatic screen printing machines will be competitive with roller print machines, particularly for large runs of fabric. These screen printing machines will still maintain the desirable advantages of large designs, an increased number of colors for each pattern, and a decided advantage of lower cost.

The short runs of screen printed fabric are produced more economically than short runs of roller printed fabric could be produced if the latter was considered economically feasible. An executive for one of the printing companies has stated that combined roller and screen print operation is seen as the "pattern for the future." (41:131)

The automatic screen printing method is similar to the hand method. There are two types of automatic machines, the flat-bed and the rotary. (17:27) The construction of these automatic machines has general characteristics which include rigid substructures, two blanket guide rollers at the ends, an endless blanket to carry the print goods and a number of squeegee devices. Electronic controls determine the pattern and the dye feed which made the patterns more luxurious with an increase in color depth. The changing of the screens and the manipulation of the rubber squeegees that apply the colors are done automatically. Electronic controls are
used to hold the fabric straight as it feeds through the printing machines. Specialized equipment has also been developed to improve the drying and curing of screen prints.

Some of the companies have replaced the conventional cottage steaming with a new technique called "autoclaving" (31:45). Autoclaving uses vacuum and pulsating steam cycles to make uniform the penetration of steam during the processing cycle and the color development and fixation. This method is used to screen print selected dyes on fabrics that are composed of silk, nylon, polyester, acetate, blends of silk with wool or rayon, and blends of polyester with cotton. Color fixation is consistent since the autoclaver is programmed for the required temperature, pressure, time, and vacuum. This method requires shorter steaming time and eliminates fabric clean-up time, thereby increasing production over cottage steaming by 300 per cent. (16:36) The printed fabric is dried on overhead racks. Jonasus also reported (16:36) that a reel carrier has been developed to hold up to 1600 yards without breaking a yarn. As the fabric comes off the machine the reel winds the fabric layer by layer on rods that are placed into perforated spokes which can hold more fabric and allow for more uniform steam penetration.

Fabric, that is to be printed by automatic machines,
is attached on an endless blanket with the use of water-based or permanent adhesive. The permanent adhesive is a thermoplastic resin coating placed on the endless blanket at the feed-in end. An electrically heated pressing plate is used to soften the coating to make the surface tacky so the fabric will adhere to the printing blanket. The development of permanent thermoplastic adhesives resulted from the need for simplifying the printing of sheer and of knitted fabrics. The permanent thermoplastic adhesives hold either sheer or knitted fabrics onto the printing blanket evenly and firmly preventing them from stretching and distortion. (5:75) Squeegees, mounted on the top of the machine, operate either parallel to or perpendicular to the blanket. The screens lift up after printing, the print goods move one repeat, screens move down and the printing cycle is repeated.

After printing, the fabric peels off the blanket easily without retaining any of the adhesive. The permanent adhesive is an economical method of gluing fabrics that are to be printed since the resin lasts for weeks and the renewal is simple and inexpensive.

Fitz Raff (27:150) describes a rotary screen printing machine having engraved cylindrical screens mounted around a central rubber-covered pressure roller for a springy printing surface. The machine is supported by
cast iron sides. The fabric to be printed passes between the cylindrical screen and the pressure roller. Print color is fed to the screen where a stationary roller squeegee forces the print color through the cylindrical screen on to the fabric. An even supply of color is fed into the cylindrical screen by flow controls. The cylindrical screen can be shifted up and down and from side to side for pattern fit. Electro-plating is used to reinforce the design on the circular screens. This method is an adaptation of roller print equipment and processes.

No reports of consumer studies specifically related to screen-printed textile products were found in the literature.

The review of literature revealed the following facts that support the validity of questionnaires as a method of analyzing consumer behavior and ascertaining consumer opinions.

The United States Census Bureau uses consumer surveys to estimate future spending by consumers for durables. (10:156)

The Federal Government uses the University of Michigan Survey Research Center to conduct surveys to determine the attitudes of consumers, their awareness and concern of rising prices, and the realities of the economy. (28:69)
III. PROCEDURE

Twenty screen printed fabrics were selected for study. Fiber content of the selected fabrics included: cotton, polyester, acetate, triacetate, acrylic, silk, cuprammonium rayon, and blends of Dacron and cotton, nylon and Spandex, acetate and Lastex. Fabrics were tested for colorfastness to laundering, crocking, perspiration and light. Each test on each fabric was replicated.

Before cutting test samples from the fabrics descriptive tests were completed. The width of each fabric was determined by taking five equally spaced measurements; measurements included selvages only when the screen printing was done to the edge of the fabric. The average width of the fabric was determined. Yarn counts or gauge were made on each of the fabrics using ASTM method D1910-64. (4:420) An average yarn count or gauge was determined for each direction of the fabric. The basic construction of the fabrics was determined.

The test for colorfastness to laundering was performed using the launderometer and following AATCC test method 61-1965. (4:616) The size of the specimen was two inches by six inches; a two-inch square of test fabric with floating yarns was attached to the specimen
by means of a basting thread. Test IIA was used which specifies a temperature of 120°F, a liquor volume of 150 milliliters of water, .75 grams of heavy-duty detergent, and 50 steel balls. One 45-minute test was performed. After completion of the test, the color of both the soap solution and the rinse water was noted. The fabric samples were air-dried. The samples were evaluated with the use of the gray scale for color change and staining.

The fadeometer was used in testing for lightfastness; the method used was AATCC test 16A-1964. (4:603) Fabric samples were properly mounted in the standard fading strip test holders and exposed to 20, 40, 80, and 160 hours as specified by AATCC test conditions. The total number of hours was determined by projected end-use. The gray scale was used to determine the color change of the fabric samples.

The test for colorfastness to perspiration included both the acid and the alkaline tests using the methods as prescribed by AATCC test 15-1962. (4:600) Two test specimens were cut to a size two and one-half inches by two and one-half inches. Five milliliters of the acid solution was pipetted onto the specimen. The specimen and a floater yarn sample were rolled together with the floater fabric on the outside and placed in a test tube. The test tube was placed in the incubator at a temperature
of 98° - 100° F. for 24 hours. The test tube was removed from the incubator, allowed to air-dry and the specimen was evaluated for staining using the gray scale. The above procedure was repeated for the alkaline perspiration solution.

The test for colorfastness to crocking was done using AATCC method 8-1961. (4:598) Two specimens for the dry and wet tests were cut to a size two inches by five inches. The test specimen was placed on a base and a square of white test cloth was rubbed twenty times on the colored specimen using a wooden dowel. The white test cloth was then wetted and the same procedure was used. Staining was measured using the gray scale. Results were carefully recorded.

A questionnaire was developed to determine consumer interest in the colorfastness properties of printed textiles, consumer knowledge of screen printing, consumer interest in purchasing textile products having screen printed designs, and the influence of identified screen printing in the consumer's decision to purchase textile products. (See sample questionnaire in Appendix).

Initially, a pilot questionnaire was developed and given to a select group of 25 women who answered the questions and made constructive suggestions. As a result of this pilot study, the questionnaire was modified and then administered to the selected sample of 100 women.
The composition of the sample is cited in Table 1, page 23 and discussed on page 21.

The questionnaire answers were analyzed using a General Electric 445 computer. Chi squares were computed.
IV. RESULTS AND DISCUSSION

The questionnaire was devised to collect data concerning three areas of interest. Questions were asked to obtain personal data and to determine interest in and knowledge concerning colorfastness and screen printing.

Personal Data

The personal data section of the questionnaire determined marital status, income level, age, and family size of respondents. (See Table 1)

Married women comprised 91 per cent of the participants. Family composition was determined and only two of the married women had no children. Some of the women had children in several age groups with the greater number of children in elementary school while children in pre-school and junior high ranked second and third respectively. The one divorcee had children in two of the age groups. Seven women indicated they were single and two of these indicated they had children. Only one respondent did not answer any of the personal data questions.

Forty of the women had incomes between $10,000 -
$14,999 and 26 women had incomes in the $15,000 - $19,999 level. There were 17 women who had incomes over $20,000. The remaining seven respondents had incomes under $10,000. Eight women did not respond to this question. See Table 1. Due to small numbers the two highest income levels were combined for analysis.

Forty-nine women were between 25 and 34 years of age. See Table 1. The next group with 32 women was between 35-44 years old. No woman in the sample was over 65 years of age and only one woman was over 55 years of age. This respondent was combined with the nine women in the 45-54 age group for analysis. Seven women were under 25 years of age.
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Colorfastness

Hypothesis 1: Selected screen printed fabrics exhibit high colorfastness ratings as measured by standard test procedures.

The 20 selected screen printed fabric samples were placed into three categories: fabric for swimwear, fabric for draperies, and fabric for apparel. The availability of screen printed fabrics was a major factor in the number of test fabrics in each of the designated categories. Four fabric samples were selected for each of the categories in swimwear and draperies. Fabrics number one to number four were considered to be swimwear fabric and number five to number eight were fabrics suitable for draperies. The fabric samples in the apparel category were divided into two groups: woven and knit. Six fabric samples were selected for each of the designated categories. The woven fabrics are number nine to number 14 while number 15 to number 20 are fabrics in the knitted group.

The screen printed swimwear fabrics number one and number two were from a screen printing company that used a hand screen printing method. Swimwear fabrics number three and number four were from a swimwear manufacturing company; fabric number three was screen printed by hand while fabric number four was machine screen printed. The
drapery fabrics number six, number seven, and number eight were from a retail yardage shop. Drapery fabric number five and apparel fabrics number 11 and number 12 were from a wholesale store. The other apparel fabrics were from retail fabric shops. The method used to screen print the designs on the drapery and apparel fabrics tested was not determinable.

Table 2 identifies the test fabrics by number and contains selected label information. Descriptive tests for each fabric included width, and yarn count or gauge. Three of the fabrics had selvages that had been cut off so fabric widths for these could not be determined. Yarn counts were determined at five different locations on each of the fabrics. The five readings were averaged to determine the yarn count for each fabric. The basic construction of each of the fabrics was determined.

**Colorfastness to Laundering Test**

One 45-minute test in the Launderometer, equal to five home launderings, was performed on each of the test fabrics to determine colorfastness to laundering. The rating scale used to determine color change and stain transfer has a range from five, change negligible or no staining, to one, change in color and stain equivalent to step one on the gray scales for color change and for staining.
<table>
<thead>
<tr>
<th>Fabric Number and Category</th>
<th>Fiber Content</th>
<th>Fabric Construction</th>
<th>Finish</th>
<th>Fabric Width-avg.</th>
<th>Yarn Count-Average Warp/Wales</th>
<th>Yarn Count-Average Filling/Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Swimwear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Acetate/Latex</td>
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<td>Unknown</td>
<td>39.60</td>
<td>65.6</td>
<td>40.4</td>
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<td>2</td>
<td>Spandex</td>
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<td>--</td>
<td>45.8</td>
<td>33.8</td>
</tr>
<tr>
<td>3</td>
<td>58% Antron/26% Nylon, 16% Lycra Spandex</td>
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<td>--</td>
<td>43.8</td>
<td>45.4</td>
</tr>
<tr>
<td>4</td>
<td>80% Nylon/20% Lycra Spandex</td>
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<td>--</td>
<td>46.4</td>
<td>51.4</td>
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<td><strong>Drapery</strong></td>
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<td></td>
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<td>54.8</td>
<td>26.6</td>
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<tr>
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<td>12</td>
<td>Acrylic</td>
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<td>fast color</td>
<td>45.20</td>
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<td>13</td>
<td>65% Dacron/35% Cotton</td>
<td>plain weave</td>
<td>min. care</td>
<td>44.73</td>
<td>62.2</td>
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<td>33.4</td>
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<td>wash-wear</td>
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<td>26.8</td>
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<td>wash-wear</td>
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<td>32.8</td>
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<td>19</td>
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<td>40.4</td>
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<td>20</td>
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<td>knit</td>
<td>none</td>
<td>45.13</td>
<td>50.0</td>
<td>36.4</td>
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</table>

Table 2: Identification of Test Fabrics
Fabrics number three and number four in the swimwear category were colorfast to washing with no color change or stain transfer. Fabric number one had considerable loss of color with heavy staining on the nylon and a slight to negligible amount of staining on cotton. Fabric number two rated three in color change and two-three in stain transfer. See Table 3. The drapery fabrics exhibited excellent colorfastness to laundering except for fabric number eight. This fabric rated three in color change and four in staining. Results on the drapery fabrics indicated that these fabrics could be laundered successfully even though it is more likely that draperies would be dry cleaned.

The fabrics in the apparel category that rated four-five in colorfastness to color change and stain transfer were number 11 through number 16. Fabrics number nine, the silk chiffon, and number 20, the triacetate, rated three in color change and three-four in staining. Fabric samples number 10, number 17, number 18, and number 19 were rated one to two in color change; there was considerably heavy staining on nylon, rating one to two, and slight to noticeable amount of staining on cotton, rating three to four. Results on the two light-colored polyester knitted fabrics, sample number 15 and number 16 indicated these fabrics could be laundered with good results. Laundering the other two polyester fabrics, sample number
### TABLE 1
RESULTS OF COLORFASTNESS TESTS
(Evaluated by Gray Scales)

<table>
<thead>
<tr>
<th>Samples</th>
<th>Laundering</th>
<th>Stain Transfer**</th>
<th>Light***</th>
<th>Perspiration**</th>
<th>Crocking**</th>
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<tbody>
<tr>
<td></td>
<td>Color Change*</td>
<td>Acid</td>
<td>Alkaline</td>
<td>Dry</td>
<td>Wet</td>
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<td>1</td>
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<tr>
<td></td>
<td>2</td>
<td>cotton 2-3</td>
<td>3</td>
<td>2</td>
<td>4</td>
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<td>4</td>
<td>cotton 5</td>
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<td>5-1</td>
<td>1-3</td>
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<td>4-5</td>
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</tr>
<tr>
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<td>4-5</td>
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</tr>
<tr>
<td></td>
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<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>cotton 3-4</td>
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</tr>
<tr>
<td></td>
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<td>cotton 3-4</td>
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<td>1-2</td>
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<td></td>
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<tr>
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<td>20</td>
<td>cotton 1-2</td>
<td>3</td>
<td>1-2</td>
<td>1</td>
</tr>
</tbody>
</table>

* - rating 5 (no loss of color) to 1 (considerable loss of color)
** - rating 5 (negligible or no staining) to 1 (heavily stained)
*** - rating 8 (outstanding) to 1 (very poor)
17 and number 18, would result in much color change and staining. The triacetate and acetate knitted fabrics would not be considered colorfast to washing because of the color change and the staining. Dry cleaning should be recommended. The apparel fabric samples that rated high in colorfastness to laundering test had finishes that made the fabric fast to washing.

Colorfastness to Light Test

The rating classes used to determine fastness to light ranged from class eight, very high light fastness, to class one, very low light fastness.

The test for colorfastness to light showed excellent ratings when swimwear fabric samples were exposed to carbon-arc light for 20 hours; however, the fabric samples gradually faded when exposed to additional hours of light. After 160 hours of light exposure, swimwear fabrics number one and number two rated only two to three, and number three and number four rated at the bottom-one. A lab technician (14) for a swimwear manufacturing company stated that fabrics to be used for swimwear are tested for colorfastness to light with only 20 hours of exposure in a fadeometer (carbon-arc light).

Drapery fabric sample number seven showed no fading after 160 hours of exposure to light, and number eight had only a slight amount of fading and was rated seven.
Samples number five and number six showed no fading after 20 hours but there was gradual fading with each additional 20 hours of exposure. After 160 hours number five rated three and number six rated four. See Table 3. Fabrics selected for draperies should have good resistance to light. The four drapery fabric samples tested had excellent fastness to light for the first 20 hours but only fabrics number seven and number eight had excellent ratings after 160 hours in the fadeometer. The label on fabric number five stated that the fabric was lightfast but when tested for colorfastness to light there was gradual fading after 40 hours of exposure.

The apparel fabrics were exposed to 80 hours of carbon-arc light since these fabrics generally would not be exposed to direct sunlight for long periods of time. Samples of the woven apparel fabrics number nine through number 15 rated from one, very poor, for the silk chiffon sample number nine, to the highest rating—eight—for the 100 per cent acrylic fabric sample number 14. Fabric number 13, the Dacron polyester and cotton, rated four and fabrics number 10, number 11, and number 12 rated only three. There was no fading in three of the polyester knit fabrics, number 16, number 17, and number 18 after 80 hours exposure to light. The polyester knit, number 15, exhibited a slight amount of fading and was rated six. The knitted acetate, number 20 and the triacetate,
number 19, were rated three. The ratings of the color-
fastness to light test for the apparel fabric samples
would not be so important since these fabrics would not
be in direct sunlight for any great length of time. The
apparel fabric samples all rated high in colorfastness to
light after 20 hours of exposure.

The method of screen printing the fabrics did not
appear to have any effect on the results of this test.

Colorfastness to Perspiration Test - Acid and Alkaline

The rating scale used to determine colorfastness to
perspiration, acid and alkaline, ranged from negligible
or no change as shown on the gray scale, step 5, to a
change in color equivalent to gray scale, step 1.

The perspiration test indicated swimwear fabric
number three had excellent colorfastness qualities to
both the acid and alkaline test. There were extreme
ratings in the first sample and the replicate in fabric
number four. The first sample rated five, no staining,
in the acid test to a rating of one, heavy staining, in
the alkaline test. The replica had heavy staining,
rating one, in the acid test and noticeable staining,
rating three, in the alkaline test. Fabric number two
rated two in the acid test and four in the alkaline test.
Fabric number one was heavily stained in both tests,
rating one.
The four drapery and woven apparel fabrics, sample numbers, five through 14, had slight to no staining, rating four to five, in both tests. The polyester knits varied in the amount of staining in both of the tests. The polyester knitted fabrics, numbers 15 and number 16, had slight to no staining, rating four to five, in both tests. The brighter and darker colored polyester knitted fabrics, number 17 and number 18, rated from noticeable to heavy amount of staining, rating one to three, in both tests. Fabric number 18, was noticeably stained, rating three to four, in both tests. Fabric number 20, rating one to two in both tests.

The knitted fabrics had more staining in the perspiration tests than the woven fabrics. The type of dye used and the difficulty of screen printing knitted fabrics could be determining factors. Fabric samples number 17 through number 20 had noticeably to heavy staining in the perspiration tests. Staining problems could occur if these fabrics were made into apparel items that came in contact with the body.

Fabric number four in swimwear showed an extreme rating in the first sample and the replicate. The prominent colors in each sample varied with the green color having less colorfastness properties than the other colors.

Fabrics made into draperies would not be concerned with this colorfastness test.
Colorfastness to Crocking - Dry and Wet

The fabric samples were evaluated for colorfastness to crocking or rubbing using the gray scale for staining which had classes ranging from class five, negligible or no color transfer, to class one, color transfer equivalent to step one on the gray scale.

The crocking test results using a dry test cloth on the swimwear fabric samples varied from slight or no staining, rating four to five, on fabrics number two and number four to noticeable or heavy staining, rating one to three, on fabric samples number one and number three. The drapery fabric sample number five to number eight and the apparel fabric samples number nine through number 16, number 19, and number 20 showed only slight or no staining, rating four to five. Apparel fabric samples number 17 and number 18 were in the range from considerable to heavy staining, rating one to two.

The test results for crocking using a wet cloth on the swimwear fabric samples number two, number three, and number four had no staining rating five. Fabric sample number one was in the range of noticeable to considerable staining, rating two to three.

The drapery fabric sample number five had no staining, rating five, number six had a slight amount of staining, rating four, number seven was noticeably stained,
rating three, and number eight was in the range of noticeably stained to considerably stained, rating two to three.

Apparel fabric samples number nine, numbers 11 through number 16, number 19, and number 20 had no staining, rating five. Fabric sample number 10 was noticeably stained, rating three, number 17 was in the range of slight to noticeable staining, rating three to four, and number 18 was considerably stained, rating two.

The results of the crocking test using a wet cloth would be of greater interest for swimwear fabrics since most of the rubbing would occur on wet fabric. The test results of three of the swimwear fabric samples indicated colorfastness to crocking.

Drapery fabrics are usually not subjected to extreme rubbing so the colorfastness to the crocking test particularly using a wet cloth, would not be as important as the other colorfastness tests.

All but three of the apparel fabric samples had high ratings, four to five, in the crocking tests using both dry and wet test cloth. The three fabric samples, number 10, number 17, and number 18, had ratings one to four. The type of dye used or lack of a finish could be factors that would effect the colorfastness qualities. The method used to screen print did not seem to have any effect on the colorfastness qualities.

The ratings of the four colorfastness tests for each
of the fabric samples tested are stated in Table 3.

Hypothesis 2: Consumers are interested in the colorfastness properties of textile products.

It was necessary, initially, to determine whether women read labels before purchasing apparel items or yard goods. If they do read labels, how interested are they in colorfastness properties of textile products.

Ninety of the 100 women in the survey indicated that they read labels before purchasing apparel items or yard goods, while nine women indicated they did not and one woman did not answer the question. (See Table 4) Eighteen of the 19 women in the $20,000 or above income level and the 11 women in the 45 years or older age group read labels. This reflects the two older age groups and the two upper income levels of the women in the survey. The nine women who did not read labels included one single, seven married, and one divorcee. Only two of the nine women were consistent in answering "no" to questions one and 16 stating that they did not read labels before purchasing apparel items or yard goods, and did not read labels to determine whether a colorful print fabric was colorfast. (Table 5) Seven of the nine indicated that they did read labels to determine whether a colorful print fabric was colorfast. One of the nine women who stated that she did not read labels did indicate in question 7
### TABLE 4
USE OF LABELS BY RESPONDENTS BEFORE TEXTILE PURCHASE

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<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Total Cases</th>
<th>df</th>
<th>CHI$^2$</th>
<th>Level of Significance</th>
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* Not significant at .05 level.
TABLE 5
COLORFASTNESS DATA OF PRINTS AS USED BY RESPONDENTS

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<th>Marital Status</th>
<th>Yes</th>
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<th>df</th>
<th>CHI²</th>
<th>Level of Significance</th>
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</table>

* Not significant at .05 level
that she sometimes read a label to determine how a fabric had been colored.

It would appear that the participants who answered "no" to question one about reading labels were inconsistent in their answers. Perhaps, the questions directed to the reading of labels would appear to be susceptible to different interpretations.

Women read labels, at least some of the time, to determine whether an apparel item is colorfast, particularly fast to washing, as evidenced by the answers to questions four and 16. There were 85 women who read labels to determine whether a fabric was colorfast. Only five women bought printed apparel labeled as washable but with no information to indicate if the colors were fast to washing. However, 37 women assumed a print to be colorfast. (Table 6)

When women had to rank the most important characteristic that influenced a purchase of colored apparel items, (question three), colorfastness ranked approximately the same as wrinkle recovery; 48 women ranked colorfastness first and 46 ranked wrinkle recovery first. Colorfastness was the most important characteristic that influenced a purchase of colored apparel items by single women when ranking this characteristic with stain resistance and wrinkle recovery. Sixty women responded that stain resistance was the least important characteris-
<table>
<thead>
<tr>
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<th>No</th>
<th>Sometimes</th>
<th>Assume to be colorfast</th>
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<td>37</td>
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</table>
tic that influenced a purchase of colored apparel item (question 15). In both questions three and 15 approximately the same number of married women ranked colorfastness as the most important characteristic. Five women ranked colorfastness or wrinkle recovery as being both the most important and the least important. It would appear that the question was not properly interpreted.

Textile items were classified into four groups - women's apparel, children's clothing, swimwear, and draperies. Colorfastness properties were a determining factor when purchasing colored items in each of the above groups either some or all of the time according to 90 or more of the women. There were less than 10 women who did not answer or who answered "no" to this question. The majority of women who stated colorfastness was not a determining factor were married women in the 25-34 age group in the $10,000 - $14,999 income level. The divorcee stated that colorfastness was a determining factor in women's apparel, swimwear, and draperies but not in children's clothing even though she had preschool and elementary age children. She was consistent in her answers since she stated in questions three and 15 that colorfastness was the least important characteristic of those listed that influenced her decision when purchasing colored apparel items. It was interesting to note the answers given by the two married women under 25 years of
age to question 20. The one woman who had preschool children indicated that draperies were the only items for which colorfastness properties were determining factors. The one woman in this group who did not have any children stated that colorfastness properties was a determining factor when purchasing women's apparel, children's clothing, swimwear, and draperies. (Table 7)

Colorfastness properties were determining factors when purchasing colored draperies according to 92 women. This was emphasized in question 22 when 55 women stated sunfastness or other colorfastness properties were the most important characteristic to influence their purchase of colorful draperies. The women who ranked cost as the most influential characteristic in a drapery purchase consisted of women in income groups from under $10,000 to the income group of $30,000 or above.

The women in the survey did indicate colorfastness properties are important when purchasing apparel items. Ninety-three women rated the degree of colorfastness properties when purchasing apparel items medium to high.

Ninety-four women stated they bought swimwear. According to 75 women, the most important feature influencing their purchase of swimwear was style. Forty-six stated colorfastness properties were the least important feature in a swimwear purchase. As stated previously one swimwear manufacturing company tests fabric
### TABLE 7
COLORFASTNESS PROPERTIES AS DETERMINING PURCHASE FACTORS

<table>
<thead>
<tr>
<th>Marital Status</th>
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*Not significant at .05 level*
that will be used for swimwear for colorfastness to light using only 20 hours of exposure to light.

Consumer Responses to Screen Printing

Hypothesis 3: Consumers are interested in textile products that have been screen printed.

Initially, it was necessary to determine how many women understood what was meant when a label on a fabric indicated that the fabric had a screen printed design. Sixty-two women indicated that they knew a screen printed design. Only these 62 women were to answer the remaining questions relating to screen printed designs. Three women who answered "no" to this question apparently misunderstood the question and proceeded to answer questions 10 through 14 which was contrary to instructions. Twenty-seven women were certain they had purchased a screen printed fabric in yard goods or apparel items. However, the women stated that a label reading "this fabric is screen printed" was not a primary factor for purchasing a print fabric. Only eight married women were influenced by this label all or part of the time. (Table 8)

The effect of screen printing in the selection of certain textile items was reflected in responses to the list of items. Approximately 50 women answered this question, although not all women answered it completely. These women indicated that screen printing had its great-
# TABLE 8
SCREEN PRINTED DESIGNS AS PRIMARY REASON FOR PURCHASE DECISION

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* Not significant at .05 level
est effect on the selection of women's apparel both part-time and all-the-time. Draperies ranked next followed by men's sport shirts. Concerning the latter textile item, the largest proportion of women influenced by screen printing were in the $10,000 - $14,999 income group.

Screen printing has been thought to have a certain amount of prestige. Seventy-nine per cent of the women who answered the question that had selected terms which would or would not apply to screen printed fabrics indicated the term "individualistic" applied to screen printed fabrics. Approximately 50 per cent of the women who answered this question believed screen printed fabrics were expensive.

Forty-one women ranked color as the most important factor that influenced the purchase of a print. Design was the second most important factor according to forty women.

Chi Square Analysis

The questions which showed a .05 chi square level of significance when categorized according to their marital status included: 1) reading of labels before purchasing apparel items, 2) ranking wrinkle recovery and colorfastness as the most important characteristics and also ranking wrinkle recovery as the least important
characteristic in the purchase of colored apparel items, 3) whether or not washable printed apparel would be purchased if the label did not indicate the colors were fast to washing, and 4) whether colorfastness properties would be a determining factor when purchasing colored items for children.

When categorized according to age the questions which showed a .05 level of significance by chi square analysis were: 1) colorfastness and its rank according to the importance of its influence on a purchase of colored apparel items, 2) whether washable printed apparel would be purchased if label did not indicate colorfastness to washing, 3) the term "bright colors" applies to screen printed fabrics, 4) ranking wrinkle recovery as the least important characteristic when purchasing colored apparel items, 5) originality as a factor of importance in the influence of a print purchase, 6) whether swimwear is purchased, 7) ranking of features that influence swimwear purchase, and 8) ranking of other colorfastness properties and design as characteristics that influence purchase of colorful draperies.

The following items had a .05 or higher level of significance by the chi square analysis when the questions were categorized according to income groups: 1) wrinkle recovery ranked as the most important characteristic in the influence of a purchase of colored apparel items,
2) screen printed design a determining factor in the selection of men's sport shirts, 3) ranking of the least important characteristic when purchasing colored apparel items - stain resistance, 4) ranking of factors - originality, design, cost - in their importance in the influence of a print purchase, and 5) the ranking of the important characteristics that influence purchase of colorful draperies - sunfastness, cost, and design.
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This research was conducted to investigate the hypotheses that a selected sample of screen printed fabrics will exhibit high colorfastness ratings as measured by standard test procedures; that consumers are interested in the colorfastness properties of textile products; and that consumers use their knowledge of screen printed textiles when making decisions concerning the purchase of selected textile products.

Twenty screen printed fabrics of different fiber content were selected to test for colorfastness. Descriptive tests (ASTM method D1910-64) were completed on each fabric before test samples were cut. Four tests were performed on each of the fabric samples: colorfastness to laundering following AATCC test method 61-1965, colorfastness to light using the carbon-arc light following the AATCC test 16A-1964, colorfastness to perspiration including both the acid and the alkaline tests following the AATCC test 15-1962, and the colorfastness to crocking including both the dry and the wet tests following the AATCC method 8-1961. Each fabric test was replicated. The fabric samples were evaluated using the gray scale for color change and staining on all the tests except
colorfastness to light. This was evaluated using the scale recommended by the AATCC.

A questionnaire was developed to determine consumer interest in the colorfastness properties of printed textiles, consumer knowledge of screen printing, consumer interest in purchasing textile products having screen printed designs, and the influence of identifiable screen prints in the consumer's decision to purchase textile products. This questionnaire was given to 100 women living in the San Fernando Valley in the Los Angeles area.

Chi squares were computed with the use of a General Electric 445 computer.

The 20 screen printed fabrics selected for testing were placed into three categories: four fabrics for swimwear, four for draperies, and 12 for apparel. The apparel fabrics were divided into two groups: woven and knit. The fabrics were purchased from a swimwear manufacturing company, a screen printing company, a retail yardage shop, and a wholesale yardage store. The swimwear fabrics were the only fabrics identified as to screen printing method, i.e., hand or machine.

Hypothesis 1: A selected sample of screen printed fabrics will exhibit high colorfastness ratings as measured by standard test procedures.
The two swimwear fabrics, numbers three and four, from the swimwear manufacturing company had good color-fastness qualities in all the tests except the test for colorfastness to light. After only 20 hours of light exposure there was no fading but this is a relatively brief test for a fabric used in swimwear. On longer testing they faded considerably. The number three fabric had extreme ratings in the perspiration tests in the original and replicate. The prominent colors in each sample varied with the green color having less colorfastness properties than the other colors. Fabric number one that was obtained from a screen printing company would not be considered colorfast in any of the tests except in the laundering test where there was very little staining on the cotton. The other fabric, number two, from the screen printing company showed good colorfastness qualities in the alkaline perspiration and the dry and wet crocking tests. The acid perspiration test had much staining. There was also considerable color change and stain transfer in the laundering test and considerable fading in the light test.

The drapery fabrics generally were colorfast in each of the four tests. The one cotton fabric with the Zepel finish had a rating of three in color change in the laundering test. The other fabrics could be laundered successfully even though it is more likely they would be
dry cleaned. Both fabrics with the Zepel finish had noticeable to considerable staining in the wet crocking test. The other two drapery fabrics rated three and four in the colorfastness to light test after 160 hours of light exposure but there was no fading after 20 hours of light.

Four of the apparel woven fabrics had wash and wear or a similar finish and one fabric was labeled as fast color. The fast color fabric, acrylic fiber, was colorfast in all of the tests except in the test for colorfastness to light where it had a rating of three after 80 hours of light exposure; however, there was no fading after 20 hours of light. The apparel fabrics were exposed to 80 hours of carbon-arc light rather than 160 hours used for other fabrics since these fabrics normally would not be exposed to direct sunlight for long periods of time. The other acrylic fabric with minimum care finish was colorfast in all the tests except the alkaline test in the perspiration test; the rating for this test was three. The Dacron and cotton blend fabric rated between four and five in all of the tests. There was no fading in the colorfastness to light test after 20 hours of light exposure. The silk fabrics showed considerable color staining and color change in the laundering and light tests. Those fabrics rated four and five in the perspiration and crocking tests except for the twill
which rated three in the wet crocking test. The two light colored polyester knits were colorfast in each of the four tests. The two darker colored polyesters were colorfast only to light. The acetate and triacetate were colorfast only to crocking in both the dry and wet tests. The tests for perspiration indicated that these two fabrics could cause staining problems if these fabrics were made into apparel items which came in contact with the body. The color staining and color change would indicate that the silk, acetate, and triacetate fabrics would not be colorfast to laundering. The type of dye used or lack of finish could be factors that would affect the colorfastness qualities. The method used to screen print did not seem to have any effect on the colorfastness qualities.

Therefore, the hypothesis, selected screen printed fabrics exhibit high colorfastness ratings as measured by standard test procedures, could be only partially accepted on the basis of the results of the colorfastness tests since there was a wider variation in colorfastness ratings.

Hypothesis 2: Consumers are interested in the colorfastness properties of textile products.

Ninety of the 100 women who completed the questionnaire read labels before an apparel or yardage purchase. Eighty-five women read labels all or part of the time to
determine whether a fabric was colorfast. There were only five women who would purchase washable printed apparel items if not labeled colorfast. Colorfastness properties were a determining factor when purchasing colored items in the four groups - women's apparel, children's clothing, swimwear, and draperies sometimes or all the time according to 90 or more women. Ninety-two women stated sunfastness and other colorfastness properties were the most influential characteristics when purchasing colorful draperies. The degree of colorfastness properties when purchasing apparel items was rated medium to high by 93 women.

Colorfastness was the least important feature in the purchase of swimwear.

The questions which showed a .05 Chi square level of significance when categorized according to marital status, age, and income were: 1) ranking of colorfastness as the most important characteristic in the purchase of colored apparel items, 2) whether washable printed apparel not labeled as colorfast would be purchased, 3) whether colorfastness properties are determining factors in purchase of children's colored items, and 4) ranking of colorfastness properties in purchase of colorful draperies.

The conclusion drawn from analysis of the data is: consumers are interested in the colorfastness properties
Hypothesis 3: Consumers with knowledge concerning and interest in screen printed textiles use these data in decision making regarding the purchase of selected textile products.

Sixty-two women indicated that they knew a screen printed design. Only these women were to answer the group of questions relating to screen printing. Twenty-seven women were certain they had purchased screen printed fabrics in yard goods or apparel items. A label reading that the fabric was screen printed was not a primary factor in their purchase of a print. Eight married women were influenced by this label all or part of the time. Over half of the women who responded to this question indicated that screen printing was not a determining factor in the selection of swimwear, children's clothing, and men's sports shirts. Of the 51 women who answered this question, 35 women were influenced all or part of the time when selecting women's apparel; draperies ranked next. The majority of women indicated that screen printed fabrics were individualistic, and approximately 50 per cent of the 62 women believed screen printed fabrics were expensive.

The questions which showed a .05 level of significance by Chi square analysis when categorized according
to age and income were: 1) the term "bright colors"
applies to screen printing, 2) screen printed design
a determining factor in the selection of men's sports
shirts.

The conclusion can be drawn from the analysis of the
data developed from the questionnaire that consumers are
not interested in textile products that have been screen
printed. Thus, the hypothesis, consumers with knowledge
concerning and interest in screen printed textiles use
these data in decision making regarding the purchase of
selected textile products, is not supported by the data.
Therefore, the hypothesis is rejected.

Recommendations

This study tested only 20 fabrics for colorfastness.
Future studies could test a greater number of available
fabrics with the different fiber content. A comparative
study could be made with fabrics of the same fiber con-
tent with and without finishes to see the direct result
of finishes.

A future questionnaire might incorporate questions
with emphasis on what is known before purchasing to pro-
vide more valid consumer data. The population could be
enlarged and have a broader socio-economic base.
BIBLIOGRAPHY


34. Sprinz, Harry, interview held at a screen printing company, January, 1968.


QUESTIONNAIRE

Directions: Please check your answers to the following questions using the spaces provided.

1. Do you read labels before purchasing apparel items or yard goods?
   ( ) Yes
   ( ) No

2. Do you buy apparel items or yard goods with a printed design?
   ( ) Yes
   ( ) No
   ( ) Sometimes

3. Which one of the following characteristics do you consider most important when purchasing apparel items made from colored fabric?
   ( ) Stain resistance
   ( ) Wrinkle recovery
   ( ) Colorfastness

4. Have you ever read a label that indicated the print in a fabric was screen printed?
   ( ) Yes
   ( ) No

5. Would you buy washable printed apparel if the label did not indicate the colors were fast to washing?
   ( ) Yes
   ( ) No
   ( ) Sometimes

6. Is it important to you to know how the designs in a textile product have been applied?
   ( ) Yes
   ( ) No

7. When a label does not indicate whether or not a fabric is colorfast to washing, would you test a sample of the fabric before laundering?
   ( ) Yes
   ( ) No
   ( ) Sometimes
8. Which of the following terms apply to screen printed fabrics?
   ( ) Expensive
   ( ) Individualistic
   ( ) Bright colors
   ( ) Limited to small patterns
   ( ) Don't know

9. Which one of the following characteristics do you consider least important when purchasing apparel items made from colored fabric?
   ( ) Stain Resistance
   ( ) Wrinkle Recovery
   ( ) Colorfastness

10. Do you understand what is meant when a label on a fabric indicates that the fabric has a screen printed design?
    ( ) Yes
    ( ) No

11. If you were purchasing a print which of the following factors would influence your purchase?
    ( ) Originality
    ( ) Color
    ( ) Design
    ( ) Cost
    ( ) Others (list)_________________________

12. Do you ever read a label to determine how a fabric has been colored?
    ( ) Yes
    ( ) No
    ( ) Sometimes

13. Have you ever purchased a screen printed fabric in yard goods or apparel items?
    ( ) Yes
    ( ) No
    ( ) Don't know

14. Which one of the following characteristics is most important when purchasing colorful drapery fabric?
    ( ) Drapeability
    ( ) Colorfastness
    ( ) Cost
    ( ) Design
15. In selecting the following items would a screen printed design be a determining factor?
   - Swimwear: Yes  No  Sometimes
   - Drapery: Yes  No  Sometimes
   - Women's apparel: Yes  No  Sometimes
   - Children's clothing: Yes  No  Sometimes
   - Men's sports shirts: Yes  No  Sometimes

16. Have you ever returned an apparel item that did not maintain its colorfast properties?
   - Yes
   - No
   - Sometimes

17. Do you ever read a label to determine whether or not a colorful print fabric is colorfast?
   - Yes
   - No
   - Sometimes

18. Would a label that reads "This fabric is screen printed" be the primary reason for your decision to purchase the print fabric?
   - Yes
   - No
   - Sometimes

19. To what degree do you consider colorfastness properties when purchasing apparel items.
   - High
   - Medium high
   - Medium
   - Low
   - No

20. Do you buy swimwear?
    - Yes
    - No

   If answer is no, omit question 21.

21. Which one of the following features is most important when purchasing swimwear?
    - Color
    - Style
    - Fabric
    - Colorfastness properties
22. When purchasing a colored item which of the following would you want to have good colorfastness properties?
- Women's apparel
- Children's clothing
- Draperies
- Swimwear
- None of the above

23. What is your present status?
- Single
- Married
- Divorced or separated
- Widowed

24. If married, do you have any children?
- Yes
- No

25. If you have children, what are the ages of the children?
- Pre-school age
- Elementary school age
- Junior High age
- Senior High age
- College age
- Beyond college age

26. Your age:
- Under 25
- 25-34
- 35-44
- 45-54
- 55-64
- Over 65

27. Your family income (annual):
- Under $10,000
- $10,000 - $14,999
- $15,000 - $19,999
- $20,000 - $24,999
- $25,000 - $29,999
- $30,000 or over