Visual complexity of women's streetwear in photographs, 1839 to 1929

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Visual complexity of women's streetwear in photographs, 1839 to 1929

by

Rosalynd Lee Rhen

A Thesis Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of MASTER OF SCIENCE

Major: Textiles and Clothing

Signatures have been redacted for privacy

Iowa State University
Ames, Iowa
1986
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INTRODUCTION

Justification

Styles in clothing considered fashionable have changed continuously. Costume historians have described variations in clothing by studying primary and secondary sources, but past examination of these sources has sometimes been tainted by the researcher's biases. Because few researchers have constructed methodologies which could be applied objectively to study clothing changes through time, it has become increasingly important to develop additional objective approaches for clothing research.

According to Hollander (1978), people throughout history have wanted to see visual representations of themselves wearing fashionable dress. The visual arts, recording fashionable dress, have mediated people's perceptions of themselves and influenced fashion change. Photography has been and continues to be one such art. With the introduction of photography in 1839, camera vision has become a standard which measures people's sense of visual truth. Hollander (1978) believed that this visual "truth" revealed in photographs stimulated visual simplification of women's dress. She wrote that by 1917 women's garments had lost their quality of being made of many individual parts, each needing separate, slow appreciation. This new look was
visually simple; it had achieved unity and compactness of design.

Social, economic, political, and technological factors probably had as much influence as photography on any change in the style of women's clothes. However, Hollander's theory raised the primary question: Was there any change in visual complexity of women's streetwear as presented in photographs from 1839 to 1929? Research addressing this question would be valuable in providing knowledge about trends in clothing variation as well as related social and economic changes for the chosen interval.

DeLong (1968) suggested an approach that could be adapted to examine photographs objectively for any change or variability in visual complexity. She referred to the organization of costume on a uni-form and multi-form continuum, with the costume-body form being seen first in terms of either a whole or parts. This continuum provided the basis for developing an unbiased method for counting the visual parts of women's streetwear in photographs.

Purpose

The purpose of my proposed research was to examine photographs to see if they revealed changes in visual complexity of women's dress. In order to measure the complexity of dress, DeLong's approach was used as a basis
for developing an objective method to count the number of visual parts.

Operational Definitions

1. Photographs - Pictures made by producing images upon photosensitive surfaces. These might include daguerreotypes, ambrotypes, tintypes, or film reproductions on paper.

2. Uni-form dress - The perceptual unit, the thing seen first, was the entire clothed body form. Uni-form clothed body forms had one focal point and were at one end of a continuum.

3. Multi-form dress - The perceptual unit, what was seen first, was the visual part or parts of the clothed body form. The total body was seen second. Multi-form clothed body forms had more than one focal point and were at the opposite end of a continuum from uni-form clothed body forms.

4. Complexity of dress - A measure of the number of visual parts, not necessarily structural or sewn parts.

Objectives

My objectives for this research were threefold. The first objective was to develop a methodology for objective analysis of visual complexity of dress. My second objective was to use this methodology to describe and analyze complexity in U.S. women’s streetwear seen in photographs from approximately 1839 to 1929. If sufficient data were obtained, I would undertake the third objective of testing the hypothesis: Visual complexity in U.S. women’s streetwear
seen in photographs did not change from approximately 1839 to 1929. However, not enough data were obtained to test the hypothesis presented in the third objective.

Assumptions

An initial assumption for this research was that it would be possible to verify that photographs were authentic, not retouched. A second assumption was that there would be enough full-length photographs from approximately 1839 to 1929 to permit generalizations about changes in complexity of women’s streetwear. With fewer photographs available than were anticipated, the description and analysis of variability in complexity of dress were confined to the specific data collected. It was not possible to make general statements.

Limitations

In order to obtain a consistent data set to uniformly study and describe complexity of dress, I set limitations on the types of clothing and photographs to be examined. Only women’s streetwear as shown in portrait or studio photographs would be analyzed. Men’s and children’s clothing would not be considered, nor would snapshots be included in the sample. In addition, this research would use full-length photographs. Studio photographs that were three-quarter or bust views would not be examined. Hollander (1978) referred to artists’
snapshots, which were a special category between portrait and amateur snapshots. However, I chose to use portrait or studio photographs. Limiting pictures to full-length studio photographs would maintain equivalence in formality of women’s streetwear examined and equivalence in clarity of photographs as a result of pictures being taken from similar distances.

Although no special class or category of people would be selected, there would be some bias in the sample. It would not be possible to choose photographs of people distributed across all social classes. To maintain an objective analysis, I would deal only with the visual facts of the photograph, not the intentions of the sitter or the photographer.

The geographic area of the research would be defined by available, verifiable photographs. Because a sufficient number of museums containing usable photographs were located in the central United States, the study was limited to this region.

Photographs would be examined from a maximum time span of 1839 to 1929. Since photography in its practical application began in 1839 with daguerreotypes, I chose to begin my research with that year. Hollander (1978) wrote that dress was simplified by the 1920s, therefore I decided to conclude my research in 1929.
The number of photographs selected from each year between 1839 and 1929 would be limited to ten. With substantial technical advances in 1840, the public's demand for daguerreotype portraits was extremely high (Newhall, 1964) and I expected that daguerreotypes would be available for examination. I also anticipated finding ambrotypes, patented in 1854, and tintypes, patented in 1856. However, few surviving daguerreotypes, ambrotypes, and tintypes were usable. Film reproductions, mostly on paper, were examined in the latter part of the time span. The actual number of photographs that met the requirements for the determined limitations was much fewer than ten per year. Consequently the data obtained were about half of what were originally expected for the research.
VISUAL ANALYSIS OF DRESS

A small number of investigations in costume research have employed methods of visually analyzing change in dress for varying purposes. Visual analysis has been applied in cases where historic research has been combined with social-psychological and aesthetic research. However, either type could use contemporary as well as historic data.

Social-psychological Research

Wass and Eicher (1980) used visual analysis to report objectively on forms of clothing as well as on their meanings. Photographs showing full-length images of the subjects were the primary data for their research on historic Yoruba dress and were analyzed using a methodology adapted from methods for analyzing languages. The researchers listed and calculated the frequency with which items were worn. Based on these frequencies, they determined modal combinations of dress and developed rules relating social roles and statuses to use of modal forms of dress.

Littrell and Evers (1985) visually analyzed dress to draw associations between clothing change and role change. Photographs of designs of ornament for chasubles worn by priests for Mass served as primary historical data and were analyzed using existing methods, developed by researchers such as Wass and Eicher (1980) and Cerny (1980), for coding
structural design and surface embellishment. Five design characteristics were recorded for the photographs of the chasubles. These included: percent of embellishment, design organization, number of motifs, embellishment techniques, and motif content (Littrell & Evers, 1985). Frayser (1985) conducted similar research with photographs of liturgical vestments used in the Church of Norway to consider associations between vestment changes and historical events in the Church of Norway and the liturgical craft movement.

Aesthetic Research

Richardson and Kroeber (1940) applied visual analysis to dress to determine aesthetic changes. They examined objectively women’s evening or formal dress as seen in fashion plates for trends in stylistic changes. Kroeber developed the methodology used for the research. For each figure observed, they took the total length measurement from mouth to toe and converted the other length and width measurements to a percentage of this total to plot design changes. The six measurements included: skirt length, waist length, decolletage length, skirt width, waist width, and decolletage width.

Using Kroeber’s methodology, Weeden (1977) examined stylistic changes in women’s daytime dress as seen in fashion news illustrations from the *New York Times*. She expanded on
Kroeber’s original work of 1919 by investigating stylistic changes in the years beyond his first inquiry, from 1920 to 1976.

Richards (1983-84) also used visual analysis to determine aesthetic changes in dress. She studied women’s daytime dress of the 1920s in fashion illustrations in magazines to test traditional assumptions about changes in waist/hip and hem locations. She used Kroeber’s method for measuring stylistic changes to record length from mouth to each of the following: skirt hemline, uppermost waist/hip horizontal line, and next lower waist/hip horizontal line (Richards, 1983-84).

Lowe (1984) utilized visual analysis of dress to evaluate aesthetic rules of proportion. She examined women’s evening dress seen in fashion publications using an adaptation of the method described by Richardson and Kroeber (1940). Measurements of six dimensions of women’s evening dress were taken for comparison with predicted rules of proportion. These included: skirt length, waist length, decolletage length, skirt width, waist width, and decolletage width (Lowe, 1984).

Historic and Aesthetic Theory and Method

Hollander (1978) believed people perceived themselves in terms of the generally accepted mode of fashion at any
particular time. People modeled themselves on pictures, which in turn presented an image of how people were seen and how they saw themselves. She wrote that dress changed when people perceived themselves so differently that changes in dress resulted from their altering visual perceptions.

Throughout history, artists have edited what they depicted in portraits, but this edited vision ended temporarily with the earliest use of the camera (Hollander, 1978). According to Hollander, these first unedited photographs portrayed clothing as complex and ungraceful. Therefore photographs served to alter people’s perceptions of themselves, leading them to choose simplicity rather than complexity in dress. It is not possible to connect such a change in dress to one isolated cause such as photography; however, Hollander’s statements suggested the need for investigation of the changes in complexity of dress as recorded in photographs.

Hillestad (1980) stated that appearance had an underlying structure which could be studied as a whole, and he developed a taxonomy for identifying units in the structure of appearance. Dress and the body made up the components of the structure of appearance which Hillestad believed could be analyzed on the basis of their interrelatedness. He wrote that there was value in studying
dress and the body as a total concept of appearance but provided no methodology for doing so.

DeLong (1968) suggested an objective approach to analyze visually the clothed body form. Looking at the clothed body form as a visual organization allowed polar terms to be applied to this form for visual analysis. Uni-form and multi-form were polar terms which DeLong (1968) developed to describe the clothed body form in terms of a whole or parts. She wrote that perception of a whole or parts depended upon the relationship of the body and the details of clothing. DeLong’s approach could be used as a basis for developing an objective methodology to analyze the complexity of the clothed body form by means of counting the number of visual parts.

Summary

The social-psychological research reviewed made use of photographs as a source of primary data for visual analysis of dress. Wass and Eicher (1980) listed the frequency of separate garments as parts of the entire clothed body form. Littrell and Evers (1985) and Frayser (1985) recorded the number of different types of motifs seen in the decoration of each chasuble.

The aesthetic research visually analyzed dress seen in fashion publications. The overall purpose of each study was
similar in that all were concerned with aesthetic changes, even though the specific change of interest varied. Richardson and Kroeber (1940) and Weeden (1977) investigated trends in stylistic changes of dress. Richards (1983-84) tested traditional assumptions about stylistic changes. Lowe (1984) evaluated the aesthetic rule of proportion. Methodology was also similar. Visual analysis employing Kroeber’s method for comparing dimensions as a percentage of total length was used in each investigation.

Hollander’s (1978) theory and DeLong’s (1968) method set the stage for my research. Photographs were used as a primary source of data for visual analysis of women’s streetwear to describe complexity of dress. In other costume research dress has been visually analyzed in photographs, but my research differed because of the specific methodology adapted from DeLong for the distinctive purpose suggested by Hollander’s theory.
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PROCEDURES

Investigation of Literature

Before beginning this research it was necessary to define the problem. First, I searched literature for theory pertaining to historic costume which provided a researchable question to investigate. Then, in order to carry out the research, I reviewed literature relating to methods of visual analysis. This gave me a basis for developing a methodology to examine changes in visual complexity of dress.

Developing a Counting Methodology

To examine the visual complexity of women's streetwear as seen in photographs from 1839 to 1929, I developed a counting methodology based on a system proposed by DeLong (1968). According to DeLong's approach, the clothed body form was seen in terms either of a whole or parts. In the clothed body form, the body was considered an object, just as the clothing was an object. Therefore in this research, dress was defined as the body and any modification of it. Complexity of dress was measured by counting parts and placing the clothed body on a uni-form and multi-form continuum. Uni-form clothed body forms had one strong focal point and were at one end of the continuum; multi-form clothed body forms had several strong focal points and were
at the opposite end of the continuum. Structural or sewn parts did not always form strong focal points and consequently were not considered separate visual parts. A count of the number of focal points or visual parts revealed the complexity of dress for each image. Using the uni-form and multi-form continuum as a starting point I developed a method for counting visual parts of the clothed body form to objectively analyze visual complexity.

To begin measuring the number of visual parts I first looked at "visual boundaries" (Arnheim, 1954) within a clothed body form. Visual boundaries were value contrasts in lightness and darkness which separated parts of the clothed body form. By squinting, I located visual boundaries that served as a basis for counting visual parts (C. Salusso-Deonier, personal communication, January 1985).

Rules

The following rules determined whether a part was considered separate from or continuous with the whole clothed body form (C. Salusso-Deonier, personal communication, January 1985).

I. Separate parts were

A. perceptual units of the whole clothed body form which were visually separate and distinct from each other (Figure 1).

B. structural units which were distinct and separate from the whole. Structural units were
sometimes, but not always, distinct visual parts (Figure 2).

C. details which varied in value, texture, shape, or size so that contrast set them apart from their surroundings (Figure 3).

II. Continuous parts were

A. spatially close units which appeared to group because of proximity. This exemplified the law of grouping (Figure 4).

B. small, regularly repeated design motifs which tended to be seen as a whole (Figure 5).

C. details or structural units which were similar to each other and were seen as portions of the whole because they blended together (Figure 6).

Counting was most consistent by using these rules to progress from the bottom to the top and from the center to the sides of the photographed clothed body form. Photographs with profile images were not used, but full front images with partially covered parts were included in this research. The idea of mirror images was employed in the latter samples, with left and right sides being assumed to repeat each other. The partially obscured portion of the clothed body form was allocated the same number of visual parts as its revealed mirror section.

Testing the rules

After developing the rules for counting visual parts, I tested the rules for reliability. I determined repeatability of counts in using the rules by examining ten photographs and comparing the resulting counts with the counts of two other
Figure 1. Perceptual unit visually distinct from the whole or surrounding parts

Figure 2. Structural units visually separate from the whole or surrounding parts

Figure 3. Details visually distinct because of contrast from the whole or surrounding parts
Figure 4. Separate units in close proximity grouping, counted as one continuous part.

Figure 5. Small, repeating design motifs, treated as one continuous part.

Figure 6. Similar details or structural parts that blend, considered as one continuous part.
people familiar with DeLong's (1968) system and the rules. Two resident faculty members acted as the expert examiners. Both were familiar with DeLong's methodology, and DeLong served as one faculty member's major professor. The rules were considered a reliable measure of complexity when each of the examiners could repeat within two the count of visual parts for a given photograph.

Photographic examples

Two sample photographs have been included here to illustrate the counting methodology. Each photograph has an accompanying line drawing which shows the separate or continuous visual parts counted using the rules. The numbered sections in the line drawings correspond with the numbered descriptions presented in the text. Each statement accounts for a separate or continuous visual part and designates which rule most strongly applied. In some cases more than one rule could have been followed, but the visual part distinguished remained the same using any of the appropriate rules.

Visual parts identified in the first example (Figures 7 and 8) were:

1. skirt panels of the same fabric which blended, considered as one part of the whole (II. C.).

2. and 3. and 4. rows of buttons which grouped, each formed one part (II. A.).
5. bow at neckline contrasting in value, treated as a separate part (I. C.).

6. white neck band blending with face, both considered as one continuous part (II. C.).

7. hair distinct from the whole, counted as a separate part (I. A.).

8. and 9. bodice sides and sleeves which were visually similar, each side blended to form one continuous part (II. C.).

10. and 11. sleeve cuffs and hands similar in value, each side considered as one continuous visual part (II. C.).

Visual parts identified in the second example (Figures 9 and 10) were:

1. skirt panels made of same fabric, counted as one part (II. C.).

2. bodice with continuous motifs, treated as one part (II. B.).

3. collar with distinct shape, considered as a separate part (I. B.).

4. face visually set off from surrounding parts, treated as a separate unit (I. A.).

5. hair distinct from the whole, counted as a separate part (I. A.).

6. and 7. Sleeve caps as visually defined structural units, treated as separate parts (I. B.).

8. and 9. sleeves as structural units, considered as distinct parts (I. B.).

10. and 11. hands of contrasting value, counted as separate parts (I. A.).
Figure 7. Line drawing showing separate and continuous parts

Figure 8. Photograph, Textiles and Clothing Department Collection, Iowa State University, Ames
Figure 9. Line drawing showing separate and continuous parts

Figure 10. Photograph; Jane Farrell-Beck personal collection; Ames, Iowa
Developing a Data Collection Form

After developing and testing the methodology for objectively analyzing visual parts of clothing as seen in photographs, I wrote a data collection form (Appendix A). The first section provided space to write the museum’s name and the date of examination. In the next section space was allowed to note information about the photograph itself: specifically, the type of photograph, whether daguerreotype (p. 27), ambrotype (p. 33), tintype (p. 34), or paper; the date and place it was taken; the photographer; and the subject(s) of the photograph. Finally, a section was provided for describing the costume and counting the number of visual parts. Space was also left for noting whether the photograph was especially representative of the overall data sample. This was to aid in decisions about which photographs to purchase for use in the thesis. For ease of analyzing the data collected, the forms were duplicated in a different color for each decade of the interval of the research.

Selection of Museums

To determine which museums contained photographic collections with pictures meeting the requirements set in my limitations, I sent out letters of inquiry with a short information request form (Appendix B) to be completed and returned to me. The questions on this form provided me with
information about the museums' collections, particularly the availability to researchers of full-length studio photographs from any of the decades between 1839 and 1929. From the nine letters I sent to museums throughout the United States, I received three positive responses. These were from the state historical societies of Iowa, Wisconsin, and Minnesota. Appendix C lists the museums that participated in this research and records by decade the number of photographs examined at each site.

Verification of Dates of Photographs

In their responses, the three museums I visited stated that their photographic collections were dated. As I collected the data I made certain that the assigned dates were accurate by comparing the photographs to copies of fashion plates with known dates.

The fashion plate copies were obtained from the Mary Barton Fashion Plate Collection at the Iowa State University Library. The publications in the collection from which fashion plates were duplicated included *Godey's Lady's Book & Magazine*, *Peterson's Ladies' National Magazine*, the *Delineator*, *McCall's Magazine*, and *Vogue*. Fashion plates were reproduced approximately every three or four years from a total interval of 1839 to 1930.
Comparison of the photographs to the fashion plates verified a majority of the pictures' dates. A few could be identified as being from a particular decade but the specific date given within that decade was questionable (Appendix C).

Examination of Photographs

Each of the museums I visited grouped together snapshots and studio photographs reproduced on paper. Before examining the photographs, I sorted through the available pictures to separate those studio photographs which met the requirements established by my limitations. Daguerreotypes, ambrotypes, and tintypes were compiled separately, but also needed to be sorted to find the full-length photographs of women's streetwear. For each of the qualifying photographs, I completed one data collection form. After examining all the available photographs for the interval of the research, I purchased representative examples from the photographs examined.

Obtaining usable photographs

Before the outset of this research, I expected that the museums would own more usable photographs. In an attempt to gather more data after the initial museum visits, I contacted eight private photographic collectors in and near Ames, Iowa. Two sources furnished a few additional samples (Appendix C).
Reviewing Photographic Developments and U.S. History

After concluding the collection of data from the photographs, I reviewed historic literature. First, I looked for developments in photography for the chosen interval of study, 1839 to 1929. Second, I searched for social and economic histories pertaining to Iowa, Minnesota, and Wisconsin, concentrating on the intervals from which the photographs were actually examined in each state. Gathering this information after examining the photographs helped in understanding, explaining, and analyzing the data I had obtained.
PHOTOGRAPHIC HISTORY, 1839 TO 1929

The invention of photography was the result of an evolution rather than a sudden discovery by any one man. Provided with the knowledge of the same principles, men working separately and without the knowledge of one another made the same inventions about the same time. It was typical for innovations to develop in this manner in the nineteenth century.

Origins of Photography

Thomas Wedgewood conceived of the original idea for photography but was unsuccessful in practice. Nicephore Niepce first succeeded in taking a permanent photo from nature. Louis Jacques Mande Daguerre invented the first practical process of photography. William Henry Fox Talbot introduced the negative-positive process (Newhall, 1982; Welling, 1978). Daguerre is often credited with inventing photography, but Gernsheim (1969) believed that Niepce deserved to be considered the true inventor of photography since he was the first to successfully take a lasting photograph.

Niepce’s heliography

Attempts at photography with a camera began in France in April 1816 by Nicephore Niepce. In 1826 Niepce made his
first successful experiment from nature. This was nine years prior to Talbot’s first paper negative and eleven years earlier than Daguerre’s first successful still-life. After discussions with Daguerre regarding the photographic process, Niepce signed a partnership contract for ten years with Daguerre on 14 December 1829. The purpose of the partnership was to perfect and exploit Niepce’s invention. In 1833, however, Niepce died without seeing his process perfected (Gernsheim, 1969; Newhall, 1982; Rinhart & Rinhart, 1981).

The daguerreotype

Credit goes to Niepce for developing the first photographic process, but Louis Jacques Mande Daguerre made photography practical. Daguerre’s first successful photograph was a still-life taken in his studio in France in 1837. He insisted on naming the invention for himself alone because the image was fixed by methods quite different from Niepce’s (Gernsheim, 1969; Newhall, 1982; Rinhart & Rinhart, 1981).

Newhall (1974), in his biography of Daguerre, presented Francois Dominique Arago, a noted physicist, astronomer, and member of the Chamber of Deputies, as proposing that the daguerreotype be purchased by the French government and be given as a free gift to the world. The invention was publicly announced on 19 August 1839 after Arago’s bill, stipulating that Daguerre receive a lifetime pension for the
daguerreotype process, was passed by the French government. The day after this announcement, Daguerre published a booklet, History and Description of the Process of the Daguerreotype and the Diorama (Daguerre, 1969).

Daguerre's booklet, first printed in 1839, contained the bill drafted by Arago on 15 June 1839, the Chamber of Deputies report of 6 July 1839, an historical account of the process of the daguerreotype, and a practical description of the daguerreotype as well as the diorama. To further explain the process described in Daguerre's manual, public demonstrations were also given. Daguerre's method was presented as a unique invention, being distinct from anything developed previously by Niepce.

Daguerre's process used the following steps. A silvered copper plate was thoroughly cleaned and polished. The plate was sensitized in an iodizing-box by vapor of iodine forming a thin layer of silver iodine on its surface. After exposure the image was developed using vapor of mercury heated over a spirit lamp. The mercury attached itself to the parts of the silver iodide which had been affected by light. The picture was then fixed with thiosulfate of soda, washed with distilled water, and gently dried over a flame. To prevent abrasion of the fragile deposit of mercury, the daguerreotype was framed behind glass with the edges tightly sealed to stop
oxidation of the silver (Gernsheim, 1969; Jenkins, 1976; Rinhart & Rinhart, 1981).

The invention captured the imagination of the public very quickly and many people rushed to buy daguerreotypes. A strong feeling arose against Daguerre when the public found out that he had secretly patented his process in London just five days before the French government donated the process to the whole world (Gernsheim, 1969). At this time the process was far from perfect and other scientists were left to speed the process in order to make it applicable for portraiture (Newhall, 1982; Rinhart & Rinhart, 1981).

The daguerreotype had some profound disadvantages according to Jussim (1974). The image was fragile and needed protection by glass. The mirror-like surface of the silvered copper plate made the picture difficult to see. The picture was laterally reversed, being a direct positive. It could not be used as a negative to print copies because it was on a solid metal plate; each picture was unique. The daguerreotype camera was slow, but remained the common model for several decades until improvements were made.

The photosensitive materials used in the photographic process proved to be perishable. They had to be exposed soon after sensitization and required development and fixing shortly after exposure. As a result production remained
decentralized. Daguerreotypists usually worked at the site of exposure (Jenkins, 1976).

**Talbot's negative-positive process**

William Henry Fox Talbot laid the foundation for modern photography. He developed a negative which could be used for the production of an unlimited number of positive copies. Early positives were hazy and indistinct. The grain of the paper was dependent upon perfect fixing and on making the negative transparent by waxing it before producing proofs. Talbot patented the negative-positive process, known as the calotype, on 11 February 1841, but it was slow to win acceptance in the United States (Buckland, 1980; Gernsheim, 1969).

In the calotype process solutions of nitrate of silver and iodide of potassium, which formed silver iodide, coated a good quality writing paper. Then the iodized paper was made more sensitive by brushing it with solutions of gallic acid and nitrate of silver. It was exposed in the camera while slightly moist, or in a dry state. After exposure the image was developed with further applications of gallo-nitrate of silver solution. When the paper was warmed by a fire for 1 or 2 minutes, the image became visible. The picture was fixed with a solution of bromide of potassium. Later, Talbot discontinued using bromide of potassium in favor of thiosulfate of soda, the only fixing agent which actually
dissolved away the unchanged silver. Applying gallow-nitrate of silver solution had the same function as the mercury developer had in the daguerreotype process. Talbot's negative produced an image as quickly as Daguerre's positive (Gernsheim, 1969; Newhall, 1982).

The Daguerreotype in the United States

D. W. Seager, an English subject living in New York, took the first successful daguerreotype in the United States on 16 September 1839. Seager gave a series of public lectures on the daguerreotype process beginning 5 October 1839 (Gernsheim, 1969; Rinhart & Rinhart, 1981).

Daguerre's agent, Francois Gouraud, arrived in New York late in November 1839, to establish an overseas agency for the sale of apparatus (Gernsheim, 1969; Jenkins, 1976; Newhall, 1982). In April 1840 Gouraud published a 16-page brochure clearly explaining the daguerreotype process. Gouraud's brochure was supposedly more understandable than Daguerre's manual describing the process. Gouraud recommended a room in the south-east corner of a building with a large window from floor to ceiling, with floor, ceiling, and walls white. The chair on which the person sat had to be of yellow wood. Men were to dress in a light gray coat, with pantaloons of a deeper hue, a vest with a fancy ground, yellow-orange if possible, and a white shirt.
contrasting with a cravat of a gray ground. Women were told to dress in the same shades as men, but black, green and red must be avoided. This arrangement was supposed to be best for the face, which was most important in a portrait (Gernsheim, 1969).

To position the sitter his or her head was placed on a semi-circle of iron fitted to the back of a chair. Arms were arranged leisurely and eyes were fixed on a well-defined object. Once everything was arranged, the portrait could be made in less than twenty seconds (Gernsheim, 1969; Rinhart & Rinhart, 1981).

In October 1839, Alexander S. Wolcott, a New York manufacturer of dental supplies, with his partner John Johnson, began experimenting with photography in anticipation of taking portraits. In March 1840, Wolcott and Johnson opened the world’s first photographic portrait studio (Gernsheim, 1969; Rinhart & Rinhart, 1981; Weiling, 1978).

Improvements in Photography

Wet collodion process

A new period in photography began in 1851, the year of Daguerre’s death. In March, Frederick Scott Archer introduced the wet collodion process in England. This photographic process was the most rapid one yet developed (Newhall, 1982; Rinhart & Rinhart, 1981).
Collodion was a sticky glue-like solution containing potassium iodide. The photographer poured collodion onto the glass plate and tilted it until the emulsion formed an even coating all over the plate. The plate was sensitized immediately by dipping it in a bath of silver nitrate solution. The photographer exposed the plate while it was still moist because the sensitivity deteriorated immensely as the collodion dried. As soon as the plate was exposed, he developed the plate with pyrogallic acid or ferrous sulphate. He fixed the picture with sodium thiosulfate or potassium cyanide. The collodion process was frequently referred to as the "wet plate process" since it was essential that all procedures be carried out while the coating on the plate was still moist (Gernsheim, 1969; Jenkins, 1976; Newhall, 1982).

The advantage of collodion was its high degree of sensitivity. Landscape exposures took only 10 seconds to 1 1/2 minutes. Small portraits, called ambrotypes, took 2 to 20 seconds. Collodion was therefore suited to portraiture (Gernsheim, 1969).

**Ambrotypes**

Archer and P. W. Fry found that by subjecting a collodion negative to a bleaching operation with nitric acid or bichloride of mercury, they transformed the blackened silver iodide into white metallic silver. In the ambrotype,
the negative image was converted into a seemingly positive one when viewed by reflective light against a dark background. When seen without a dark ground the picture retained its negative character. Patented in 1854, ambrotypes were used almost entirely for portraiture. Since ambrotype materials were relatively cheap and manipulation was simple, they soon displaced the daguerreotype (Gernsheim, 1969; Jenkins, 1976; Newhall, 1964).

**Tintypes**

In 1853 Adolphe Alexandre Martin, a French teacher and photographer, presented a memoir to the Academy of Sciences describing production of direct positives on tinned iron. Tintypes were easily produced and could be presented to the sitter within a few minutes. Patented in 1856, they became very popular in the United States and were collected in albums or cut to fit brooches and lockets. Because of their sturdiness, tintypes could be mailed, increasing their circulation and therefore peoples' awareness of tintypes. The Civil War spread the popularity of tintypes which in turn served as another avenue for disseminating fashion. Tintypes were converted into direct positives as were ambrotypes. Photography was no longer an art for the privileged. It was an art for the millions (Jenkins, 1976; Newhall, 1964).
Photographic Industry in the United States

Portrait photography was fast becoming a new industry. In 1841 photography was not known of as a profession, but both the number of photographers and the number of portrait studios increased rapidly. Jenkins (1976) described trends in the development of the American photographic industry. There was a movement from decentralized to centralized factory production. As a mass market for apparatus and materials emerged, functions separated and specialized. Photography increased in the scale and integration of enterprises. The awareness of technology and its sophisticated use as a business strategy was increased.

**Carte de visite**

In the early 1850s many photographers adopted the idea of placing a small portrait on a person’s visiting card which contained his name and address. These photographs, known as carte de visites, were usually full-length portraits, 2 1/4 inches by 3 1/2 inches, mounted on a card 2 1/2 inches by 4 inches. The carte de visite was patented in 1854 by Andre Adolphe Eugene Disderi (Newhall, 1982). It was fashionable to collect cartes in albums, like stamps. Cartes became very popular in the United States during the Civil War, but despite their popularity, Disderi died penniless.
It was the fashion in cartes to be represented in exotic surroundings. Clients would look awkward in unnatural positions required by the process. Studios provided background accessories for cartes. Common settings included: the column and curtain in the 1860s; the rustic bridge in the 1870s; the hammock and swing in the 1880s; and the bicycle, palm tree and cockatoo in the 1890s. The cartes served as small fashion plates to show off a sitter’s latest dress (Gernsheim, 1969).

Cabinet portraits

As the market for carte de vistes became saturated, cabinet views were introduced. The cabinet portrait had larger proportions than the carte de viste. For a cabinet view, a 4 inch by 5 1/2 inch photograph was mounted on a 4 1/2 inch by 6 1/2 inch card. By the late 1860s, cabinet portraits had become as fashionable as carte de visites had previously been (Gernsheim, 1969).

Further Developments in Photography

The 1860s, 1870s, and 1880s were times of rapid development (Jenkins, 1976). New applications of photography were investigated and new techniques were mastered. The inconvenience of the need for a moist state in the collodion process led to experiments to extend the period of sensitivity for collodion or to develop a dry plate process.
As early as the mid-1850s there were substances to preserve collodion coating in the sensitive state, but these substances made the process considerably slower than the wet plate method.

**Dry plates**

Four dry collodion processes were available. In one, the excess nitrate of silver was washed and the plate was dried. Before development, the exposed plate was dipped in the silver bath once more. In the second, the sensitized collodion plate was coated with hygroscopic substances, which kept the coating moist. In the third, a protective coating, like albumen or gelatine, covered the plate and it was dried. And in the fourth, a tannin solution was applied after washing off excess nitrate of silver. Then the plate was dried (Gernsheim, 1969).

**Collodion emulsion dry plates** In 1864 the first workable photographic emulsion was made, creating an important advance in dry plate photography. The emulsion could be preserved until needed for coating the plate. The collodion emulsion contained silver-bromide instead of iodide. It was necessary for silver-bromide to form the principal part of such emulsions. The light sensitivity of silver-bromide was effective only with alkaline development. Collodion emulsion dry plates were slower than wet plates of
the time, but were simpler and cheaper (Gernsheim, 1969; Newhall, 1982).

**Gelatine dry plates** A gelatine emulsion had often been suggested as a substitute for collodion, and in July 1873 the first gelatine emulsion was advertised for sale by a London photographer named John Burgess. Anyone could prepare dry plates equal in sensitivity to the best wet plates by pouring an emulsion on the glass and allowing it to dry. Exposure was the same as for the wet collodion plate. One application of the developer, alkaline pyro, revealed the picture. The practical introduction of the gelatine dry plate, by John Burgess, ushered in a new era of photography (Gernsheim, 1969; Jenkins, 1976).

Many professionals satisfied with the wet collodion process did not readily try the new gelatine dry plates, even though they were better and faster than other dry plates. Anyone who tried these new plates adopted them almost immediately (Jenkins, 1976).

The making of gelatine emulsion was best carried out by commercial firms on a large scale. By April 1878 four firms in England were producing gelatine dry plates which were superior to wet plates because of their good keeping qualities, their simplicity of development, their rapidity, and their sensitivity. By heating the emulsion, photographers found that the sensitivity could be greatly
increased. Exposure time of dry plates was 1/10 to 1/20 that of wet collodion plates. Photographs with exposures of less than a second were possible. Photographic technology became so simplified that the amateur movement began and grew wildly in the 1890s (Gernsheim, 1969; Jenkins, 1976).

**Emulsion papers**

The likelihood of albumen paper fading led experimenters to try applying emulsions, similar to those evolved for dry plates, to paper. The advantage of the paper negative compared with the glass plate was its light weight and sturdiness, lower price, and speed for positive printing (Jenkins, 1976). Shortly after the announcement of collodion bromide emulsion for negatives, a collodio-chloride of silver emulsion paper was introduced. This paper was more sensitive and permanent than albumen paper. In 1873, gelatine silver-bromide paper was first produced in 1873. Its recommended use was for the production of paper negatives and for positive copies (Gernsheim, 1969). The most important qualities of bromide papers were their speed, the ease with which contact prints or direct enlargements could be obtained by artificial light, and the consistency of the results (Jenkins, 1976).

Gelatine chloro-bromide paper, developed in 1883, had some characteristics of both bromide and chloride paper. The sensitivity was in between the two, and it printed a warm
brown tone. Chloride and chloro-bromide papers were initially called "gaslight paper" because they were sensitive enough to be printed by gaslight. Chloride papers were generally slower than bromide papers. Because they were cheap and simple to manipulate, chloride papers were used for contact printing. Bromide paper was used for enlarging (Gernsheim, 1969; Jenkins, 1976).

Photography on film

Photographers were eager to replace glass plates by a lighter and less fragile support, but it was not easy to find a material as transparent and smooth as glass, that was as light as paper, but free from impurities and grain. Film filled this role.

Stripping film Stripping film was a paper negative in which the paper was used as a support for the emulsion. It was peeled off before printing to prevent the grain of the paper from being reproduced in the positive. A variety of kinds of stripping film were on the market, but it was not employed to a large extent until George Eastman introduced it for the Eastman/Walker roller slide camera in 1886 and for the Kodak camera in 1888. Stripping film's popularity was short-lived because only one year later, in 1889, the Kodak was loaded with nitro-cellulose roll-film (Mees, 1961).
Eastman’s stripping film had a paper base, a layer of soluble gelatine, a layer of collodion, and the sensitized gelatine emulsion. The roll of stripping film was cut up into individual negatives and fixed after exposure. The emulsion side of the film strip was adhered to glass plates and coated with glycerine to help with removal of the image. Applying hot water to the paper dissolved the soluble gelatine, permitting the paper to be stripped off. Since the image on the glass was reversed it had to be transferred once again to a moistened gelatine sheet. It was then ready for printing (Gernsheim, 1969; Mees, 1961).

Flexible film Celluloid was developed from a substance chemically known as cellulose, and was registered in 1873 as a trade mark in the United States and Great Britain by John W. Hyatt. Hyatt had been persuaded to manufacture thin sheets of celluloid. In 1888 he succeeded in creating clear, uniform sheets with a thickness of 1/100 inch (Gernsheim, 1969). It was perfect for a new photographic base. Celluloid was the best substitute for glass yet devised. Celluloid was light, tough, flexible, and could be handled like a glass plate in development.

In December 1889 a patent was granted to Eastman Kodak for nitro-cellulose roll-film (Mees, 1961). A layer of hardened gelatine that did not curl was on the back of the celluloid. The only change in film material since then
occurred about 1930. Highly flammable nitro-cellulose was replaced by non-flammable cellulose acetate. The modern era of photography had begun with the invention and popularization of transparent roll-film.

The amateur movement

Simpler and more compact cameras developed in the late 1880s. These small, hand-cameras, along with the improvements made in developing and printing processes, were influential in the expansion of the amateur photography movement. Individuals previously hesitant to try photography were able to purchase one of the new cameras, load it with film, and simply snap the pictures. After the film was exposed, the photographer no longer had the responsibility of developing and printing the pictures. Growth in the photographic industry led to establishment of developing and printing firms, which relieved amateurs of carrying out these processes. After the late 1880s, expansion in the number of amateur photographers far surpassed increases in the number of professional photographers (Gernsheim, 1969; Newhall, 1982).

Summary and Conclusions

Various individuals were credited with the diverse photographic innovations during the nineteenth century. The first permanent photograph was taken from nature in 1826 by
Nicephore Niepce. In 1839 Louis Jacques Mande Daguerre made photography practical and it was widely adopted. William Henry Fox Talbot developed the negative-positive process. Patented in 1841, this process laid the foundation for modern photography. In 1851 Frederick Scott Archer introduced the wet collodion process which was more rapid than any process previously invented. The resulting ambrotypes and tintypes were used often for portraiture beginning in the mid-1850s.

Because of the inconvenience of the wet plate process, dry plates were developed. Collodion emulsion dry plates were workable by 1864. In 1873 gelatine emulsion dry plates were introduced as a substitute for collodion plates. To replace the heavy glass plates used for negatives, emulsion papers were invented and first produced in 1873. Stripping film, a paper negative in which the paper was employed as a support for the emulsion, was used in the late 1880s. Beginning in 1889, celluloid was used as a photographic base. Flammable nitro-cellulose roll-film was replaced by non-flammable cellulose acetate about 1930. These photographic developments, combined with improvements in the camera, brought about the expansion of the amateur photography movement.

When photography was first invented, long exposure times were required. Consequently, individuals posing for photographs needed to be extremely still to prevent the
pictures from becoming indistinct. Photographers often owned chairs with head rests that helped subjects remain stationary. Suggestions were also made for the best type of clothing to wear while being photographed. These recommendations did not have any expressed association with the sensitivity of the photographic process. The suggested dress would, however, reveal value contrasts when the photograph was developed. The contrasts were supposedly best for enhancing the subject's face, the focal point of the photograph.
SELECTED REGIONAL HISTORY

I collected data in Iowa City, Madison, and St. Paul. However, the historical background discussed here has focused on states because the photographs were not necessarily representative of the cities in which the state historical societies were located, but were from areas throughout the three states. The purpose of this research was to study complexity of dress in photographs, therefore general state histories provided sufficient background for the research.

Because photographs were examined from the 1850s to 1929, the historical background concentrated mainly on that interval. Information from the 1930 census was included since the data reflected the decade of the 1920s.

Economic and social conditions were investigated to reveal the level of prosperity, which would in turn suggest reasons for the presence or absence of studio photographs (the penetration of photography) in each state. No political history was included.

Population

Iowa

Iowa, located in the west central United States, is bordered by the Missouri and Big Sioux Rivers to the west and by the Mississippi River to the east. After a rapid influx of settlers during its territorial years from 1838 to 1846,
Iowa entered the Union in 1846 (Wall, 1978) and by 1850 the population numbered 192,214 (Seventh census, 1853). By 1860 Iowa’s population had more than tripled to 674,913 (Population of the United States, 1864). Statistics of the population (1872) showed Iowa’s population to have surpassed 1 million inhabitants by 1870. Population continued to increase steadily and the Twelfth census (1904) reported numbers in excess of 2 million people. Through 1930 Iowa’s population remained within the range of 2 million people. The only decrease in population for the interval of the research was revealed in the Thirteenth census (1913).

Wisconsin

Wisconsin, located in the east central United States and bordered by Lake Superior to the north, Lake Michigan to the east, and the Mississippi River to the west, was appropriately named. Wisconsin means "gathering of the waters" (Current, 1977). The territory of Wisconsin became a state in 1848 (Nesbit, 1973) with the Seventh census (1853) revealing a population of 305,391. Over 1 million people were reported living in Wisconsin by 1870 (Statistics of the population, 1872). With a consistent and steady rise in population, Wisconsin had over 2 million residents by the Twelfth census (1904). By 1930 Wisconsin’s population numbered nearly 3 million (Fifteenth census, 1931).
Minnesota

Located in the north central United States, Minnesota is bordered on the west by the Red River of the North, on the northeast by Lake Superior, and on the east by the Mississippi River. As a territory, Minnesota had a population of 6,077 in 1850 (Seventh census, 1853). By the time Minnesota gained statehood in 1858 (Lass, 1977), the population, recorded during the 1860 census at 172,023, had increased almost thirty-fold from the 1850 figure (Population of the United States, 1864). The Report on population (1895) showed Minnesota residents to number more than 1 million. By 1910 the population surpassed the 2 million mark (Thirteenth census, 1913). With strong and steady increases, the number of Minnesota inhabitants was recorded at 2,563,953 in 1930 (Fifteenth census, 1931).

Comparison

The population for each state from 1850 through 1930 has been provided for comparison in Table 1. The increase in numbers of people was nearly parallel for Iowa and Wisconsin during the interval. Gaining statehood within two years of each other, both Iowa and Wisconsin reached the population level of 1 million in the 1870 census and 2 million in the 1900 census. Minnesota, which became a state a decade after Iowa and Wisconsin, attained a population of 1 million in the
Table 1. State populations from the interval of 1850 to 1930

<table>
<thead>
<tr>
<th>State</th>
<th>1850</th>
<th>1860</th>
<th>1870</th>
<th>1880</th>
<th>1890</th>
<th>1900</th>
<th>1910</th>
<th>1920</th>
<th>1930</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>192,214</td>
<td>674,913</td>
<td>1,194,020</td>
<td>1,642,615</td>
<td>1,911,896</td>
<td>2,231,853</td>
<td>2,224,771</td>
<td>2,404,021</td>
<td>2,470,939</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>305,391</td>
<td>775,081</td>
<td>1,054,670</td>
<td>1,315,497</td>
<td>1,606,880</td>
<td>2,069,042</td>
<td>2,333,860</td>
<td>2,632,067</td>
<td>2,939,006</td>
</tr>
<tr>
<td>Minnesota</td>
<td>6,077</td>
<td>172,023</td>
<td>439,706</td>
<td>780,773</td>
<td>1,301,826</td>
<td>1,751,394</td>
<td>2,075,708</td>
<td>2,387,125</td>
<td>2,563,953</td>
</tr>
</tbody>
</table>

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*aSeventh census of the United States: 1850, 1853.*

*bPopulation of the United States in 1860, 1864.*

*cStatistics of the population of the United States, 1872.*

*dStatistics of the population of the United States at the tenth census (June 1, 1880), 1883.*

*eReport on population of the United States at the eleventh census: 1890, 1895.*

*fTwelfth census of the United States taken in the year 1900, 1904.*

*gThirteenth census of the United States taken in the year 1910, 1913.*

*hFourteenth census of the United States taken in the year 1920, 1921.*

*iFifteenth census of the United States: 1930, 1931.*
1890 census, two decades later than her neighbors. A population of 2 million was reached in the 1910 census, one decade after Iowa and Wisconsin. By the 1930 census, with continued fast-paced growth, Minnesota's population surpassed that of Iowa but remained less than that of Wisconsin.

Education and Illiteracy

Iowa

Public schools were established by the Iowa Territorial Legislature in 1838. By 1846, when Iowa became a state, there were approximately 100 public schools (Dwelle, 1958). The public school, or common school, was open to all white citizens and was supported by tax dollars. These early schools taught reading, writing, and arithmetic because the citizens believed that only the 3 R's were necessary. The period of attendance was often less than two months per year for many country school students. Iowans began to want better preparation of students for further education. In 1857 a study was conducted in order to improve Iowa's educational system by regulating the common schools (Wall, 1978).

The importance of education to Iowans was further evidenced by the development of higher education. Iowa's first high school opened in 1856 and its second in 1858 (Iowa centennial, 1946). Private colleges founded and supported by
religious groups, often with little financial backing, were established throughout the state. In addition, three state universities were provided for by tax dollars. These were the State University of Iowa, opening in 1855; Iowa State College, founded in 1858; and Iowa State Teachers College, established in 1876 (Dwelle, 1958; Wall, 1978).

It was not until 1902 that school attendance was mandatory for children between the ages of 7 and 16 (Wall, 1978). Even so, the importance Iowans placed on education helped keep the rate of illiteracy low in comparison with the other states of the Union. In 1880, the first census year that illiteracy was given as a percentage of the population for persons over 10 years of age, Iowa’s rate of illiteracy was only 3.9 percent (Statistics of the population, 1883). By the end of the interval in 1930, the illiteracy rate was a mere 0.8 percent, the lowest rate of any state (Fifteenth census, 1931).

Wisconsin

The Wisconsin state legislature in 1849 reworked the existing common school system that had been provided by the territorial government. The public schools provided an opportunity for education supported by tax dollars, rather than by private funding (Current, 1977).

Teaching Protestant values, patriotism, and English, the public schools were held in high esteem by Wisconsin's
Protestants. A number of private and parochial schools were also established in Wisconsin by immigrants wanting to retain their native languages and customs. There was much conflict between the public and parochial schools in the state. In teaching English, the public schools aimed at assimilating new immigrants to the American culture as quickly as possible. Because the parochial schools desired continuation of native customs, they resisted the public schools’ recommendations that they teach English and U.S. history (Current, 1977).

In an effort to resolve the problem, in 1889 the Bennett Law was passed. This law required children between the ages of 7 and 14 to attend a school, public or private, that taught reading, writing, arithmetic, United States history, and the English language. There was so much opposition to this law by private and parochial schools that it was soon repealed (Thwaites, 1973).

Provisions for higher education were made early in the state’s history. Protestants and Catholics founded a number of colleges. The University of Wisconsin, a state-supported school, was established in 1848 (Thwaites, 1973).

Residents of Wisconsin were concerned with education, despite the apparent conflicts. As a result levels of illiteracy remained relatively low. In 1890 Wisconsin’s highest illiteracy rate was recorded at 6.7 percent of the
population for people over 10 years of age (Report on population, 1895). By 1930 the percentage had dropped to 1.9 (Fifteenth census, 1931). In the latter year Wisconsin claimed the lowest percentage of illiteracy of any state east of the Mississippi River (Wisconsin: Facts, 1930).

Minnesota

The foundation for the state system of common schools was laid in the early 1850s (Folwell, 1973). The law provided schooling free to the public for all people between the ages of 4 and 21. These early schools taught reading, writing, arithmetic, and geography. Students often attended school for only two to three months each year (Blegen, 1975).

Initial development of high schools was slow. With the recognition of the importance of education beyond the elementary level and the granting of state aid in 1878, the number of high schools increased at an accelerating rate (Blegen, 1975).

Minnesotans, well aware of the importance of higher education, were instrumental in the foundation of colleges. Leaders in the establishment of Minnesota’s colleges were the Swedish and Norwegian Lutheran churches (Lass, 1977). Land for the University of Minnesota was set aside in 1851, but the state supported school officially opened only in 1869 (Folwell, 1973).
In 1881 Minnesota organized its school system from the common school through the high school to the universities and colleges (Folwell, 1973). Minnesotans’ recognition of the value of an education contributed to the state’s low rate of illiteracy. Figures recorded in 1880 revealed an illiteracy rate of 6.1 percent for Minnesotans over the age of 10 (Statistics of the population, 1883). But, by 1930 the rate had decreased to a slight 1.3 percent (Fifteenth census, 1931).

Comparison

Education was highly valued at all levels within the school systems of Iowa, Wisconsin, and Minnesota. Early in the development of each state, common schools were established which taught reading and writing. In addition, high schools, as well as numerous colleges and universities, were founded. These schools were instrumental in producing the relatively low levels of illiteracy in Iowa, Wisconsin, and Minnesota compared with other states in the Union.

The rates of illiteracy (Table 2) were higher in 1880 than 1930 for each of these states. Moreover, the percentage of illiteracy showed a general decrease throughout the interval. This can be attributed to the increased recognition of the importance of education, the improvement of the school systems over time, and possibly fewer non-English speaking people by 1930.
Table 2. Percentage of illiterate persons over the age of ten from 1880 to 1930

<table>
<thead>
<tr>
<th>State</th>
<th>1880</th>
<th>1890</th>
<th>1900</th>
<th>1910</th>
<th>1920</th>
<th>1930</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>3.9</td>
<td>3.6</td>
<td>2.3</td>
<td>1.7</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>5.7</td>
<td>6.7</td>
<td>4.7</td>
<td>3.2</td>
<td>2.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Minnesota</td>
<td>6.1</td>
<td>6.0</td>
<td>4.1</td>
<td>3.0</td>
<td>1.8</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*aStatistics of the population of the United States at the tenth census (June 1, 1880), 1883.

*bReport on population of the United States at the eleventh census: 1890, 1895.

*cTwelfth census of the United States taken in the year 1900, 1904.

*dThirteenth census of the United States taken in the year 1910, 1913.

*eFourteenth census of the United States taken in the year 1920, 1921.

*fFifteenth census of the United States: 1930, 1931.
Newspaper Communication

Iowa

Iowa's first newspaper was established in 1836, during territorial days (Wall, 1978). By 1850, 29 newspapers were available to Iowa's citizens and had a reported circulation of 22,500 (Seventh census, 1853). These newspapers included daily, tri-weekly, semi-weekly, weekly, semi-monthly, monthly, and quarterly issues. The numbers of newspapers published in Iowa increased rapidly and obtained their maximum in 1900 with 1,104 publications (Twelfth census, 1904). After 1900 the numbers of newspapers decreased, falling to 599 in 1930 (Fifteenth census, 1931). Circulation, however, maintained a continual increase during the entire interval. By 1930 circulation for all classes of newspapers reached 4,736,143 (Fifteenth census, 1931).

Wisconsin

In 1833 Wisconsin published the first newspaper between Lake Michigan and the Pacific Ocean (Thwaites, 1973). By 1850 Wisconsin's newspapers numbered 46, with a circulation of 33,015, which included all classes of newspapers (Seventh census, 1853). The greatest number of newspapers published were recorded at 677 in 1910 (Thirteenth census, 1913). Although decreasing to 593 in 1920 (Fourteenth census, 1921), the number of papers showed a slight increase in 1930 with
607 publications (Fifteenth census, 1931). Throughout these 80 years circulation multiplied to number 6,355,172 in 1930 (Fifteenth census, 1931).

Minnesota

Providing news of America and the world, Minnesota's first newspaper was organized in 1848 (Lass, 1977). Many early newspapers promoted Minnesota in an attempt to encourage more people to immigrate to the state. As a territory Minnesota had no recorded newspapers in 1850 (Seventh census, 1853), but as a state Minnesota reported 47 papers in 1860 (Population of the United States, 1864). Taking into account all classes of newspapers, circulation in 1860 was 32,554 (Population of the United States, 1864). Publication numbers increased constantly until 1920 when 767 papers were noted (Fourteenth census, 1921). In 1930 the number of publications fell to 649, but circulation, having steadily increased, reached its maximum of 4,746,5574 (Fifteenth census, 1931).

Comparison

In early territorial years of the states, newspapers provided a source of information for people living in Iowa, Wisconsin, and Minnesota. Although the numbers of newspapers first increased and then decreased, the circulation for the papers in each of the states grew unceasingly. This seems to
show that after 1920 there were fewer small newspapers and more subscribers to the larger ones. With greater numbers of newspapers available in 1930 than in 1850 and the immense circulation which emerged throughout the interval (Table 3), newspaper communication proved to be an effective means of reaching the citizens within the states.

Economic Diversity

Iowa

In the 1850s pioneer farmers coming to Iowa brought with them wheat, oats, flax, and fruit trees but soon found these crops to be disease prone. In searching for a seed resistant to disease, farmers observed Indian maize, or corn, which flourished in the Iowa soil. They soon switched to growing corn and by the 1880s corn was the major crop under cultivation (Wall, 1978).

With revolutions in technology and improvements in crop and livestock breeding, agriculture proved to be Iowa’s top industry. Decreased manpower during the Civil War encouraged farmers to adopt the newly invented machines for cultivating, planting, and harvesting. Machines compensated for fewer workers but also allowed for more land to be cultivated, resulting in greater yields at harvest. In the early twentieth century the Iowa farmer was influenced tremendously by two changes in crop production. Beginning in 1910 various
Table 3. Numbers of newspapers and their respective circulations from 1850 to 1930

<table>
<thead>
<tr>
<th>State</th>
<th>1850a</th>
<th>1860a</th>
<th>1870a</th>
<th>1880b</th>
<th>1890b</th>
<th>1900b</th>
<th>1910c</th>
<th>1920d</th>
<th>1930e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td>29</td>
<td>130</td>
<td>233</td>
<td>1,004</td>
<td>804</td>
<td>1,104</td>
<td>1,004</td>
<td>845</td>
<td>599</td>
</tr>
<tr>
<td></td>
<td>22,500</td>
<td>89,240</td>
<td>219,090</td>
<td>508,885</td>
<td>1,088,019</td>
<td>1,884,875</td>
<td>3,806,253</td>
<td>4,910,108</td>
<td>4,736,143</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>46</td>
<td>155</td>
<td>190</td>
<td>340</td>
<td>521</td>
<td>654</td>
<td>677</td>
<td>593</td>
<td>607</td>
</tr>
<tr>
<td></td>
<td>33,015</td>
<td>139,145</td>
<td>343,385</td>
<td>403,176</td>
<td>1,053,389</td>
<td>1,426,499</td>
<td>2,121,662</td>
<td>2,521,583</td>
<td>6,355,172</td>
</tr>
<tr>
<td>Minnesota</td>
<td>0</td>
<td>49</td>
<td>95</td>
<td>223</td>
<td>445</td>
<td>699</td>
<td>758</td>
<td>767</td>
<td>649</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>32,554</td>
<td>110,778</td>
<td>193,581</td>
<td>1,023,005</td>
<td>1,949,630</td>
<td>3,176,700</td>
<td>4,506,073</td>
<td>4,746,574</td>
</tr>
</tbody>
</table>

*aStatistics of the population of the United States, 1872.
*bTwelfth census of the United States taken in the year 1900, 1904.
*cThirteenth census of the United States taken in the year 1910, 1913.
*dFourteenth census of the United States taken in the year 1920, 1921.
*eFifteenth census of the United States; 1930, 1931.
strains of the soybean brought from the Orient were tested for their suitability as a rotation crop with corn. In 1922 developments in hybrid corn started, which immeasurably increased production (Wall, 1978).

Iowa has continuously been a leading agricultural center in the world (Iowa centennial, 1946) and has ranked first among the states in per capita production of a number of agricultural products for almost every year recorded (Carpenter, 1940). Major products included corn, oats, hogs, corn-fed cattle, soybeans, poultry, eggs, and popcorn (Carpenter, 1940; Dwelle, 1958; Iowa centennial, 1946). Agriculture in the 1880s was extremely profitable in Iowa.

The development of railroads in the 1850s and 1860s prepared the way for Iowa to ship crops to much wider markets, a critical advantage to farmers, and also to expand into other industries. It was no longer necessary to locate businesses near the main route for transportation, the Mississippi River. Activity could be situated throughout the state.

As a natural outgrowth of farming, some of the first businesses to develop were agriculture-related industries. Meat packing, cereal production, and manufacture of farm machinery were three such businesses. The meat-packing industry began in the late 1850s (Dwelle, 1958) and by 1923 Iowa ranked fourth in that industry (Iowa centennial, 1946).
In 1873 Quaker Oats built in Iowa an oatmeal factory which became the largest cereal plant in the world (Carpenter, 1940; Dwelle, 1958). Iowa provided a great market for farm machinery and in 1892 the John Deere Company set up production in the state (Iowa centennial, 1946; Wall, 1978).

Non-agriculture-related industries developed in Iowa as well. The largest washing machine business in the world, Maytag, got its start in the state in 1890 (Dwelle, 1958; Iowa centennial, 1946). In 1900 the Thomas D. Murphy Company, the pioneer of all calendar companies, was established in Iowa. In addition, the Sheaffer Fountain Pen Company, founded in the state in 1908, became the biggest fountain pen manufacturing plant in the world (Dwelle, 1958).

Besides its soil, Iowa had other natural resources to tap during the interval of 1850 to 1930. Coal fields located in the south central part of the state were a minor factor in the state’s economy (Wall, 1978). Deposits of clay and limestone were used for the manufacture of cement, plaster, tile, and wallboards (Dwelle, 1958; Iowa centennial, 1946). Also worth noting was the pearl button industry which began along the banks of the Mississippi River in 1891. Buttons were carved from the pearl lined shells of fresh water clams (Carpenter, 1940; Dwelle, 1958).
Wisconsin

For early farmers in Wisconsin, spring wheat was the best cash crop. When railroads opened up markets world-wide in the 1850s, wheat production became extremely profitable (Current, 1977). For a few years in the early 1860s Wisconsin was the leading wheat-producing state in the nation (Nesbit, 1973; Thwaites, 1973). Beginning in the 1850s and spanning through the 1880s flour milling was Wisconsin's most valuable industry. But the soil eventually became depleted and the dominance of wheat declined (Current, 1977; Nesbit, 1973).

Soil exhaustion led to diversification. In the transitional years from wheat to dairying in the late 1860s through the late 1880s, farmers planted flax, sorghum, sugar beets, hops, and large quantities of corn, oats, and hay to feed increasing numbers of horses, pigs, cows, and sheep (Current, 1977; Nesbit, 1973). Eventually farmers were convinced that dairying would be the best alternative and would provide the greatest profits in the long run. Dairying was a costly, labor-intensive, year-round operation, not seasonal like raising grains. It took some time before farmers realized its benefits (Nesbit, 1973). Wisconsin cheese factories multiplied in the 1870s, supplying both national and foreign markets. During the 1880s butter creameries expanded. It was not until after 1900, with
refrigeration and improvements in transportation, that sales of fresh milk increased. By the early twentieth century, after a difficult time of experimentation and adjustment, dairying became Wisconsin's specialty (Current, 1977). In the 1920s dairying was the state's number-one industry.

Early on, farmers took up raising hops as a supplementary crop to wheat. The growing of hops, along with a new process developed in the 1840s which made beer less perishable, contributed to the brewing industry's rapid expansion. Pabst and Schlitz, two of the nation's largest breweries, were located in Wisconsin. Milwaukee exported beer as early as 1852 and by 1872 was the largest beer-exporting center in the United States. In 1920 Prohibition was disastrous for Wisconsin's brewing industry. Although beer could not be produced, large breweries used their machinery by adapting it to other products. When Prohibition was repealed thirteen years later, the industry was revived and beer was produced once again (Current, 1977).

Lumbering started in the late 1840s in Wisconsin, but showed little growth until the 1870s and 1880s. Much of the inland lumber remaining in the northern two-thirds of the state became accessible with the expansion of railroads into that area. Besides taking workers to the lumber, railroads could transport hardwood logs which would sink in the rivers. Railroads helped lumbering to become a big business in
Wisconsin. By the end of the 1880s lumbering had superseded flour milling as the most important industry in the state. Even though lumbering had reached its peak by 1892, production remained substantial and lumber products surpassed all other products manufactured in Wisconsin through 1910 (Current, 1977; Nesbit, 1973).

As lumbering decreased, Wisconsin once again looked for other industries to provide employment. The aluminum cookware industry, beginning in 1895, created needed jobs for the state. The industry controlled less than 5 percent of the nation's sales in aluminum pots and pans in 1910. However, by 1920 Wisconsin had captured over 50 percent of the business, producing more aluminum cookware than all other states combined (Current, 1977; Wisconsin: Facts, 1930).

The heavy machinery industry began developing in 1847 with farm machines produced by J. I. Case Company. Other machine shops appeared in the 1850s, producing a variety of heavy machine products. In the 1870s the machinery industry became widely dispersed throughout the state. By 1930 manufacturing of heavy machinery was Wisconsin's largest producing industry in value of products manufactured (Current, 1977; Nesbit, 1973).

Minnesota

Wheat production, becoming a major source of income in Minnesota in 1850, continued to expand each decade until
1890. Seventy percent of Minnesota's tilled land was planted in wheat by the late 1870s. This was a time of specialized wheat farming. By the 1880s the soil was becoming depleted, creating favorable circumstances for diversification. Farmers in southeastern Minnesota began to diversify, but those in southwestern part of the state, as well as farmers in the Red River Valley, continued with wheat production. In the 1890s and 1900s, even though wheat farming was no longer expanding and only 30 percent of the cultivated land was in wheat, harvests continued to increase. Minnesota was the nation's leading wheat producer (Blegen, 1975; Lass, 1977).

A number of things contributed to the success of wheat farming in Minnesota. Land was free or very cheap in pioneer days, which encouraged people immigrating to the state to enter into farming. Because good soil was available, the initial yields of wheat were large, providing farmers with cash returns and incentive to continue production of the crop. Improvements in farm mechanization happened at the same time as expansion began in wheat production. This permitted farmers to handle larger acreages in Minnesota's short growing season. The profitability of wheat farming was further enhanced by the expansion of railroads into the state, transporting the crop to local and export markets (Blegen, 1975; Lass, 1977).
From 1880 to 1930 many adjustments were made in agriculture. Farmers in Minnesota diversified into a number of different areas. Oats, corn, rye, potatoes, and alfalfa were raised. Raising beef cattle and dairying became important as well (Blegen, 1975; Lass, 1977).

Development of flour milling coincided with the tremendous production of wheat. In the 1860s the number of flour mills in Minnesota increased greatly. An abundance of wheat, water power, money and organization, technological improvements in processing, and railroad advances all were factors contributing to the growth of flour milling in the state. The mills succeeded in producing better flour in larger quantities at lower costs, making flour milling a big business in Minnesota (Blegen, 1973; Lass, 1977). By the 1880s Minneapolis was the largest producer of flour in the nation (Current, 1977). As a result of decreasing wheat production because of further soil exhaustion, flour milling began to decline in Minnesota in the 1920s. Seeing that they were losing the lead in flour production, Minneapolis companies chose to provide manpower, financing, and technological developments for the newly emerging milling centers in Kansas City and Buffalo. Thus, these firms retained company headquarters in Minneapolis and Minnesota was able to continue with the flour milling industry in the state, only with a different emphasis (Lass, 1977).
Before the dominance of wheat in the 1860s, lumbering had been the most profitable business in Minnesota. The lumber industry was very important to the economic development of the state. In addition to supplying building materials for Minnesota’s growth, lumbering raised the capital necessary to finance the start of flour milling and railroad construction. With a slow pace of development, the earnings from lumbering were surpassed by those from wheat production and flour milling. Even though lumbering did not regain its status of primary industry in the state, it still became a big business in Minnesota. After the Civil War, technological improvements in lumbering and saw milling increased the demand for lumber. This brought lumbering to its peak between 1870 and the late 1890s which, in turn, led to the exhaustion of Minnesota’s pine forests. Production declined gradually from the late 1890s until 1905; then it decreased dramatically. By the 1920s the lumber industry had shifted to the Pacific Northwest (Blegen, 1975; Lass, 1977).

Besides its rich soil and its abundant forests, Minnesota possessed another lucrative natural resource found in the northeastern portion of the state, iron ore. Iron ore was found in the early 1880s at the Vermillion Range. Exploration of the Mesabi Range led to discovery of ore in 1890. By the late 1890s the third major ore deposit was unearthed at the site of the Cuyuan Range. The ranges grew
rapidly because of the increased demand for iron and steel as a result of the great industrial expansion in the United States after the Civil War. Of the three ranges, the Mesabi came to produce the greatest amount of iron ore. The soft ore of the Mesabi Range laid near the earth's surface in horizontal beds and could be strip mined, a much easier process than the underground mining that was necessary at the other two ranges. The Mesabi Range had become the largest source of iron ore in the United States by the early twentieth century. The growth of iron mining was extraordinary. Almost two-thirds of all iron mined in the world came from Minnesota by the early 1930s (Blegen, 1975; Lass, 1977).

The Minnesota Valley Canning Company began canning sweet corn in 1903. This company, which started marketing peas in 1923, made famous the Jolly Green Giant. Libby's, Del Monte, and General Foods also produced canned and frozen vegetables in Minnesota (Lass, 1977).

Comparison

From the 1850s through 1930 industry in Iowa, Wisconsin, and Minnesota was both diverse and decentralized. Farming led to related industries in all three states, from meat packing and flour milling to the manufacture of farm machinery. Industries in Iowa, Wisconsin, and Minnesota exploited natural resources such as coal, limestone, forests,
and iron ore. Other miscellaneous businesses, like manufacturing calendars, brewing, and canning vegetables, added to the economic diversity of the states. There was no sense of greater prosperity in one state than in the others. All three flourished during the interval researched.

Transportation

Iowa

Transportation in Iowa’s first years was mainly by horseback or in vehicles that could be pulled by horses. In the late 1840s and early 1850s wagons and stagecoaches were common (Carpenter, 1940; Dwelle, 1958; Wall, 1978). Water travel was also significant. For transportation within the state, smaller boats were used on Iowa’s rivers (Dwelle, 1958). The Mississippi River allowed use of larger vessels, especially the steamboat in the 1860s (Iowa centennial, 1946; Wall, 1978).

By 1855 Iowa had its first railroads, which greatly reduced water transportation within the state (Dwelle, 1958). As early as 1856 Congress provided for four main railroad lines to pass through Iowa (Wall, 1978), but it was not until after the Civil War that railroad building really progressed (Iowa centennial, 1946). The first interstate line was completed in 1867, and the first transcontinental line was finished in 1869 (Dwelle, 1958). In the 1880s five main
railroad lines crossed the state east and west, with additional lines running north and south. Iowa’s system of railroads was one of the most complete in the nation; all citizens in the state were within 25 miles of a railroad station (Wall, 1978).

In the early 1900s the Ford Model-T was seen on Iowa roads (Dwelle, 1958). Most of Iowa’s roads were rough, and as late as 1925 only 586 miles of the roads were paved (Carpenter, 1940).

Wisconsin

Many horses and wagons traveled throughout Wisconsin on roads, the most important means of transportation in the state during pioneer days. However, roads were less than adequate until the state took responsibility for them in 1911 (Thwaites, 1973).

Water transportation was notable beginning in the 1850s with the increasing use of steamboats. Rivers within Wisconsin connected the state with the Mississippi River and Lake Michigan, both primary routes of transportation for imports and exports (Current, 1977). Later in the nineteenth century ports on Lake Superior became important (Thwaites, 1973).

Wisconsin’s first railroad lines, laid in 1851, drew much patronage from water travel within the state (Current,
1977). With two main lines running across the state, railroad building had barely begun when it was forced to slow down during the Civil War (Nesbit, 1973). In the 1870s construction of railroad lines revived with continued western development and with penetration of northern Wisconsin (Current, 1977; Nesbit, 1973; Thwaites, 1973).

**Minnesota**

Territorial roads were made for frontier defense in Minnesota. Horses, wagons, buggies, and stagecoaches were means of transportation (Blegen, 1975). In the 1850s water travel became more important for Minnesota, especially with steamboat expansion on the Mississippi and Red Rivers and on Lake Superior. However, water transportation had its limitations; rivers were frozen for at least five months during the winter (Blegen, 1975; Lass, 1977).

Minnesota began planning for railroads in the 1850s, with the first lines being laid in 1862. However, little construction got under way until after the Civil War (Blegen, 1975). In the 1870s and 1880s railroads expanded across the northern plains to the Red River of western Minnesota (Folwell, 1973; Lass, 1977). By 1880 all the main lines had been laid which connected Minnesota's hinterlands with the hubs of the towns and cities (Lass, 1977).

Automobiles were in an experimental stage in the 1890s, but by the early 1900s they were in production. Roads were
rough when the automobile was first introduced, but increasing numbers of cars influenced road improvements within the state. In 1902 Minneapolis sported 12 automobiles (Blegen, 1975).

Comparison

Transportation in Iowa, Wisconsin, and Minnesota went through the same basic stages. Beginning with horse travel across the land and water travel on rivers and lakes, transportation improved with railroad expansion and the invention of the automobile. Each of these forms of mobility carried people around within the states, as well as from state to state. Horses pulling wagons over rough roads tended to be quite slow and rivers were frozen during the winter. Railroads overcame these limitations; they offered both speed and efficiency. With improvements in the automobile and in paved roads, cars eventually became a prominent and convenient means of travel for citizens of Iowa, Wisconsin, and Minnesota. However, from 1850 through 1930 railroads were the most influential means of transportation in the three states.
For the early settlers in Iowa, social events such as quilting, sewing, and corn-husking bees; barn and house raisings; hog killings; and wood-chopping bees conveyed a spirit of cooperation (Carpenter, 1940; Dwelle, 1958; Iowa centennial, 1946). Churches often served as meeting places for a variety of social affairs. Church socials, bazaars, and ladies’ aid meetings were examples (Iowa centennial, 1946).

Women’s clubs were popular throughout Iowa. Twice each month women would gather together in their homes to read and discuss current books about history and biography, as well as the latest fiction. The Lyceum, or public lecture, began in the 1860s and thrived until the late nineteenth century when it was replaced by Chautauqua. The canvas tents of Chautauqua brought culture from books, lectures, and visiting actors and musicians to the people of Iowa. But by the 1930s the Chautauqua tents were obsolete (Wall, 1978).

The first state fair in Iowa in 1854 was an agricultural fair. The favorite attractions were the livestock, farm machinery, and farm products (Dwelle, 1958). Since its beginning, the state fair in Iowa has continuously become more popular; crowds have expanded and the fair’s attractions have enlarged. In 1880 Des Moines was selected as the much-
needed permanent site for the growing state fair (Carpenter, 1940).

Watching and participating in sporting events were other forms of entertainment for Iowans. During the Civil War soldiers learned the game of baseball and after the war brought the sport back to Iowa. The state’s first baseball tournament was held in 1867. As early as the 1880s Iowans enjoyed college sporting events. Iowa hosted the first intercollegiate football game west of the Mississippi River in 1889 (Carpenter, 1940).

In the late nineteenth and early twentieth centuries bicycles and automobiles provided entertainment. In 1889 the first bicycles were introduced in Iowa. Bicycle paths were built and riding became easier and safer. The first gasoline-operated automobile was also brought to the state in 1889, and ownership of cars spread rapidly. By 1906 Iowa had over 1,000 cars; by 1910 more than 10,000; and by 1911 over 30,000 (Carpenter, 1940; Wall, 1978).

**Wisconsin**

Having many small lakes and a number of rivers throughout the state, Wisconsin sported a multitude of summer resorts for both its citizens and those from other states. The resorts promoting sparkling spring waters, fishing, and hunting were frequented by sports enthusiasts (Current, 1977;
A great number of resorts offered bicycling, boating, hayrides, croquet, lawn tennis, billiards, dancing, concerts, and theater. Yacht races and Chautauqua meetings were available, but were not as common as sports. From the late 1860s through the 1890s, summer resorts thrived in Wisconsin but, with growing numbers of automobiles in the early 1900s, resorts lost popularity (Current, 1977).

The Barnum & Bailey and Ringling Brothers circuses had their beginnings in Wisconsin. In the late 1840s the circus that would later become Barnum & Bailey based the organization's headquarters and farm for winter lodgings in the state. In 1884 the Yankee Robinson & Ringling Brothers Circus & Caravan gave its first show in Wisconsin. Each year this circus expanded, and by 1895 it was no longer opening in Wisconsin but was giving its first show in Chicago. In 1908 Ringling Brothers bought out Barnum & Bailey, and by 1918 the headquarters had been moved from Wisconsin to Connecticut and later to Florida (Current, 1977).

Participatory and spectator sports were enjoyed by Wisconsinites. With abundant snow and ice, winter sports such as hockey, figure skating, snow skiing, ice boating, and ice fishing were all enjoyed. In the 1920s, Model-T Fords were converted into snowbuggies by replacing the front wheels with skis and the back wheels with treads. A favorite form
of entertainment starting in the early 1900s was professional
football. The numerous winning seasons of the Green Bay
Packers, organized in 1919, increased the desirability of
football as a spectator sport (Current, 1977).

Minnesota

During the 1860s and 1870s Minnesota’s spas and resorts
were frequented. People from within and outside of the state
went to the numerous lakes and rivers for recreation and
outdoor activities (Lass, 1977). Minnesotans had the
opportunity to participate in both winter and summer sports.
Snow skiing, ice skating, and tobogganing were as well liked
as swimming, water skiing, and sailing (Blegen, 1975).

Since the 1880s, St. Paul has been the site for annual
social events. The state fair was permanently established at
St. Paul in 1885. It was important educationally as well as
socially (Blegen, 1975). In addition, a Winter Carnival was
sponsored by the city almost continuously after 1886 (Lass,
1977).

In the 1880s, 1890s, and early 1900s people were active
in numerous music clubs. By the mid-1880s, theaters were
also very popular in Minnesota. Theaters thrived during the
late nineteenth and early twentieth centuries, until the
arrival of motion pictures (Blegen, 1975).

Minnesotans enjoyed spectator sports, too. In the 1870s
the Minneapolis Baseball Association was created, organizing
the popular sport. In 1882 the University of Minnesota played its first football game (Blegen, 1975).

**Comparison**

A variety of forms of entertainment were available to the citizens of Iowa, Wisconsin, and Minnesota from 1850 to 1930. Spectator sports were common in each state as were social happenings like fairs, carnivals, or circuses. Wisconsin and Minnesota were known for their summer resorts and their diversified recreational activities, both for summer and winter. In Iowa social affairs with a community spirit were prevalent, especially in pioneer days. This type of activity may have been present in Wisconsin and Minnesota as well, but the sources reviewed indicated no such events. Musical and theatrical interests emerged in Minnesota. However, the literature examined did not reveal these interests for Iowa and Wisconsin. Overall, forms of entertainment enjoyed in Iowa, Wisconsin, and Minnesota were quite similar.

**Conclusions**

This review showed the progression of economic and social developments of Iowa, Wisconsin, and Minnesota during the interval for this research, 1850 to 1930. The increasing populations of the states, growing at comparable rates, made
communication between greater numbers of people possible. As time passed and the population multiplied, more people were available to be exposed to new ideas such as studio photography.

The importance of education to residents of Iowa, Wisconsin, and Minnesota was demonstrated by their ever decreasing rates of illiteracy. In addition, the circulation of newspapers expanded tremendously during the 80-year interval, indicating greater levels of communication throughout these three states. With the vast majority of people over the age of 10 being able to read, newspapers served as an effective means of communication. Any information regarding studio photography printed in the newspapers would have been accessible to most people as circulation increased and illiteracy decreased.

Prosperity resulting from diverse economic activities in Iowa, Wisconsin, and Minnesota made studio photographs affordable to a large percentage of the population. Methods of travel were difficult in the pioneer years for the residents of the three states, but transportation improved with the building of railroads. Consequently, it became easier to travel to areas where photographers set up studios. Social events located in towns and cities could also have exposed people to the possibility of studio photographs.
This examination indicated that people had the means, if not the inclination, to have studio photographs taken. Economic and social conditions favored the presence of studio photographs, especially from the 1870s forward.
FINDINGS AND DISCUSSION

The state historical societies of Iowa, Wisconsin, and Minnesota and two private photographic collectors cooperated in this research. A total of 97 photographs meeting the determined limitations were examined from the interval of 1850 to 1929. Iowa provided 25 usable photographs; Wisconsin furnished 27; Minnesota supplied 37; private collectors contributed 8. Appendix C lists these sources and records for each the number of photographs examined per decade.

The initial boundary established for the research also included the years 1839 to 1849. However, no photographs were found from that ten year time span that met the set limitations. Therefore, the discussion of findings concentrated on the interval from 1850 to 1929.

Because too small a number of usable photographs was found, generalizations could not be made beyond the pictures investigated. Also, the number of photographs donated to the museums was not necessarily equal in proportion to the actual number of photographs taken. Therefore, the discussions in this section were confined exclusively to those photographs examined.

In this section, the data collected were plotted for description and analysis. Next, the variations found in complexity of dress were illustrated. After a brief summary of trends found in complexity of dress, Hollander's (1978)
theory was examined in light of my findings. Finally, adoption trends for photography were discussed in relation to Rogers’ (1983) theory on the diffusion of innovations.

Data Plot

To facilitate analysis, the data collected were recorded in a plot that revealed complexity of dress (Figure 11). Each photograph examined was plotted by decade according to the number of visual parts counted. Because a small number of usable pictures were found throughout the interval of the research, analysis by decade was more efficient than analysis by year.

Within each decade, photographs with like numbers of visual parts were grouped and plotted together. For example, three photographs from the 1890s had 17 visual parts (Figure 11). The number of visual parts counted in a photograph showed the complexity of dress. Smaller numbers of visual parts represented simpler dress and larger numbers depicted more complex dress.

Appendix D provides a similar data plot revealing complexity of dress, but in greater detail than Figure 11. Each photograph was plotted by year and by number of visual parts using a symbol to denote the picture’s source. The earliest photographs obtained were from the 1850s and were located in Iowa. It was not until the 1860s that usable
Figure 11. Photographs plotted by decade and by the number of visual parts, revealing the complexity of dress.
pictures were found in Wisconsin and Minnesota. Wisconsin had the shortest span, with photographs continuing through 1910. In Iowa, no usable pictures were available after 1925. Minnesota provided photographs through 1926.

Discussion of Trends

Overview, 1850 to 1929

For the interval from 1850 to 1929, the numbers of visual parts recorded from the photographs examined had a range of variability for each decade. The lowest and highest numbers of visual parts counted for each decade formed the boundaries for the range of variability. The smallest range of variability during a decade was 6; the largest 15. Generally, the photographs were dispersed evenly throughout the range of variability for a decade; few clusters formed.

The smallest numbers of visual parts recorded for each decade showed a gradual increase from the 1850s through the 1890s. In the 1900s there was a decrease in the number of visual parts. The number remained constant from the 1900s through the 1920s.

The greatest numbers of visual parts plotted for each decade increased sharply from the 1850s to the 1860s. After showing a slight decrease in the 1870s, the greatest numbers of visual parts counted occurred in the 1880s. This high point continued through the 1900s. In the 1910s the number
of parts fell substantially, only to increase considerably in the 1920s. Through the middle of the plot (Figure 11) there was a gap indicating an absence of photographs. This gap began in the 1870s and continued through the 1900s at 14, 15, and 16 visual parts. However, the gap did not interfere with the overall trend revealed by the data collected.

Considered as a whole, the data plot revealed an overall pattern within the interval from 1850 to 1929. The fewest number of visual parts, were noted in the 1850s. From the 1850s through the 1890s, the number of visual parts increased continuously. By the 1890s, the greatest number of visual parts for any decade were recorded at both ends of the range of variability. After the 1890s, the number of visual parts decreased through the 1910s. By the 1920s, the number of visual parts had once again increased.

Description and analysis by decade

1850s  The fewest number of photographs from any decade were found in the 1850s. The four photographs examined had a range of variability of eight, with counts from 6 to 13 parts, and were concentrated at the low end of the range. The simple average of the number of visual parts for the 1850s was 8.5, the smallest average during the interval.
The few photographs found in this decade could have influenced the low range and average, but it was not possible to determine whether greater numbers of photographs would have expanded the range or increased the simple average. Even with greater numbers of photographs the range and average could have remained similar.

**1860s** The number of photographs obtained in the 1860s increased to 15. Having counts from 7 to 21, the photographs' range of variability expanded to 15, the largest span of visual parts for any decade. Again, the photographs tended to collect at the low end of the range. The average calculated for the 1860s was 11.9 visual parts.

**1870s** The ten photographs examined in the 1870s were evenly dispersed throughout the range of variability for the decade. The range decreased to 12, and counts recorded were from 9 to 20 visual parts. For the 1870s, the average number of visual parts was 14.6.

**1880s** Twenty-one photographs were available from the 1880s, the greatest number of usable pictures from any decade. With counts from 9 to 22, the photographs had a range of variability of 14, and formed a cluster near the center. An average of 15.1 visual parts were counted for the 1880s.

**1890s** The 14 photographs examined from the 1890s revealed the highest counts of visual parts. With a range of
variability of 12, counts were from 11 to 22. The counts from the photographs tended to be more numerous at the low end of the range, and had an average of 15.6 visual parts.

1900s Nineteen photographs were obtained from the 1900s. Having a range of variability of 14 and counts from 9 to 22, the 1900s were similar to the 1880s. However, grouping of photographs within the range of variability differed. A cluster of pictures formed at the low end of the range in the 1900s, rather than near the middle as in the 1880s. The average number of visual parts for the 1900s was 13.5.

1910s The number of pictures dropped to six by the 1910s. The numbers of visual parts also decreased. Having counts from 9 to 14, the range of variability was six, the smallest range recorded throughout the interval. The counts for the pictures tended toward the low end of the range, with the average number of visual parts dropping to 10.5.

Just as in the 1850s, fewer photographs were found in the 1910s and the resulting range and average were lower in comparison with the other decades. Again, specifying how increasing numbers of photographs would influence the range and average was not possible.

1920s Eight photographs were examined from the 1920s. The range of variability expanded to 12, with counts from 9 to 20, an increase in numbers of visual parts counted over
the previous decade. The photographs were randomly scattered throughout the range of variability, and had an average of 14.3 visual parts.

Variations in Complexity of Dress

Two representative photographs have been provided from the data collected. These examples, one simple and one complex, illustrate the variability in complexity of dress uncovered in this research. The format that was used in the counting methodology section for identifying visual parts was also used here.

The first example represents low visual complexity in dress (Figures 12 and 13). The six visual parts identified were:

1. skirt, bodice, and sleeves of the same fabric which were visually similar, all blended to form one continuous part (II. C.).

2. brooch at neckline contrasting in shape and value, treated as a separate part (I. C.).

3. white neck band and face similar in value, considered as one continuous part (II. C.).

4. hair distinct from the whole, counted as a separate part (I. A.).

5. and 6. sleeve cuffs blending with hands, each side considered as one continuous visual part (II. C.).
The second example represents high visual complexity in dress (Figures 14 and 15). The twenty visual parts identified were:

1. and 2. shoes as separate units, treated as distinct parts (I. C.).

3. and 4. and 5. rows of ruffles as separate structural units, each considered as separate parts (I. B.).

6. upper skirt distinct from the whole, counted as a separate part (I. B.).

7. waistband contrasting in shape and size, considered as one part (I. C.).

8. under bodice tucked into waistband, treated as a separate part (I. B.).

9. ruffle over bodice with visually distinct shape, counted as one part (I. C.).

10. upper bodice, collar, and face similar in value, all blended to form one continuous part (II. C.).

11. hair distinct from the whole, counted as a separate part (I. A.).

12. hat contrasting in value, shape, and size, treated as one part (I. C.).

13. decoration on hat varying in value, texture, and shape, counted as a separate part (I. C.).

14. and 15. ribbons extending from either side of the hat visually set off from surrounding parts, each treated as one part (I. C.).

16. and 17. ruffled sleeves as structural units, each considered as a separate part (I. B.).

18. and 19. hands contrasting in texture, shape, and size, counted as separate parts (I. C.).

20. handkerchief held in hand with distinct shape, treated as a separate part (I. C.).
Figure 12. Line drawing showing separate and continuous parts

Figure 13. 1850s photograph courtesy of the State Historical Society of Iowa, Iowa City
Figure 14. Line drawing showing separate and continuous parts

Figure 15. 1900s photograph courtesy of the State Historical Society of Wisconsin, Madison
The number of visual parts counted in the photographs examined for this research revealed the complexity of dress. The data collected represented a wide range of variability in complexity. Some photographs had few visual parts, while others had many.

Summary

The pattern within the data plot (Figure 11) revealed trends in complexity of dress. Having few visual parts, dress was least complex at the beginning of the interval. Visual parts increased after the 1850s, with dress reaching a height of complexity by the 1890s. Visual parts decreased and dress became simplified in the 1910s. However, with greater numbers of visual parts, complexity of dress increased in the 1920s. In Figure 16, the simple averages calculated for each decade were plotted as a summary of the trends revealed. Comparison of Figures 11 and 16 showed the modes and the means of the number of visual parts to be in similar positions.

According to the data collected, the economic downturns of 1873 and 1893 were not paralleled by decreases in complexity of dress. Fashion change, to the extent that the economy had an impact, was not in the direction of simplicity in photographs.
Figure 16. Plot of simple averages of the number of visual parts for each decade
Hollander’s Theory

Hollander (1978) wrote that women’s dress had become simplified by the 1920s. She believed the invention of photography in 1839, which assisted people in altering visual perceptions of themselves, influenced the change in dress from complexity to simplicity. Hollander’s theory led to my investigation of the change in complexity of women’s dress as seen in studio photographs from 1839 to 1929.

The rules I developed for counting visual parts provided an objective method for examining the complexity of dress. Plotting the number of visual parts counted in dress seen in photographs revealed changes in visual complexity. Analysis of the data collected indicated that Hollander’s theory was not supported under objective examination. According to Hollander, dress was most complex at the beginning of the interval and became simplified by the end. The trends presented in the data plot did not agree. Dress was least complex in the 1850s, and reached a maximum point of complexity by the 1890s. Dress did simplify in the 1910s, but increased in complexity in the 1920s.

Hollander (1978) referred to the change from more complex dress to less complex dress as being a decrease in the number of visual parts needing separate consideration. This, too, was my definition for the change from complexity to simplicity. If we considered the same criteria for
developing generalizations about changes in complexity of dress, why was Hollander’s theory so different from my findings? The manner in which we each arrived at our general statements would have influenced the variation. Hollander’s theory was a statement of intuition, having no stated basis in scientific analysis. A general observation of artists’ photographs was the foundation for her theory. She wrote of no methodology to support her statement. In contrast, my findings were the result of direct application of an objective methodology for counting the number of visual parts of dress seen in photographs. The trends revealed in my research were based on objective analysis rather than intuition.

Adoption Trends for Photography

An analysis of the actual numbers of photographs found from 1850 to 1929 revealed fewer pictures at the beginning and the end of the interval, and more pictures during the middle decades. One possible explanation for this dispersion of the photographs was provided by Rogers’ (1983) theory on the diffusion of innovations.

This explanation was limited, however, to only the data collected. As previously mentioned, it was not possible to determine whether the number of photographs from a period donated to museums were equal in proportion to the total
number of photographs taken in the period. A greater number of photographs could have been found during the middle of the interval simply because more pictures from that time were given to the museums. Therefore, generalizations could not be extended to all photographs. Rogers' concepts were applied solely to the data collected for this research.

When photography was invented in 1839, the diffusion of the innovation to potential adopters began. Through the process of diffusion, photography was "communicated through certain channels over time among the members of the social system" (Rogers, 1983, p. 5). This diffusion process, leading to the adoption or rejection of the innovation, presented insight into the dispersion of the studio photographs found during the interval. The dispersion of the photographs possibly represented the adoption trends for the innovation resulting from diffusion.

Rogers (1983) wrote that individuals passed through an innovation-decision process before adopting or rejecting an innovation. First, they became aware of photography's existence, gaining only basic knowledge about the invention. Next, attitudes were formed toward the innovation based on its attributes. Then, a decision was made to adopt or reject photography. When people decided to adopt the innovation, the new process was confirmed and spread. Finally, the
choice to adopt photography was reevaluated and the decision was reaffirmed.

Attitudes toward photography were important in the decision to adopt the innovation. Rogers (1983) described five characteristics of an innovation that affected attitudes and the decision to adopt. These included: relative advantage, compatibility, complexity, trialability, and observability. Favorable attitudes toward these five attributes increased the likelihood of the adoption of photography.

Developments in photography during the interval researched related to these characteristics. For people who desired to own portraits of themselves, photography had a relative advantage. Studio photography had the capability to produce visual representations of people much more quickly than portrait painting. It was perceived to be better than the idea it superseded. Studio photography was also compatible because of its consistency with existing experiences of potential adopters. Since people wanted visual representations of themselves, prior to the invention of photography, the innovation fulfilled an established need.

When first introduced in 1839, the process of photography was complex, having technical and chemical limitations. As improvements were made, the process became easier to understand and quicker to perform. Portraiture was
suited to the quicker photographic processes. Because manuals and public demonstrations on photography were offered from the start, it was possible for people to experiment with the process on a limited basis. However, trialability was constrained in early years by the complexity of photography. Advancements in the process, particularly in the 1860s and 1870s, enhanced the trialability of photography and aided the development of the photographic industry, including studio photography.

Photography produced representations that were observable to all. Because the results were visual, it was possible to observe the effects of improvements in the photographic process as well.

As developments were made in photography and the process improved, positive attitudes toward these five characteristics intensified. Consequently, the potential to adopt studio photography was higher, especially from the 1870s on.

As previously mentioned, changing social and economic conditions in Iowa, Wisconsin, and Minnesota during the interval of the research also improved the likelihood of adoption of photography from the 1870s forward. With growing populations, more people were available for exposure to the innovation. Mass media channels for communicating information improved as numbers of newspapers increased and
circulation expanded. Because educational systems improved and illiteracy decreased, greater numbers of people were able to read the printed media possibly containing information on studio photography. The states were economically prosperous and had a variety of forms of entertainment available. Transportation had improved greatly after the Civil War, which gave people the opportunity to travel to photographic studios. Generally, the social system worked to facilitate the diffusion of the innovation.

The relationship of photographic developments and state economic and social conditions to the diffusion of photography provided understanding of the possible adoption trends for studio photographs. At the beginning of the interval fewer pictures were produced. This was due in part to the newness of photography. It had its advantages and was compatible, but photography was also complex and had limited trialability and observability. With time, technological developments improved the process of photography, making it less complex. Trialability and observability also increased. As awareness of photography expanded in the three states potential for adoption grew. With greater public acceptance during the middle of the interval, more studio pictures were taken.

By the end of the interval, however, fewer numbers of studio photographs were found. Continued developments in
photography conceivably led to this decline. As the amateur photography movement took off in the 1890s, hand-held cameras and the snapshot possibly replaced the studio photograph in popularity. As an innovation, the snapshot was compatible with prior forms of photography and had an advantage of being taken by oneself. The hand-held camera was not complex, could be easily tried, and had visible results.
CONCLUSIONS

The first objective of this research, to develop a methodology for unbiased analysis of the visual complexity of dress, was achieved by adapting DeLong's (1968) approach. According to DeLong, the clothed body form was seen in terms of a whole or parts. This classification served as the foundation for developing rules to determine whether a part was considered separate from or continuous with the whole or other parts of the clothed body form. Using the rules developed, counts of visual parts were obtained from the photographs examined; separate and continuous parts were determined objectively. Providing unbiased counts, the rules were simple and reliable to use.

The second objective was also accomplished. By using the rules developed, I was able to describe and analyze the visual complexity of U.S. women's streetwear as seen in photographs. The data plot of numbers of visual parts counted in the photographs provided a visual representation of the complexity of dress. Trends in complexity of dress revealed by the numbers of visual parts were described and analyzed. As previously mentioned, the trends disclosed by analysis of the data collected did not support Hollander's theory that dress was most complex at the beginning of the interval and was simple by the end. Objectively counting the numbers of visual parts in the photographs showed that the
visual complexity of dress fluctuated from the 1850s through 1929.

The third objective, to test the hypothesis: Visual complexity in U.S. women’s streetwear seen in photographs did not change from approximately 1839 to 1929, was not undertaken. Insufficient data were obtained to test this hypothesis and to make generalizations.

Recommendations from this Research

In developing the counting methodology, the expert examiners testing the the rules for reliability were familiar with methods of visual analysis and DeLong’s approach. Consequently, reliability of counts might be applicable only to researchers possessing these qualifications. The rules worked efficiently for this research, but I was also well-aquainted with DeLong and methods of visual analysis. Researchers with little knowledge of visual analysis, as well as those familiar with the topic, who desire to use the counting method developed for this research, would benefit by retesting the rules and making needed modifications for their specific purposes.

Setting a restriction that only studio photographs would be examined for this research assured consistency in the data collected but greatly reduced the total number of photographs investigated. Because of the limited sample size obtained, I
could not make generalizations beyond the pictures examined
nor could I undertake the third objective for this research.
In future research, it would be desirable to increase the
sample size to facilitate making generalizations.

One suggestion for obtaining a larger number of
photographs would be to include other forms of pictures
besides studio photographs. Because more snapshots were
available at the museums visited than were studio
photographs, including snapshots in an investigation could
greatly increase the sample size. However, the researchable
intervals would be shifted to the 1880s forward by the use of
snapshots.

An additional suggestion would be expansion of the
geographic area of the research. Museums or private
photographic collectors in other areas could provide more
pictures to increase the numbers of photographs examined.

Another limitation for this research was that only full-
length photographs would be used; three-quarter and bust
views would not be examined. There was a great deal of
variation in the partial views noted at the museums. I would
recommend, for consistency in the data gathered in future
research, a limitation specifying use of only full-length
photographs.
Implications for Further Research

This research examined photographs of women's streetwear from 1839 to 1929 to reveal changes in complexity measured by the number of visual parts counted. The objective methodology developed could be applied to investigate variations in complexity of other types of clothing, as well as clothing from other time spans.

Only women's streetwear was investigated using this counting method. Further research could be conducted using the methodology on both men's and children's clothing.

Holland's theory proposing simplification of dress during the years spanning 1839 to 1929 instigated this research. From the data gathered, it was possible to describe the changes in complexity from the interval as well as to give indications about the supportability of Holland's theory. Other theories or generalizations regarding changes in complexity of dress from different intervals could also provide time frames to be researched. One example would be an investigation of the commonly stated change from more complex dress during the 1750s to less complex dress during the French Revolution. An objective examination of fashion illustrations from the interval, using the counting method developed for this research, would show changes in visual complexity, testing the correctness of the generalized statement.
Objective analysis of visual complexity might not support the statement that dress simplified during the French Revolution, just as Hollander’s theory was not supported. A possible explanation could be that the methodology developed for this research objectively examined visual complexity, which encompassed only the exterior of the clothed body form. Statements made regarding changes from complexity to simplicity could feasibly refer to the interior of the dress and a decreasing number of layers or garments worn underneath. Because the interior of dress could simplify at the same time that the exterior of dress became more complex, assertions made about the complexity of dress should be clarified for greater accuracy in researching and discussing changes in clothing over time.

Potential exists for further research that objectively discloses and analyzes the visual complexity in dress. The methodology developed for this research could be applied to other types of clothing or to other intervals for studying changes in complexity.

Further research using the developed methodology could reveal trends in complexity over time or could show continual variation. Regardless of the pattern disclosed, another factor should be considered: the range of variability in complexity within any defined time, whether a year or a decade. Each decade described and analyzed in this research
showed variability. This led to proposing the hypothesis: There is always a range of variability in complexity of dress within any defined time. The range in variability influences the mean number of visual parts for any year or decade. The averages provide a summary of the trends revealed. Standard deviations from the average number of visual parts could also be calculated.
SUMMARY

The purpose of my research was to objectively examine dress in photographs noting changes revealed in visual complexity. My first two objectives accomplished this aim. The first objective was to develop a method for unbiased analysis of complexity of dress. The second objective was to use this methodology to describe and analyze complexity in U.S. women’s streetwear seen in photographs from approximately 1839 to 1929. The third objective, to test the hypothesis: Visual complexity in U.S. women’s streetwear seen in photographs did not change from approximately 1839 to 1929, was not completed because an insufficient number of data were collected.

The common factor of the research examined for the review of literature was the analysis of change in dress seen in visual representations of clothing. A limited number of investigations were found that utilized objective methods for visually analyzing change in dress. The literature reviewed showed that research on this topic had been conducted mainly in the social-psychological and aesthetic areas of textiles and clothing, using either historic or contemporary data.

Reviewing Hollander’s (1978) theory and DeLong’s (1968) methodology laid the foundation for my research. Hollander’s theory suggested the need to examine changes in complexity of dress recorded in photographs from the interval 1839 to 1929.
DeLong presented an approach that could be modified to develop an objective methodology for investigating the complexity of dress seen in photographs.

The methodology I developed for this research was based on DeLong's (1968) system in which the clothed body form was viewed either in terms of a whole or parts. Rules were developed to objectively determine whether a part was considered separate from or continuous with the entire clothed body form. By using the rules to count the number of visual parts in photographs, the complexity of dress was revealed.

The rules were tested for reliability by two expert examiners, and then were used in collecting data. Photographs were examined at the historical societies in Iowa, Wisconsin, and Minnesota. Because a smaller number of photographs were found than were originally anticipated, two private collectors supplied a few additional pictures.

To provide background for analysis of the data collected, photographic developments were investigated for the interval of the research, 1839 to 1929. Early photographic processes were complicated and slow, and exposure times were long, requiring subjects to hold unwavering poses. Numerous advancements from the 1860s through the 1880s simplified and accelerated photographic procedures. Photography became better suited for studio
portraiture. Continued developments in photography led to the invention of hand-held cameras, which were influential in the growth of the amateur photography movement after the 1880s.

Economic and social conditions were explored to disclose the level of prosperity in Iowa, Wisconsin, and Minnesota for the years data were obtained, 1850 through 1929. Population, education and illiteracy, newspaper communication, economic diversity, transportation, and society and entertainment were investigated. The level of prosperity indicated the possibility for the presence or absence of studio photographs in the three states.

The changing conditions in Iowa, Wisconsin, and Minnesota were very similar for the interval researched. As the population increased in the newly formed states, educational systems improved and rates of illiteracy decreased. Numbers of newspapers expanded and circulation grew. Economic activities were diverse, as were social happenings. Vast improvements were made in transportation after the Civil War. Each of the three states increased in prosperity from 1850 to 1929. With economic and social conditions becoming particularly favorable, especially from the 1870s on, people had the means if not the desire to have studio photographs taken.
The photographs examined for this research were plotted by the number of visual parts counted and by decade. Patterns in changes of complexity of dress revealed in the plot were described and analyzed for the interval researched. Because a small number of usable photographs was found, generalizations could not be made beyond the data collected.

An overall pattern of visual complexity was disclosed from 1850 to 1929. Dress was least complex at the beginning of the interval. Complexity of dress increased from the 1860s through the 1890s, when the highest level of complexity was reached. Dress became simpler in the 1910s, but again increased in complexity by the 1920s. The trend revealed by the data collected did not support Hollander's theory that dress was most complex at the beginning of the interval and simplest by the end.

The variability in complexity of dress found in this research was illustrated by two photographs representative of the data collected. Dress in one example was simple; dress in the other was complex.

Analysis of the data plot also revealed fewer photographs at the beginning and end of the interval and more photographs during the middle. Theory on diffusion of innovations provided a conceivable explanation for the dispersion of the photographs. Developments in photography and the changes revealed in the social and economic
conditions of the three states were discussed in relation to the diffusion of the innovation, photography. This provided a greater understanding of the adoption trends for studio photographs and the resulting dispersion of the pictures examined.

As a result of this research and the limited number of usable photographs obtained, recommendations were made for increasing the data sample. One suggestion was to include snapshots in addition to studio photographs within the limitations for the research. The other suggestion was to expand the geographic range to include a larger area.

Implications for further research came from the methodology developed and employed in this research. The rules provided an objective method for describing and analyzing changes in complexity of dress. Investigations of visual complexity using the objective methodology could be expanded to include men's and children's clothing. The methodology could also be applied to clothing from other intervals.
LITERATURE CITED


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*Godey’s Lady’s Book and Magazine*. 1830-1898.


*McCall’s Magazine*. 1870-1934.


Peterson's Ladies National Magazine. 1842-1898.


Vogue. 1892-1930.


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APPENDIX A.
DATA COLLECTION FORM
DATA COLLECTION FORM

MUSEUM:_____________________________________________________________

DATE:_______________________________________________________________

PHOTO DOCUMENTATION

TYPE OF PHOTOGRAPH:________________________________________________

DATE OF PHOTOGRAPH:________________________________________________

PLACE PHOTO WAS TAKEN:_____________________________________________

PHOTOGRAPHER:_______________________________________________________

SUBJECT(S) OF PHOTO:_______________________________________________

COSTUME DESCRIPTION:

NUMBER OF VISUAL PARTS OF COSTUME:_______________________________

PHOTOGRAPHED: YES_____ NO_____

IF YES, THEN: FILM ROLL NUMBER_____
             EXPOSURE NUMBER _____
APPENDIX B.

LETTER OF INQUIRY AND INFORMATION REQUEST FORM
Iowa State University  
College of Home Economics  
Dept. of Textiles and Clothing  
140 LeBaron Hall  
Ames, IA  50011  
21 June 1985

Bonnie Wilson  
Minnesota Historical Society  
Audio-Visual Library  
690 Cedar Street  
St. Paul, MN  55101  

Dear Ms. Wilson:

I am a graduate student in Textiles and Clothing at Iowa State University working on my master’s thesis in historic costume. The objective of my thesis research is to describe visual complexity in U.S. women’s streetwear seen in photographs from approximately 1839 to 1929.

It is necessary for me to study full-length photographs of women’s streetwear as shown in studio photographs. To obtain background information from you I have included a short form I would like you to complete and return to me in the stamped, addressed envelope enclosed with this letter.

If you have any questions about the research, please call me at (515) 294-3264 or Jane Farrell-Beck, my advisor, at (515) 294-4233. Your time taken in answering my questions is much appreciated.

Sincerely,

Rosalynd Rhen

Jane Farrell-Beck  
Associate Professor

Enclosures
1. Name of museum ____________________________________________

2. Address____________________________________________________

3. Phone number ( ) ____________________________

4. Does the museum have full-length studio photographs from any of these decades? Check applicable dates.
   - 1840s
   - 1850s
   - 1860s
   - 1870s
   - 1880s
   - 1890s
   - 1900s
   - 1910s
   - 1920s
   - 1930s

5. Are the photographs identified by date and place?
   - yes ___
   - no ___

6. May researchers examine the photographs?
   - yes ___
   - no ___

7. May researchers photograph the photos?
   - yes ___
   - no ___

8. If no, are copies of the photos available through the museum?
   - yes ___
   - no ___

9. Is the museum open summer and fall 1985?
   - summer ___
   - fall ___

10. Please indicate convenient times for examination of photographs in the space provided.
    __________________________________________________________
    __________________________________________________________
    __________________________________________________________

11. Signature ________________________________________________

12. Date _____________________________________________________
APPENDIX C.
MUSEUMS AND PRIVATE COLLECTORS PARTICIPATING IN THIS RESEARCH WITH A LISTING OF THE NUMBER OF PHOTOGRAPHS EXAMINED PER DECADE
The numbers in parentheses indicate the numbers of photographs whose specific dates within a decade, assigned by the museums, were questionable.

**MUSEUMS:**

**Iowa State Historical Department**
State Historical Society
402 Iowa Avenue
Iowa City, IA  52240

<table>
<thead>
<tr>
<th>Decade</th>
<th>1850s</th>
<th>1860s</th>
<th>1870s</th>
<th>1880s</th>
<th>1890s</th>
<th>1900s</th>
<th>1910s</th>
<th>1920s</th>
</tr>
</thead>
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<td>6</td>
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<td>3</td>
<td>1</td>
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**State Historical Society of Wisconsin**
816 State Street
Madison, WI  53706

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<th>1870s</th>
<th>1880s</th>
<th>1890s</th>
<th>1900s</th>
<th>1910s</th>
<th>1920s</th>
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<td>2 (1)</td>
<td>9 (4)</td>
<td>3</td>
<td>3</td>
<td>3 (1)</td>
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**Minnesota Historical Society**
Audio-Visual Library
690 Cedar Street
St. Paul, MN  55101

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<th>1870s</th>
<th>1880s</th>
<th>1890s</th>
<th>1900s</th>
<th>1910s</th>
<th>1920s</th>
</tr>
</thead>
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<tr>
<td></td>
<td>2 (2)</td>
<td>5</td>
<td>8 (3)</td>
<td></td>
<td>6 (1)</td>
<td>6 (2)</td>
<td>2</td>
<td>8</td>
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PRIVATE COLLECTORS’ SOURCE OF PHOTOGRAPHS:

Ohio

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<td>1860s</td>
</tr>
<tr>
<td>1870s</td>
</tr>
<tr>
<td>1880s</td>
</tr>
<tr>
<td>1890s</td>
</tr>
</tbody>
</table>
| 1900s  | 7
| 1910s  |
| 1920s  |

Iowa

<table>
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<tbody>
<tr>
<td>1850s</td>
</tr>
<tr>
<td>1860s</td>
</tr>
<tr>
<td>1870s</td>
</tr>
<tr>
<td>1880s</td>
</tr>
</tbody>
</table>
| 1890s  | 1
| 1900s  |
| 1910s  |
| 1920s  |
APPENDIX D.

DATA PLOT
Photographs were plotted by year and by number of visual parts, using a symbol that denoted the picture's source. The sources and their representative symbols included: Iowa State Historical Society, triangle; State Historical Society of Wisconsin, square; Minnesota Historical Society, circle; and private collectors, diamond.