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MASTER'S THESIS ABSTRACTS

JULY 1969 / JUNE 1971

ST. CLOUD STATE COLLEGE / ST. CLOUD, MINNESOTA

MASTER'S THESIS ABSTRACTS 1971

FOREWORD

This publication, the fourth in a series which began in 1962, contains the abstracts of Master's Theses completed by graduate students of St. Cloud State College. The bulletin contains those theses completed during the period from July 1969 through June of 1971.

A bound copy of each thesis is on file in Centennial Hall, which houses the library on this campus. The library copy of each thesis is available for use on an interlibrary loan basis.

Copies of this bulletin may be obtained from the School of Graduate Studies, St. Cloud State College, St. Cloud, Minnesota 56301.

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ELEMENTARY EDUCATION

AN EXPERIMENTAL INVESTIGATION OF TWO SPELLING PROGRAMS

Donald D. Ahlstrom

PROBLEM. The purpose of the study was to compare the effects that an individualized spelling program and a single text-oriented spelling program had on the spelling achievement and attitudes of sixth grade pupils at Brimhall Elementary School in Roseville, Minnesota.

PROCEDURE. The Experimental Group ($N=31$, Mean I.Q. = 115.5) used an individualized spelling program as developed and taught by the investigator. The Control Group (randomly sampled from a total $N=93$, Mean I.Q. = 116.8) used the single text-oriented spelling program suggested by the district and taught by three teachers other than the investigator. The training period covered September, 1969, to April, 1970. Scores from the Stanford Achievement Test, Form X and Form W; the Iowa Test of Basic Skills; and Teacher Made Tests One and Two, given in April, 1970, were used as post-test measures for Experimental and Control group scores.

CONCLUSIONS.

1. Pupils under the individualized method of teaching spelling made statistically more gain than those under the traditional method.
2. The Stanford Achievement Test, Form X, subtest three, and Form W, subtest three, showed no significant gain at the .05 confidence level.
3. Teacher Made Tests were highly significant in favor of the Experimental group.
4. Inter-class grouping at the upper and lower thirds showed no significant difference at the .05 confidence level between Experimental and Control groups.
5. Inter-class grouping of the middle third of the class showed significant results at the .05 confidence level favoring the Experimental group.
6. A favorable attitude toward spelling was gained by the pupils in the Experimental group.
7. A self-motivating interest in spelling and proofreading was developed by those pupils of the Experimental group.
8. Reinforcement was a strong positive element of the experimental program.
9. The Pod Grouping approach stimulated interest in spelling and created a good environment for achievement growth.

It cannot be assumed that the findings in the study of "no significant difference" mean that the experimental evidence was of no value. It might be assumed instead that such findings were permissive rather than directive.

APPROVED BY THESIS COMMITTEE, MARCH 1971
James W. Anderson, Chairman
Russell Schmidt
William Kukuk

A DESCRIPTIVE STUDY OF THE CREATIVE WRITING PHILOSOPHIES, PRACTICES, AND EVALUATION METHODS OF TEACHERS IN GRADES FOUR THROUGH SIX IN TWO LAKE CONFERENCE DISTRICTS

by Martha Pauline Corbin

PROBLEM. The purpose of this paper was to determine the actual philosophy, practice, and evaluation of teachers grades four through six as pertaining to creative writing and as related to the literature.

PROCEDURE. After the review of the literature was completed, a questionnaire was designed to provide a descriptive study of the sample population. Results were then tabulated.

FINDINGS. While philosophers and educators purport dichotomous philosophies regarding creative writing, teachers of this sample support the idea that creativity

can be taught and is subject to refinement. There is confusion among the sample as to successful practice and evaluating techniques.

SUMMARY AND CONCLUSIONS. With no consistent patterns of teaching and/or evaluating student writing emerging from this study, it would indicate that teachers are indeed confused about creative writing and the translation of research into actual classroom practice. Certainly this confusion and lack of continuity would manifest itself in student performance.

APPROVED BY THESIS COMMITTEE, AUGUST 1969
Thomas C. Park, Chairman
James W. Anderson

A SURVEY OF PUPIL AND CLASSROOM ORGANIZATION PLANS AND HOW THE NEEDS OF THE SLOW LEARNER WERE MET

by Earl Victor Hebeisen

PROBLEM. The purpose of this study was to determine the pupil and classroom organization plans in use in the schools of the Minneapolis-Saint Paul suburban area; and how the needs of the slow learner were met within these plans.

PROCEDURE. A principal of every other elementary school in each of twenty-nine school districts included in the study was surveyed by means of a mailed questionnaire. The data were collected in the fall of 1970, for the 1970-1971 school year.

FINDINGS. The majority of the sampled schools were using heterogeneous grouping with homogeneous grouping in some subject areas as their pupil organization plan. Self contained classrooms with teachers exchanging classes in some subject areas was the most common classroom organization plan. There was a summer school program of a remedial or special help nature in 95.7 percent of the sampled schools. Principals reported the employment of supplementary personnel to work with the slow learner in 92.4 percent of their schools. The needs of the slow learner were met through a variety of programs and provisions in the sampled schools.

SUMMARY AND CONCLUSIONS. There was a strong preference for heterogeneous grouping with homogeneous grouping in some subject areas as the pupil organization plan. Self contained classrooms with teachers exchanging classes in some subject areas was the most common classroom organization. The needs of the slow learner were met through a variety of provisions by the classroom teacher and supplementary personnel.

APPROVED BY THESIS COMMITTEE, DECEMBER 1970
James W. Anderson, Chairman
Louis J. Karakas
Armand E. Falk

THE HOLDINGFORD NONGRADED PROGRAM

Ruthe M. R. Lachelt

PROBLEM. It is the purpose of this study to present a descriptive case study of the development and results of the nongraded program in the Holdingford Elementary School.

According to the results of a special learning disability study made in 1967-1968, there was little doubt that the youngsters in the Holdingford Elementary School were deficient in language arts and mathematical skills.

PROCEDURE. An appraisal was made by administration and staff of what should be taught, what methods of instruction should be employed, what materials and facilities could be used to better meet the needs of the districts' youngsters. Within one year, determinations of staff utilization, subject matter organization, teaching methods, curricular directions, grouping practices, and all facets of teaching and

learning were resolved for a beginning instructional framework. The operational framework chosen by the faculty and administration to meet the needs of the districts' unique pupil population was the nongraded structure.

SUMMARY AND CONCLUSION. The ultimate goal of the Holdingford District was to provide an instructional and organizational program that would meet the needs of each individual youngster.

The flexible organizational structure which promotes the philosophy of continuous growth has allowed each youngster to increase the rate and degree of his learning and because of the structure the district has been able to realize its educational objectives.

After a three year period of study the change efforts have resulted in a great difference in the learning situation of each youngster.

It seems clear that if any new form of school organization is to produce the benefits that the Holdingford Elementary School has experienced in the three years of being nongraded, it must be accompanied by appropriate adaptations in the instructional practices of teachers. Changes in organizational structure alone are not enough.

APPROVED BY THESIS COMMITTEE, JUNE 1971

James W. Anderson, Chairman

Boyd A. Purdom

Mary B. Craik

A SURVEY AND ANALYSIS OF THE OUTDOOR EDUCATION PROGRAM IN THE MOUNDS VIEW ELEMENTARY SCHOOLS

by Douglas Martin Syring

PROBLEM. Our natural environment has been badly abused; therefore, our educational system will have to make the American public aware of the potential dangers through outdoor-environmental education programs. Therefore, it was the purpose of this study (1) to show the need for improved outdoor-environmental education; (2) to present the scope and nature of outdoor education; (3) to present survey results with regard to existing outdoor education programs in the Mounds View elementary schools; (4) to make an analysis of the existing outdoor education programs in the Mounds View elementary schools; and (5) to present recommendations for an outdoor education program for the Mounds View elementary schools.

PROCEDURE. The procedure used was to survey the Mounds View elementary teachers and administrators by developing a questionnaire on outdoor education. The objective of the questionnaire sent to the elementary teachers was to survey the areas of science background, present and future use of the outdoors for teaching, use of a recommended outdoor education program, and the willingness to participate in in-service workshops. The objective of the questionnaire used for the elementary principals was to take a sampling to determine the feelings of the elementary administration toward the development of an outdoor education program.

FINDINGS. The surveys indicated not only a definite interest in a recommended outdoor education program for the Mounds View elementary schools, but also a very distinct need for such a program. The elementary teachers' questionnaire results indicated 84 per cent used the outdoors for teaching with physical education, science, and art the most common subject areas taught outdoors. Whenever the out-of-doors could best serve a lesson's objective was the most common use of the outdoors for teaching purposes.

Other significant findings were: 97 per cent of the respondents would use a nature center facility if developed; only 41 per cent would feel qualified to teach in an outdoor education program; 96 per cent would be willing to participate in in-service workshops if credit were given, 71 per cent without credit; and 95 per cent felt that an outdoor education curriculum should be developed.

The majority of the study dealt with a recommended outdoor education program for the Mounds View elementary schools. The recommendations were based on basic considerations and principles for development of an outdoor education program and objectives for such a program. Included here were activities appropriate for use in the outdoors. The recommended program included school site development, an outdoor education camp site, mobile trailers, a nature center, field trips,

student kits, adult education, pre-school programs, in-service education, recommended staff, and evaluation procedures.

SUMMARY AND CONCLUSIONS. The study concluded that an outdoor education program was needed for the Mounds View elementary schools and that such a program was desired by the elementary teaching staff and administrators. It was the study's recommendation that an outdoor education program be developed for the Mounds View elementary schools as soon as feasibly possible.

APPROVED BY THESIS COMMITTEE, JUNE 1970
James W. Anderson, Chairman
John C. Coulter
Louis J. Karakas

SECONDARY EDUCATION

CHANGES IN AMERICAN EDUCATIONAL THOUGHT DURING 1957 AND 1958 AS THE RESULT OF SPUTNIK

by Dean A. Herrboldt

PROBLEM. The problem undertaken was to determine the effect of Sputnik upon American education on a national and on a suburban level.

PROCEDURE. Articles on education in two newspapers, *The New York Times* and the *Edina-Morningside Courier*, were researched for the years 1957-58 in an attempt to prove the following hypotheses:

1. There was no interest in comparative education prior to Sputnik.
2. After Sputnik, interest in progressive education was dropped in favor of specific programs to help America regain "educational superiority."
3. After Sputnik there was widespread support for large appropriations of funds to improve education.
4. Affluent suburbs were more concerned about education than the national norm.

FINDINGS.

1. The suburban medium showed very little interest in comparative education at any time during the two-year period.
2. The national medium showed a growth pattern in its interest in comparative education. Beginning with a negligible amount of interest early in 1957, attention paid to comparative education grew to 40 per cent of the total articles on education in the second quarter of 1958.
3. Both newspapers indicated an initial interest in progressive education which dropped in favor of curriculum reform during the period of the Sputnik launch and then gained in intensity during the latter months of 1958.
4. The national medium indicated willingness to appropriate funds for education, but the suburban indicated most interest in economy in education.
5. The suburban medium indicated much interest in the areas of school plant and school social activities.

SUMMARY AND CONCLUSIONS. On a national scale, 1957 was one of the pivotal years in American education. Sputnik caused Americans to make a commitment to education which lasted even after the initial shock of the Russian scientific achievement.

Suburban attitudes did not reflect the same degree of concern as the national norm. Rather, their chief concerns lay with economy, school maintenance, and school social activities.

APPROVED BY THESIS COMMITTEE, JUNE 1970
A. Wilbur Brewer, Chairman
James A. Grunerud
John W. Laakso

SPECIAL EDUCATION

A STUDY OF POSTSCHOOL ADJUSTMENT OF FORMER EDUCABLE MENTALLY RETARDED PUPILS IN ST. CLOUD, MINNESOTA

Clifford Dale Baker

PROBLEM. The purpose of this study was to evaluate the postschool adjustment of a selected group of educable mentally retarded pupils and to compare these data with baseline data from a previous study in which the retardates were exposed to a different school program. The adjustment areas include (1) occupational adjustment, (2) occupational mobility, (3) post-high school education, (4) marital status, and (5) socio-economic status.

PROCEDURE. The subjects in the present study consisted of the total population of nineteen former students who attended classes for the educable mentally retarded at Technical High School in St. Cloud, Minnesota, between 1967 and 1970. The subjects had all participated in the resource room program or the work study program, or both, while attending Technical High School. The intelligence quotient of the population ranged from 56 to 97, with a mean IQ of 74.9. The chronological age of the subjects ranged from 19 to 23, with a mean age of 21 years. Data from the present study were compared with data gathered in a similar study completed in 1967. The subjects in the previous study had not been exposed to any special education services at the high school level. The thirty subjects in the previous study were selected by the random sample method and had a mean IQ of 70.5 and a mean age of 23.5.

The personal interview was used to gather the data which were presented in tabular and discussion form. The occupations were rated according to the *Minnesota Scale for Paternal Occupations*.

FINDINGS. The results of the study indicate that the majority of the subjects in both groups are making an adequate adjustment in the areas measured. Although the evidence was not overwhelming, the two most significant differences in the two groups were:

1. Lower unemployment rate of the subjects in the present study.
2. The average income in the present study was significantly higher than that of the earlier study and approximated the per capita income of the general population.

APPROVED BY THESIS COMMITTEE, JUNE 1971

Stanley C. Knox, Chairman

Floyd W. Ayers

Gordon E. Mortrude

A STUDY OF TEACHERS' PERCEPTIONS OF PREPARATION FOR TEACHERS OF THE EDUCABLE MENTALLY RETARDED AT ST. CLOUD STATE COLLEGE

by Paul Allen Zemke

PROBLEM. This study attempts to determine the effectiveness of selected aspects of the preparation program at St. Cloud State College for the teachers of the educable mentally retarded as perceived by recent graduates.

The study analyzes and describes aspects of (1) student teaching, (2) general program developments, (3) specialized sequence of preparation, (4) professional education, (5) teacher opinions of their professional preparation, and (6) suggested improvements in programs.

PROCEDURE. The population for the study was compiled by reviewing the graduation lists in Teacher Education. Students who had undergraduate minors in mental retardation and students who received initial training in mental retardation at the master's level from 1964 to 1967 were selected for the study. A questionnaire containing a check list as well as open-ended questions was sent to each of the 107 graduates who meet the requirements. Completed returns were received from 79.4 per cent of the respondents.

Graduates were separated into two groups. One group taught the retarded after graduating and the other did not. Where it was possible, the two groups

were compared to see if any significant difference existed in the way they perceived the program.

FINDINGS. The following are some of the findings:

1. The respondents' number one suggestion for improving the student teaching program was that college supervisors should have training in special education.
2. The respondents' number one suggestion for improving the minor program of preparation was for more practical experiences with handicapped children.
3. The second most frequent suggestion was for more information on diagnostic tests and remediation techniques to use with retarded children.
4. Adequate emphasis was indicated by 50 per cent or more of the respondents on all course objectives within the minor field of preparation except that concerning curriculum for the retarded. A total of 37.87 per cent indicated curricula had been adequately emphasized.
5. A total of 90.41 per cent indicated that weekly seminars conducted during student teaching by the college special education personnel would be beneficial.
6. Over 50 per cent of the respondents indicated that a one-year internship replacing the present student teaching program would be beneficial.
7. The respondents were generally satisfied with the information obtained through professional education courses. However, a total of 32.94 per cent were dissatisfied with information given on diagnostic and achievement tests for exceptional children.

SUMMARY AND CONCLUSIONS. The results of this study seem to indicate that the respondents were more satisfied than dissatisfied with their college experiences.

The study suggests, however, that there are certain areas which should be given consideration in future program development. Those areas include the need for college student teaching supervisors to have some training in special education; careful placement of student teachers; consideration of an internship program under master teachers replacing the present student teaching program; an analysis of the objectives relating to curriculum development for the retarded; additional course offerings in developmental reading, diagnostic and remedial techniques; demonstrations of diagnostic and remedial techniques by master teachers; and additional information on the role and importance of various community agencies.

APPROVED BY THESIS COMMITTEE, JULY 1969

Stanley C. Knox, Chairman

William Lovelace

HEALTH, PHYSICAL EDUCATION AND RECREATION

A STUDY TO DETERMINE THE EFFECTIVENESS OF THE ELEMENTARY PHYSICAL EDUCATION CONSULTANT VERSUS THE CLASSROOM TEACHER

by Robert Dwight Lindberg

PROBLEM. It was the purpose of this study to determine whether there was a significant difference in physical fitness between students in sixth grade who were taught daily by the physical education consultant in the Mound School District and students who were taught daily by the classroom teacher with assistance by a physical education coordinator once every three weeks in the Osseo School District.

PROCEDURE. Approximately thirty girls and thirty boys in grade six were selected at random from an elementary school in Mound. An additional thirty girls and thirty boys from a school within the Osseo School District were selected. Pupils were administered the AAHPER Youth Fitness Test in October, 1968, and again in May, 1969.

To analyze the results of the test, the mean score of each test given in the fall was determined and the random test score was computed in order to determine whether there was a significant difference between the mean score made by the girls/boys from Mound in the fall/spring compared to the mean score made by the girls/boys from Osseo in the fall/spring. The actual scores of each test were then transposed into national percentile ranks. The fall/spring percentile rank scores of girls/boys from Mound were compared to the fall/spring percentile rank scores of girls/boys from Osseo. The national percentile rank achieved by the girls/boys from Osseo/Mound in the fall was compared to the percentile rank achieved in the spring.

FINDINGS. In the fall the Mound girls scored higher than Osseo on all seven test items but only in three test items were the scores statistically different. In the spring Mound scored higher than Osseo on six of the seven test items, the scores being statistically different in four of these items. Except in the shuttle run in the spring, when the scores were the same, Mound girls achieved higher on national norms established by AAHPER than Osseo.

In both the fall and the spring, Mound boys achieved higher than Osseo in five of the seven test items. In four of the test items in the fall and three of the test items in the spring, the difference between the mean scores were statistically significant. Mound boys achieved higher than Osseo on national norms in five of the seven test items in the fall and four of the seven items in the spring.

SUMMARY AND CONCLUSIONS. The null hypothesis, which stated there was no significant difference in physical fitness between students in sixth grade who were taught daily by the physical education consultant in the Mound School district and students who were taught daily by the classroom teachers with assistance by a physical education coordinator in the Osseo School District, must be rejected. Girls appeared to benefit more from instruction by a physical education consultant than did boys. The study points out that a physical education consultant did have a positive influence on the performance of the students in regard to physical fitness.

APPROVED BY THESIS COMMITTEE, JULY 1970

Frances A. Bleick, Chairman

John Kasper

A. Wilbur Brewer

PSYCHOLOGY

A STUDY OF ROLE PERCEPTION OF NURSES ENGAGED IN REHABILITATION OF PSYCHIATRIC PATIENTS

by Dorothea M. Lenarz

PROBLEM. It was the purpose of this study to explore dissonance and consonance between the nurse's perception of herself as a therapeutic agent in the rehabilitation of psychiatric patients and her perception of her nursing functions.

PROCEDURE. The subjects in this study were forty-seven nurses who had completed one of a series of seminars in basic principles of patient counselling at the Veterans Administration Hospital in St. Cloud, Minnesota. A questionnaire was constructed and employed for collecting data. Six judges from the professional staff at the hospital reviewed and evaluated data. Results were presented in four tables.

FINDINGS. Forty-one of the forty-seven questionnaires were returned. Fifty-five percent of the nurses responding indicated they felt they were therapeutic agents and forty-five percent felt they were not. Consonance between the nurses perception of their role and their description of nursing functions was indicated in sixty-five percent of the samples. Dissonance was evident to the judges in thirty-five percent of the questionnaires.

SUMMARY AND CONCLUSIONS. The proportion of nurses in this study who indicated they were not functioning as therapeutic agents in the rehabilitation of psychiatric patients is sizable. The degree of dissonance between the nurses' perception of themselves as therapeutic or non-therapeutic agents and the description of their nursing functions suggests confusion in role identification. This study reflects a need for careful evaluation of the practical value of the seminars, the organization of nursing service, and the attitudes of nurses themselves toward the therapeutic role of nurses. There is a definite need to determine whether or not the therapeutic role of the nurse in the rehabilitation of psychiatric patients in this setting is feasible. Successful recruitment and retention of a dynamic nursing staff may depend on the outcome.

APPROVED BY THESIS COMMITTEE, AUGUST 1969

Eugene Perkins, Chairman

Albert H. Krueger

ART

PHOTOGRAPHY AS A MEANS OF ENHANCING SECONDARY ART EDUCATION

by Carl Christian Andersen

PROBLEM. The purpose of this study is to identify the potential value of photography in the art curriculum of the secondary school and colleges.

PROCEDURE. An investigation of current and relative information that reveals values in the theory and practice of photography.

Step number one was reviewing the origin and the history in the development of photography. This included the history of photography in general as well as photography in education.

Step number two was expanding on information revealed in the history of photography which was orientated towards art education.

Information was sought at the St. Cloud Public Library, the St. Cloud State College Library, the Technical High School Library, and the University of Minnesota Library.

Sources used included card catalogues, publications listing art periodicals, *The Reader's Guide*, publications listing current abstracts of thesis, and microfilm on periodicals.

FINDINGS. The history of photography is being revived in experiments of an earlier origin with new values. Photograms, for example, are used in education and for novel illustration purposes. Early photographers were often artists seeking a technical solution to the problems of visual imagery. Tom Wedgewood, the son of a very famous potter, could very well have been distinguished as the father of modern photography although he was unable to solve the technical problem of fixing silver nitrate. Samuel Morse, Thomas Eakins, and Edgar Degas are known as famous painters, but it is a little known fact that they were also active in photography. The past has revealed some who have believed that photography is not an art. This belief has faded, especially in recent years with the involvement of contemporary artists in photographic technique. The unique characteristic of photography is revealed in its innate reality not common in other art mediums.

SUMMARY AND CONCLUSIONS. Through art education photography can be an effective means of self expression. Photography can also be an outlet for creativity. An art instructor can gain in either a limited or very comprehensive program in photography.

As a means of self expression, photography relates well to contemporary art with its sharp detail and efficient technology; as a means of documentation, photographs can be compact and effective as motivation or for instructional purposes.

APPROVED BY THESIS COMMITTEE, JULY, 1970
Gerald Korte, Chairman
James Roy

REFLECTIVE REPRESENTATION FIGURATIVELY EXPRESSED

by Wayne John Buidens

PROBLEM. The artist discovers an inherent need for expression and communication with his contemporary society. Dependent upon his individually formulated personality the artist will disclose a sincere need for self-expression in whatever activities he may partake. Following his natural desires the artist will attempt to communicate through a visual medium. The visual artist, who is emotionally directed, attempts to make his medium and his subject harmonize in a predestined direction. The artist creates an atmosphere he has emotionally experienced and presents this experience to benefit another. While reviewing the artist's experience and visual statement, the viewer should find this statement beneficial.

PROCEDURE. Through his medium the artist discloses his potentiality. Paint and painterly application are methods for creating explosive and energetic statements.

The particular application or relationship of one color to another will create a pliable atmosphere in which a sensitive or intuitive artist will re-develop an emotional situation he has at sometime experienced. The subjective elements and the particularly adopted palette are the means through which sensitivity is personified and communication is most explosive.

FINDINGS. The more sensitive artist will allow intuition to direct his interpretation. Should a particular artist find his most adaptable subjective elements as questionable by his viewing public, he will discover that sincerity to his creativity is a more influential standard for aesthetic creation. The sensitive artist, being emotionally directed, will value personally developed experiences as the most potential elements for visual communication.

SUMMARY AND CONCLUSIONS. The contemporary artist displays a need for communication. Self-expression is a most important desire and emotional involvement becomes the drive for sensitive interpretation of personal experiences. By means of his palette and expressive application the artist is capable of creating a potentially explosive atmosphere in which communication becomes a visual element. In experiencing the artist's interpretation, the viewer will be able to benefit either by better understanding the artist's involvement or by formulating his own emotional experience. An emotional experience is considered the best means for sensitive communication. The sincere artist will best operate within his own experiences.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
David Brown, Chairman
Leland Wallin

PAINT AND THE PHOTOGRAPHIC IMAGE

by Thomas Anthony DeBiaso

The artist deals with the problems of integrating the photographic image with the painted canvas. Painting and photography have many qualities which give them visual strength. Paint derives its power through color and its plastic qualities which allow the paint to be moved, structured and both physically and visually tactile.

Photography's strongest power lies in its capacity to represent a believable "mirror of reality" and to document a slice of time.

Because of the importance of these qualities, it is imperative that neither media detract from the other but work together, preserving their identities to produce a result which is a new vision or perception.

The artist began his work by photosensitizing the surface and printing the photographic image directly into the canvas. A hard edge style of painting was used to surround the image in an attempt to create a sterile atmosphere for the photograph. Many different variations of color, size and form were experimented with until a workable image-paint relationship was achieved.

The new relationship preserved the qualities of both the paint and photograph by raising the photographic image from the surface of the canvas. A new perception was developed through this visual and physical separation of image and paint and consequently a workable harmony.

The idea of surrounding the image with paint gave way to creating an environment in which the paint would hold the photographic image.

This idea set up a suitable premise to work from. The artist paints the geometric environment and combines it with his imagery of the common man and comes up with a totally fresh statement.

The resulting work allows the elitism of the artist to manifest itself through the strong content of the work, the visual harmony and the artist's knowledge that the common people will never understand or perceive what he is doing to them.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
David Brown, Chairman
Myron Anderson
Laurie L. Halberg

AN INTRODUCTION TO THE TECHNIQUE OF STAINED GLASS A TOPICAL MANUAL AND TEACHING GUIDE

by *Richard Lee Haeg*

PROBLEM. Because little, if any, research has been done about stained glass and its adaptation to an art curriculum, this project was undertaken. This study is intended as a help to those students and teachers making their first attempt at designing with stained glass.

PROCEDURE. It was the purpose of this study (1) to give a general introduction to stained glass; (2) to explain step by step the construction of a stained glass window; and (3) to list available sources for materials needed to set up a shop for stained glass.

FINDINGS. With the introduction of new concepts of thinking and time configurations in our present day educational systems, art curriculums have expanded from the basics of drawing, painting, and sculpture to include a renewed awareness of the creative crafts. A tremendous surge of activity and interest in new media may be discerned. This expansion of media can help to solve some of the problems met in an expanded art curriculum because with the necessary experimentation comes knowledge and understanding.

Art students are intrigued by the interplay of light and color. Work with stained glass provides ample opportunities to explore the potentials of transparency. Stained glass can readily be used to stimulate interest, further discussion and lead to the discovery of new uses for this medium.

SUMMARY AND CONCLUSIONS. The discussion in the text of stained glass media points out details, examples, and utilization suggestions to assist teachers and students in making practical applications. The aim was to go beyond mere identification of materials or descriptions of their characteristics—advantages or disadvantages—although these areas were not ignored.

The stained glass craftsman seeks to paint with light. He uses pieces of colored glass to form a design. The truth of the work, however, is not primarily to be found in the colored picture, but rather in the kind of light in the intervening space between this surface and the spectator's eye.

Very little published research was available in the area of stained glass technique, but the author feels that teachers and students may benefit from the research completed on this thesis.

APPROVED BY THESIS COMMITTEE, AUGUST 1969

James Roy, Chairman

Laurie L. Halberg

PLASTIC AS A SCULPTURAL MEDIUM

by *Stephen L. Henslin*

PROBLEM. To investigate three-dimensional composition through the medium of acrylic plastic and gain an understanding of the inherent possibilities of this medium.

PROCEDURE. The conditions of the problem were satisfied by producing sculpture of sufficient quality and quantity so as to obtain the necessary knowledge and insight.

FINDINGS. The artist, through personal investigation, has ascertained acrylic plastic a legitimate and flexible sculptural medium. With a minimum of specialized tooling, the material can be handled with relative ease and maximum accuracy. Acrylic plastic offers a vast range of aesthetic possibilities and potential.

SUMMARY AND CONCLUSIONS. With the exception of certain structural limitations, acrylic plastic has proven to be an acceptable material for the purpose of sculptural composition.

APPROVED BY THESIS COMMITTEE, JUNE 1970

James Roy, Chairman

Joseph Aiken

James R. Johnson

A RELATION OF THE VISUAL THESIS

by Raleigh Earl Kinney

The thesis intent is to implement a means for the artist to analyze his body of work in a meaningful and ordered way.

The artist developed the written portion of the visual thesis with a combination of pieces of work completed in both the intaglio process and the plantographic process over the past four years. In addition, the written portion of the thesis seeks to explore the intent of the artist through his work. The total works were divided into basically two parts: Development (early expression and growth); Envolvement (two groups of series of work, one entitled by the artist *The American Landscape* series depicting the effects man and nature have on one another, the other, a group based on the *Thoughts and Memories* in a child's growth as dealt with by the artist.)

The introspection by the artist enabled him to understand his work a great deal more clearly and helped him to define his attitudes and goals toward his visual product.

All have need to express themselves. The politician has talk, the poet has a way with the written word, still others build. The artist has found a means through which he speaks, writes and builds, more clearly defining his essence than words can say. He finds his satisfaction in his viewer's reactions to his works. He finds his frustrations dissolved in the action of the crayon and the bite of the burin into metal. The artist reaps his reward through bringing to the fore an insight, an unnoticed impression, the amplification of a thought. The explanation of the artist's work has implicated him with life and set up thought patterns exhorting him to set them down, which, by so doing, sets him apart from all but his kind.

APPROVED BY THESIS COMMITTEE, AUGUST 1969

William Ellingson, Chairman

James Roy

THE DESIGN AND CONSTRUCTION OF CERAMIC SECTION POTTERY

by Thomas Chester Kishel

PROBLEM. Since effective production of ceramic pieces of considerable size is a difficult task, the author attempted to illuminate the procedures of the additive method, illustrating the necessary steps and techniques.

PROCEDURE. The author presented certain design factors of basic utilitarian pottery and explained how to incorporate these factors in the assembling of large non-utilitarian section pottery. He further presented problems involved in various phases of such construction as well as glazing techniques utilized.

FINDINGS. A potter must discipline the development of each individual unit and at the same time maintain a creative awareness of the ultimate role each will play in the total assemblage. Basic design factors of utilitarian ware should be considered in order to create a pleasing composition and a means of unification. So that cracking or warping will not ruin the piece, certain precautions must be taken in preparing the clay, in maintaining uniform moisture of the separate units "setting up" to a leather hard state, in working the sections together to insure a good bond, and in drying. In glazing, techniques of application, such as spraying and dripping, should be utilized and varied so as to break up the larger surfaces, thereby creating interest and unity while avoiding monotony.

SUMMARY AND CONCLUSION. In developing section pottery, the potter, while remaining aware of the aesthetic value of the final product, must incorporate utilitarian design factors into individual units and observe precautions in preparing, working, drying and glazing, so that the finished pot will be not only aesthetic but strong.

APPROVED BY THESIS COMMITTEE, JULY 1970

Laurie L. Halberg, Chairman

Rena Coen

Roger Barrett

RAKU CLAY BODIES, GLAZES, FIRING AND FORMS

by Richard Anthony Mayo

PROBLEM. The purpose of the study was to develop a clay body that could withstand the violence of the unusual firing process; to develop some glazes that would work effectively; and to refine firing procedures with the end result being the production of pleasantly designed Raku ware.

PROCEDURE. The causes of thermal expansion were studied and properties were introduced which lowered that coefficient and opened the clay body. Glazes with low melting temperatures were developed and experimented with until desirable qualities were found. Many varying glaze firing procedures were examined in a Raku kiln of St. Cloud State College's design until satisfactory perfection was achieved. A pottery design which would fit Raku glaze and texture was sought.

FINDINGS.

- A. Five Raku bodies were developed.
- B. Twenty-eight glazes were brought to perfection.
- C. Many glaze firings were studied and noted.
- D. A ceramic design was found that would work well with Raku glaze and clay.

SUMMARY AND CONCLUSIONS. It was the author's intent to develop Raku clay and glazes that would work effectively with the Raku firing technique. The author with the cooperation and help of his advisor, Laurie L. Halberg, researched and studied these areas.

The low temperature at which Raku is fired brings the making of Raku pots within the range of any enthusiast. One may start with very little apparatus and expense. A broad range of colors are available, and direct control of each individual piece is possible. Raku has the advantage of speed of firing and spontaneous, direct result. The intimacy and immediacy are never more deeply felt in any other ceramic process.

Very little published material is available in the area of Raku, so it is hoped that the research will be of service to anyone wishing to investigate Raku. This paper is merely the beginning; many more variations are waiting. The potential of the materials and process are limited only by the individual concepts in the artist's mind.

ACCEPTED BY THESIS COMMITTEE, AUGUST 1969
Laurie L. Halberg, Chairman
James Roy

AN ANALYSIS OF EXPERIMENTATION IN CARDBOARD EMBOSSEMENT WITH INTAGLIO PRINTING

by Richard Lee Mittelstadt

PROBLEM. The problem of the thesis paper was to supplement the artist's visual Master of Arts thesis which consisted of a body of nine related prints. The initial intention of the artist was to record the procedures, materials, and results in creating prints by inking mat board; lifting color from poster board, reusing intaglio plates and printing motifs;; creating a relief or embossed printed surface; and printing multi-color, multi-process prints in a one-run operation.

PROCEDURE. The author discussed his thesis problem in terms of reappraising chronological events that related to the methods and exploratory findings which subsequently went into the development of the visual thesis prints. The author documented the procedures that he used and that influenced ensuing procedures. The investigator did not explore the philosophical motivations that produced the prints, but rather recorded only the technical processes that were involved in the production of the prints. In his description of procedures and techniques, the author used one of his thesis prints as an example to explain the entire step-by-step process and to explain required materials and equipment that he needed to produce his thesis prints.

RESULTS. At the end of the thesis (under each photograph of the thesis prints), the author explained the basic procedures that were involved and evaluated the

visual and technical success of the prints. The author felt that he adequately succeeded in producing prints that incorporated the combined operations of intaglio, inked mat board relief, and poster board color-lift printing techniques. The consolidation of subdued colors of poster board, bolder-contrasting colors of inked mat board, and the illusion of depth achieved by intaglio plates made "exciting" visual statements. When printed on Arches Paper which was expedient to plate-embossment, the plates increased the print's three-dimensional illusion with a raised surface effect.

SUMMARY AND CONCLUSIONS. The primary objective in supplementing the visual thesis was to record the artist's exploratory findings, related background, and eventual achievements in his printmaking development. Included in the thesis are the incentive factors that motivated the printer continually to produce, in succession, visually improved prints.

The artist was pleased that he produced a body of work that was indicative of his personal mental attitude, interests, and abilities. Technically, the artist resolved many problems in mastering his media. Aesthetically, the artist reached a level of visual excitement that he had not achieved earlier in his printmaking experience. From this series of prints, the artist felt that he had something for which to strive in his next series. He felt that he had gained knowledge and experience from his involvement with this newly explored trend of printmaking style.

APPROVED BY THESIS COMMITTEE, JUNE 1970
William Ellingson, Chairman
James Roy
Lorene Marvel

A STUDY ON THE FEASIBILITY OF CHANGE IN THE JUNIOR HIGH ART CURRICULUM

James Schluck

PROBLEM. The study was set up to investigate the "change" of an art curriculum at the junior high level. The writer teaches curriculum at the junior high level. The writer teaches ninth grade art in Hopkins, Minnesota. Hopkins School District #274 has undergone many curriculum changes in the last few years. The two high schools in the district are presently on a modular schedule, and the three junior highs are looking for a new and meaningful direction in curriculum planning.

The study was initiated through very frequently heard questions and statements from the students which indicated a lack of purpose and self-motivation in the present structure.

PROCEDURE. The writer devised a nine-week program which allowed every ninth grade art student the choice of two directions to pursue. The traditional or control program remained the same with direction and deadlines set by the teacher. The experimental program allowed students greater freedom and responsibility with all projects due at the end of the quarter. The projects were the same for both groups, but the experimental group was free to pursue the assignments at its own rate and order.

All students were given passes which allowed them to use the art room during any free time they might have. The room was partitioned into three mini-studios, and the instructor's office was set up as a resource center.

FINDINGS. All students were given a creativity exercise at the beginning of the quarter in order to establish homogeneity of the two groups. In order to gain some standards of measure, they were given a pre-test and a post-test measuring attitude toward art. Letter grades were charted before and after the nine-week period with the same judges grading the art work.

The results of the attitude survey showed no significant difference in either group. The letter grades showed no significant difference in the control group, but grades declined significantly in the experimental group.

SUMMARY AND CONCLUSIONS. Students in the experimental group were not too concerned with grades as their attitude toward art showed a slight positive increase even though their grades declined. All students were aware of their final grade before the post-attitude survey was given. Students welcomed the change

in the art curriculum as indicated by the large number of participants who elected the program which offered them choices as well as freedom and responsibility.

APPROVED BY THESIS COMMITTEE, FEBRUARY 1971
James Roy, Chairman
William Ellingson
Robert Ryan

PRINTING AND EMBOSSED FROM CARDBOARD

by Richard J. Susag

PROBLEM. To meet the requirements for the degree Master of Arts, all candidates must exhibit work done while working on the degree. Each candidate must also write a paper explaining the visual thesis.

PROCEDURE. The procedure will involve visual examples and explanations of the processes used in printing from cardboard.

FINDINGS. Cardboard is an excellent media for printmaking.

SUMMARY AND CONCLUSIONS. The written paper describes the processes, advantages, disadvantages, and limitations of printing and embossing from cardboard. The photographs in the back of the paper are visual examples of the artist's work.

APPROVED BY THESIS COMMITTEE, MAY 1970
William Ellingson, Chairman
R. Keith Michael
Eriks Rudans

MULTIPLE-SHAPED CANVASES INTERACTING WITH WHITE WALLS

by Alice Wasko

PROBLEM. It was the artist's expressive intent that the form of the paintings be a total organization of color, line and space to interact with white walls; an object relating to its physical environment.

PROCEDURE. Since the problem of the artist was to reject spatial illusion and rather make space an integral part of the painting, a decision was made to work on multiple-shaped canvases. The artist used a minimum of one or two geometric forms and close color tones in contrast to the negative areas of the painting and the wall.

FINDINGS. The artist's involvement with conceptual sketches, led her to work out related ideas and from these, select the ones relating to the problem most effectively. Some ideas, using the circle as the central image, were set aside due to technical limitations involving the shaped stretchers. The artist then concentrated on the square as the central image.

SUMMARY AND CONCLUSIONS. Involvement in the visual thesis gave the artist a better understanding and appreciation of the problems of today's mainstream artist. It was an exciting experience with endless possibilities for future contemplation. The introduction of the wall is a contributing factor to the formation of an infinite variety of ideas. Color and form may be varied, but the concept of simple geometric shapes interacting with a white wall to form the whole, will remain the basic concept for future work.

APPROVED BY THESIS COMMITTEE, AUGUST 1969
David Brown, Chairman
Gerald Korte

AN INVESTIGATION, SURVEY, AND PROPOSED SOLUTIONS TO PROBLEMS RELATED TO CERAMIC KILN OPERATION

by James Bernard Young

PROBLEM. Although a great deal of information concerning ceramic kiln construction has been published recently, a void has been left concerning regulatory restrictions. It was the author's intent to identify the new anti-air pollution laws and community regulations which might restrict or prevent the building or successful operation of such kilns.

PROCEDURE. Recent "quality air" laws were investigated. Those portions pertaining to ceramic kilns were summarized. Community restrictions, building codes and zoning were reviewed. A survey was conducted to poll ceramics teachers throughout the United States to discover if any restrictions have affected kiln operations. The requirements of a reduction fire pottery kiln were stated and an experimental wood-fueled kiln was built.

FINDINGS. Regulations are indeed a problem. The flame-safe equipment required by many installations can be prohibitive in cost. The equipment required was originally designed for installation other than kilns. Returns from the survey indicated that:

1. Continual upgrading of regulations had posed problems with kiln-firing operations.
2. Many colleges and universities had contributed to unsafe conditions by providing "temporary" facilities.
3. Many ceramics teachers felt that air pollution would be the key issue in the future.
4. The returned questionnaires indicated lack of concern for regulations.

A two-chamber kiln was found to solve most problems with air pollution requirements. Loose brick construction of superior insulating material proved to be the most plausible solution with bonuses of lower firing costs and true portability.

SUMMARY. A kiln installation should be thoroughly examined and carefully planned. Careful selection of the locality is a must. When working with the regulatory agencies, a tactful approach is necessary. Very few problems ensue where some degree of knowledge about kilns is understood.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
Laurie L. Halberg, Chairman
Rena N. Coen
Roger Barrett

MUSIC

TRAINING THE ADOLESCENT MALE TENOR IN THE USE OF THE HEAD TONE

by Donald W. Crouch

PROBLEM. It is generally agreed that the tenor voice is the most difficult to develop in the four-part high school mixed choir. The problem is the high register of this voice: the head tone. The most prevalent area of confusion which this writer has found in ten years of teaching vocal music is the development of the male head voice. Through research it was discovered that this is not a new problem. The variation in terminology and vocal techniques found in diverse sources hinder, rather than help, the voice teacher of the adolescent tenor.

PROCEDURE. In order to bring some clarity to this area of teaching, this writer searched authorities on vocal technique for the information necessary to establish a program of instruction for the tenor voice. From this original survey, a list of books was chosen for a selected bibliography on vocal techniques. This bibliography was then utilized to establish a set of terms to be used in the instruction of the student and to establish the foundation for the basic procedures and exercises which may be employed in developing the tenor head tone.

It was found that current instructional practices of the development of the tenor are varied and contradictory. These practices were surveyed and categorized into three areas: (1) the malpractices, (2) the methods used to establish the head tone, and (3) the developmental procedures used to expand the head register.

FINDINGS. The techniques needed to develop the head tone are divided into three main areas of instruction: (1) production of the head tone, (2) procedures needed to strengthen this first tone, and (3) exercises which will blend the head tone into the chest register enabling the singer to develop a wider range of uniform quality. The techniques and exercises included within this paper were drawn from authoritative sources and from the experience of this writer.

SUMMARY AND CONCLUSIONS. This study has been concerned primarily with the adolescent male tenor and the development of his head voice. It was discovered through research that there were several areas of conflicting instructional procedures which were evident between authorities concerning the tenor voice. The most apparent area of disagreement was terminology, which necessitated the establishment of a set of terms. Exercises were included for finding the head tone, strengthening this tone, and then expanding this tone to blend with the chest register. An extremely important factor in the use of these exercises is that the student should not be rushed. Each step would be repeated until the singer can perform the exercise with ease and freedom. When these techniques are within the grasp of the learner, he should be prepared to continue the widening of his range by repeating the exercises beginning a half step higher than his original pitch.

ACCEPTED BY THESIS COMMITTEE, JULY 1969
Lorene Marvel, Chairman
Helen Huls

A CASE STUDY TO DETERMINE THE EFFECTS OF MUSIC USED AS THERAPY ON AN ORTHOPEDICALLY HANDICAPPED CHILD

by Donald Christ Petrick

PROBLEM. It was the purpose of this study (1) to consider the activities of music in association with the knowledge of elements of music used in treatment; (2) to define the condition of the patient to determine the best method of music therapy to be applied; (3) to indicate specific cases where music therapy applications were used in treatment of the orthopedically handicapped, and (4) to describe the effects of applied trumpet therapy on an orthopedically handicapped individual.

PROCEDURES. Through singing, being creative, playing instruments, or listening, the principle elements of music, rhythm, pitch, melody, and harmony were considered of utmost importance. The characteristics of an orthopedically handicapped child were determined through course study at St. Cloud State College and personal visits to the Gillette State Hospital in St. Paul, Minnesota.

Letters were sent to various sources requesting all available information concerning orthopedic music therapy.

Two tests were administered to the child. The first, the Lorge-Thorndike Intelligence test determined mental aptitude. The second, Music Aptitude Profile measured musical aptitude.

Trumpet therapy was applied to the right hand fingers of a twelve year old girl. Clinical sessions were prescribed in forty-five minute periods each Wednesday. The girl was treated for four months. During this time a complete record was kept of each session.

FINDINGS. Definite improvement was noted in the following valve combinations: first valve position down, first and second valve positions down, second and third valve positions down, and third valve position down. Only slight improvement resulted from placing first and third valve positions down, and second valve position down.

SUMMARY AND CONCLUSION. The study has stressed the importance of music when used as treatment for an orthopedically handicapped child. Singing, being creative, playing instruments, or listening were suggested activities for therapy. It appeared to the instructor that the condition of the patient must be thoroughly

analyzed before music therapeutic applications can be prescribed. Specific cases were indicated where music therapy was successfully applied.

In conclusion, this project has revealed how therapy can produce significant results when used as therapeutic treatment. The study indicates how trumpet therapy helped to regain partial strength and coordination in the right hand fingers of a twelve year old girl.

APPROVED BY THESIS COMMITTEE, JUNE 1970
Harvey R. Waugh, Chairman
Roger Barrett
Paul Cairns

THE TROUBADOUR HARP IN THE ELEMENTARY SCHOOL

by John Vincent Wolak

PROBLEM. Music educators strive to help children understand the elements of music. These elements are: melody, rhythm, harmony, form, and expressive qualities.

The writer, a music consultant in the North St. Paul-Maplewood School System, District 622, wished to experiment with the modern Troubadour harp in the elementary classroom to help children gain a more valuable, first-hand experience in understanding the above-mentioned elements of music.

PROCEDURE. The Troubadour harp was used in the writer's daily teaching in three elementary schools. He visited fifty-eight different classrooms with approximately seventeen-hundred children every two weeks from September 3, 1969, to May 10, 1970. The Troubadour harp was used in many activities to discover its potential with children in the elementary school.

In order that teachers and children could better appreciate the Troubadour harp, the writer visited the largest harp manufacturer in the world, the Lyon and Healy Company of Chicago, where he obtained pictures and information concerning the history and construction of the modern Troubadour harp.

FINDINGS. The main findings obtained from this research were the valuable uses of the Troubadour harp in helping children become better acquainted with the elements of music.

The Troubadour harp:

1. may be used with children of all ages and mental capacity.
2. may be used for small or large group instruction.
3. may be used for solo work or as an accompanying instrument.
4. may be used to play vocal or instrumental compositions.
5. blends well with most instruments.
6. is conducive to creative expression.
7. may be played by one or more persons simultaneously.

SUMMARY AND CONCLUSIONS. This thesis was written to illustrate how the Troubadour harp could be used in the elementary school to teach the elements of music.

The Troubadour harp is a useful instrument for the elementary classroom for the following reasons:

1. The Troubadour harp is very appealing to grade-school children.
2. The Troubadour harp is easily portable. It is smaller than the full-size concert harp and may, therefore, be carried by hand or transported by car. This makes it an ideal instrument for the classroom teacher, music specialist, or consultant.
3. The Troubadour harp is easy to maintain. The mechanics of the harp are simple. Consequently, there is little upkeep, except for tuning and occasional string replacement.
4. The cost of the Troubadour harp, today, is minimal. The instrument could be purchased by an individual or the school district.

APPROVED BY THESIS COMMITTEE, JULY 1970
Lorene Marvel, Chairman
James R. Johnson
Gerald Korte

THEATRE

A PRODUCTION RECORD AND ANALYSIS OF TWO PLAYS PRODUCED AT THE STATE REFORMATORY FOR MEN ST. CLOUD, MINNESOTA

Paul LeRoy Winters

PROBLEM. This study was undertaken (1) to show that there is a need for interested inmates to have an opportunity to participate in prison drama, (2) to show that there is a need to develop an appreciation of the dramatic arts within the general population of adult correctional institutions, (3) to provide a production record of two productions *A Cook for Mr. General* and *The Resistible Rise of Arturo Ui* performed at the Minnesota State Reformatory for Men, St. Cloud, Minnesota, (4) to, hopefully, aid other individuals who desire to do theatre with inmates of a prison, reformatory or penal institution, and (5) to show that prison theatre can be an activity which allows an inmate to spend leisure time in a profitable and active manner.

PROCEDURE. In this study the author briefly outlines the history, physical plant, administrative structure and educational and recreations programs of the Minnesota State Reformatory for Men. He then examines five sessions of a Drama Class taught by the instructor-author in the night school program at the Minnesota State Reformatory. The content, exercises and results of the classroom sessions are included in the study. The author then discusses in detail the directorial procedures used in producing the two plays. To aid the director of prison theatre there is a section on play selection, cutting and adaptation. The problems involved in working with music, lights, make-up, costumes, publicity, properties and set construction are also enumerated.

FINDINGS. Using the inmate evaluations sheets as an index of success and failure the two productions enabled the men to spend their leisure time in a profitable manner. By and large the general population reacted favorably to the theatrical productions. However, there are numerous problems involved in producing a play within a prison environment, problems that a director would not normally encounter.

SUMMARY AND CONCLUSION. Theatre can be and probably should be included as part of the rehabilitation program in prisons because theatre can stimulate creative abilities and develops confidence and self-expression. In addition theatre, when effectively taught, can nurture an appreciation of the cultural aspects of life. Prison theatre can also provide a means whereby the inmate develops as an individual. By belonging to a group that works toward a creative goal, the inmates also develop attitudes that require teamwork, cooperation and dependence upon one another.

All of these contributions of prison theatre are highly desirable in that they will enrich not only the man but the society into which he will eventually return.

APPROVED BY THESIS COMMITTEE, MAY 1971
R. Keith Michael, Chairman
F. W. Breckenridge
David Brown

INDUSTRIAL EDUCATION

A STUDY TO COMPARE THE METHOD OF INDUSTRIAL ARTS MASS PRODUCTION WITH THE TRADITIONAL METHOD OF TEACHING MACHINE WOODWORK AT THE SENIOR HIGH SCHOOL LEVEL AT TECHNICAL HIGH SCHOOL, ST. CLOUD, MINNESOTA

by Albert John Behrens

PROBLEM. It was the purpose of the study to compare the traditional method of instruction in the industrial arts classroom and laboratory with the mass production method concerning the attainment of machine skills.

PROCEDURE. The study could have taken many different directions. Therefore, it was necessary to delimit it. The study was confined to (1) comparison of equated groups of students on the amount of related knowledge possessed by them after completion of a nine-week related information unit, (2) comparison of the two groups of students to determine significant difference, if any, in the performance of selected machine skills when taught under differing methods of instruction, and (3) methods of instruction in machine skills and manipulative performance limited to the mass production procedure for one group and the traditional project method for the other group.

The experimental and control groups were the students enrolled in an elective course entitled Wood II. These two groups were equated through comparison of group scores received on (1) the Otis Quick-scoring Intelligence Test and (2) the Mechanical Reasoning Raw Scores for the Differential Aptitude Test.

Both groups were (1) tested in regard to background knowledge in related matter, (2) instructed in the same manner for a nine-week period in related subject matter, (3) tested to determine progress in acquisition of related knowledge, and (4) given a machine skills exercise for comparison purposes after different teaching methods were used.

The experimental group was instructed for a three-week period using the mass production method in the production of a wooden planter bucket. The control group worked for the same period of time constructing a project of their choice through the traditional method. The experiment was concluded with a final machine skills exercise. These exercises were then graded by a jury and scores were compared.

The two test group scores and the two machine skills exercise group scores were compared statistically to reveal the findings.

FINDINGS. It was found that both groups increased in background knowledge but that there was no significant difference between the two groups in this respect. Also, when the machine exercises were statistically compared in relation to group scores it was found there was no significant difference between groups in achievement.

SUMMARY AND CONCLUSIONS. Since there was no significant difference in the achievement of the groups in any of the tests or exercises administered, it was concluded that neither of the two methods tested in the study was significantly superior to the other in attainment of machine skills. Based on the findings of this study, it seems reasonable to conclude that effectiveness of learning is influenced more by some variable or variables other than the two methods listed. The study suggested the possibility that the method used is not as important in the student's achievement as that of the teacher's ability to instill and motivate an interest in the student, regardless of the method used.

ACCEPTED BY THESIS COMMITTEE, JULY 1969
Raymond H. Larson, Chairman
William H. Kemp

A COMPARATIVE INVESTIGATION OF INDUSTRIAL ARTS EDUCATION IN ANOKA-HENNEPIN SCHOOL DISTRICT NO. 11 AND ITS RELATIONSHIP TO THE DISTRICT CURRICULUM GUIDE

Joseph K. Haddad

PROBLEM. The problem of this study was to determine the degree to which the industrial arts teachers of Anoka-Hennepin Independent School District No. 11 adhered to the objectives and course topics of the district industrial arts curriculum guide.

PROCEDURE. The procedure used in conducting this study was the survey method, utilizing a questionnaire distributed to twenty-four senior and junior high school teachers in the district schools. The data collected from the questionnaire were tabulated and analyzed to provide the answers to the questions raised in this report.

FINDINGS. The findings of this study indicated that the senior and junior high school teachers placed a varying degree of emphasis on most objectives surveyed. The senior high school teachers placed a high degree of emphasis on the first six objectives. These are "Interest in Industry," "Appreciation and Use," "Health and

Safety," "Cooperative Attitudes," "Self-Realization and Initiative," and "Interest in Achievement." The junior high school teachers emphasized these objectives less than the teachers of the senior high schools. The junior high school teachers emphasized very highly the seventh objective, "Orderly Performance." The senior high school teachers placed a relatively lower degree of emphasis on this objective. The objective, "Shop Skill and Knowledge," received the highest degree of emphasis on the senior high school level while the junior high school teachers placed their highest degree of emphasis on the objective "Orderly Performance." "Drawing and Design" was highly emphasized by both senior and junior high school teachers.

The activities which were utilized to attain each objective could be presented in the following order: Demonstrations were the most highly emphasized activity by both senior and junior high school teachers, lecture and textbook assignments followed, and individual product construction was next in importance. The least emphasized activities were field trips and visiting speakers, followed by group mass production, and products from industry.

The course topics surveyed revealed that differences existed among teachers teaching the same course in different classes.

SUMMARY AND CONCLUSIONS. This report dealt with the degree of teachers' adherence to the objectives and course topics of the Anoka-Hennepin School District industrial arts curriculum guide. A survey was made to discover the degree of adherence.

The findings indicated that both senior and junior high school teachers adhered to the objectives of the guide. The teachers of both types of schools utilized demonstrations as the most important activity to attain these objectives. They placed a varying degree of emphasis on course topics.

The conclusions were that the teachers adhered to the objectives of the guide, utilized traditional methods of instructions, and that they did not follow a coordinated pattern in their coverage of subject topics. It was also concluded that portions of the district curriculum guide needed to be rewritten.

APPROVED BY THESIS COMMITTEE, NOVEMBER 1970

Raymond H. Larson, Chairman

William Kemp

Eugene C. Bjorklund

THE ROLE OF MICROFILM IN SELECTED INDUSTRIES AND ITS IMPACT UPON SECONDARY SCHOOL INDUSTRIAL ARTS

Merrill V. Wiese

PROBLEM. The purpose of this study was: (1) to determine to what extent microfilm techniques were being taught in industrial arts technical drawing programs in Minnesota senior high schools; (2) to determine how, and to what extent, Minnesota manufacturing industries were using microfilm; (3) to determine if, and to what degree, microfilm techniques should be taught in Minnesota senior high school industrial arts; and (4) to make recommendations based on the results of the study.

PROCEDURE. The two populations involved in the study were: (1) technical drawing teachers in senior high schools in Minnesota with an enrollment of five hundred or more; and (2) representatives of selected Minnesota manufacturing industries which were actively utilizing microfilm. Ninety-eight senior high schools and thirty-six manufacturing industries fell within the limitations of the study. A two-part questionnaire was developed and mailed to the members of the populations to determine the status of microfilm in the senior high schools and of the manufacturing industries. The questionnaire surveyed the attitudes of the members of each population concerning changes in technical drawing techniques as a result of microfilm use. The status information derived from the first part of the questionnaire was reported in textual and tabular form. Information provided by the second part of the questionnaire was statistically analyzed using the chi square test. Recommendations were made based on the results of the study.

FINDINGS. Fifty-nine, or sixty percent, of the ninety-eight technical drawing teachers responded and it was found that seven, or twelve percent, were providing instruction in microfilm techniques. Seven, or twelve percent, of the teachers

indicated that they had access to some type of microfilm equipment. Twenty-four, or sixty-seven percent, of the thirty-six representatives of industry responded and it was found that eighteen, or seventy-five percent, of the industries were employing microfilm (roll) systems and aperture card systems. Six, or twenty-five percent, industries reported that they were utilizing microfiche systems. Drawing transfer and storage was the most prevalent use of microfilm with data transfer and storage next in amount of usage. Microfilm utilization for ordering was indicated to be on a very small scale.

Data derived from the second part of the questionnaire were statistically analyzed and it was found that the teachers and engineers agreed that industrial use of microfilm had brought about changes in basic techniques of *lettering, instrument usage, line-weight, dimensioning, tracing, reproduction and storage* in technical drawing. It was also determined that the teachers and engineers agreed that changes in drawing techniques as a result of microfilm use, except for changes in *layout* techniques, should be included in technical drawing instruction at the senior high school level.

CONCLUSIONS. The technical drawing teachers and the representatives of industry agreed that microfilm use had affected changes in technical drawing techniques related to *lettering, instrument usage, line-weight, dimensioning, tracing, reproduction, and storage*. Therefore, instruction in such changes should take place in senior high school industrial arts technical drawing.

Since the responding industries indicated the primary use of microfilm was for drawing transfer and storage, technical drawing would be the most logical area for industrial arts to begin providing instruction in its uses and techniques.

Due to the fact that thirty-five percent of the total questionnaires were not returned by the technical drawing teachers and thirty-four percent of the returned were incomplete, it was concluded that industrial arts technical drawing teachers in high school are not cognizant of the uses of microfilm and its impact upon technical drawing. The investigator further concluded that this lack of cognizance directly relates to the dearth of professional literature concerning microfilm as revealed by the review of literature.

APPROVED BY THESIS COMMITTEE, DECEMBER 1970
William H. Kemp, Chairman
Robert D. Ryan
Derwyn Anderson

BIOLOGY

A BIRD CENSUS ON TWO ISLANDS NEAR MONTICELLO, MINNESOTA

by Bruce Albert Carlson

The object of my study was to determine the bird population on two islands near the Monticello nuclear powered electricity generating plant. It represents a base population study prior to the opening of the plant. My study, covering the period from November 29, 1968 through July 11, 1969, included a winter census, a spring migrational phenology, and a breeding-bird census. Further studies after the plant opens, in late 1970, may show changes in population densities.

I employed a census procedure which is a combination of the Williams spot-map method and the strip census method. The procedure, based on the territory theory of birds, was developed by S. Charles Kendeigh. The winter and breeding-bird censuses were made by plotting the occurrence of individuals on 11 complete surveys in the winter, and seven in the spring. Upon completion of the field work, I made composite maps for each species. Groups of different dates lying close together on the composite maps represent territories or defended areas. Lines were drawn around groups of dates lying close together where singing males or apparent pairs were established.

Inasmuch as some birds sing louder than others, I attempted to assess the value of this factor by estimating the distance from the trail that birds first came to my attention. I used these data to determine the effective censusing distance for as many species as possible. The effective censusing distance is that distance

at right angles from the trail within which the total number of birds observed can be used for calculating the actual population density.

During the winter census, I recorded 14 species and 21 established territories along the Oxbow Island trail. The Blue Jay, Blackcapped Chickadee, and White-breasted Nuthatch were equal in abundance. On Cedar Island I recorded 12 species and 28 established winter territories along the trail. The Brown Creeper was the most abundant species. Blue Jays were also abundant during this period.

For the breeding-bird census, 65 species and 199 established territories were recorded for Oxbow Island. The seven most abundant species along the Oxbow Island trail were, in order: Song Sparrow, Mourning Dove, House Wren, Robin, Brown-headed Cowbird, Catbird, and Bank Swallow. On Cedar Island, 48 species and 111 established territories were recorded. The seven most abundant species along the Cedar Island trail were, in order: Robin, Rough-winged Swallow, Catbird, Blue Jay, House Wren, Mourning Dove, and Eastern Wood Pewee.

A bird census was initiated in 1968 on two islands in the Mississippi River near the Northern States Power Company Monticello nuclear powered electricity generating plant. The study consisted of a winter census, a spring migrational phenology, and a breeding-bird census. The study represents a base population survey prior to the opening of the plant.

I employed a census procedure which is a combination of the Williams spot-map method and the strip census method. Further studies after the plant opens may show changes in population densities. Predictions as to the effect of the plant on specific bird densities are difficult and will not be made.

APPROVED BY THESIS COMMITTEE, JANUARY 1970

Alfred H. Grewe, Chairman

Alfred J. Hopwood

William Nickles

VEGETATION AND SOIL SUCCESSION ON SELECTED MESABI SPOIL BANKS

by Michael James Damyanovich

PROBLEM. During the summer of 1970, a study was made of plant succession on the 49 year old Warren stripping bank, the 30 year old Harrison and 40 year old Warren lean ore banks. In addition soils data were collected on the Warren stripping bank.

PROCEDURE. Quantitative data were obtained for the woody vegetation by means of nested plots and for herbaceous plants with a point-contact apparatus. Soil studies were made on samples obtained from profile pits exposed to the depth of 15 inches.

FINDINGS. On the Harrison lean ore bank *Betula papyrifera* was the dominant woody species. *Populus tremuloides*, *Populus grandidentata*, *Populus balsamifera* and *Pinus resinosa* were present in decreasing proportions. Scattered seedlings of *Acer rubrum* were present but did not appear in the quadrat. *Salix spp.* increased in both frequency and density and were the most significant of the shrubs on all three banks. Herbaceous ground cover was sparse. On the Warren lean ore bank *Populus tremuloides* was the dominant woody species. *Populus balsamifera*, *Pinus banksiana* and *Betula papyrifera* were present to a lesser extent. *Prunus pensylvanica* and *Acer rubrum* were recent woody invaders. The ground cover was sparse though not to the extent as on the Harrison. On the Warren stripping bank *Populus tremuloides* was the dominant woody species. *Populus balsamifera*, *Populus grandidentata*, *Betula papyrifera* and *Prunus pensylvanica* were major members of the woodland community. Seedlings of *Acer rubrum* and young *Abies balsamea* were present but the latter was not recorded in any quadrats. Ground cover under the overstory was composed of shade tolerant species such as *Aster macrophyllus* and *Diervilla lonicera*. *Poa pratensis* and *Fragaria virginiana* dominated the ground cover. The stripping bank showed thicknesses in A⁰ and A¹ horizons of ½ inches and 1¾ inches respectively. There was no evidence of development of the B horizon. Some acidification had occurred at all three levels. Mechanical analyses showed the soil was composed of 84% to 94% sand. The maximum amount of clay occurred at about 1 inch where there was 70%. Chemical tests showed the presence of available nitrates and potassium but available phosphorus was limited.

SUMMARY AND CONCLUSIONS. The presence of *Acer rubrum* on all three spoil banks indicated a shift in the future succession toward a more shade tolerant community. Increase in clay fraction indicated an improvement in site quality with the aging of the bank. The pH values showed a trend towards increasing acidity with time.

APPROVED BY THESIS COMMITTEE, AUGUST 1970

Harold Hopkins, Chairman

Thomas W. Clapp

Richard E. Walker

A LIMNOLOGICAL BASELINE SURVEY OF LITTLE ROCK LAKE, BENTON COUNTY, MINNESOTA

by Norman Willard Esterberg

PROBLEM. A limnological survey was conducted on Little Rock Lake, Benton County, Minnesota from 3 May 1969 to 2 May 1970. Problem analysis was aided by answering the following questions: What biological populations are present in the lake; What is the size of the populations present in the lake; What are the physical and chemical characteristics of the environment at the time of study?

PROCEDURE. Station locations were marked by depth and visual sightings with established points on land and were used at weekly intervals throughout the ice free period. In October the sampling schedule was reduced to one station, once per month. Light penetration was measured with a Secchi disc. Temperatures were measured with a mercury thermometer. Chemical analysis at weekly intervals for dissolved oxygen, alkalinity, hydrogen ion concentration, total phosphate, iron, and suspended and dissolved solids were made according to standard methods on water samples from the surface and each succeeding meter to as near the bottom as possible. Bottom samples were taken one week and biochemical oxygen demand samples were obtained the next.

Plankton samples were obtained at each station. Net hauls were counted using a Sedgwick-Rafter cell.

Bottom sampling was done with an Ekman dredge. Representative invertebrates, and aquatic plants were also collected.

Weather conditions and water color were noted previous to and at the time of sampling.

FINDINGS. Physical Conditions—The temperature ranged from 0 to 28.1 C. Water temperature was homogenous. No thermocline developed. Transparency ranged from .17 to 3.2 meters.

Chemical Conditions—Dissolved oxygen ranged from 1.4 to 17.7 ppm. Supersaturation was associated with phytoplankton blooms. Biochemical oxygen demand ranged from 1.7 to 11.2 ppm.

No hydroxide alkalinity was observed. Carbonate alkalinity ranged from 0 to 30 ppm. Bicarbonate alkalinity ranged from 34 to 125 ppm. Free carbon dioxide ranged from 0 to 10 ppm. The overall pH was 7.3 to 9.7. Total phosphate ranged from 0.1 to 1.6 ppm. Total iron ranged from 0.0 to .4 ppm. Suspended solids ranged from 0 to 600 ppm. Dissolved solids ranged from 20 to 323 ppm.

Biological Conditions—Most representative invertebrates and aquatic plants were found in and around the inlets. The lake bottom was a black ooze with a pulpy peat texture. Dominant bottom organisms were *Pentaneura*, *Tendipes*, *Palpomyia* and *Tubifex*. Dominant zooplankton included *Daphnia*, *Cyclops*, *Chydorus*, *Keratella* and *Ceratium hirundinella*. *Aphanizomenon flos-aquae*, *Microcystis aeruginosa*, and *Anabaena spiroides* were the dominant phytoplankton. The diatoms, *Melosira*, *Stephanodiscus*, and *Fragilaria* were also present.

SUMMARY AND CONCLUSIONS. Little Rock Lake is undergoing rapid eutrophication. The premature aging of Little Rock Lake has been verified by the measurement of many parameters. For example: The dominant algae are the blue-green types. Increasing populations of forage fishes, high summer temperatures, suspended and dissolved solids, reduced transparency, high BOD during the summer months and nutritional overenrichment. This might well be its epitaph.

APPROVED BY THESIS COMMITTEE, JULY 1970

Alfred J. Hopwood, Chairman

John M. Erickson

John F. McCue

A STUDY OF THE CHANGES IN THE POPULATION AND DISTRIBUTION OF THE BIRDS OF THE CENTRAL MINNESOTA AREA

by Nestor M. Hiemenz

PROBLEM. During the past four decades there have been many changes in the population and distribution of birds. What changes have taken place and what are the reasons for these changes?

PROCEDURE. The area for the study was limited to the ten central Minnesota counties, Todd, Morrison, Mille Lacs, Stearns, Benton, Sherburne, Kandiyohi, Meeker, Wright, and McLeod, as all are within a short distance of St. Cloud. Numbered areas on the prepared map of these counties were visited numerous times during the forty years, from 1929 through 1968. These forty years were divided into four decades. Data cards for each species were prepared from the journals of the author, and tabs were prepared for each species indicating the number of years recorded, the number of dates, the total number of individuals, and the average per date. Observations were recorded on a total number of 2608 days in the four decades, about 18% of the total elapsed time.

FINDINGS. A total of 274 species were recorded in this area during the period of the study. The data of thirty-two species indicates an increase in the population, that of fifty-five indicates no change, that of eighty-seven indicates a decline, that of thirty-five indicates not enough information to show a change, and lastly that of sixty-five indicates species that are rare or very uncommon in this area.

SUMMARY AND CONCLUSIONS. The two most important reasons for an indicated increase in the population appear to be, first, an adjustment to changes in habitat because of man's activities and, second, changes in distribution. Better protection because of enlightened laws and education and filling the void created by declining species also seem to be important.

The most important reasons for a decline appeared to be the indiscriminate use of pesticides in the case of the fish and insect eating birds, overshooting of game species, loss of habitat and wanton destruction of the birds of prey. In many cases there seems to be no apparent reason for the indicated decline but further study may indicate a combination of many factors.

APPROVED BY THESIS COMMITTEE, MARCH 1970
Harry H. Goehring, Chairman
Alfred H. Grewe

A LIFE HISTORY STUDY OF THE GREAT HORNED OWL IN SOUTHEASTERN STEARNS COUNTY, MINNESOTA

by James Edward Hinz

PROBLEM. To study and describe some of the annual activities of the Great Horned Owl in central Minnesota.

PROCEDURE. Locations of the owls and their approximate territories were determined via a "night hooting census" conducted within a ten square mile area.

Nest and roost site locations were discovered by searching each of the territories on foot.

The owls are permanent residents and maintain a territory of approximately one square mile. Periodic calling from within a territory is recognized and respected by owls of adjacent territories and appeared to eliminate physical conflicts.

An increase in hooting activity during the end of January and first part of February appeared to indicate increased courtship and sexual activity among the adult owls. Approximately two weeks after this peak the eggs were laid. Two eggs were laid at each site.

Nesting sites were determined long in advance of egg laying. The owls utilized old hawk nests, Crow nests, and artificial platforms which I had erected, that were located within their territory. The owls made no attempts to build or repair a nest. Nests ranged from 14 feet to 60 feet in height above the ground.

The incubation period is approximately 30 days. Attentive pairs were the most easily observed and the most successful in producing fledglings.

The sexes of the adults could be determined by the difference in their calls. The female was observed to do the incubating. The male supplied food to the owlets and to the female during incubation.

The owlets remained on the nest platform for approximately seven weeks. Flight was attained by ten weeks of age.

The adults were observed to continue their care of the young as late as October of the nesting season.

Fifteen nests were observed during the three seasons of study. One served as an intensive study site where physical growth and development of the owlets, and behavior patterns were recorded. Defensive behavior of the young on the nest appeared similar to the courtship behavior described for the adults.

Prey species consumed were determined by pellet analysis and observations of food items on the nest platform. A captive horned owl aided in determining feeding habits. Small birds and mammals constitute the greatest portion of the diet of the owls.

A total of 30 eggs produced ten fledglings during the three seasons of study. No re-nesting was observed among the owls.

SUMMARY AND CONCLUSIONS. Great Horned Owls are top carnivores in their food chain. They require arboreal vegetation and an abundance of prey species within their territory for survival. Man and his technology appears to be the only threat to the owls survival.

APPROVED BY THESIS COMMITTEE, JULY 1969
Alfred H. Grewe, Chairman
Vincent A. Johnson
John M. Erickson

A SURVEY OF CERTAIN LIMNOLOGICAL ASPECTS OF THE RUM RIVER

by Jack Bernhardt Maki

PROBLEM. This study was conducted from September, 1968, through June, 1969, to survey several limnological conditions of the Rum River including the flora, invertebrate fauna and some physical and chemical aspects of the river. These data were used as a basis for determining the water quality of the Rum River.

PROCEDURE. Nineteen sampling stations were selected along the 140-mile course of the river. Physical parameters measured were width, average depth, water transparency, current velocity and flow. Chemical analyses were conducted in December, March and June for acidity, alkalinity, hardness, pH, dissolved oxygen and carbon dioxide, nitrate nitrogen, phosphorus and sulfate. The biological factors were surveyed in September, December, March and June.

FINDINGS. The Rum River increases in width and depth from its source at Mille Lacs Lake to the mouth at Anoka. A marked increase in flow occurs where the West Branch empties into the Rum. Water transparency extends to the bottom in the reach through the glacial till but becomes turbid upon entering the Anoka Sand Plain.

Seasonal chemical analyses revealed that the water is alkaline with higher readings occurring in the winter and spring. The river is free of mineral acids, the only acidity resulting from dissolved carbon dioxide. The dissolved oxygen reserve of the river is sufficient to support aquatic life at all seasons. Phosphorus, nitrate nitrogen and sulfate readings were highest in December during the period of low biological productivity.

Certain dipteran and plecopteran instars revealed seasonal distribution, being more prevalent in winter and spring than in fall or summer; however, the majority of the sixty-one insect genera collected were most abundantly available in summer or fall.

The molluscs, crustaceans and plankton were limited to the clear water of the upper reaches of the river.

The calcareous-tolerant aquatic plants were restricted almost entirely to the reach in the glacial till and most abundant in numbers and species at the source.

SUMMARY AND CONCLUSION. Excluding the bacterial condition of the water, the Rum River has the characteristics of a relatively healthy river as indicated by the chemical and biological assays conducted for this study.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
Max L. Partch, Chairman
Harold Hopkins
Laurie Halberg

METABOLIC RHYTHMICITY OF *DAPHNIA PULEX*

by Carolyn Colvin Matter

PROBLEM. The equipment and methodology employed during this study were designed to determine the pattern of metabolic activity of populations of *Daphnia pulex*, as indicated by variations in oxygen depletion from the medium, under controlled conditions of pH, temperature, and light.

METHODS AND MATERIALS. *Daphnia pulex* were cultured in the laboratory and each experimental run utilized the organisms of an entire culture. The microcosm in which the experimental organisms were confined was immersed in a running water bath which could be sealed completely against light. The microcosm structure, with its accessory parts, allowed replacement of the medium in controllable amounts at selected intervals without manipulation or violation of the microcosm. The oxygen macroelectrode of a Beckman Physiological Gas Analyzer was adapted for complete immersibility, was inserted into the microcosm and registered changes in the dissolved oxygen content of the medium. These changes were recorded at 10 min. intervals over 24 hr. periods for experimental runs and over 8 hr. intervals for control runs.

RESULTS. Actual use of the equipment and methodology designed for this study resulted in the discovery that several refinements were needed if statistically significant results were to be obtained. These refinements were not possible with the available facilities. Despite these imperfections, the data obtained strongly suggested a constant pattern of metabolic rhythmicity for *D. pulex* populations and indicated that the basic design of the equipment and experiments was valid and merited further analysis, modification and utilization.

SUMMARY AND CONCLUSIONS. The study should provide a strong impetus for further research into the use and modification of the unique equipment involved. The basic pattern of the experiments, coupled with the equipment, were thought to have great potential for experimentation with a wide variety of quiet-water organisms under many laboratory-controllable physical and chemical conditions. It was believed the most valuable results of the study were a new direction of approach to the study of the metabolic rhythmicity of fresh-water organisms, a highly adaptable, modifiable design in equipment, and an insight into the factors which must remain constant or be capable of monitoring in order to obtain valid data.

APPROVED BY THESIS COMMITTEE, JUNE 1970
Alfred J. Hopwood, Chairman
Vincent A. Johnson
J. McMullen

MACROINVERTEBRATES OF THE MISSISSIPPI RIVER IN THE MONTICELLO REGION

by David Raymond McConville

A nuclear steam-electric generator is being constructed for the Northern States Power Company on the Mississippi River near Monticello, Minnesota. The Monticello study area will be affected by the operation of this power generator which is scheduled to begin power production in 1970. This facility will use a "once through" system of steam condensation which will use up to 65% of the riverflow, during periods of low water, as the primary coolant. Some of the excess heat will

be returned to the river. There is a definite lack of information as to what the effects of the addition of this heat to the environment will be. Therefore, this research represents part of an overall ecological survey to establish the ecological baseline condition of the Mississippi River in the Monticello, Minnesota region before the nuclear power plant begins operation. Specifically, my research has attempted to determine the quality and the quantity of the macroinvertebrate population and to determine those factors affecting it. It is hoped that the invertebrates will provide an index of physical and biological conditions which will help indicate the effects of thermal addition in the river.

Monticello, which is in Central Minnesota, has a mean temperature of 42.4 F and a mean rainfall of 26.49 inches. In the study area, the river varied from 500 to 700 feet in width and ranged from 6 inches to 20 feet in depth. Flow records from the St. Regis Paper Mill at Sartell, Minnesota indicated that the seasonal flow levels may vary by a factor of thirty times between low and high water.

This research was carried out between 1 June 1968, and 1 June 1969. Water quality data was collected throughout the study to establish the organic nutrient, baseline condition of the river. Water samples were collected at four stations within the study area. The mean dissolved oxygen was 10.15 mg/l. The mean biochemical oxygen demand was 2.07 mg/l and the ortho-phosphate seasonal mean was 0.12 mg/l. The hydrogen ion concentration varied between 7.2 and 7.4 and the mean alkalinity was 153.8 mg/l. Finally, the mean dissolved solids was 184.3 mg/l. Basically, water quality data indicates that the river environment in the Monticello area is relatively stable and free from serious organic pollution.

Qualitative shoreline samples were collected during the summer and fall of 1968. During qualitative sampling, representatives of 11 orders, 32 families, and 66 genera of macroinvertebrates were collected. The major groups represented in this survey were the Coleoptera, Ephemeroptera, and the Hemiptera.

Quantitative river bottom samples were difficult to obtain because of sampling problems and vandalism. Consequently, quantitative sampling was done between June 1968, and March 1969. Quantitative sampling revealed that the invertebrate bottom fauna was very dependent upon current, depth, and river bottom characteristics. The major components of the invertebrate bottom fauna were the Tricoptera (caddisflies) and the Ephemeroptera (mayflies). Qualitative analysis of the bottom fauna produced representatives of 8 orders, 15 families, and 24 genera of macroinvertebrates.

APPROVED BY THESIS COMMITTEE, DECEMBER 1969

Alfred J. Hopwood, Chairman

Ralph W. Gundersen

THE EFFECTS OF BENADRYL UPON METABOLISM, MOTILITY AND PHOTOTAXIS OF *EUGLENA GRACILIS*

Gary B. Newton

PROBLEM. To establish the effects that the antihistamine Benadryl (BND) has upon the normal functioning of *Euglena gracilis*. Three aspects were considered: (1) effects upon velocity; (2) effects upon metabolic responses as reflected by respiratory rates; and (3) responses to various wavelengths of light.

PROCEDURE. Axenic samples of *E. gracilis* (strain Z) were obtained from Indiana University and cultured in 125 ml Erlenmeyer flasks containing ACE medium at a constant temperature of $25 \pm 1^\circ \text{C}$ until used. The organisms were subjected to motility tests to determine the effects of 6 different molar concentrations (1.0×10^{-5} , 1.0×10^{-4} , 2.5×10^{-4} , 5.0×10^{-4} , 7.5×10^{-4} and 1.0×10^{-3}) of Benadryl upon their rates of locomotion. Randomly selected samples were placed on a microscope slide and the slide was examined, using a Nikon microscope which contained a previously calibrated ocular micrometer. Time expended while an individual traversed 50 μ was measured using an electrical timer.

A second phase of the investigation involved respiratory determinations. The effects of 6 concentrations of BND upon *E. gracilis* were examined using a Warburg microrespirometer. The QO_2 and RQ values of the BND-treated samples were compared with those of the controls.

A third phase of the investigation involved the phototactic response of *E. gracilis* to the colors violet, blue, green, yellow, orange and red. A rounded tank was built of plexiglas and filled with test organisms. These organisms were sub-

jected to a primary spectrum produced by passing light through a Welch grating. Randomly selected aliquots of 0.001 ml were removed from 3 different depths in each color area. *E. gracilis* populations were determined by counting the number of organisms in each aliquot.

FINDINGS. The results indicated that motility rates, judged by the "T" test, were statistically altered by: (1) the 5.0×10^{-4} M concentration after 90 minutes; (2) the 7.5×10^{-4} M concentration after 60 minutes; and (3) the 1.0×10^{-3} M concentration after 30 minutes. The second phase showed that QO_2 values were statistically altered by the 7.5×10^{-4} and 1.0×10^{-3} M concentrations of BND. A significant difference was also shown to exist between the RQ values of the BND-treated *E. gracilis* and the controls. The third phase showed *E. gracilis* favored the 6 colors in the following order of preference: blue, red, yellow, green, orange, violet. There was no significant difference in *E. gracilis* numbers at the top, middle or bottom of the container.

SUMMARY AND CONCLUSIONS. Both time of exposure to BND and BND concentration were influential in determining motility rates. Motility rates decreased with an increase in BND concentration and time of exposure to the BND. QO_2 values were reduced by the tested BND concentrations exceeding 5.0×10^{-4} M and RQ values were higher for the BND-treated organisms than the controls. *E. gracilis* showed greatest preference for the color blue and least preference for the color violet with no particular preference for a medium depth.

One might conclude that indiscriminate use of BND should be avoided and additional study should be made to determine potentially harmful concentrations to other organisms.

APPROVED BY THESIS COMMITTEE, JUNE 1971
Vincent A. Johnson, Chairman
Charles Rehwaldt
Ivan Watkins

A FISH STUDY ON THE MISSISSIPPI RIVER AT MONTICELLO, MINNESOTA

by Howard Peter Scherer

PROBLEM. A nuclear-fueled electrical generating plant is now being constructed for Northern States Power Company on the Mississippi River, near Monticello, Minnesota. Part of the operation of this plant will call for borrowing water from the river to use as a coolant for the condensers. This water will be returned to the river in heated condition, and the heated discharge water is expected to manifest changes in the existing biota of the river. This is a report on the fish portion of a complete eco-system study which has been made to establish baselines for future studies designed to delineate the effects the heated discharge water are expected to cause.

METHODS AND MATERIALS. The study has primarily been designed to determine: (1) population makeup, by species, of the fish from a point one mile above the plant site to a point approximately five miles below the site; (2) migration patterns exhibited by the various species of fish inhabiting the study area; (3) an evaluation of indices of physical condition, by age groups within species; and (4) the use made of microhabitat by the various species. Samples were obtained by electrofishing. The fish were then measured, weighed, tagged, and scales were taken for ageing. The fish were then returned to the environment.

RESULTS. Through the application of the Schnabel method of population estimation, it was possible to derive statistically significant estimations for populations of northern redbreast and carp. Since the greatest number of observations had been made of northern redbreast, population figures for this species were used as a base for application of a direct proportion and further used to derive population estimations for minor species. With respect to the migration patterns of species, it was observed that, except for walleye, a transient species, the fish which had been tagged during 1968, and recovered in 1969, tended to remain within the sector of the river where they had originally been tagged. In treating length and weight gain data, it was determined that age groups within a species could not be isolated statistically. Qualitatively, however, progressive and predictable trends were ob-

served. A study of the use made of microhabitat by fishes indicated that each species had particular requirements of habitat wherein it was best able to function.

SUMMARY AND CONCLUSIONS. It is believed that this study will furnish valid baselines for the postoperational studies which are to follow. Techniques have been described and data has been furnished which will serve as a valuable guide to those who will be taking over this portion of the project.

ACCEPTED BY THESIS COMMITTEE, JUNE 1970

Alfred J. Hopwood, Chairman

Alfred H. Grewe

Floyd Gilbert

A VEGETATION STUDY OF THE WOODLANDS OF NORTHWESTERN KANDIYOHI COUNTY, MINNESOTA

by John H. Strand

PROBLEM. 1. To locate and determine the vegetational composition of the various stands of upland forest in the prairie-forest border region of the four northwest townships of Kandiyohi County, and to correlate these findings with certain environmental and topographical factors. 2. To compare the vegetation of these stands to others in Minnesota and the Lake States region that are located in the prairie-forest border area and also with stands located more toward the center of the deciduous forest biome. 3. To contribute to the knowledge of the present biological resources of the area.

METHODS AND MATERIALS. Woodlands of the study area chosen for intensive study were those that were naturally forested and free from excessive disturbances and flooding. The plan of investigation was based on the Point-Centered Quarter Method. The vegetational continuum index value, based on relative density, relative frequency, and relative dominance of the trees, was determined for each stand. The continuum index ranges from 300 to 3,000. Pioneer stands have low numbers and climax stands have high numbers. Relative density and relative frequency of saplings were determined. Percentage of ground cover and total number of individuals per quadrat were determined for herbs, shrubs, and seedlings in each stand.

RESULTS. Eighteen species of trees were found, basswood and ironwood being the most common species. Twenty species of shrubs and vines and 73 species of herbs were found. The following continuum index values for the 11 stands were determined: 584, 808, 2099, 2123, 2131, 2166, 2251, 2273, 2342, 2451, and 2603. Almost all of the stands were located to the northeast of lakes or swamps or steep moraines. Many factors showed a correlation to the continuum index number (C.I. number) of the stands. Percentage of ground cover for shrubs decreased as C.I. number increased. Some herbs (*Hydrophyllum virginianum*) peaked in more climax stands, while others (*Cryptotaenia canadensis*) peaked in more pioneer stands.

SUMMARY AND CONCLUSIONS. About three general successional groups of stands can be recognized in this study. Group one, consisting of stands below C.I. number 810, is the most pioneer group. Group two consists of the stands with C.I. number values from 2099 to 2273, medium high in the continuum. Group three is the most climax group and consists of the stands with C.I. values above 2300, usually containing sugar maple. Fire has been a major factor in influencing the location and stage of succession of woodlands in this study. Where fire barriers (water or steep slopes) exist, woodlands have been protected from fires (usually coming from the southwest) and have had time to reach a late stage of succession. Where fire barriers are poor, woodlands are either nonexistent or are in the pioneer stage. Three other Minnesota studies produced tree data quite similar to that of the present study. Three studies done outside of Minnesota all report species lacking in the western Minnesota studies. The number of herb species and the total percentage of herb cover does not seem to be greatly influenced by the location of stands in relation to biome borders, at least in Minnesota.

ACCEPTED BY THESIS COMMITTEE, JULY 1970

Max Partch, Chairman

Alfred H. Grewe

David T. Sorensen

BIOELECTRIC EFFECTS ASSOCIATED WITH DAPHNIA SP.

by Wayne R. Paris

PROBLEM. It was the purpose of the investigation to first determine if electric potentials or the electric fields generated by them could be detected from small crustaceans such as *Daphnia*. This detection was to be limited to environmental or surface pickup only. No investigation of the signals picked up by the piercing of the organism with micro-electrodes would be attempted. Secondly, the purpose was to record these signals and attempt to correlate them with observable phenomena within the organism such as heartbeat, muscle movement, and respiration.

PROCEDURE. The most satisfactory results were obtained in the following manner: The *Daphnia* was placed in a two-millimeter bore capillary tube with silver wire electrodes inserted in either end trapping the organism between them. This arrangement was then placed in a Faraday cage to prevent the pickup of extraneous electrical fields present in the environment. Shielded cable led from the probes out through the Faraday cage to a special high-gain, low-noise amplifier. The greatly amplified signal was then fed to a display unit. This display was either a cathode-ray tube oscilloscope or a paper tape chart recorder. Data were collected by photographing the waveforms on the oscilloscope screen or by collecting the paper tape from the chart recorder. By observing the *Daphnia* while the data were being collected it was possible to correlate the signal with a particular activity of the organism.

SUMMARY AND CONCLUSIONS. It was found that three visually observable phenomena could also be detected electronically. These three were antennae movements, gill action, and digestive tract movements. A fourth observable activity, heartbeat, was not detected within the limits of this experiment. The antennae movements were found to produce a signal with an amplitude up to approximately 300 microvolts and a maximum duration of 125 milliseconds. The movements of the gills also produced a significant signal, its maximum values being 350 milliseconds in length and 120 microvolts. The signals from the third detected phenomenon, the raking of the gills by the digestive tract (digestive tract movements), gave values of 400 microvolts in strength and more than 450 milliseconds in length. Further experimentation would be necessary to detect the bioelectric signal from heart action of the *Daphnia* and to establish its parameters.

ACCEPTED BY THESIS COMMITTEE, AUGUST 1969

John M. Erickson, Chairman

Vincent A. Johnson

John H. Carpenter

A SURVEY OF THE GENERAL SCIENCE CURRICULUMS IN SECONDARY PUBLIC SCHOOLS IN THE STATE OF MINNESOTA

by Lowell Lynn Zimmerman

PROBLEM. The purpose of the study was to investigate and compare the current activities in the junior high school general science program in the State of Minnesota. The specific points analyzed were (1) the time schedules; (2) the percentage of class time allocated to laboratory, demonstration, and discussion methods; (3) the number of schools that have a typical general science curriculum as opposed to the three-divisional life, earth, and physical science curriculum; (4) the grade level at which life, earth, and physical science are presented; (5) the number of junior high schools that currently employ some modern study method program; (6) the number of schools that currently employ a secondary curriculum coordinator; (7) the age of the school building; and (8) the number of years of teaching experience for seventh, eighth, and ninth grade science teachers.

PROCEDURE. The public secondary schools were divided into three groups based on their secondary enrollment. The large schools had an enrollment exceeding 951, the medium schools had an enrollment from 951 to 351, and the small schools had

an enrollment of less than 351. One-third of the schools in each category were surveyed. The classroom teachers were instructed to complete the survey.

FINDINGS. Approximately 96 per cent of the schools selected for the study returned the surveys. First of all the study revealed that the seventh and eighth grade small and medium schools tended to employ the half-year program more often than did the large schools. However, in the ninth grade all the schools surveyed, regardless of school size, used a one year program. Also the study revealed that school size had little effect on the mean number of days per week or mean number of minutes per day.

Secondly, the study revealed that the large schools tended to use a laboratory approach more often than the small or medium schools. Also the study proved that the three-divisional science program was used far more often than the typical science program regardless of school size. Also, those schools that had a three-divisional program tended to have life science in the seventh grade, earth science in the eighth grade, and physical science in the ninth grade. The study also revealed that the large schools employ a modern approach method and a curriculum coordinator more often than the medium schools and likewise the medium schools employ a modern approach method and curriculum coordinator more often than the small schools. Still another fact which the study bore out was that there was a decrease in the mean building age with an increase in school size. Finally, the survey showed that regardless of the grade level there was an increase in the mean number of years of teaching experience with an increase in school size.

SUMMARY AND CONCLUSIONS. The majority of answers obtained for the various survey questions tended to support the idea that school size does have an effect on the type of science curriculum that a school employs, as well as other related factors.

ACCEPTED BY THESIS COMMITTEE, AUGUST 1969
John W. Laakso, Chairman
William Nickles

ENGLISH

PHONETIC SYMBOLISM: A STUDY OF THE AFFECTIVE CONTENT OF ENGLISH PHONEMES

by Gary Lee Anderson

PROBLEM. The purpose of the study was two-fold: to examine the hypothesis that phonetic symbolism exists, and if so, to "map" the meanings which adhere to individual phonemes, and to examine the presence of phonetic symbolism in the work of selected poets.

PROCEDURE. The research in phonetic symbolism and universal phonetic symbolism was reviewed and it was concluded that language-specific systems of phonetic symbolism undoubtedly exist, but that these patterns differ across languages. A further study was conducted to "map" the semantic content of selected English phonemes, using nonsense syllables as stimulus words and Osgood's semantic differential scales as response categories.

FINDINGS. Subjects responded to the stimulus materials (nonsense CVC trigrams) at levels beyond chance expectancy, indicating that they made their judgements according to knowledge of the rules of phonetic symbolism. Further analyses of the results also confirm this. The meanings attached to nonsense words seemed to be due to the phonetic make up of the syllables themselves. Furthermore, it was possible to extract meanings for each phoneme. These meanings were shown to co-vary with the phonological features of the speech sounds. Generally, frontness and non-roundness accounts for the "small," "weak," and "pleasant" connotations of the vowels /i/ and /I/, while backness and roundness accounts for the "large," "strong," and "unpleasant" connotations of /a,u,o/ and /au/.

Similarly, the anterior consonants /b/ and /p/ were judged weaker and more pleasant than the non-anterior (velar) consonants /g/ and /k/. The Potency factor also admitted of a further subclassification: it can be divided into the classes of

magnitude and strength. Given a strong consonant, the presence or absence of voicing accounts for the felt magnitude of the phoneme. Of the four phonemes /b, p, g, k/, the voiced member is perceived as larger than the unvoiced member.

The poetry of Donne, Sandburg, Dylan Thomas, and Brother Antoninus was examined for the use of phonetic symbolism as a stylistic device. It was found that the patterns of sound used in certain contexts helped to shape and reinforce the meaning of poetic lines.

CONCLUSIONS. On the basis of the study reported in Chapters IV and V it was concluded that phonetic symbolism exists because (1) subjects are able to attribute meanings to otherwise meaningless words, (2) there is considerable consensus among speakers as to the meaning of these words, and (3) the meanings seem to be due to the phonetic content of the words and the distinctive feature composition of the phonemes. Some suggestions were also made concerning the significance of phonetic symbolism for literary criticism and the teaching of poetry.

APPROVED BY THESIS COMMITTEE, MAY 1970
T. A. Hansen, Chairman
John Melton

THE MENAGERIE OF THE GROTESQUE: A STUDY OF SAUL BELLOW'S NOVELS

by Barbara Jean Beck

PROBLEM. It is the intent of this study to investigate the grotesquerie (the diseases, the animals, the bizarre settings) of Saul Bellow's novels to ascertain whether he validly diagnoses twentieth century America.

PROCEDURE. To do this I will examine Bellow's six novels — *The Dangling Man*, *The Victim*, *The Adventures of Augie March*, *Seize the Day*, *Henderson the Rain King*, and *Herzog* — to determine whether he presents a one-sided philosophy of a world totally diseased and animalistic, a world without hope for a better future.

FINDINGS. There can be no doubt that the world Bellow delineates is a grotesque abomination polluted by diseased, animalistic people. However, Bellow does not limit mankind to this formula. With the exception of Joseph (*The Dangling Man*) and Allbee (*The Victim*) who choose to compromise meaningful values for security, Bellow's protagonists manage to painfully and at times even hopefully live with themselves in the irrational, unjust, decadent world Bellow describes.

CONCLUSION. From an artistic viewpoint, this kind of world, grotesque as it is, provides the perfect medium for Bellow to express his ideas. The colors, the bizarre situations, the diseases, the animals — all add interest to his novels; the reader, not knowing what absurdity will next appear, can hardly complain of boredom. The grotesque also provides Bellow with the opportunity to reveal his intellectual acumen, his versatility, and his mastery of the English language. Bellow's novels become the stage for him, the author-actor, to display his talents. In addition, the grotesque affords Bellow, the comedian, the chance to make his audience laugh. Bellow juxtaposes the serious and the comic in the same breath, ranging from the beauty of the lioness Henderson confronts to his habitual garb of dirty jockey shorts. There is also a more serious purpose for Bellow's use of the grotesque: he is "telling it like it is." The aim of the modern artistic movement is to lift the veil of propriety and pretense to see what is really there; these artists are finding ugliness, absurdity, and humorous disproportion in abundance. They are finding truth in grotesque form. This, too, is Bellow's aim and his finest achievement.

APPROVED BY THESIS COMMITTEE, JULY 1969
Elizabeth Van Felt, Chairman
John Melton
Alfred Grewe

A COMPARATIVE STUDY OF THE TREATMENT OF CHARACTER
IN RICHARD II AND HENRY V AS IT REFLECTS CEREMONY
AND SHAKESPEARE'S USE OF HISTORICAL SOURCES

by Barbara Ann Brewster

PROBLEM. The purpose of this study was to discover how Shakespeare used ceremony in his characterization of Richard II and Henry V. The most important historical sources were also examined for reflections of ceremony and characterization.

PROCEDURE. A careful study of both plays was made to determine the most important character traits of Richard II and Henry V and the ceremonial nature of the plays. Scenes of a highly ceremonial nature which also revealed character were carefully studied to determine the relationship between Shakespeare's characterization and the use of ceremony. These scenes were then compared to the historical sources in an attempt to determine how much Shakespeare borrowed from or altered his sources. Holinshed was used as the primary source for both plays. In addition to this source, Froissart's *Chronicles* was studied as a source for *Richard II*, with special attention given to the ceremonial quality of Froissart's work. After the play and historical sources had been read and reread, the works of many critics were studied to provide background and a more thorough understanding of the plays.

FINDINGS. This study shows that in *Richard II* and *Henry V* Shakespeare used ceremony in his delineation of character. In *Richard II* the king is characterized as a despotic, passive king unfit to rule. The scenes which reveal these qualities are always ceremonial in nature, indicating that the ceremony serves to highlight the unfitness of Richard II. As Richard moves from unking'd king to suffering man, ceremony is used to focus the attention on the inward struggle he undergoes in making this transition. At this point, the ceremony provides a formalism to counter-balance the emotionalism of Richard.

Holinshed and Froissart, both examined as sources for *Richard II*, reveal hints of characterization. Both sources describe Richard as a despot, incapable of ruling. Froissart tends to be more sympathetic in his treatment of Richard, a fact which might have been noted by Shakespeare. There is little evidence of the use of historical sources for reflections of characterization or ceremony in the last part of the play as Shakespeare portrays Richard's internal struggle.

In *Henry V* ceremony is used in the delineation of Henry as the ideal king. In each scene where Henry is portrayed as possessing kingly virtues, ceremony is used to heighten the king's ideal image. Since this occurs repeatedly, the use of ceremony cannot be dismissed as unintentional, especially in view of its use in *Richard II*. In *Richard II* ceremony reflects Richard's inability to rule, while in *Henry V* it reflects Henry's possession of kingly virtues. Ceremony is also used in *Henry V* to develop a concept of kingship. Because Henry, unlike Richard II, realizes that ceremony is not the essence of kingship, he can fulfill his duty to his subjects.

An examination of Holinshed reveals a close relationship between the source and Shakespeare's Henry V in the description of the king as ideal monarch, though Shakespeare did reorder some events to highlight certain qualities of Henry. Though Holinshed's general description of Henry's reign might have suggested the ceremonious nature of the king, there are no specific examples of ceremony in the historical source.

SUMMARY AND CONCLUSIONS. It is apparent from this study that Shakespeare deliberately uses ceremony to heighten the portrayal of Richard II as a despotic ruler in contrast to Henry V as the ideal monarch. Although he relied on his sources to supply suggestions for the development of his characters, his creative genius has transformed this material into characters that have greater depth and reality than the historical figures.

ACCEPTED BY THESIS COMMITTEE, DECEMBER 1969
Marvin Thompson, Chairman
Alfred E. Leja

PARADISE REGAINED: *An Unfinished Epic*

Nina Doorneweerd

PROBLEM. John Milton's second epic, *Paradise Regained*, is a short epic, containing only four books; it compares in length and development to just the first section, also four books, of *Paradise Lost*, his first epic. Many critics maintain that Milton held an unorthodox view of the identity and nature of Christ; therefore, in keeping with his unorthodox view, he could present Christ merely as the perfect man, but, as the perfect man He was able to regain Paradise which Adam had lost through his imperfection. If, on the contrary, Milton's view of Christ were orthodox, there must be some other reason for the brevity of *Paradise Regained*.

PROCEDURE. Milton's theological statement, *Of Christian Doctrine*, and his first epic, *Paradise Lost*, were examined and compared with Scripture to determine their correlation. Then, by analogy with *Paradise Lost*, an attempt was made to project what Milton left unwritten in his second epic.

FINDINGS. Milton's theological views as found in *Of Christian Doctrine* and *Paradise Lost* reveal that he fully concurs with the orthodox Christian view that Christ as the Son of God and Son of man redeemed mankind through His atoning death on the cross.

CONCLUSION. For some reason other than a theological one, Milton stopped short of Christ's regaining Paradise for mankind. By analogy with *Paradise Lost*, the conclusion has been reached that Milton should have added two more sections, eight books, to *Paradise Regained*, after having presented the nature and identity of Christ in the first four books as he similarly showed the nature and identity of Satan in the first section of *Paradise Lost*. Part II should show Christ as instructor of men, comparing to Satan and Raphael as instructors of Adam in Part II of *Paradise Lost*. Finally, Part III should show the act consummated: Christ dies sacrificially, fully regaining Paradise for man. This would compare to the act completed: Adam falls, fully losing Paradise in Part III of *Paradise Lost*.

APPROVED BY THESIS COMMITTEE, MARCH 1971

Alfred E. Leja, Chairman

Armand E. Falk

Fred Menninga

WHITMAN'S PERPETUAL ORBIT

by Eugene Henry Eckhoff

The basic thesis of this study was to determine directly from Walt Whitman's poetry his cosmic view. "Song of Myself," "The Sleepers," and several short poems were studied for evidence that supported the contention that his firm belief in man's immortality came from his belief in the perpetual transmigration of souls, and, that his world picture was, by nature of his concept on immortality, circular and continuous.

It was the plan of this paper to first sketch in lightly those areas of thought which must have in some way stimulated Whitman's thinking, while leaving any direct parallels between his poetry and the current of ideas that flowed through his age to be drawn by the reader. Therefore, the first chapter cursorily reviewed those areas of most probable influence. It touched upon his childhood on Long Island and upon his contact there with Quakerism. It examined the affinities Whitman's philosophy had with oriental thought and his obvious familiarity with German idealism. It established in more detail how Emerson and the Transcendentalists stimulated his great eclecticism.

The paper then explored Whitman's major poem "Song of Myself" in search of textual evidence that elucidated his cosmic view. It was established that an integral theme of this poem is that of immortality, and it was hypothesized that the soul pursues a circular path.

In light of the conclusion concerning his cosmic circle as first established in "Song of Myself," the next chapter attempted to provide a unique interpretation of "The Sleepers." It was established that structurally the poem seems to move through the reincarnative cycle from birth to life to death to birth again. This

interpretation demonstrated that "The Sleepers" concerns itself with a more profoundly philosophical concept than merely the exertions of the subconscious mind in sleep, and that the poem is structurally stronger than has been commonly thought.

A final chapter examined superficially several short poems for corroborative evidence. However, "Eidolon's" more detailed analysis revealed that it is probable that "eidolon" is yet another name for the immortal soul or "I" that journeys the circular reincarnative orbit from the womb to the grave to the womb.

In short, the paper attempted to establish that Whitman's concept of man's perpetual journey around a circular cosmic orbit was a cornerstone in the philosophical foundation that lies beneath all his poetry.

APPROVED BY THESIS COMMITTEE, JULY 1969

Elizabeth Van Pelt, Chairman

Armand E. Falk

THE DEPARTURE

by Michele Fletcher

PROBLEM. One of the primary concerns of much contemporary literature is finding a *raison d'être*: I intend by my play to suggest that meaning must be imposed upon reality by the individual. The meaning of any person's life ultimately depends upon his structuring and mastery of his environment.

THEME, CHARACTERIZATION, AND PLOT. *The Departure* is a three act play about a group of people who consider themselves a family. They are Raymond, a bourgeois psychoanalyst, Edna, his nagging wife, whose primary concern is what the neighbors will think, Arnie, their twenty-four year old drug-pushing draft-evading artist son (who pretends he is working at a paint factory and earning his M.A. in history), Rich, their twenty-two year old son, who claims, "Twenty years from now I'll definitely be famous—I don't know for what, but for something, certainly . . .", and their nineteen year old paranoid, friendless, apathetic daughter, Becky, whom Raymond continually claims is "a very well-adjusted young lady."

Each member of this family is isolated from other members, and each except Becky is unneeded of family companionship. Raymond was long ago incarcerated in the bourgeois world, an unfortunate fixture; Edna, with her unfailing concern for "what the neighbors will think," is likewise a fixture, but in her situation of bitterness and insecurity, deserves at least a fragment of sympathy. Arnie, rejecting the bourgeois world entirely, has accepted the companionship of society drop outs like himself. Rich has adjusted to a college life, aware of what is wrong with it, but handling it, as all else, with a sense of humor. Only Becky seems to have no world of her own. Whereas Arnie will not adjust, Becky cannot. Subsequent to her father's leaving, she attempts unsuccessfully to break into the world of each of the other members of her family. Finally she is cast entirely from them. Her environment, like any person's, is partially responsible for her personality. By my play, though, I mean to imply that it is *her* responsibility to dispel the paranoia and apathy that possess her. The only hope of the play is at the same time the most frightening aspect of it: Becky's concluding forced departure.

CONCLUSION. The central problem in *The Departure* is implicated by Garcin's statement, "Now I wonder why that door opened," and the situation he is in when he says it. In the play *No Exit*, Garcin screams several times for the door to the room which imprisons him to open; it finally does, but he doesn't leave through it. Instead, he stays in order to have his companions confirm he is not a coward. He can't leave—for when he died a coward, he locked his hell within himself. Becky, however, possesses the freedom which Garcin lacks—life. During Act III, Scene I, Becky says to Rich:

It's not good, trying to escape like that. It's like there's something in yourself that you want to get away from so you keep leaving each place—hoping you'll leave that part—of yourself—at the place too. But you know you can't. You can't leave it anywhere. Because it's part of you. And you can't just leave part of yourself anywhere, can you. Can you?

Becky at this point is not talking about Rich; she's talking about herself. She has, as the first act indicates, attended four colleges unsuccessfully. Like Garcin, then, she has thought that by opening a door, she can escape that which is causing her problems; as her speech to Rich demonstrates, she is no longer so disillusioned.

Unlike Garçin, though, Becky *can* shed her hell; she is being forced at the play's end to leave the environment that instilled it in her. The concluding question is whether Edna's forcing her to leave will cause Becky to avenge her parents' mistreatment of her by taking control of herself and thus imposing a meaningful structure upon her surroundings. The door to such mastery has been opened for her; it is up to her to walk through it.

APPROVED BY THESIS COMMITTEE, AUGUST 1969
Marvin Thompson, Chairman
Paul E. Cairns

LITERARY USE OF THE CASTLE IN THE GOTHIC NOVEL: TIMELY AND TIMELESS

Virginia Melton

ABSTRACT. Long neglected by academic critics, the Gothic novel has recently begun to achieve scholarly recognition, primarily for its presentation of the problem of evil and as an early manifestation of the Romantic spirit. This study concentrates, however, upon a single aspect of the Gothic novel: its use of the castle, "the focal point of Gothic romance," as setting and symbol. Many Gothic novels have the word "castle" in their titles, but even where the word does not appear in the title, there are likely to be castles, usually old and partly ruined, in the story.

In order to understand the effect that the actual castles of Britain had upon the writers of Gothic fiction, I visited forty-seven of the most important and picturesque castles in England, Wales, and Scotland. A number of these real castles have served as models for the castles of the novels; others show characteristics typical of the fictional castles. Most of the real castles were ruined by Cromwell's troops during or after the Civil War, and this may have been one factor in establishing the castle as an object of fear.

The inception of the Gothic romance, however, was not in any of the real British castles, but in the sham castle of Strawberry Hill, built about the middle of the eighteenth century by Horace Walpole. Strawberry Hill is still in existence, and one can see the ways in which it suggested portions of Walpole's *The Castle of Otranto* (1764), the first Gothic novel. In that work, though the basic portions of the castle are so clearly founded upon Walpole's imitation medieval house that one can trace the various rooms in *Otranto*, Walpole's description is also influenced by his memories of the genuinely medieval Trinity College in Cambridge.

After Walpole, the next prominent figure is Mrs. Radcliffe, who carried the Gothic novel to its heights. Her *Gaston de Blondeville* is a story of Kenilworth Castle; her *Mysteries of Udolpho* seems to have been based, at least in part, on Dover Castle. Many other lesser figures also wrote Gothic romances, and seven of these "horrid" novels are listed by Jane Austen in *Northanger Abbey*. Of the seven horrid novels, two are translations from the German, but all use castles, more or less importantly, as their settings. The first period of the Gothic novel ends with Charles Maturin's *Melmoth the Wanderer* (1820), which carries all the elements of the genre to their utmost extension.

The Gothic novel remains extremely popular today, both in essence and by name, and castles still play a prominent part, though when the setting is England or the United States, the castle is often replaced by an old mansion. The castle in the modern and in the earlier Gothic romances may serve as an instrument of terror because it represents military power, as the abbey and mansion which sometimes replace it represent ecclesiastical and financial power. They may also represent a reaction against the ordered universe of the eighteenth century. That they are decaying, often partly ruined, may increase their appeal to the reader, who perhaps unconsciously perceives it as the decay of oppressive power. Most likely, however, the average reader finds castles appealing in themselves, for their size, picturesqueness, and mystery.

APPROVED BY THESIS COMMITTEE, JUNE 1971
Alfred E. Leja, Chairman
Paul E. Cairns
Harold Liebermann

THE WAR FICTION OF STEPHEN CRANE:
A STUDY OF THE EFFECT OF ACTUAL EXPERIENCE
UPON CRANE'S TECHNIQUES AND PHILOSOPHY

Francis C. Nelson

PROBLEM. Examples of Crane's war literature from *The Red Badge of Courage* through the Spitzbergen series will be compared in terms of philosophy and such literary techniques as characterization, imagery, symbolism, syntax, and tone in order to determine the effects of actual combat on Crane's growth as an artist.

FINDINGS. Because Crane's career was so short, it is difficult to trace a steady development of technique. He early mastered such techniques as irony, impressionism, and foreshortening in order to present a type of psychological realism in his stories of initiation. Many of Crane's war stories are of inferior quality artistically, and were evidently written to capitalize on his popularity as a writer of war stories. While Crane used some techniques later employed by naturalistic writers, and while he echoed Howells' realism by his attempt to show the grandeur of the commonplace, Crane cannot be labeled as belonging to any school of writing. Both in his life and his literature he tended to show himself as a popular romantic. It is ironic that Crane, often labeled as the great realist, was often successful in writing about war prior to his actual experience.

The actual opportunity to witness war had a strong effect upon his writing style and philosophy, although again the brevity of his career makes it impossible to be very specific, except in suggesting general trends. When Crane could rely on actual experience, his writing became more human; he could more effectively employ understatement instead of fervid red imagery. War broadened his outlook, and led him to look for more complication of plot and of characters; he began to "flesh out" more characters in each story. Observation of men in combat led him to extol the virtues of the professional, who could develop a code of action that could give meaning to an otherwise meaningless and cruel existence.

APPROVED BY THESIS COMMITTEE, FEBRUARY 1971
Armand E. Falk, Chairman
James C. Lundquist
Richard L. Corliss

THE MANY FACES OF CRESSIDA

by Patricia Opatz

PROBLEM. This study set about solving three problems: to trace the development of the literary character, Cressida, of the Troilus and Cressida story, from her origin as a mere name in Homer to her appearance in a seventeenth-century drama by Dryden and to discover why the story attracted so many writers; to study the changes in Cressida's character as each author wrote his version of her story; and to discover to what extent each portrayal of Cressida was a reflection of a particular author and the time and culture of which he was a part.

PROCEDURE. References to Cressida were traced over a period of twenty-six centuries and arranged chronologically, from Homer to Dryden; from Greek literature to Roman, then French, Italian, English, Scots, and English again. Concentrating on British writers, the next step was to read the Cressida-work of each of the four major poets who contributed to her legend and do a textual study of the woman as depicted there.

It was necessary to study biographical material on each author and the history of his period: its conventions and attitudes, particularly with regard to women. It was then possible to hold each portrayal of Cressida against its background and attempt to see to what extent there was a relationship between them.

FINDINGS. It was during the Middle Ages that the Troilus and Cressida love-plot became a story in its own right, rather than an episode in the Trojan War story, and it was also during this period that Cressida came to be the focal point of interest in the story. Prior to the Middle Ages, she was a minor character in a war story; after the Middle Ages the focus again shifted away from Cressida, and the war-plot regained importance.

Further, it was found that there appeared to be a definite relationship between each particular poet's depiction of Cressida and the kind of man that poet was,

how he was affected by the society he lived in: its literary conventions, its attitudes toward women, its religion, its culture.

SUMMARY AND CONCLUSIONS. There was apparently something in the very dilemma of the Troilus and Cressida plot which attracted imaginative writers, though each was moved to interpret it according to his own temperament, personality and poetic purpose: Chaucer discovered Cressida to be a fascinating woman and wrote what amounts to a psychological study. Henryson adapted the story to a moral purpose, made a repentant Magdalene of Cressida. To Shakespeare, Cressida was a wanton, a mere pawn used in the stratagems of war politics. In Dryden's hands, Cressida became a flat, lifeless character, forced into a neoclassical mold of "propriety." Cressida's many faces were, at least in part, the reflection of temperament, genius, time and culture.

APPROVED BY THESIS COMMITTEE, AUGUST 1969

Raj Sinha, Chairman

John Melton

A GENERATIVE APPROACH TO POETIC SYNTAX

Pamela Rodberg

PROBLEM. Poetic syntax has always been of interest to teachers and scholars alike. Up to the present, however, there has been no workable or reliable means for such analysis, and those forms employed thus far have often left much to be desired in the areas of explanation and illustration. This study presents a new approach to syntactic analysis: generative transformational grammar.

PROCEDURE. Two twentieth century poems were subjected to a comprehensive analysis based upon the principals of generative grammar. These poems were "Not to Keep" by Robert Frost and "this man's heart" by e. e. cummings. After the analysis was completed for each poem, those characteristics unique to each author were selected as examples for this study. After explaining the bases of a generative grammar and presenting the necessary rules for the analysis, the examples and their respective analysis were presented in detail. These details include a phrase structure analysis based upon the four kernel sentences and represented in deep structure trees, the transformational rules necessary and their operations, and finally the morphographemic procedures needed to return surface structure forms of the examples.

FINDINGS. The above procedure illustrated several unique stylistic characteristics produced by the syntax each author chose. Both authors used several similar techniques, the more unique ones being of more interest. The Frost poem possesses an unusual hierarchy of sentences, achieved both by conjoining and embedding. It was also necessary to form three new transformational rules not ordinarily used in everyday English in order to complete the analysis. Cummings employs a hierarchy of sentences, too, although it is not as complex. More indicative of cummings is his unique expansion and deletion of adverbs as well as his extreme right-hand branching in some instances. For this poem it was again necessary to form new transformational rules, this time five.

CONCLUSIONS. This analysis and the comparisons made do indicate that generative grammar can be used as a means of syntactic analysis of poetry. This is important for two major reasons. First of all, generative grammatical analysis is composed of a very rigorous system; this system allows for a greater degree of objectivity than was possible in the past. In addition, the rigorous characteristic of the system allows for comparisons between authors like those stated above. Secondly, the transformational and especially the phrase structure components of the grammar are well-suited for graphic representation, and such clearly pictured representation is ideal for both classroom explanation and for individual study. Taken together, these two advantages seem to make the case for generative analysis of poetic syntax a clear one: a generative analysis of poetic syntax offers more objectivity and more illustrative techniques than previously available.

APPROVED BY THESIS COMMITTEE, MAY 1971

Wayne Tosh, Chairman

John R. Bovee

Martin A. Kammermeier

A COMPARISON OF IN COLD BLOOD WITH
TRUMAN CAPOTE'S EARLIER FICTION

Lorene L. Ruuska

ABSTRACT. Because it is fact in the form of fiction, Truman Capote called his 1965 bestseller *In Cold Blood* a nonfiction novel—an original literary genre. Capote's claims initiated a controversy over the form as well as the merits of the book. Some reviewers have suggested that *In Cold Blood* is basically journalistic, others that it is novelistic, while a third group contends that arguments over form are superfluous. Actually, *In Cold Blood* acquires greater significance if examined within the context of Capote's other fiction. In spite of conflicts over terminology, there are enough similarities between *In Cold Blood* and Truman Capote's previous fiction to suggest that *In Cold Blood* is an extension of rather than a departure from the author's earlier work.

An examination of Capote's characters suggests the first area of similarity. Perry Smith, the protagonist of *In Cold Blood*, recalls Joel Harrison Knox of *Other Voices, Other Rooms*. Both are in search of a father or father figure. Both like to collect trivia. Both enjoy correcting other people's grammar. Both dream of sea voyages to faraway places. Both are superstitious. Both believe in the inexorability of fate. Both have paranoid tendencies. Both are undersized. Both aspire to be famous. Joel is an impulsive liar, Perry a tenacious one. Neither one has much use for God or religion.

There are some resemblances, too, between Collin Fenwick of *The Grass Harp* and Perry Smith and between Tico Feo of "A Diamond Guitar" and Perry Smith. Both Perry and Collin are orphaned. Both are undersized, and both are left in the care of women. Both Tico Feo and Perry Smith are devoted to their guitars, and both have similar relationships to Mr. Schaefer and Willie-Jay. Randolph in *Other Voices, Other Rooms* resembles Dick Hickock, Perry Smith's partner. Both are pedophiliacs. Both are exploiters: they use other people for their own purposes.

Bonnie Clutter in *In Cold Blood* fits a pattern of socially withdrawn characters established by Dolly Talbo in *The Grass Harp* and by Buddy's cousin in "A Christmas Memory." Like Dolly and Buddy's cousin, she creates her own private existence. Other Capote characters—those who live in private worlds—also fit this pattern. They include Mrs. H. T. Miller in "Miriam," Sylvia in "Master Misery," and Holly Golightly in *Breakfast at Tiffany's*. Some Capote characters are exploiters like Randolph and Dick. Walter in "Shut a Final Door" and Vincent in "The Headless Hawk" are other examples. People like Joel, Perry, Buddy, and Collin attempt to find themselves through other people and through the choices they make or are forced to make in the process.

Capote also uses many images and metaphors to establish character. Two predominant ones are dream and mirror images. The enumeration of possessions also serves to identify individuals. Comparisons with children is another method that Capote employs to develop character.

In Cold Blood is also thematically continuous with much of Capote's earlier work. One of his most consistent motifs is the dilemma of the misfit in society. Many of his characters, including Dick and Perry have physical, mental, or sexual aberrations. These aberrations, in turn, emphasize the more universal problem of individual isolation. Individual isolation leads to another one of Capote's fictional concerns—the need for love and friendship. The search for love merges into Capote's most significant fictional theme—the quest for self. While love helps establish identity for some, hate determines it for others, including Perry Smith and Dick Hickock. Finally, the quest for self-recognition provides an encompassing metaphor for *In Cold Blood*, for this nonfiction novel represents the exposure of a nation's subconscious identity.

APPROVED BY THESIS COMMITTEE, JUNE 1971
Armand E. Falk, Chairman
Elizabeth Van Pelt
Mary Scharf

A STUDY OF THE CLERGYMAN IN SELECTED DRAMA
1881-1915

Margaret Evans Stallkamp

PROBLEM. The paper studies the characterization of the clergyman in selected dramas written between 1881 and 1915. Mainly, the dramas are "problem plays," dealing with the issues of social reform. Are there any consistent patterns of characterization in these dramas? What inferences can be drawn from comparing the characterizations of the clergyman in various dramas? The plays in the study include: Ibsen's *Ghosts*, Hauptmann's *The Weavers*, Strindberg's *The Father*, Jones' *Michael and His Lost Angel*, Shaw's *Mrs. Warren's Profession*, *Candida*, and *Getting Married*, and Galsworthy's *The Eldest Son*, *The Pigeon*, *Justice*, *The Mob*, and *A Bit O' Love*.

PROCEDURE. Each play was studied for thematic and dramatic content. Factors included in the characterization study include: the character's role in plot development, the character's relationship to other characters, the character's speech and action, and the character in relationship to the total thematic thrust of the drama.

FINDINGS. The clergymen who are portrayed unsympathetically are those who put worldly values over spiritual values. The most sympathetically treated clergymen are the ones who choose the course they think right rather than easy popularity. The chief criticism of the clergyman in these dramas is that he clings to traditional morality, dispensing safe and conventional advice, in time of social and moral crisis. The clergymen who adhere to convention are representative of a rigid society.

SUMMARY AND CONCLUSIONS. The dramas of 1881-1915 which depict the social problems of the age are frequently relevant to today's problems. Then and now, the inflexibility of institutions and of men is a barrier to solving problems.

APPROVED BY THESIS COMMITTEE, DECEMBER 1970
Paul E. Cairns, Chairman
Alfred E. Leja
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A SURVEY OF CONTENT, OBJECTIVES, MATERIALS, AND TEACHING
METHODS IN BASIC BUSINESS ENGLISH/COMMUNICATIONS
COURSES IN SELECTED PUBLIC SECONDARY SCHOOLS,
AREA VOCATIONAL-TECHNICAL SCHOOLS, AND
PUBLIC JUNIOR COLLEGES IN MINNESOTA

Roger Arthur Stark

PROBLEM. Nearly all business activity involves the utilization of effective communication skills, including reading, writing, listening, and speaking. Because of the rapid growth of technology and business and increasing requirements for many and varied types of communications in recent years, the need for personnel who can use these communication skills effectively is greater than ever. Yet many businessmen state that a practical knowledge of business English is lacking in young employees. The school curriculum is apparently failing to meet its responsibility in the preparation of such personnel. The purpose of this thesis is to survey and to analyze basic business English curricula in order to develop conclusions that may help educators improve business English curricula.

PROCEDURE. By analyzing the present status of business English curricula, this investigator has sought to make recommendations for curriculum improvement. The procedure has been twofold. First, a review of related literature and research published within the past decade has been conducted. Second, a questionnaire has been prepared and sent to schools on three levels of instruction in the State of Minnesota. Included are selected public secondary schools, all area vocational-technical schools, and all state junior colleges.

FINDINGS. Review of the related literature and research and analyses of data from the questionnaire have elicited the following findings:

1. A significant number of the public secondary schools and several of the public post-secondary schools do not offer a basic business English curriculum.
2. In all three levels, little articulation exists within and among the schools which do offer business English courses.
3. Many instructors indicate that their college preparation in the curriculum has been inadequate.
4. Considerable diversity of opinion exists among the instructors with regard to department responsibility for the courses, the titles of the various offerings, and the need for improved textbooks and supplementary materials.
5. Instructors generally agree about the worth of specific curriculum studies, the need for more professional reading in business English, the value of various methodologies, and the need for smaller class sizes.
6. Although some compromises may be necessary, the possible merger of the area vocational-technical schools and the state junior colleges should not create unsolvable curriculum problems.
7. Little research in the content, objectives, materials, and teaching methods of business English courses has been conducted prior to this study.

SUMMARY AND CONCLUSIONS. Educators, businessmen, and professionals agree that any successful individual must know how to communicate effectively. The fulfillment of this need requires an improvement in present business English curricula. Based upon the findings of this study, the following recommendations are set forth:

1. A basic business English curriculum, including practical language study, word study, the study of the techniques of oral communication, and practice in composition, should exist in all schools in the three levels of instruction.
2. College courses and workshops should be developed for instructors who feel inadequate in teaching business English. Otherwise, the curriculum should be taught by members of both the English and business departments, depending upon the specific items being covered.
3. Articulation in the curriculum within and among all three levels should be improved by opening means for communication among the instructors. Teachers should inquire whether help is available through the State Department of Education or existent professional organizations. Otherwise, a new state and national organization of business English instructors should be formed to give the curriculum unity and direction.
4. If the area vocational-technical schools and the state junior colleges merge, the implementation of a single business English curriculum should be considered.
5. Further research should be completed to thoroughly evaluate the content, objectives, materials, and teaching methods in the curriculum.

APPROVED BY THESIS COMMITTEE, JUNE 1971
 Don H. Otto, Chairman
 Russell D. Madsen
 L. Wayne Tosh

THE THEME OF FRUSTRATION IN SELECTED JOHN STEINBECK SHORT STORIES

by Margo A. Tepley

PROBLEM. The purpose of this study was to examine and to analyze the theme of frustration in John Steinbeck's short stories in order to understand his use of the theme and to give further insight into his view of man. Steinbeck's short stories are collected in *The Long Valley* and *The Pastures of Heaven*.

PROCEDURE. A survey of available criticism on John Steinbeck's work was made in order to find what the critics had discovered about the frustration apparent in his writings and to see how the critics had interpreted his view of man. Selected critical material was used to supplement the original analysis of the theme.

All the short stories were read and analyzed. The thesis considered both the causes and the results of frustration; and Steinbeck's novels were alluded to whenever they added insight to the stories under discussion. Conclusions regarding consistent behavior patterns of the characters were drawn and they were related to Steinbeck's view of man.

FINDINGS. Frustration appeared as a theme in twenty-one of Steinbeck's twenty-three short stories. Usually specific situations created the frustration within the individual characters. The frustration present came when the individual could not fully realize himself, from social pressures, or when the individual was forced to cope with the mysteries of life. Failure to attain self-realization, found in ten stories, occurred when the characters were sexually frustrated or when their plans and dreams were destroyed. Frustration resulting from social pressures, explicit and implicit, appeared in eleven stories; and frustration appearing when individuals must cope with the mysteries of life was found in two stories.

Reactions to frustration varied. They included thoughts or actions of violence, withdrawal, living with the frustration, or accepting reality and adapting to the situation. No consistent patterns were found although those individuals sexually frustrated tended towards violence and those who adapted to reality were those who viewed life realistically. Although frustration brought out some worthwhile changes, it usually was a destructive rather than an ennobling force.

CONCLUSIONS. The analysis showed that Steinbeck's view of man is more than biological while not yet being the view that man is distinct and ideal. The critics have stressed the biological view. In addition, Steinbeck's characters were created in more depth than most critics would say. Therefore, Steinbeck's characters need to be re-examined to find their true depth and development.

APPROVED BY THESIS COMMITTEE, AUGUST 1969

Armand E. Falk, Chairman

Alfred E. Leja

THOMAS MERTON: A DIFFERENT DRUMMER

Robert J. Voigt

Thomas Merton was born in southern France in 1915. He came to America at the age of one, was orphaned early in life, and moved about freely in France, England and America for his education. He is a graduate of Columbia (M.A.), a convert to the Church, a Trappist, and a prodigious writer—authored some fifty books. In 1968, he travelled to the Orient to study Buddhism and there met an untimely death by electric shock. His body was brought back to Gethsemani in Kentucky for burial.

Thomas Merton preoccupied himself with two social problems: war and racism. War was his major problem; racism came next; but to solve either problem adequately and permanently, the individual must be remade into a different Christian.

Merton deals with the psychology of war: with the vague notions planted in minds so as to start war, with Communism (a shibboleth!) and with the unfortunate killer-ape concept. He supported conscientious objectors and drew severe criticism. He also singled out exemplary conscientious objectors Dietrich Bonhoeffer and Franz Jägerstätter for special commendation.

Then there is the Vietnam war! Merton is more severe in criticizing that war than at any other time. He also focuses his attention on nuclear warfare—the thought makes a man shudder! It cannot be tolerated, for it would be the death of mankind.

Then Merton focuses on peace. Peace can spread only by developing a peaceful climate. That climate must lead nations to forget about stockpiles. To obtain a peaceful climate, Christian leaders must rid themselves of Augustine's Just War theory. They must listen to men like Pope Pius XII and Pope John XXIII, who said it is unreasonable to think of warfare as an adequate means today for settling international disputes. The International Peace Table is the solution.

The second social problem is racism. Early in life, Merton became convinced that the Negro had a great potential for virtue and that the white man in downtown New York was responsible for the Negro's vices. He was convinced that God had a special love for the abused Negro and this makes for his goodness.

The white man has often offended the Negro through his wealth, power, and paternalism. All this is too much for many a Negro, and these are cutting themselves off from white society.

The Negroes have tried by nonviolent means to get favorable reforms, but they have not been successful. White society frequently is too violent to accept the nonviolent approach! For this reason many Negroes have, unfortunately, turned to violence.

Because the white man has oppressed the Negro, it is his job to dispel that oppression. To do this he must think Black, must try to realize that the Negro is his brother—to be loved. To be successful he must re-evaluate his brand of Christianity.

To solve the problem of war and racism, Merton said the individual must perfect himself. To do this he must spend more time in solitude. He should retire there to reflect so that he can be a better member of the community when in public.

Astute men are now promulgating nonviolence. One of them is Thomas Merton, who deserves for that reason to be called A Different Drummer.

APPROVED BY THESIS COMMITTEE, JUNE 1971

Alfred E. Leja, Chairman

John Melton

Eugene Perkins

THE HEART OUT OF THE HIGHLANDS: A STUDY OF SIR WALTER SCOTT'S THE LADY OF THE LAKE

Giles H. Zimmer

ABSTRACT. Unlike most poems, Sir Walter Scott's *The Lady of the Lake* enjoyed instant and continuing success, earning its author a fortune and a literary reputation. Scott, however, considered the poem inferior because of its debt to popular tradition. What Scott failed to realize was that his treatment of the Highland and Lowland conflicts gave the poem literary merit despite its grounding in popular tradition.

The first conflict is between James and nature, represented by the stag. James's attempt to hunt the animal results in the death of his horse and his getting lost in the wilderness. Although shaken by nature, James nonetheless leaves his mark on it since the stag has barely escaped him. As James walks to his camp, the surrounding scenes so affect him that he mellowes from the stern soldier into an admirer of beauty. But he also projects his own ideas onto the beauty around him, indicating that he does not entirely give in to the Highlands.

The second conflict is between James and the supernatural. James has lost himself so completely in nature that he wanders into the supernatural. On Loch Katrine he meets Ellen, the daughter of the exiled Douglas, who takes him to her island home. There he is captivated by her spell and falls in love with her. At night he suffers from a nightmare, but to overcome its effect on him, resorts to prayer. Although he appears to win out against the supernatural, he is captivated by the charms of the Lady of the Lake when he leaves the island.

The first two conflicts are mild compared to the third which takes place between James and Brian the Hermit. Brian, a black magician, attempts to aid Roderick against James by using the *taghairm*, a Highland augury, to prophesy in the rebel's favor. Scott uses this and other aspects of the occult to discredit the Highlanders, proving them superstitious and cruel. Brian's prophecy states in ambiguous language that Roderick will be victorious over James. With this the conflict between James and Roderick begins.

The conflict between James and Roderick, the fourth so far, takes place mainly in the sword fight between the two leaders. Scott attempts to paint Roderick in dark colors from the beginning to show that he does not entirely favor the Highland side. But the sword fight between James and him does the most to discredit him and the Highlanders, whom he represents. As he fights, he becomes an animal. James wins and at this point his victory appears total.

The fifth conflict, which is between James and Douglas, and the sixth, which is between James and Ellen, show that James, although victorious, must yield to the acceptable aspects of Highland culture. Therefore, when Douglas proves his worth by submitting to Scotland's laws, James must accept him as an equal, not an exile. In the same way James must accept Ellen even though she rejects him as a suitor. His approval of her marriage to the reformed outlaw, Malcolm Graeme, indicates his final compromise between stable society, represented by the formal marriage, and Highland culture, whose proponent is Graeme.

Most noteworthy in the poem is Scott's wavering in his support between a stable society and one that favors revolution. This is not surprising since Scott

never took definite sides. When he bids farewell to the Highlands, he is not rejecting it entirely—only those aspects of it that are inhumane and rebellious and which do not belong in civilized society.

APPROVED BY THESIS COMMITTEE, MAY 1971
James C. Lundquist, Chairman
John Melton
Orville H. Schmidt

HISTORY

BRYAN AND NEUTRAL RIGHTS DURING WORLD WAR I

by Joseph John Glatzmaier

PROBLEM. The purpose of this thesis was to relate the role William Jennings Bryan played as Secretary of State in the neutral rights issues during World War I from August, 1914, to his resignation in June, 1915.

PROCEDURE. Primary and secondary sources were used for this work. Primary sources such as *The New York Times* newspaper and the *Foreign Relations* papers along with contemporary magazines were perused. Secondary sources from various authors writing shortly after the war up until the present day were looked at extensively with special attention given to the multi-volume set written by Arthur S. Link.

FINDINGS. Bryan's role involving neutral rights were basically quarrels with Great Britain and Germany. Those conflicts led to the sinking of the British liner *Lusitania* by a German submarine in May, 1915, which prompted an exchange of notes between Germany and the United States. Bryan's pacifistic tendencies during those discussions could not allow him to adhere to the harsh responses of the Wilson Administration to the German government which induced him to resign.

SUMMARY AND CONCLUSIONS. William Jennings Bryan was an apostle of pacifism but believed first in the stability of the American economy. Should the economy have faltered in America during World War I, it would have been worse than having the United States enter the European conflict. When the United States did enter the war, Bryan tacitly gave support to his country though he truly did not inwardly favor the struggle.

APPROVED BY THESIS COMMITTEE, JUNE 1970
Calvin W. Gower, Chairman
Dale Peterson
David Saffell

THE COMMUNITY LEADERSHIP ROLE OF THE FERGUS FALLS JOURNAL UNDER THE EDITORSHIP OF A. J. UNDERWOOD FROM 1873 to 1885

Dale J. Ruehle

PROBLEM. The central thesis of this study is that George Burdick Wright brought Adronium Underwood to Fergus Falls in order to establish a weekly newspaper in that community. The purpose of this action was to use the newspaper to influence the citizens of the village and the county on issues important to his financial interests. The study is also an overview of the establishment of the community's attitudes.

PROCEDURE. The research for this study was conducted in college libraries; the Minnesota Historical Society; and, most importantly, the Otter Tail County His-

torical Society which has the best collection of newspapers from the city. Secondary sources relating to this period of time were consulted, but yielded little of consequence on the specific topic. The original papers of G. B. Wright and A. J. Underwood were examined, but also contained nothing of value for this study. Therefore, a great reliance on the account of newspapers was necessary.

SUMMARY OF FINDINGS AND CONCLUSIONS. Contemporary newspaper extracts on a number of issues from 1873 to 1880 were used to demonstrate that the Wright-Underwood link was more than an implication. The selection of an employee, A. J. Underwood, to edit a newspaper for G. B. Wright was recorded in Underwood's obituary. The consistent theme of O. S. King, editor of the *Fergus Falls Advocate*, was that Underwood and the *Journal* were merely pawns in the employ of Wright. Many selections from the *Advocate's* editorials pointed out this conclusion of its editor. For the investigator the *Journal* itself provided such insight into its goals as was seen in the stands which the editor took. Although the direct and specific evidence to prove a business agreement could not be provided, the author of the study attempted to provide sufficient examples of the *Journal* in action to prove the point.

The study, however, was not only intended to prove the previous assertion. The second purpose for investigating the *Journal* was to achieve some estimation of its effect on the development of the village and on the lives of its citizens. Consequently, many of the important political and economic topics were given prominence. Much of the presentation in the last two chapters involved examples of the editorial policy which demonstrated the paper's attempt to mold the attitudes of the community. The examination of competitors of the *Journal* also emphasized the leadership role of the paper in the way in which it approached the issues with those competitors.

The *Fergus Falls Journal* was established under the sponsorship of George B. Wright to protect his financial interest in Fergus Falls and the surrounding area. For this job he employed A. J. Underwood to use the paper to create a favorable atmosphere. Underwood accomplished this by effectively leading the community in the development of its social, economic, and political attitudes.

APPROVED BY THESIS COMMITTEE, DECEMBER 1970
Edwin Cates, Chairman
Kenneth Acrea
Donald H. Otto

THE PEOPLE'S PARTY IN MINNESOTA: A MIDWESTERN POPULIST ABERRATION?

Lowell Jerome Soike

PROBLEM. To ascertain the social and political context of Populist involvement in Otter Tail County, Minnesota, 1883-1896. Specific focus was placed on two questions: (1) Who were the Otter Tail County Populists?; (2) What were the most important political events and party struggles that had a bearing on the fate of the county Populist organization.

PROCEDURE. In order to determine the sources of Populist support in the county, voting records and census statistics of several Otter Tail precincts were examined from 1883 through 1896, some of which were compared by use of the Spearman rank-order correlation technique. The transpiration of the party struggles and other political patterns were largely discerned through an analysis of local newspapers and secondary literature.

FINDINGS. The Otter Tail Populists were largely Scandinavian voters whose central core was composed of voters that were of Norwegian birth or parentage. Although a similar pattern of voting was displayed by the component Scandinavian groups, there was no deep sort of pan-Scandinavian idea in regard to political matters. Each group was quite conscious of the number of offices granted to members of their own nationality. The Swedes and Danes appear to have been inclined to have been normally Republican and were induced to join the People's Party only through persistent contact with the more Populistic Norwegians. The Germans did not join and participate in either the Farmers' Alliance or Populist causes, but instead remained generally within the ranks of the Democrats. "Native" American voters

were drawn somewhat toward Populist candidates at the state political level, but were not attracted to People's party politics in the county. Finnish voter support of Populist candidates was ambivalent. The course of Alliance and Populist political events in the county can largely be understood by reference to the relationship between Haldor E. Boen's struggle for leadership and that of his political opposition.

SUMMARY AND CONCLUSIONS. The potential mobilization of the various social groupings within Otter Tail County for and against the Populist cause was contingent upon the level of harmonization between their perceived alienation, norms and goals with the ideas, purposes and goals of the political movement. Otter Tail Populism appears to have stemmed more from social conditions than economic circumstances; more from the tensions of an immigrant society than the dislocation of farmers; and more from values and prejudices than a frustrated capitalist-on-the-make mentality. Perhaps perceived economic frustration played a greater role in conditioning the vote for state office candidates with socio-cultural distinctions assuming major importance in the county oriented contests.

APPROVED BY THESIS COMMITTEE, DECEMBER 1970
Kenneth Acrea, Chairman
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VICTOR E. LAWSON THE JOURNALIST AND POLITICIAN

by Stephen Peter Twenge

Victor E. Lawson was deeply committed to both his journalistic and political careers. His earliest and most enduring interest, however, was in journalism.

As a child, Lawson had a fascination for the printed word. As an adult, he built the *Willmar Tribune* to the largest daily in west-central Minnesota. But the *Tribune* was more than a business. Under Lawson's direction, it became a means for social change. As a journalist and politician, Lawson championed such causes as temperance, the redistribution of wealth, and abolition of monopolies.

Politically, Lawson promoted third-party efforts and ideas such as referendum and recall, as well as other legislation which would promote social justice. Lawson's interest in politics prompted him to seek public office. Some of these attempts ended in defeat, but he was victorious in gaining office both as Mayor of Willmar, Minnesota and as a Minnesota State Senator.

In determining Lawson's beliefs and examining his efforts for public office, the *Willmar Tribune* provided much of the information. Also used were Lawson's personal papers, as well as general texts which deal with local, county, and state issues.

In the development of his philosophy, Lawson was influenced by three factors: religion, commitment to reform, and a desire for knowledge. Lawson's Swedish Lutheran religious beliefs emphasized humanitarianism. He felt the need for reform as the nature of the economy changed, and advocated improvement in living conditions and social justice. Lawson's desire for knowledge introduced him to many ideas; through his self-education, he was inspired to write and preach social involvement.

APPROVED BY THESIS COMMITTEE, JUNE 1970
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MATHEMATICS

THE DERIVATIVE: ITS HISTORY AND DEVELOPMENT

Louis M. Korth

PROBLEM. It was the purpose of the study to investigate the mathematics of the second half of the seventeenth century when the ideas of the differential calculus were being formulated to show, using mathematics as a basis for argument, the origin of differential calculus. As a result of the study, a summary of the derivative from its conception to its modern applications in analysis is displayed.

PROCEDURE. A survey of the history of mathematics was conducted. The significant works in the area of the derivative were studied in detail using the facilities and data available at the Kiehle Library on the campus of St. Cloud State College, and the Mathematics Institute Library at the University of Heidelberg, Heidelberg, Germany.

FINDINGS. Early significant work was conducted by mathematicians Fermat, Barrow, Newton and Leibniz. Their works differ in notation but not in method. Although the important concept of limit is implied in their methods, no one developed the theory of limits in actual publications. Leibniz perfected the notation and both Newton and Leibniz solved many previously unsolved problems using the new calculus.

Recent developments related to the derivative came as a result of the work of Maurice Freche't. In a doctoral thesis published in 1906, Freche't defined the derivative in such a way as to facilitate its logical extension to modern topology.

SUMMARY AND CONCLUSIONS. If the method of Fermat is legitimate calculus, then by the "first to discover" criterion, Fermat invented the differential calculus.

Generally, because of Freche't's notion of differentiability much of the future work in analysis will be motivated by the needs of algebraic topology. Currently research is being conducted in an attempt to establish and refine an axiomatic structure for basic calculus.

APPROVED BY THESIS COMMITTEE, AUGUST 1969
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SPEECH

THE RHETORIC OF CONFRONTATION

A Prescriptive Analysis for the Beginning Debater

Sharla J. Barber

PROBLEM. The perceived problem is that there is not an adequate debate text for novices. By adequate, I mean a text which not only provides the beginner with the general theory and rationale for the debate process, but also gives the student concrete suggestions on what and how he is to go about engaging in a formal intercollegiate debate tournament.

PROCEDURE. To solve the problem, a creative study has been implemented. In making the decision to utilize a creative thesis approach, the author has not attempted to neglect the aspect of scholarly research. Rather, an attempt has been made to accomplish two goals: 1) to gain experience in creating new debate theories and techniques rather than merely offering a better statement of the ideas of others, and 2) to gain experience in placing an increased reliance on personal proofs.

FINDINGS. A review of the literature of the field bolstered the position taken earlier that there is a perceived need for a beginning text for debaters.

SUMMARY AND CONCLUSIONS. Hopefully, this thesis has offered the following information that may be used to reduce the gap between theory and practice:

- 1) The possible values of debate have been explored. Both possible values and actual values have been attested to by prominent Americans.
- 2) The role of the resolution in the debate has been explained. The rationale for and structure of the resolution were explored, with emphasis placed on the actual use of the resolution in the debate.
- 3) A brief, but relatively complete, research methodology was provided. The debater was instructed as to what sources to consult for specific types of information. In addition, he was informed of a recording and filing system for information.
- 4) An explanation of and steps in constructing affirmative and negative cases was included. The deficiency approach to the comparative advantages case was explained as a possible method of development. Sample case outlines were included to help the debater make the theory applicable.
- 5) The debater was given a list of duties to be performed in each of the constructive speeches. Hopefully, a general knowledge of specific techniques for application of theory can be garnered from this chapter.
- 6) The rebuttal duties of each speaker were explained and comments were provided as to different approaches that could be taken. Some elementary strategy was shared with the novice.
- 7) The importance of the flowsheet was explained. Techniques for direct application of theory were offered via a sample flowsheet of a debate.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
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A RHETORICAL ANALYSIS OF TWO SERMONS DELIVERED BY BILLY GRAHAM IN THE 1961 UPPER MIDWEST CRUSADE

by Michael C. Cheeley

PROBLEM. This is a rhetorical analysis of two sermons delivered by Billy Graham in the Upper Midwest Crusade during July 9-16, 1961. The study concentrates on an analysis of Graham's purpose in speaking and his methods of achieving that purpose. Beginning with the early evangelists, a description of the occasion is included to establish the evangelist's motives in preaching and to prepare the reader for the immediate occasion. Since Graham's arguments exist only as a result of his faith in the occasion, an analysis of how he has adapted the occasion to his audience through disposition, style and delivery is undertaken before the analysis of invention. The works of classical, as well as contemporary rhetoricians, have been utilized in analyzing Graham's use of the modes of proof (ethos, pathos, logos) in these two sermons.

SUMMARY. The study concludes that Graham persuades largely through ethical appeals on the listener. Because he is effective in establishing credibility, emotional appeals to fear indicate the urgency and persuade the audience to be receptive and accept his message. Graham has established himself as judge over the audience's spiritual and emotional well-being. He has placed the verdict of guilt on them from his personal interpretation of scripture and has offered a "practical" solution. Graham seems to be one of the few speakers who provides "workable" solutions to personal and world problems. Although his arguments are subject to criticism for reasoning from questionable premises, the audience is attracted to his simple formula because of his effectiveness in achieving credibility, and his use of the appropriate emotions. Included in this thesis are the transcripts and transcriptions of the sermons under study.

APPROVED BY THESIS COMMITTEE, AUGUST 1970
E. Scott Bryce, Chairman
Mary Emily Hannah
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THE EFFECT OF RESPONSE-CONTINGENT VERBAL STIMULI ON SELECTED UNITS OF STUTTERERS' SPEECH

by Dale Christian Hansen

PROBLEM. The problem was to determine if fluency could be defined in such a manner that contingent reinforcement could be applied to it, and to determine if verbal reinforcement could increase fluency.

PROCEDURE. An evaluation of the speech of two adult stutterers was made. The results disclosed that one subject stuttered with some predictable frequency on words beginning with the letter /l/, and the other subject stuttered with some predictable frequency on words beginning with the phoneme /k/ followed by a vowel. When words with these speech units were spoken without stuttering, they were designated as members of the response class of fluency. A baseline level of performance on response class words was obtained as each subject read single words on printed cards. Conditioning sessions were held during which the verbal stimuli "good" and "fine" were presented contingent upon fluent production of response class words. Finally, the verbal stimuli were withdrawn for the extinction phase of the experiment.

FINDINGS. A comparison of baseline, conditioning, and extinction phases was made for each subject. The results showed that one subject's fluency increased an average of 21% following the introduction of the verbal stimulus during the conditioning phase, while the other subject's fluency increase averaged about 25%. One subject's fluency increase did not return to the baseline level after the verbal stimulus was withdrawn.

SUMMARY AND CONCLUSIONS. It was concluded that for some stutterers, fluency can be defined as the unstuttered production of usually stuttered speech units. It was also concluded that fluency can be increased by verbally reinforcing the unstuttered production of words which are usually stuttered. Another observation suggested that words may or may not be effective as reinforcers depending upon their connotative value.

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ORAL-LINGUAL SENSITIVITY IN STUTTERERS

Robert E. Koll

PROBLEM. The intent of this study was to compare the performances of a group of stutterers and a matched paired group of non-stutterers on a test of oral discrimination. The stuttering aspect of speech was selected for the investigation because of the inconclusive evidence in the literature. It was hypothesized that there would be no significant differences between a group of stutterers and a group of non-stutterers on a task of oral discrimination.

PROCEDURE. Twenty stutterers, matched on the basis of age and sex with twenty non-stutterers, served as subjects for this experiment. The age of the subjects ranged from ten to twenty-one years. The mean age of the subjects was 14.25 years. All subjects were selected from the case loads of speech correctionists in the schools of St. Cloud and surrounding area.

The stimuli, used in the test of oral discrimination, consisted of plastic geometric forms developed at the National Institute of Dental Research. Ten forms of the twenty developed by the Institute were used in this study.

Each geometric form was paired with itself and each of the nine other forms, totaling fifty-five stimulus pairs. The stimulus pairs were presented to the subjects in a random order. A portion of the total set was readministered to determine how reliable the responses were. The subjects were instructed to manipulate the forms, within their mouths, in any manner they wished. After presentation of both members of a pair the subject was asked to tell whether the two forms were the "same" or "different." Correct and incorrect responses were tabulated.

FINDINGS. The data, recorded in the form of test scores, were the number of incorrect responses on a test of oral discrimination. Fifty-five was the maximum number of errors any subject could make.

Subjects in the stuttering group averaged more errors than their matched pairs in the non-stuttering group. A correlated t of 3.14 was calculated between the means. This difference was statistically significant beyond the .01 level of confidence.

CONCLUSIONS. The statistical information from this study shows a relationship between stuttering and oral sensory function. The ability to differentiate between normal-speaking and defective-speaking persons on the basis of a task of oral discrimination is of significance. Normative data on oral discrimination, along with other procedures, may make it possible to specify a sensory deficit in those who stutter. Considering the results of this study, it is suggested that further research (1) substantiate these results; (2) expand and modify the test of oral discrimination, if necessary, to include normal and speech defective individuals of different age levels; (3) test for correlation with severity and/or type of defect; (4) determine whether an increase in stress would influence oral sensitivity; and (5) determine whether an increase in oral discrimination ability through remedial work in this task would effect a change in stuttered speech.

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CONDITIONING SIZE ADJECTIVE RESPONSES IN NORMAL SPEAKING SUBJECTS

Phillip N. Moye

PROBLEM. This study was designed to investigate the effects of a Hefferline avoidance paradigm upon the relative frequency of size adjective responses as they occurred in the verbal repertoires of three subjects. It was hypothesized that the avoidance contingencies would increase the rate of size adjective responses during the conditioning phase of the experiment and that removal of the avoidance contingencies would result in the decrease of size adjective responses during the extinction phase of the experiment.

PROCEDURE. The experimental procedure consisted of fifteen, twenty minute sessions. The sessions were equally divided into an operant level phase, an experimental phase, and an extinction phase. This procedure utilized experimental rather than statistical control. During the operant level phase of the experiment the subject's rate of size adjective responses were noted and recorded. During the experimental phase an aversive stimulus consisting of white noise at an intensity of eighty-three decibels was delivered into the experimental suite. The presence of this aversive stimulus was terminated or postponed for thirty seconds contingent upon the use of a size adjective response. During the extinction phase the aversive stimulus was removed to allow the experimenter to demonstrate that any changes in response rate were related to experimental rather than chance variables.

FINDINGS. The subjects responded to the experimental contingencies in two different ways. Two subjects' rates of size adjective occurrence were not influenced by the contingencies. However, one subject's rate of size adjective occurrence increased during the conditioning phase of the experiment and decreased during the extinction phase of the experiment. It was suggested that differences in results might be related to the conditionability of the subjects, the extremely low operant level of the response class unit, or subtleties of the Hefferline avoidance paradigm.

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PREVENTATIVE SPEECH THERAPY AT THE KINDERGARTEN LEVEL

by James Thomas Nelson

PROBLEM. This project was undertaken with the hope of decreasing the number of children entering first grade with articulation defects. It was the writer's contention that many children in the elementary grades who display articulation problems could be helped to articulate their speech sounds correctly if an appropriate preventative program had been introduced earlier. Such a program was the core of this paper.

PROCEDURE. The program of preventative speech therapy which was discussed in this paper outlines a speech sound stimulation drill which was developed for kindergarten children in Silver Bay, Minnesota. The drill consisted of ear-training and correct sound production activities which were developed to promote correct speech sound articulation. One thousand and eighty-eight kindergarten children took part in this project over a six-year period from 1963-1969. The speech improvement drills consisted of thirty-minute group sessions, held once a week, for a fifteen-week period.

FINDINGS. This study has significance for two reasons. First, it demonstrated that rate of speech sound acquisition can be increased. Secondly, the program described in this study could be assumed by someone other than the speech therapist thus freeing him to devote more time to more serious speech problems. The results of the project indicate that the drill which was outlined in this report was of benefit to the children who took part in it.

SUMMARY AND CONCLUSIONS. The project which was presented was developed to stimulate correct speech sound awareness in children at the kindergarten level. The results reported in this paper show this approach to speech therapy to be of benefit to kindergarten children. While it is understood that more research is needed in the area of preventative therapy, it can be concluded that this approach may be of great value in the future.

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ORAL SENSITIVITY AND INTELLIGIBILITY OF HEARING IMPAIRED CHILDREN

Mary S. Weise

PROBLEM. The intent of this study was to determine the ability of hearing impaired children to make oral-form discriminations. It was of interest to learn what relationship existed between this ability and intelligibility of speech in these children.

PROCEDURE. Thirty hearing impaired children between the ages of nine and thirteen were chosen as subjects for the study. All sustained bilateral hearing losses and were of average intelligence.

Tape-recordings were obtained from each child and rated by two experienced speech clinicians for intelligibility. Each child was also administered a test of oral-form discrimination. The data were treated statistically and shown in tabular form.

Reliability of the intelligibility ratings was obtained by having two clinicians independently judge the tape-recorded responses of the subjects. Reliability of oral discrimination scores was also tested. The intelligibility ratings and the oral discrimination scores were then compared using the Pearson Product-Moment Correlation.

FINDINGS. The correlation coefficient between the two variables was less than .2. It was concluded that there is no relationship between intelligibility ratings and

oral-form discrimination performance. It was further shown that the number of articulatory errors is not indicated by either the severity of the hearing loss or the level of intelligibility rating.

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SPEECH SCIENCE, PATHOLOGY AND AUDIOLOGY

THE EFFECTS OF EAR TRAINING ON THE MODIFICATION OF FRONTAL LISPS

by Glenn Lawrence Herzog

PROBLEM. A considerable amount of time and effort is spent correcting functional misarticulations. The techniques and methods used to correct misarticulations are varied. The purpose of this study was to investigate a technique commonly used and labeled as ear training or training in auditory discrimination when combined with retraining of articulatory movements to modify lisping behavior. A review of the literature indicates that improvement of auditory discrimination abilities does not result in a spontaneous improvement of articulation abilities. Consequently, it was hypothesized that training in auditory discrimination would have little or no effect when combined with retraining of articulatory movements.

PROCEDURE. In order to determine the effectiveness of ear training procedures when retraining articulatory movements, twenty subjects with frontal lisps were selected and divided into experimental and control groups. All subjects' production of /s/ and /z/ was evaluated with a thirty-item pre-criterion test which contained /s/ and /z/ in words, sentences, and conversational speech. A program of auditory discrimination training was administered to the experimental group. Retraining of articulatory movements was then accomplished through the administration of a programmed instruction to both the experimental and control groups. Following retraining the same criterion test administered before therapy was readministered. A comparison of pre- and post-tests for all subjects was made to determine whether lisping behavior had been modified. To determine the effects of ear training the post-test means for the experimental and control groups were compared and obtained differences were tested for statistical significance.

FINDINGS. The pre-test mean for all subjects was 1.6 as compared with the post-test mean of 28.2. A resulting *t* test value of 14.37 demonstrates statistical significance, indicating the modification of lisping behavior. The post-test mean for the experimental group was 28.3; and 28.2 for the control group. The obtained *t* test value of .07 was not significant, indicating that modification of lisping behavior was accomplished as effectively without ear training as it was with ear training.

SUMMARY AND CONCLUSIONS. Twenty subjects were randomly divided into control and experimental groups. The experimental group received extensive training in auditory discrimination. Both groups were then administered a programmed instruction to retrain articulatory movements. Changes in articulation patterns were measured through pre- and post-criterion tests. The effects of ear training were determined by comparing the post-test scores of the control and experimental groups. No differences were found between the experimental group and the control group with regard to their ability to modify lisping behavior. It was concluded that subjects without ear training can modify their lisping behavior as effectively as those subjects who receive ear training.

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COMPARISON OF PERFORMANCE ON AUDITORY AND ORAL DISCRIMINATION TESTS TO ARTICULATORY PROFICIENCY

by Francyne Ann Kochevar

PROBLEM. It was hypothesized that speakers who exhibit articulatory anomalies would perform less well on tests of auditory and oral discrimination than speakers who do not exhibit articulatory anomalies.

PROCEDURE. Children in the second, third, and fourth grades were screened for articulatory proficiency. Thirty children, aged 7 years 10 months to 10 years 10 months, were matched on limited previous speech therapy, normal hearing ability, and no apparent structural deformities of the speech mechanism. Subjects were selected such that ten of them exhibited lateral lisps, ten of them exhibited frontal lisps, and ten of them with no previous history of articulatory anomalies. Articulation reliability judgments were made by another speech therapist. Auditory discrimination ability was assessed through the use of a discrimination test designed for this experiment. Correctly and incorrectly produced sibilant sounds were paired with each other and presented to the subject, whose task was to respond "same" or "different" to each stimulus pair. Oral discrimination ability was assessed in a similar manner. Pairs of ten plastic geometric forms were placed in the subject's mouth, one form at a time. After presentation of the form-pair, the subject was required to report whether the pair was "same" or "different." Each subject was tested individually.

FINDINGS. The data from the two tests were handled separately. Group scores were compared for each task and the differences were tested for statistical significance by analysis of variance procedures. A t-test was computed, in addition, on the results of the oral discrimination test. The results of the auditory discrimination test were not statistically significant. No further statistical computations were done. The data gathered from the oral discrimination test were statistically significant. The differences between the means of correct responses were significant at the .01 level in comparing the groups. High reliability was found in the ten-item reliability check done on the oral discrimination test.

SUMMARY AND CONCLUSIONS. The differences between groups on the auditory discrimination test were not statistically significant; therefore the hypothesis stating the relationship of auditory discrimination ability to articulatory skill was not supported. No comparison was done between the two tests because the scores on the auditory discrimination test clearly did not separate the subjects into groups. The differences between groups on the oral discrimination test were statistically significant, supporting the hypothesis that frontal lisps would perform at significantly lower levels on a test of oral discrimination than normal speakers and lateral lisps would perform at significantly lower levels than frontal lisps. The statistical information does show a relationship between the oral sensory functioning of the speech mechanism and articulatory proficiency.

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PHONETIC DISCRIMINATION ABILITY OF CHILDREN WHO MISARTICULATE SPEECH SOUNDS

by David D. Peterson

PROBLEM. The primary purpose of this study was to evaluate the ability of speech defective children to make value judgments on models of their defective phoneme as compared to a normal speaking control group.

PROCEDURE. Forty-two first and second grade children who exhibited misarticulated speech sounds including the /er/ sound were selected from the St. Cloud, Minnesota schools to serve as the experimental subjects in this study. A control group consisting of an equal number of children who did not misarticulate sounds were selected and matched on the basis of intelligence, age, and sex. A phonetic

discrimination task consisting of twenty-five stimulus pairs was presented to the subjects. The subjects responded by selecting the member of the pair which most closely approximated the phoneme /er/. A statistical analysis was made of the resulting errors of individuals in each group.

FINDINGS. The distributions of each group were non-parametrically distributed in nearly identical patterns. The similarities of distributions lent to the hypothesis that the two group samples were drawn from the same population.

SUMMARY AND CONCLUSIONS. It was thereby concluded that first and second grade speech defective children who have a defective /er/ sound discriminate phonemes as well as their normal speaking counterparts. Therefore, inadequate discrimination abilities do not appear to be maintaining factors concerning defective articulation.

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